UiA University of Agder

Master

BENEFITS AND RISKS OF PERFORMING A SUPPLY BASE REDUCTION

A case study of Aker Solutions

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Forewords

This master thesis has been conducted at the University of Agder, spring semester 2019. The study is a part of our master's degree in Economics and Business administration at the department of Business and Law. The thesis is done for Aker Solutions, and is a part of their ongoing supply base reduction process.

We wanted to learn more about some of the activities related to the management of a company´s supply chain. After reaching out to Aker Solutions, discussing with them what potential topic could be relevant, we decided on learning more about supply base management and supply base reduction. For us it was very interesting to work with a case-company, and to observe and learn how the theory is done in practice. We wanted to learn more about supply base reduction and chose to do a exploratory case study, which would give us the best insight into the topic while collaborating with a company. The research question of this study is concerned with: *"what potential benefits and challenges are associated with a supply base reduction for Aker Solutions, and what strategies could be applied to deal with them?"*

We would like to thank our contact in Aker Solutions, for being so helpful with helping us narrowing down our research topic and finding the relevant people and suppliers for us to interview. A big thanks to all of our respondents for being so helpful with providing the information we needed.

Finally we would like to thank our academic supervisor, Naima Saeed, for supervising us, giving us feedback and suggestions for improvement on our work throughout the research process.

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Abstract

This thesis aims to explore what potential risks and benefits are associated with supply base reduction for a major company in the oil service industry. A supply base reduction is the purposively reduction of the number of suppliers a company can purchase from. We have conducted an exploratory single case study and collecting data by interviewing nine people (seven employees and two suppliers) using in-depth interviews. The interview subjects represent all the business segments in the case company, while the suppliers represent steel and piping. This study has identified risks and benefits associated with every aspect of the ongoing supply base reduction at Aker Solutions. From risks connected with the wrong motive towards the actual reduction and what impact it may have, to uncovered internal issues that create unforeseen risk to the reduction. On the other hand, clear benefits have been identified that can be achieved if the reduction bypasses aforementioned challenges. It becomes clear that a supply base reduction can create more benefits and be an important contributor to Aker Solutions' competitive advantage in a highly competitive market.
The internal communication issues are a factor that must be dealt with by the case company, where they must address the situation properly and involve all stakeholders in the process. If all the risks are addressed properly, the supply base reduction will reveal clear benefits that can be used to create a strong competitive advantage in the oil service industry.

Key words: Supply Base Reduction, Supply Base Management, Supply Base Complexity, Supply Base, Oil Service Industry, Brownfield, Greenfield, Subsea

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1. Introduction

Supply chain management has since the start of 1980s become a research area of increased importance and interest, where the majority of this field of study is related to purchasing and supply management. This chapter will introduce the study topic and deduce the context of the report and its methodology. It reviews the background and research question for selecting the area of study.

There have been a significant paradigm shift in the way modern businesses are being managed over the past decades, individual organizations have gone from competing as solely autonomous entities to competing as supply chains (Lambert & Cooper, 2000). *"Supply chain management is the integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders"* (Lambert, Cooper, & Pagh, 1998). Supply chain management includes managing the flow of goods and services in the supply chain, managing the supply base and all parties involved from the initial supplier until the end user.

The focus on supply chain and supply chain management have increased more and more over the last decades. Organizations have realized the importance of looking at ways to improve their supply chain (Cooper, Lambert, & Pagh, 1997). With increased focus on globalization and more intensive competition, organizations try to manage their supply chain in order to gain a competitive edge towards their competitors (Mentzer et al., 2001). The difference between not managing or paying attention to the supply chain, and actually managing and improving it, is the potential for major cost savings and increased profit in every stage of the supply chain (Mentzer et al., 2001). One important activity is to manage the suppliers that are a part of the organization´s supply chain. As with for example with Toyota, they actively manage their suppliers, maintaining strict control and guidelines for what suppliers to use, how the suppliers need to perform etc. (Kotabe & Murray, 2004).

Managing organization´s suppliers and supply base is one way to improve the supply chain. A lot of researchers have looked at supply base management and the optimization of it, if it is by reducing or increasing the number of suppliers, developing buyer-supplier relationships or develop and improve the suppliers (Choi & Krause, 2006; Handfield & Nichols Jr, 2004; Lambert & Cooper, 2000; Monczka, Trent, & Callahan, 1993; Ogden, 2006). Much of the

focus of the previous research has been on the automotive industry, like Toyota. There seem to be a gap in the literature, where research on other industries and types of companies are lacking and limited. Looking at supply base management and supply base reduction in a project-based organization, in a fluctuating industry as within the oil and gas sector, is something that could be interesting.

1.1 Research topic

The topic of this master´s thesis is supply base reduction, where the purpose is to look at the effects that a supply base reduction may lead to. Therefore, in collaboration with the case company Aker Solutions, the goal is to look at the potential benefits and challenges related to their ongoing supply base reduction. The context is, reduction of the number of suppliers in a project-based organization in the oil and gas sector. Looking at what strategies could be applied to overcome some of the challenges the company is faced with due to the reduction. The objective of the thesis is to identify the risks and benefits, and strategies to overcome or realize these, with the help of existing literature. This study applies an exploratory approach and we define the research question as following:

"What potential benefits and challenges are associated with performing a supply base reduction and what strategies can be applied to overcome these challenges?"

Research question for this thesis can be divided into the four following sub-questions:

(1) What are the risks and benefits associated with the supply base reduction itself?
(2) What risks and benefits are related to selecting the right or wrong supplier?
(3) What risks and benefits connected to the aftermath of a supply base reduction?
(4) What strategies can be applied to overcome the challenges and exploit the opportunities from a supply base reduction?

Sub-question one is asked to find the general risks and benefits associated with reducing the number of suppliers in a supply base and what motivations and attitudes can be seen among the employees in the case company's supply chain. Sub-question two will the discuss the risks and benefits found in selecting potentially the right or wrong supplier, what challenges can be revealed in the supplier selection, and to find out what the case company highlight as the most important when choosing a supplier.

Sub-question three is used to look at the risks and benefits connected to the aftermath of a supply base reduction; this question is asked as a result of the literature arguing that a supply base reduction is initiated to get fewer suppliers which make it easier to manage and to develop a buyer-supplier relationship. The last sub-question is asked in order to look what the literature and the respondents in this case study highlight as the most crucial factors to overcome challenges associated with a supply base reduction. This study is conducted as a case study for Aker Solutions.

1.2 Case company – Aker Solutions

Aker Solutions is a major company in the oil service industry in Norway, but they also have a heavy global presence. It is a project-based organization serving customers mainly in the oil and gas industry, (e.g. Equinor, ConocoPhillips). The company is highly dependent on the prosperity of the oil and gas industry. A couple of years ago back in around 2014 the market had its downturn, affecting the company extensively, but the last years it has turned around and brought with it many projects for Aker Solutions. Aker Solutions is an EPCI-provider, which means they provide all services including engineering, procurement, construction and installation.

Aker Solutions operates in a global market environment, that are characterized by large fluctuations, project-based, complex and quality-focused. Dynamic and high value projects are executed at the same time and expected to collaborate with each other to meet the client's expectations. Projects of this nature can change quickly as the projects get executed where boundaries and confinements are revealed. The oil and gas industry/oil service industry have developed gradually through several years and is a globally oriented market.
Aker Solutions divide their business into three segments, Brownfield, Greenfield and Subsea. These three business segments separate the different types of projects they work on. The company are constantly working with multiple projects at the same time, and make sure that what they deliver meet the expectations of the customers.

In order to deal with the fluctuating and changing industry environment, there is a need to manage the supply chain and supply base in a better way. Develop and implement smarter solutions that can lead to reduced cost, improved quality and lean, so that Aker Solutions can

remain competitive in the market. Expanded participation with suppliers and supplier management is important to achieve these objectives. Aker Solutions has on a global scale utilized a supply base reduction to get more control over the supply base, where it will be easier to manage, in order to face these challenges.

This master thesis is a case study conducted in collaboration with Aker Solutions, trying to identify benefits and challenges they might face due to a reduction in the number of suppliers, and what potential strategies that can be applied to overcome these challenges. This is something that is very relevant for Aker Solutions, because they are currently performing a supply base reduction, and they proposed this as a subject for our thesis.

1.3 Structure of thesis

In chapter 2 we present the literature which is seen as relevant for the topic supply base management and supply base reduction. We present some activities related to supply base reduction and some areas of purchasing which are closely connected to the structure of a supply base. In chapter 3, the methodology is presented, the chosen methods for this study. Chapter 4 presents the empirical findings, what we have learned and understood from the data collected. In chapter 5 the findings are discussed in relation to theory. Chapter 6 includes the conclusion, the limitations of this study and recommended future research.

2. Literature review

This chapter will describe the literature related to supply base management, where the main parts will be Supply Base Management, Supply Base Reduction and Purchasing. First a more general approach towards the supply base management are presented in order to create a basis for the literature about supply base reduction. The literature regarding supply base reduction will describe the purpose of the process. Purchasing literature will include the purchasing process and risk aspects associated with purchasing.

2.1 Supply Base Management

In this section an overview of several elements related to supply base management will be presented. Aspects of supply base management includes the complexity of a supply base and performance measurement, which make up the basis for understanding how this relates to reducing the number of suppliers by a supply base reduction.

A supply base is defined as a group of suppliers which are actively managed by a buying company, often referred to as the "focal company". The focal company, being at the center, manages the suppliers in the supply base, through contracts and procurement of parts, services and other materials (Choi & Krause, 2006; Handfield & Nichols, 1999). Supply base management is the planning, organizing, leading and controlling of the suppliers in a supply base from which a focal company purchases (Choi & Krause, 2006).

Managing the supply base has become a more and more essential aspect of supply chain management, especially since purchasing has moved from being seen as a purely tactical exercise to being viewed as a strategic function of a company (Goffin, Szwejczewski, & New, 1997; Monczka et al., 1993). The link between purchasing and supplier management have grown closer. Many manufacturers are now concentrating on enhancing their core competences and moving away from vertical integration, leaving them more dependent on gaining an competitive edge from the supply-side of their operations (Goffin et al., 1997; Leenders, Nollet, & Ellram, 1994). This is one of the reasons for the increased importance of managing the suppliers. Having good suppliers can help companies in the development of new products and processes, with cost reductions and long-term quality and delivery improvements. This is a way for companies to gain an competitive advantage, where the

challenge is to maximize the performance of suppliers better than their competitors (Goffin et al., 1997; Monczka et al., 1993).

A large part of the research investigating supply base management has focused on the automotive industry and the work of Richard Lamming. He first noticed the competitive advantage Japanese car companies gained, from their use of close long-term relationships with suppliers. Also how they reduced the number of suppliers and creating closer buyer-supplier relationships, moving towards partnerships (Goffin et al., 1997; Lamming, 1993).

According to Choi and Krause (2006), one of the most commonly observed supply base management practice, during the past decade, has been the focus on the number of suppliers which the focal company maintained in its supply base. This is closely related to the complexity of a supply base.

2.1.1 Supply Base Complexity

An organization´s supply base has some degree of complexity to it. The degree of complexity a system has, affect the difficulty of managing the system. Complexity of a system refers to the degree of how the members of the system interact with one another and how varied they are. Choi and Krause (2006) define supply base complexity as *"the degree of differentiation of the focal firm´s suppliers, their overall number, and the degree to which they interrelate"* (Choi & Krause, 2006, p. 638). The supply base complexity relates to the complexity of the upstream part of the focal company´s supply chain (Brandon-Jones, Squire, & Van Rossenberg, 2015).

In the literature there are different suggestions of what components the supply base complexity is affected by. There are five commonly used components, applied in different combination: the number of suppliers, the level of differentiation between suppliers, the inter-relationship between suppliers, the geographic dispersion of suppliers, the delivery reliability and lead-time of them (Bozarth, Warsing, Flynn, & Flynn, 2009; Brandon-Jones et al., 2015; Caridi, Crippa, Perego, Sianesi, & Tumino, 2010; Choi & Krause, 2006; Vachon & Klassen, 2002).

The most used component of supply base complexity is the number of suppliers in the supply base. Having to manage many suppliers, the complexity increases, while with few suppliers, the complexity becomes lower(Choi & Krause, 2006). How differentiated the suppliers are say something about how similar or different they are compared to each other in terms of size and technology etc. It is harder to manage suppliers which are very different than suppliers who are more similar (Caridi et al., 2010; Choi & Krause, 2006). The level of inter-relationship between the suppliers refers to supplier-supplier relationships. A supply base is more complex if it has two inter-related suppliers compared to two independent suppliers (Brandon-Jones et al., 2015; Choi & Krause, 2006). The more geographically dispersed suppliers are, the more difficult it is to manage them, cause it creates more complexity by having supplier with different culture, language or other characteristics (Brandon-Jones et al., 2015; Stringfellow, Teagarden, & Nie, 2008). The more unreliable suppliers are and longer lead-time the more complexity it creates (Brandon-Jones et al., 2015; Simangunsong, Hendry, & Stevenson, 2012). All of these components affect the complexity of a supply base. Changing the number of suppliers is the most common way of managing the complexity of the supply base.

Choi and Krause (2006) propose that the degree of supply base complexity has a major effect on four different elements: transaction costs, supply risk, supplier responsiveness and supplier innovation.

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Table 1: Elements effected by supply base complexity (Choi and Krause, 2006)

Transaction cost	Cost related to the buyer-supplier interface; frictional cost of doing business with the suppliers.
Supply risk	Risk of not getting enough supply to meet the customers demand. Risk of negative events that can lead to disruption in the supply.
Supplier responsiveness	Is viewed as the degree of accuracy and punctuality of the supplier´s response to focal company´s request for new requirements. On-time delivery, Just-in-time etc.
Supplier innovation	Is the ability for creating an innovative environment in relations to the suppliers.

Choi and Krause (2006) propose that a high complexity of the supply base may lead to higher transactional costs and reduced supplier responsiveness. Supply risk becomes high if the complexity is too high or too low but gets lower when the complexity is at an optimized level. Supplier innovation becomes low if the complexity is too low or high, but is higher when complexity is at a rational level (Choi & Krause, 2006). How Choi and Krause (2006) propose the degree of complexity affects the four abovementioned elements can be seen in Figure 1:

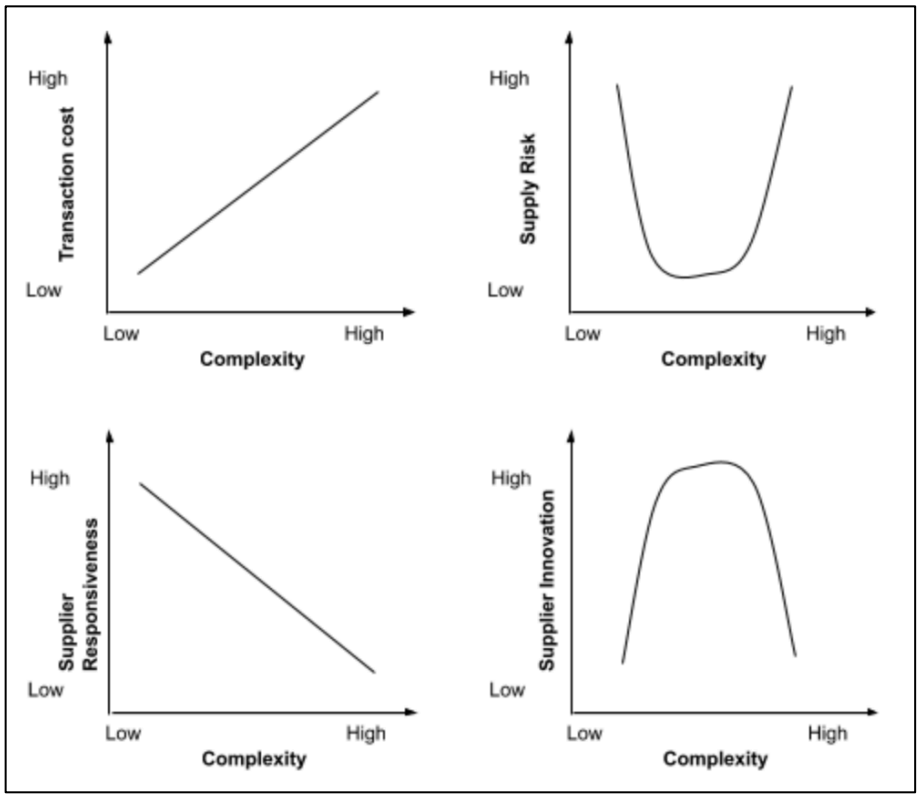

Figure 1: Impact of supply base complexity of focal company (Choi and Krause, 2006)

In the research of Brandon-Jones et al. (2015) they found that the supply base complexity in terms of number of suppliers and delivery leads to an increase in supply chain disruptions which decreases the performance. They also found the effect of supplier differentiation and geographical dispersion to be insignificant, meaning that it did not have a clear effect on the frequency of supply chain disruptions. The complexity have an effect on the frequency of supply chain disruptions (Brandon-Jones et al., 2015). Reducing or increasing the number of supplier in the supply base is among the most common way to manage the complexity of a focal firm´s supply base (Bozarth et al., 2009; Brandon-Jones et al., 2015; Caridi et al., 2010; Choi & Krause, 2006).

2.1.2 Performance measurement

Performance measurement can supplement the supply base reduction as it will lead to better decision-making since it identifies variances, these variances can be analyzed by the performing company and determine their causes and further actions can be taken to prevent their occurrence (Van Weele, 2014, p. 288). It is often said that you can´t manage what you can´t measure, which also say something about the importance of measuring performance.

Performance measurement systems can be a method for separating suppliers apart. This is a tool that clearly shows significant differences when it monitors performance. Performance measurement can also be a method in improving motivation and communication (Chan, 2003).

Van Weele (2014) presents a figure of key areas of purchasing performance measurement (see figure 2), where he divides purchasing performance as the outcome of purchasing effectiveness and purchasing efficiency. He defines purchasing effectiveness as to the extent in which previously established objectives and goals have been met due to a chosen course of action. In other words, a strategy or activity is either effective or not, which means the goal is reached or not (Van Weele, 2014, p. 289). While purchasing efficiency relates to the relationship between planned and actual resources used in order to achieve a previously established goal or desired output. With high efficiency you get the wanted output with minimum input (Van Weele, 2014, p. 289).

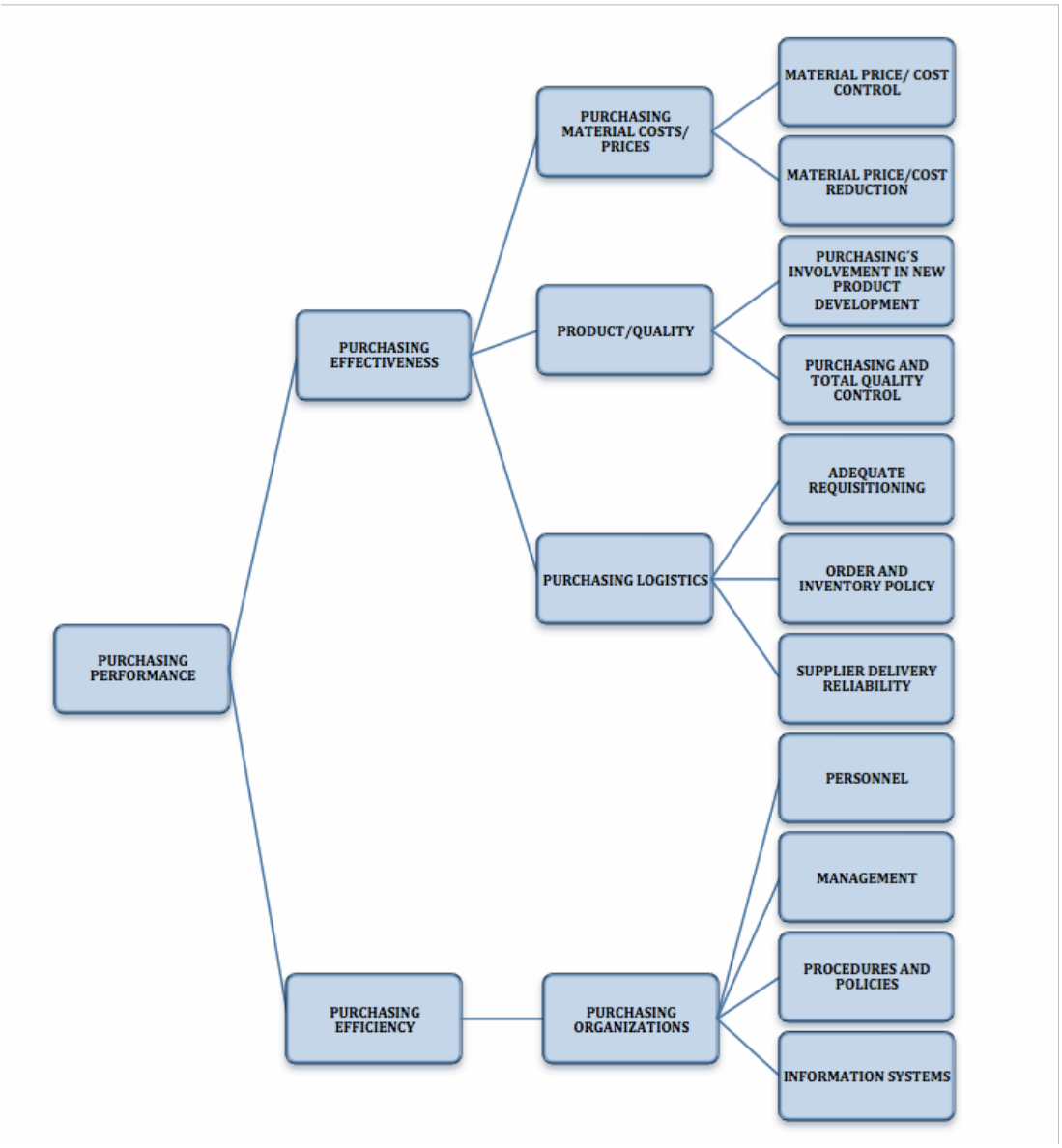

Figure 2: Performance measurement (Van Weele, 2014, p. 290)

Performance measurements is regarded as a good baseline across the literature among researchers, and some argue that specific performance measurement methods are specified to a certain market or company (Cousins, Lamming, Lawson, & Squire, 2008; Gunasekaran, Patel, & McGaughey, 2004). Cousins et al. (2008) present six common steps that companies can use to implement their own performance measurement system, as seen in Figure 3. This model is straightforward, and Cousins et al. (2008) argue that this model could act as a guideline for the companies.

Figure 3: Key elements - performance measurement (Cousins et al., 2008, p. 155)

The first step includes determining the goals, where the goals are the aspects that the company wants to measure. The second step emphasize the importance of establishing the correct performance measures. The next step surrounds the previous step where the importance of establishing benchmarks are necessary for the implementation of the performance measurement system. Further in the fourth step involves monitoring the progress provided by the measurement system. The last two steps is evaluating the results monitored and further to implement the changes for continuous improvement (Cousins et al., 2008, p. 155).

2.2 Supply Base Reduction

This section will look at the supply base reduction process, and with focus on the purpose of conducting a supply base reduction. This part will also present success factors crucial to making the implementation of the reduction, where these success factors finds its origin in several articles, where the empirical study of Ogden (2006) is central.

Supply base reduction can be defined as the process of purposely reducing the number of active suppliers in the supply base. The motivation of a reduction strategy is to consolidate the company´s spend from many to fewer suppliers, and to leverage a better value from the relationships with the remaining suppliers. Supply base reduction has been the subject of great attention over the last three decades, and several companies, both small and large, across the globe are initiating a supply base reduction as a part of their supply chain strategy. Both Ogden & Carter (2008) and Cousins et al. (2008) argue that the supply base reduction should be motivated by the overall desire to experience reduced costs, improved quality, better responsiveness and flexibility from the suppliers and a more manageable supply base.

By performing a supply base reduction, organizations can achieve lower transaction costs and operating costs. With fewer suppliers in a given product category, there are greater possibilities to earn effects like economies of scale and increased quality. Reduction in resources used for managing and maintaining the supply base is also an outcome, due to fewer

suppliers to manage. A reduction can also facilitate improvement of buyer-supplier relationships, and supplier-development (Ogden & Carter, 2008).

Goffin et al. (1997) argue that a supply base reduction will allow the focal company to prioritize more time to develop a closer and more collaborative relationship with the remaining active suppliers. He further states that the supply base reduction could be a route towards a competitive advantage for the company mainly through reduced costs, higher quality and innovation. The literature indicates that fewer suppliers are regarded as a prerequisite for developing strong relationships between the buyer and supplier. The supply chain can only facilitate effective partnership by reducing the number of suppliers to a manageable level (Cousins, 1999; Goffin et al., 1997; Sarkar & Mohapatra, 2006).

Obviously, there are also critique related to performing a supply base reduction. One of these is the highly respected economist Michael Porter, who in his study in 1997 stated four reason for not doing a supply base reduction. These were the fear of weaken the competition between suppliers; the need for formalized systems for evaluating supplier's performance; time needed to change the internal culture; time needed to develop standardized design for not going back to increased supply base again. Ogden (2006) also mention that it is not good to start a reduction to abruptly, due to many companies not realizing how time-consuming and comprehensive such a reduction can be. Porter (1997) follows this up with the fact that it is very time-consuming to create a framework that caters to the changes and makes it possible to keep the supply base at the desired level.

2.2.1 Supply base reduction process

There is no correct answer for how a supply base reduction process should be conducted or what to focus on, but a common similarity can be seen. Important elements of a reduction of suppliers centers around identifying the suppliers and matching them with the purpose and needs, defining the scope of the reduction , and trying to implement the selected changes (Ogden & Carter, 2008; Sarkar & Mohapatra, 2006).

Ogden and Carter (2008) constructed an overarching supply base reduction process from the basis of several case studies. They summarized the process into six major steps: establishing a cross-functional team, developing a commodity strategy, identifying potential suppliers,

performing a supplier-selection process, implementing the changes, and continuous improvement and benchmarking initiatives (Ogden & Carter, 2008).

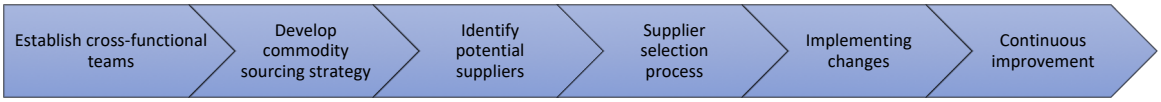

Figure 4: Process - Supply base reduction (Ogden & Carter, 2008)

The first step is to establish cross-functional teams, in order to get valuable input from all of the relevant stakeholders. Involving stakeholders and making them feel they have had a saying in the process, and greater the chance of them seeing the benefit of the efforts with a supply base reduction. This will more likely lead to the approval from the stakeholders of the changes being implemented (Ogden & Carter, 2008)

The second step is to develop a commodity sourcing strategy, which means that the company should develop a specific sourcing strategy for product category or group of services or supplies (Rendon, 2005). It is important to develop a strategy that will serve as a guide in connection with the supply base reduction efforts, making the reduction and selection more determined than random (Ogden & Carter, 2008).

Identifying potential suppliers is a very important step in the efforts a company puts into a supply base reduction. This step can involve making a list of potential suppliers and completing supplier profiles. Using internally available information and developing a short-list of qualified suppliers and criteria for pre-screening.

In the supplier-selection step involves narrowing down the list of potential suppliers and deciding on the most fitting number of suppliers that would best meet the company´s needs. This is an important step which needs to be aligned with the selected commodity strategy.

The next step is one of the most difficult one, implementing the supply base changes. Difficulties occurs because issues related to communication, push back, information spreading, quality, risk, system integration and supplier validation etc.

The last step of the supply base reduction is to continuously improve by evaluating, measuring and managing of the relationships with the supplier, in order to ensure that the processes, quality and prices remain at top. It is important to continue to follow-up and improve, or else the company can fall back into the previous conditions (Ogden & Carter, 2008).

Sarkar and Mohapatra (2006) propose a very similar process, but the difference is that they recommend starting with identifying the problem and learning why a reduction should be done. This process contains the same essence, with a different formulation and ordering, like involving the stakeholders and internal experts at a later stage. There are also a more focus on looking at performance measurements, as a basis for ranking the suppliers.

Termination of relationship

Synonymous with implementing a supply base reduction, is that buyer-supplier relationships must be terminated. There are several methods for terminating relationships with supplier when reducing the supply base. Three types of endings can be seen regarding termination of buyer-supplier relationships: (1) a chosen ending, where one partner takes the purposeful decision to end the relationship, (2) a forced ending, often caused by external circumstances and (3) a natural ending, where the acknowledgment of the need for a new business approach (Halinen & Tähtinen, 2002; Moeller, Fassnacht, & Klose, 2006). A supply base reduction is however within a chosen ending. A *natural ending* will often be if a supplier has not been used for several years. Alajoutsijärvi et al. (2000) supplements this term as a silent exit. He further states that a *silent exit* can be used with existing relationships too, where the silent exit can act as an indirect strategy to exit a relationship, and if performed in the correct way, this can offer both parties time to adjust, making the exit extend over a time period (Alajoutsijärvi, Möller, & Tähtinen, 2000).

When it comes to how to perform a *chosen ending*, Alajoutsijärvi et al. (2000) argue that a direct terminated in an orderly manner often proves to be the right way in a professional buyer-supplier relationship. He further defends this with the fact that the suppliers may be used on a later occasion, at the same time, it is important to be professional in the market. Appearing unprofessionally can damage the reputation of the ending-initiated company (Alajoutsijärvi et al., 2000).

2.2.2 Buyer-supplier relationship

Buyer-supplier relationships can be addressed in numerous ways where the literature ranges from a logistic to a strategic, IT or organizational view. Considering the thesis is surrounding the oil and gas industry and more precisely the oil service industry, this part will look at buyer-supplier relationships from a strategic point of view, as the goal is to improve business performance and create value for the end customer.

Cousins (1999) states that the recession of the late 1980s and early 1990s forced companies to look at adding value and reducing cost throughout their entire business as market places became highly competitive and dynamic. Business evolved to becoming a strategic function rather than a routine as a response to intensified competition in the industries and the globalization of commerce (Cousins, 1999; Tang, Shee, & Tang, 2001; Wu & Weng, 2010). Buyer-supplier relationships with strategic goals offers significant advantages and disadvantages to both the buyer and suppliers. This will now be explained in a more thorough fashion, emphasized on the advantages and disadvantages associated with the buying company.

Advantages and disadvantages

Buyer-supplier relationships are related to several consequences which affect the desire to collaborate closely in the supply chain. Gules and Burgess (1996) presents a summary of Lyons et al. (1990) as shown in Table 2, demonstrating the most common advantages and disadvantages of establishing closer buyer-supplier relationships (Lyons, Krachenberg, & Henke Jr, 1990). Gules and Burgess (1996) states that both buyer and suppliers need to carefully consider the disadvantages as risks, but also to keep in mind the many advantages presented of collaborating more closely with each other. As seen in Table 2, advantages include reduced costs of manufacturing and labor, predictability for both parties and improved quality. Disadvantages are risk of increased dependence, loss of proprietary information, less competition between the different suppliers etc. (Gules & Burgess, 1996).

Table 2: Advantages and disadvantages for buyers in collaborative buyer-supplier relationship (Gules and Burgess, 1996)

Advantages	Disadvantages
Reduced manufacturing and labor cost	Increased dependence on supplier
Improved quality	New negotiating style
Reduced complexity and cost of assembly and buying	Less competition among suppliers
Supply assurance	Reduced personnel mobility
Cooperative relationships with suppliers	Increased communication and coordination costs
Fair pricing assurance (open books)	Increased support for suppliers
Negotiated price reductions during contract life	Loss of direct contract with secondary supplier

Types of buyer-supplier relationships

The literature indicates that it is essentially two main types of buyer-supplier relationship, namely: Adversarial relationships and Collaborative relationships. Adversarial relationships are often referred to as arm's-length relationships and the literature uses both terms (Cousins et al., 2008; Gules & Burgess, 1996; Hoyt & Huq, 2000).

Arm's-length relationships are characterized by little or no investment in assets with minimal information exchange. In different words, adversarial relationships are where there are low levels of dependency and low levels of risk (Cousins et al., 2008, p. 182). Tang et al. (2001) further characterize arm's-length relationships by short-term contracts, tough negotiations, multiple sourcing and focus on price. The arm's-length relationship resembles a traditional kind of buyer-supplier relationship (Cousins et al., 2008, p. 97). In contrast to the arm's-length relationship, the collaborative relationship emphasizes the suppliers' competence in production, distribution, design, and post-purchase service, as well as the focus on long-term contracts and relationships (Tang et al., 2001). A mix of arm's-length and collaborative relationships is generally required, as seen with Kraljic's (1983) matrix different product categories need different approaches (Cousins et al., 2008, p. 84).

2.2.3 Success factors in supply base reduction

The literature surrounding success factors in supply base reduction are heavily discussed and multiple economists. Most articles address the same issues, where information sharing, communication and interdependence are recurrent elements (Ab Talib & Hamid, 2014; Cruz, 1996; Monczka et al., 1993; Ogden, 2006; Porter, 1997). Ogden (2006) conducted an

empirical study on success factors, where he identified numerous success factors necessary to make the supply base reduction process a success for the organization. Based on the findings from ten different organizations, which conducted a supply base reduction, he compiled a list of six crucial success factors seen in most of the studied companies. This list can be seen in Table 3:

Table 3: Success factors in supply base reduction (Ogden, 2006)

Success factors	Comment
Communication	Good communication with stakeholders is crucial, especially during the implementation phase. Stakeholders and associates of the company is critical for the success for the company and so forth the importance of informing them to what purpose and which benefits of performing a supply base reduction offers. A saying is: Communication ensures commitment. Communication throughout the process is also crucial to keep every employee and every stakeholder at the same page.
Good information systems	Ogden (2006) states that one of the main challenges in supply base reduction is linked with the lack of historical data, a good information system operation is an important source in providing such information. A good information system creates a solid foundation for performance measurement.
Key management support	People in the management is connected with power and influence and should be involved early in the process.
Selecting the right supplier/s	Cons of implementing a supply base reduction is being more reliable on its suppliers, therefore it is vital that the remaining suppliers holds the capacity and competencies to deliver large volume high quality products.
Cross-functional teams	Among every industry in every company there is a resistance to change. However, the importance of involvement from stakeholders and management demand the use of cross-functional teams. A cross-functional team will increase the probability of involvement from key participants.
Win-win relationship	The motivation behind the supply base reduction should include the desire to make a healthy buyer-supplier relationship where both parties can play of each other's strengths.

Similar to the articles of Porter (1997) and Monczka et al. (1998), Ogden (2006) highlight the importance of communication, where he argues the importance of involving both internal and external stakeholders in the early stages of the reduction. Another common denominator with the mentioned articles is the importance of information through information systems. Basing the reduction on correct information is essential for making the right choices during the actual

implementation. However, Ogden (2006) emphasize the importance of involving cross-functional teams to safeguard the interest from the stakeholders. Stakeholders in this matter can be different entities within the organization, or the customers of the company conducting a supply base reduction. What essentially separates Ogden (2006) from the other economists is that he emphasizes more on stakeholders, where he argues that the stakeholders appear to be critical in the conduction of the supply base reduction. Ogden also state, as the other researchers, the importance of using the supply base reduction to create better relations with the remaining suppliers, and possibly conducting supplier development with some suppliers (Ogden, 2006). In addition to the list of the six most important success factors, he addresses several other factors that may play a role in different companies. He states that companies should attempt to get the selected suppliers under long-termed contracts to utilize and realize the promised benefits. He further emphasizes the importance of hiring the right people for the project, and to not initiate the reduction to abruptly (Ogden, 2006).

2.2.4 Risk of supply base reduction

By changing the strategy towards reducing the supply base, the approach should not be taken lightly since it is not easily reversed. It is hard to reverse the strategy because when you change your approach as others in the market are generally doing the same thing. In addition, you cannot only have an external focus, but also an internal focus (Ogden & Carter, 2008).

Because of this tendency where major players within their industry also take the same approach towards their supplier base, the medium to long term relationships are more important than ever (Goffin et al., 1997). This are making the firms highly dependent on relationships. By this approach it seems like the way to success is two-folded; first, important to focus on long-term relationship, and they must be achieved. This could occur through relationship development strategies. Second, internal systems and approaches must be realigned, including a focus on performance measures for the supply process. A focus on adjusting the evaluation systems of the supplier's perspective and a concentration on skills and competence development for all parties involved in the relationship management (Ogden & Carter, 2008).

The supplier selection is much more complex than the reduction strategy. There are several issues that will come to the surface, where its argued that these types of issues could only be discussed if both firms were taking a long-term relationship focus (Ogden & Carter, 2008).

The conclusion of this article is that firms appear to be adopting supplier reduction strategies without a thorough consideration of the market dynamics. Firms also appear to be pursuing supplier reduction without a clear assessment of the costs and benefits involved.
Firms do also recognize that they need to alter their relationship with suppliers when implementing a supply base reduction but appear to be confused as to how to do it (Jüttner, Peck, & Christopher, 2003). In addition, they are not measuring and managing the relationship in a mutually beneficial manner. Without changing the relationship method, organizations may be leaving themselves exposed to higher prices and margin reduction (Jüttner et al., 2003).

It is apparent that an approach to reduce the number of suppliers in the supply base can bring significant competitive advantages to organizations, but they must be approached with the understanding of how comprehensive such initiatives are. Firms need to assess their strategic maturity and their overall strategic focus; they should not adopt these strategies lightly. It's also important to assess the supplier's capabilities, when proposing these approaches: there is a need to maintain high levels of mutuality and impose joint risk/reward and incentive contracts. With the correct infrastructure, strategic focus and performance measures, significant cost reduction and competitive advantage can be realized.

2.3 Purchasing

The following section will present the literature involving purchasing, market structure, transaction costs, product portfolio and sourcing strategy. The purchasing department is considered a highly important part of any firm. The purchasing department is also very affected by how the supply chain is managed and especially in regard of how the supply base is structured and maintained.

2.3.1 Market structure

The market structure can be seen in combination with supply and demand. Van Weele (2014) define market structure as "*the total set of conditions in which a company sells its products, with special attention to the number of parties in the market and the nature of the product being traded*" (Van Weele, 2014, p. 118). He further divides market structure into four types on the supply side, with clear similarities to Adam Smith and his perception on market structure: pure competition, monopolistic competition, oligopoly and monopoly.

Pure competition is characterized where neither the supplier nor the buyer can influence the price of the product. The price appears to be given for all parties involved in the structure. Another characteristic of this market structure is the high degree of market transparency. Products in this structure is homogeneous, meaning that every product are the same and fully replaceable by substitutes (Van Weele, 2014, p. 118).
The market structure referred to as monopolistic competition is similar to many actual markets where the market has a high degree of product differentiation. Each supplier in this structure tries to make its product stand out in order to create a monopoly situation for itself. Characteristics of this market is suppliers trying to manipulate prices and there is no direct pressure on prices (Van Weele, 2014, p. 118).
Oligopoly is a market structure with a limited number of suppliers and a limited product differentiation. The market is characterized with the fact that there is hard to get a foothold in the market, due to entry barriers. The market price can be set by a market- or price-leader depending on the situation. In some situations, arranged through some form of price agreements, often referred to as cartels (Van Weele, 2014, p. 118).
Characteristic of monopoly market structure is the presence of only one supplier of the product in question. In this case substitutes are absent, and it enables the monopolist to create their own pricing policy. One can further divide monopoly into natural monopolies and

government monopolies. Natural monopolies exist where the entire supply of either raw materials or a particular manufacturing process is owned by just one producer. Government monopolies exist when special licenses are required from either the government or based on state law (Van Weele, 2014, p. 119).

2.3.2 Purchasing process

A crucial part of Supply Chain Management is the purchasing process. The purchasing process have traditionally only referred to buying; however, the function has evolved to include all processes from determining the need to evaluating the contracts and the suppliers (Van Weele, 2014, p. 28).

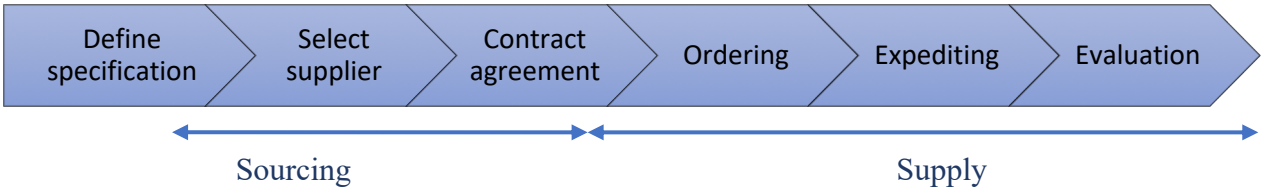

Figure 5: Purchasing process (Van Weele, 2014, p. 9)

As shown in Figure 5, there are main activities in the purchasing process. The first phase of the process is called sourcing and the second phase is supply. The purchasing process starts with defining the specifications of the product and requirements of suppliers, which can entail pre-qualifying possible suppliers. Next is selecting an appropriate supplier and ensuring good routines for the process. This may include setting the supplier selection criteria. The last step in sourcing is doing the administrative things, with negotiations and agreeing on a contract, categorized as an important step in many industries as it influences the buyer-supplier relationship. The first step in the supply phase involves ordering from the selected supplier, further expediting the order through monitoring and control. The last step of the supply phase is the evaluation which includes activities such as follow-up, supplier rating and supplier ranking (Van Weele, 2014, pp. 9, 29+).

2.3.3 Transaction cost

A transaction refers to the interaction between a seller and a buyer to exchange goods, services or financial instruments. In transaction cost analysis, the unit of analysis is the transaction, where the focus is to economize transaction costs, which is widely defined as the "cost of running the economic system" (Arrow, 1969). The main theme of transaction cost analysis is that there is cost associated with any transaction, even though these transactions take place in the market or within a hierarchy (Coase, 1937).

Transaction cost economics operate at a more microanalytic level of analysis than does orthodoxy. Whereas prices and quantities were thought to be the main if not the only relevant data in the orthodox scheme of things (Arrow, 1969), transaction cost economics looks at the attributes of transactions (Williamson, 1981). There are three different attributes that form the key components of transaction cost economics – asset specificity, frequency and uncertainty (Hobbs, 1996; Saeed, Song, & Andersen, 2018). Asset specificity refers to how specific the asset is for one specific transactional exchange. If a firms (A) investment has little or no use outside the transactional exchange between firm (B), then the asset has a high specificity. In such case firm (B) might act opportunistic towards firm (A) if it is known that asset has little or no use outside the purpose for firm (A) (Hobbs, 1996). Goods which are non-specific or low specificity have many alternative uses. Frequency refer to how often a type of transaction occur. Both buyer and seller will most likely value repeated business and will not try to mess up their reputation by acting opportunistically, when the transactions occur frequently. This will also provide them information about one another. The degree of uncertainty a transaction has to it give a pointer on the formality of the transaction. A low level uncertainty, like shopping at the super-market, needs no specific assurances, but a higher uncertainty transaction might need the formality of a contract, strategic alliance or some form of vertical integration (Hobbs, 1996).

2.3.4 Portfolio models

"The major advantages of a portfolio perspective are its focus on the interdependencies among the various decisions and the forcing of a discipline for resource allocation among the portfolio components – an allocation which takes explicitly into account the projected outcomes of each course of action on the relevant management objectives." (Zolkiewski & Turnbull, 2002).

Strategic supplier portfolio management is the management of an array of supplier relationships. Every supplier has a unique characteristic and each supplier are serving the firm in different ways. The firm manages its suppliers, not only individually, but as a set of suppliers, developing a portfolio of supplier relationships that eventually leads to an optimized supplier base for the firm (Wagner & Johnson, 2004).

A huge part of a firm's success is played by suppliers. This fact shows the increasingly action of implementing supplier portfolios. Strategic supplier portfolios allow a firm to take into account the various interdependencies among relationships with the suppliers, and the trade-offs in terms of risk, ability, and other characteristics (Wagner & Johnson, 2004).

Portfolio models is often referred to in literature and have been modified many times. Today we see that companies have key suppliers that are highly appreciated because they may have major impact on economic parameters such as profitability, viability and turnover. The portfolio models' strength lies in how one discovers these suppliers, largely because the strategic and tactical level of relationship management is explored through relationship portfolio analysis (Zolkiewski & Turnbull, 2002).

As with every model in the literature, portfolio models are criticized with weaknesses and limitations. Authors have criticized these models for their limitations in considering environmental factors and claiming these models simplify the reality companies are operating in. The models also display weakness in the fact that the models lack an integrated view on supplier's interdependencies (Roseira, Brito, & Henneberg, 2010). Criticism with the portfolio models for being over-simplificated, meaning they base their judgment on too few factors and in being imprecise as values are based on "high" and "low" measures and may lead to key factors being overlooked (Zolkiewski & Turnbull, 2002). Despite the criticism towards portfolio models, they are implemented in a wide range of companies as a framework for developing supply chain strategies (Cousins et al., 2008). Kraljic (1983) made a framework for relevant classification and categorization of suppliers and will be described further as a framework.

Kraljic's purchasing approach

Kraljic's matrix on categorization of suppliers is the recommended portfolio approach when designing commodity strategies. Conducting a purchasing portfolio is considered the first in

the process of deciding sourcing strategy (Van Weele, 2014). Kraljic's (1983) purchasing portfolio approach analyze purchasing turnover and the supplier base on the basis of two variables:

- Purchasing's impact on the bottom line to the company
- The supply risk

The impact purchasing has in the bottom line to the company can be measured against cost of materials, total cost and percentage of total purchase cost, volume, growth of business or the impact is having on quality. Using such criteria to measure the impact profit has on the different supply items. If the amount of money involved in the supply items or the volume is high, then there the financial impact it has on the bottom line is higher (Van Weele, 2014, p. 163). The supply risk is measured against product availability, is the availability short-term or long-term. Number of potential suppliers, structure of supply market, geographic distance and the cost of substituting suppliers, inventory risks and possible available substitutes. When there are fewer supplier for a given product, or you only source from one supplier, then the supply risk increases. With more suppliers available, and sourcing from multiple suppliers, then the risk usually is lower, as well as the cost of switching suppliers (Van Weele, 2014, p. 163).

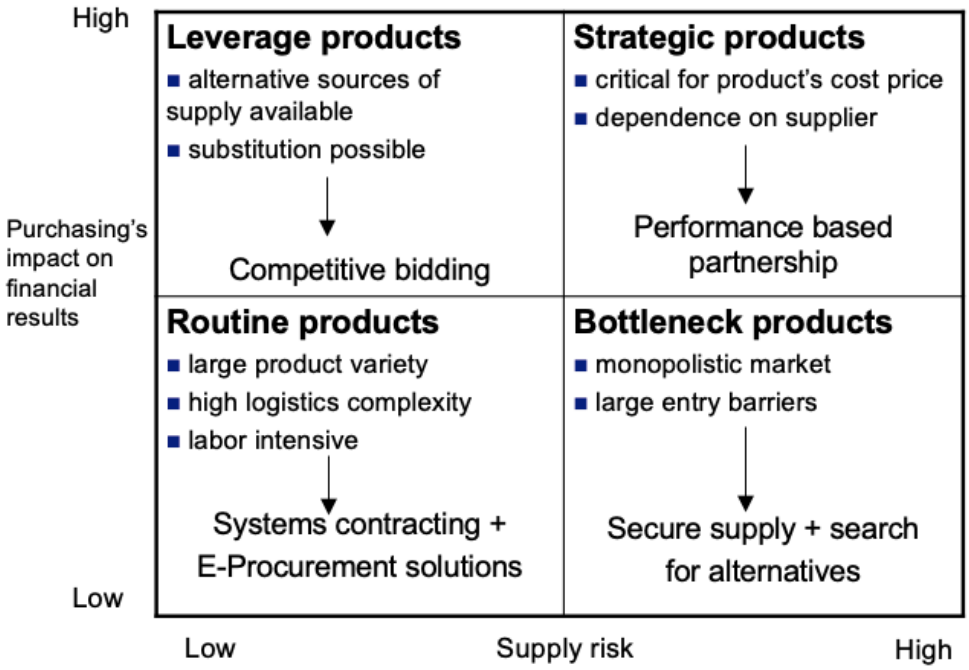

Figure 6: Purchasing product portfolio (Van Weele, 2014, p. 164)

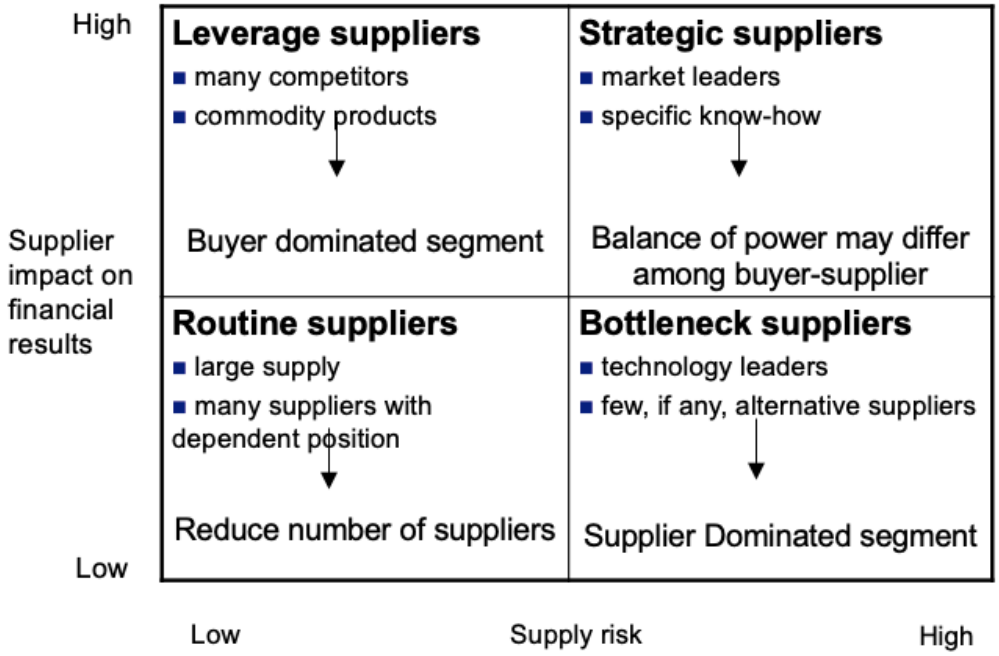

Figure 7: Supplier portfolio (Van Weele, 2014, p. 164)

Strategic products are referred to as high-tech, high-volume products often supplied at customer specification. Strategic products often associate with limited sourcing opportunities for the company where only one source of supply is available, hard to change in short-term without incurring costs (Van Weele, 2014, p. 165).

Leverage products can more often than not be obtained from multiple suppliers at standard quality grades. Leverage products represent a relatively large share of the end product's cost price and are bought at large volumes. In general, for leverage products, a small change in price has a strong effect on the cost price of the end product (Van Weele, 2014, p. 165).

Bottleneck products represent a limited value in terms of money but appear as vulnerable with regard to their supply. Bottleneck products are categorized as products that can only be obtained from one supplier (Van Weele, 2014, p. 165).

Routine products are referred to as products with few technical or commercial problems from a purchasing point of view. These are products with a small value per item and there are multiple alternative suppliers. Typically, most inventory items fall into this category (Van Weele, 2014, p. 165).

By identifying what category, the products an organization purchases fall into, is important for avoiding the risk of supply disruption, disruptions in the manufacturing etc. Being able to

identify the bottleneck products and find the best way of securing the supply of them so production capacity is not reduced.

2.3.5 Sourcing

Choosing the right supplier is an important part of supply base management and strategy of a company. When choosing sourcing strategy, question that often need to be addressed is whether the supply base needs to be expanded or reduced, and from what location should the suppliers come from. What kind of relationship should be pursued by the company and what type of contract should be used with these suppliers (Van Weele, 2014, p. 200). Should a firm source global or just local, and how many suppliers should be used, single or multiple suppliers. This are typical concerns a company should consider when making their strategy for sourcing.

Global and local sourcing

The action of carefully choosing suppliers as the best or most suitable partner based on location and sourcing strategy has become of strategic importance due to the added value they provide and increased fierce global competition in today's markets (Kotabe & Murray, 2004). In that event, companies are seeking competitive advantage through a global supply base with sourcing strategies as a central matter in their overall business strategy. This can be explained with the importance of establishing a number of sourcing plans, distribution, and service networks, because without such it is extremely difficult to exploit both emerging technology and potential markets around the world simultaneously (Kotabe & Murray, 2004). Over the last 40 years gradual yet significant changes have taken place in global sourcing strategy. Where cost-saving justification for international procurement in the 1970s and 1980s was gradually supplanted by quality and reliability concerns in the 1990s. sourcing directly from foreign suppliers requires greater purchasing know-how and is riskier than other alternatives that use locally based wholesalers and representatives. This is explained by the fact that local suppliers are subjected to local laws and assume some of the current risk associated with importing. However, trends now are that purchasing managers are increasingly making long-term commitments to foreign suppliers, direct dealings with suppliers are justified (Kotabe & Murray, 2004).

However, managing a global supply base doesn't come without problems, where such problems can be cultural differences, language barriers, and different business practices

(Handfield & Nichols Jr, 2004). To overcome these challenges Handfield and Nichols Jr (2004) argue that communication is the most critical factor to control these challenges, where communication will make these differences significantly smaller, at the same time this will help strengthen the relationship with the suppliers in the global supplier base. In order to overcome any business practice differences, it is essential to involve personnel with knowledge and experience with such business practices (Handfield & Nichols Jr, 2004). The prime example of embracing these differences can be seen at Toyota, where Toyota's sourcing strategy involves giving the managers at the specific operation ample authority to accommodate local circumstances and values without diluting the benefit of integrated global operations (Kotabe & Murray, 2004).

Local sourcing involves the sourcing, purchasing or procurement of products from within a specific distance from where they will be used or sourced. Advantages with local sourcing are when it concerns high-tech products where the product specification often changes, and the importance of being flexible and precision is necessary in the relationship (Van Weele, 2014, p. 200). Local sourcing could also suggest that the personal communication within the relationship is better, and the importance of good communication is important when it comes to vulnerable products that are sensitive to flexibility and precision (Van Weele, 2014, p. 200). Besides the advantages described by Van Weele (2014), local sourcing will also give lower shipping costs, and should be considered against the cost of low-price manufacturers (Cousins et al., 2008).

Multiple or single sourcing

Choosing the right sourcing structure is critical for the functionality of the company and must be seen in accordance with the needs of the company in terms of; type of relationship needed in terms of level of involvement and dependency considered appropriate and the market structure of the wanted suppliers (Cousins et al., 2008).

Single sourcing is defined as a situation where within a certain product category (e.g. steel and piping), the company buys from only one source (Van Weele, 2014). This sourcing strategy may be the result of a deliberate choice to only source from one supplier but can also be a result of the final customer has explicitly required the firm to work with a particular supplier, or because there might only are one source of supply for the product (Cousins et al., 2008, p. 52). When you are forced to buy from one source, it is often called sole sourcing

(Van Weele, 2014). Kraljic (1983) argue that single sourcing is likely to be prevalent in either the strategic or bottleneck quadrants of the model (see Figure 6). Single sourcing is often related with negative consequences, there are advantages to managing this type of relationships. Buyers and suppliers working in a single-sourced scenario often tend to experience that it is easier to exchange ideas, have a clear understanding of costs structures and look for ways to enhance the product and processes (Cousins et al., 2008, p. 53). The disadvantage of single sourcing is that there is only one source of supply, which could put the buying company in a position of weakness if the relationship is not managed properly. Another disadvantage is where the buying company is "locked" into a sole sourcing relationship with the supplier, where this may restrict the buying company's flexibility to acquire new technology or innovation (Cousins et al., 2008, p. 53).

Multiple sourcing is defined as the strategy where the buying company within a certain category buys from more than one supplier (Van Weele, 2010, p. 410). This structuring approach is frequently used to maintain competition in a given supply market. The multiple sourcing strategy offers the buying company a wide range of suppliers to choose from and will help to carefully balance capacity constraints with individual supplier performance when placing orders (Cousins et al., 2008, p. 54). This strategy allows the buying firm to frequently use "Dutch auctions" where they play suppliers off against each other to achieve the best price. This strategy is often viewed as an adversarial (arm's-length) approach and prevails in marketplaces with high degree of competition (Cousins et al., 2008, p. 54). Kraljic (1983) argue that this structure tends to appear in the routine quadrant of his matrix and applies to the low-level type of purchase.

2.4 Risk

The term "risk" is an ambiguous concept, meaning that it has several definitions, depending on the specific context and the application of it. Risk is often associated with a negative perspective. Rowe (1980) also focus more on the negative aspect and defines risk "*as the potential for unwanted negative consequences to arise from an event or activity*" (Khan & Burnes, 2007; Rowe, 1980).

What people mean by risk is usually dependent on the context and perspective, like risk in a supply chain setting or financial investment situation. "*Regardless of the area of interest, risk is associated with an undesirable loss, i.e. an unwanted negative consequence, and uncertainty*" (Tummala & Schoenherr, 2011). Risk in supply chain context concerns potential unwanted consequences caused by events or activities within or related to the supply chain. Tummala and Schoenherr (2011) conceptualized supply chain risk as "*an event that adversely affects supply chain operations and hence its desired performance measures, such as chain-wide service levels and responsiveness, as well as cost*".

When looking at risks to the supply chain, there are those that are external and those that are internal. External risks that can affect a supply chain may arise from events like natural disasters and extreme weather, terrorism and epidemics, or legal restrictions imposed by government. Internal risks refer to risks that may arise as a consequence of how the supply chain is structured and managed. Internal risk can be influenced by managerial actions, this is not possible for external risk (Christopher, 2011, p. 190).

2.4.1 Supply Chain Disruptions

Organizations today are more and more exposed for potential disruptions in their supply chain. This is affected by the way the organization manage the supply chain, as well as by external factors which cannot be dealt with. Disruptions can have long-term effect on organizations competitive ability, stock price, manufacturing and financial performance etc. (Christopher, 2011, p. 189; Tang & Tomlin, 2008).

Tang & Tomlin (2008) highlights three major types of supply chain risks that regularly can occur: supply risk, process risk and demand risk. Supply risks relates to the risk of disruption in supply, issues with getting enough materials from suppliers in time etc. Process risk relates

to the internal processes, like manufacturing, where issues concerning the capacity or bottleneck of the processes etc. Demand risk are related potential problems with the demand with for example the volume or mix of products sold, or distorted information causing amplifications in the demand. There are more than three major types of risks that can lead to disruptions, like control risk and environmental risk, but these three are very central (Christopher, 2011, p. 194; Tang & Tomlin, 2008).

2.4.2 Supply risk

"*Supply risk involves the potential occurrence of events associated with inbound supply that can have significant detrimental effects on the purchasing firm*" (Zsidisin, 2003b). There are many sources of disruptions in an organization´s supply which could pose a risk. What sourcing strategy a company use, and the importance of the product being purchased, these are some major factors that can pose a potential risk for the supply flow (Zsidisin, 2003a). The size of the supply base matters, because a small supply base gives arise risk of disruption in the supply (Sarkar & Mohapatra, 2009). The degree of dependency an organization have towards its suppliers as well as how complex the supply base is, will affect the supply risk. Supply base with high complexity and a large number of suppliers can increase the potential for unreliable delivery; low complexity and a small number of suppliers could increase the potential for issues with capacity of supplier due to higher dependence on fewer suppliers for specific products (Choi & Krause, 2006).

A great example of a company experiencing a supply risk is the case of Ericsson. Ericsson was a major player in the mobile phone industry and employed a single-sourcing policy. They used the Philips plant as a single source of a microchip critical to their mobile phones. The Philips plant was set on fire due to a lightning strike and was ultimately shut down after the fire. Ericsson had no other source of microchips, which disrupted their production for months and led to a loss of $400 million in sales (Chopra & Sodhi, 2004).

3. Methodology

Yin (2009) describe research design as a logical plan for how to conduct the specific study at hand. This plan often starts with a relevant set of questions and ends with the answers to those questions, as well as information on what data to collect, how to collect and analyze the data.

The purpose of this thesis is to explore how a company could optimize their supply base through a supply base reduction, and to identify the potential threats and opportunities related to such an activity. The main intention was to explore the actual effect such an activity brought with it, in an effort to give the company an outside evaluation of the reduction. However, during the first meetings with Aker Solutions, it became apparent that the situation was very different than first envisioned. Before the meeting it was indicated that the supply base reduction already was completed and the changes where implemented, but it turned out that the process was long from finished. The reduction process had started but remained the more demanding and difficult part of a reduction. It was then decided to focus on the potential risks, challenges and opportunities that could come this reduction. This focus would be more beneficial for Aker Solutions, hopefully aiding the decision-makers to conduct a successful reduction, due to the fact that this activity would still be going on for some time. The goal is to analyze what has been done so far, and that which is planned (or not considered) to do, for the future completion of the reduction by the case company. Looking at what the case company should be aware of in terms of exploiting opportunities and deal with challenges and risks.

3.1 Research approach

The purpose of this study is to explore the phenomenon of supply base reduction and the potential consequences that could emerge from it. The literature on supply base reduction have only been explored to some extent, where much of the studies have focused on industries characterized by high degree of mass production. Research within industries that are more project-based seems to be lacking a bit. The research question in this thesis reflects this with open-ended formulations, where the aim is to obtain more insight and look for new links to what has previously been studied to a limited extent in the literature that exists. This suggest that it would be best suited for this study to adopt an exploratory approach. An exploratory approach is typically adopted when the purpose is to generate insight about a particular subject or situation that lacks and suffer from limitations, or the topic is highly complex

(Sekaran & Bougie, 2016, p. 43). Along the way, new perspectives related to the research question of this study were discovered.

Based on this a qualitative approach for the collection of data and analysis, with open-ended designs are the techniques that are best suited for this study. According to Stake (1995) and Sekaran & Bougie (2016), when investigating a phenomenon qualitatively in a company, the best approach is to conduct a case study. This is also a flexible and adaptable approach which would be beneficial for this study because it allows for adjustments along the way (Sekaran & Bougie, 2016; Stake, 1995).

3.1.1 Case study

According to Sekaran & Bougie (2016) the purpose with case study is to collect information about a specific object, activity or event that is of interest for the researcher. It can be a particular company or business unit that is the object from which the data is collected. The idea is to examine the research question in a real-life situation from different angles and perspectives, to obtain a clearer picture of the problem, using various methods of collecting data. According to Yin (2009) it is a strategy for conducting an empirical investigation into a particular contemporary object or event in a real-life context. The main argument against the use of case studies when conducting research is that case studies provide a very limited basis for generalization.

It was found interesting to investigate Aker Solutions due to their increased focus towards their suppliers, and because of their recently initiated supply base reduction and ongoing change within their supply chain. Especially since their ongoing initiatives would affect the company globally and give insight into how this would be handled in such a large project-based company. By doing a case study, it enabled to explore and investigate the different attitudes and concerns from the angles of the different business segments within the company, as well as thoughts of a couple suppliers. On the basis of the scope of the thesis and limited time available, a single-case study was chosen, only looking at one company. To the knowledge of the researchers of this thesis, no similar research has previously been done within the oil and gas industry combined with a project-based company.

3.2 Data Collection

For this study, a qualitative approach is chosen for the collection of data. A quantitative study deals with numbers, while a qualitative study is characterized by the use of words and being open-ended. A qualitative study separate itself from quantitative by closeness of the researchers, with viewing point of the participants, unstructured, contextually understanding and rich and deep data (Bryman, 2012).

For this study, semi-structured in-depth interviews are conducted and used as the main source of data. In-depth interviews will give the best insight into the current situation at the case-company. Using open-ended questions and a semi-structured layout lets the researcher collect information that was identified beforehand as needed. But it also allows the participants to talk more freely, giving the possibility to get other unknown information to the surface (Sekaran & Bougie, 2016). It allows the interaction between the respondent and interviewer to follow the planned questions, but also evolve beyond the planned questions. In addition to using interviews as primary source of collecting data, general company info is retrieved from their web-site, and classified information such as PowerPoints, excel-sheets and other documents directly from employees at Aker Solutions. Two preliminary meetings in December 2018 and February 2019 with the company-contact was also a way of gathering information which also helped shaping the direction of the study.

3.2.1 Interviews

The interviews chosen are semi-structured. This imply that the topics and questions asked are decided in advance and incorporated in an interview guide. But it also means that a relatively high degree of freedom to speak is given to the respondents, not limiting them so strictly to the planned interview guide. Follow-up questions are also asked by the interviewer where considered necessary. Semi-structuring the interviews helps to ensure that the intended questions are covered, but also provide a great deal of flexibility for both the respondent and interviewer (Bryman & Bell, 2011, p. 467; Silverman, 2000, p. 314). This method was chosen because it was desirable to get solid data about the planned subjects, but also capture some data that reflects thoughts and attitudes of the respondents. Also letting the interviewees respond more freely and bring up other subjects or information unsolicited.

Conducting in-depth interviews is a very time-consuming method of collecting data and demand more resources when a wide geographic region is being covered. The respondents also may become concerned with confidentiality issues, affecting the answers (Sekaran & Bougie, 2016, p. 123).

Before the interviews were conducted, a series of questions were formulated and made. These questions were based on the main topics in the theory and from the impression of the two preliminary meetings with the contact in the company. Two interview-guides were developed and approved by the researcher's supervisor before being used. The one used for interviewing the suppliers of Aker Solutions was approved by the company-contact as well before being used. These can be found in the Appendix A and B.

3.2.2 Population and Sampling

The purpose of this study is to explore the potential implications a reduction in the global supply base of Aker Solutions could bring with it for the supply base and for the company as well. This implies that the population need to be employees involved in the reduction, but also users of the suppliers and supply base. As previously mentioned, in-depth interviews are a time-consuming method of collecting data. Given such a time-limited projects such as a master thesis, the sample should be limited to what is considered practically possible to handle in a relatively short period of time. Therefore, it was decided to concentrate on employees that where situated in Norway and where directly involved in or which would be affected by the reduction. It was decided that obtaining the point of view of some suppliers also would be beneficial. With help from the company-contact, a list of possible candidates was discussed and agreed upon, and contact was initiated. This list was suggested by the contact based on desired requirements from the researchers, so that the sample would be differentiated and represent several departments and views within the company. One of the candidates interviewed also suggested one extra candidate to interview, which was pursued and achieved.

In total, nine interviews were conducted, seven of them were employees while the remaining two are suppliers of the company. The employees had very different roles, and were affiliated with different business segments, mainly Subsea and Brownfield. The two suppliers interviewed, are situated in Norway and are not subjects for potential removal from the supply base. All of the employees are situated in Norway as well. It was important that the subjects

had different roles and perspectives, in an effort to achieve a good spread of the subjects and their background. This was important in order to avoid a one-sided view among the subjects. By also interviewing suppliers, the view of suppliers is also represented to a certain degree, opening up for thoughts and opinions both ways. Table 4 present an overview of the subjects that have been interviewed. Candidates A-D are connected to Brownfield while E-G are affiliated with Subsea/Greenfield. The supplier subjects that was suggested and interviewed, by the company-contact, were not exposed to the reduction in any way.

Table 4: List of participants

Candidate	***Position***	***Interview-technique***	***Length***
A	*Global Category Manager*	*Face-to-face*	*84 min*
B	*Head of Global Category Management*	*Face-to-face*	*48 min*
C	*Senior Manager Supply Chain Brownfield*	*Face-to-face*	*83 min*
D	*Fabrication Manager*	*Face-to-face*	*52 min*
E	*Global VP of Supply Chain Excellence*	*Telephone*	*23 min*
F	*Quality Surveillance Process Owner*	*Telephone*	*24 min*
G	*Head of Quality and CI Projects*	*Telephone*	*32 min*
H	*Supplier – Piping*	*Face-to-face*	*22 min*
I	*Supplier – Steel*	*Face-to-face*	*45 min*

Six of the interviews where done face-to-face while other three where done over telephone. It was preferable for the researchers to do all of the interviews face-to-face, but due to those candidates being located in Oslo and having a very tight schedule, it was preferred by them to do it by phone. The respondents were more than willing to contribute and provide good data.

3.3 Data Analysis

Short time after the interviews, the conversations were transcribed with the help from audio-recordings and notes from the interviews. After the transcribing, the material was sent to each respondent for quote control and approval, as this would improve the reliability of the study. Furthermore, a data reduction was made to remove bias and other unnecessary information which was not excluded in the transcription process.
For handling the rich data, a qualitative data analysis software was used. The software NVivo was used for categorizing and coding the data that was collected. NVivo is a qualitative data analysis computer software package. One of the benefits of using a software like NVivo is, that it makes handling larger empirical data material easier (Binderkrantz & Andersen, 2011). By using qualitative data analysis software, it is easier to maintain control over large data material, code and categorize, detect connections and differences (Lewins & Silver, 2007).

When coding and categorizing the topical structure of the interview guide was heavily used, but also identifying other categories when working with the data. Categories emerged along the way, which was expected due to the fact that this is an exploratory study. There is a risk of missing or misinterpret important information and not categorize the data to the best when doing the analyzing in an exploratory study. Therefore, somewhat broad but specific categories have been used for most of the data, but also some very specific categories. This reflects the outcome of the semi-structured interviews, that the respondents have answered very freely, meaning that much of the same data material falls into several categories.

3.4 Quality of the research

Reliability and validity in qualitative research are an expression for how good the quality of the research is. It is important, so that the conclusions that have been drawn from the qualitative data can be verified in one way or another. When doing research, it is very important that the method used for conducting the research, how data have been collected and how conclusions have been drawn are plausible, reliable and valid (Sekaran & Bougie, 2016, p. 348).

3.4.1 Reliability

Reliability is concerned whether or not the process of the study is consistent, reasonably stable over time, as well as across researchers and methods (Miles, Huberman, & Saldana, 2014, p. 312). The reliability in a study is simply a way of indicating how trustworthy the methods used in the study is. It is concerned with how reliable the information obtained are, the way it was obtained and how the data was analyzed, categorized and conclusions were drawn. Reliability is concerned with consistency of the method and measure applied in the study.

All nine of the interviews were recorded, with the consent of each subject, in order to retrieve all the details from the interviews and also enhance the reliability. A confidentiality agreement was also signed between the researchers and the case company. This was also informed to all subjects that were interviewed, which would strengthen the information provided by them during the interviews. Not all the interviews were conducted by both the researchers. The three telephone interviews were done by one of the researchers, and one of the face-to-face interviews was done by the other researcher alone. The remaining five face-to-face interviews were done together. This reduces some of the reliability but is somewhat countered by the use of audio recordings on all interviews. After every interview the recordings were transcribed and sent for checking and approval to each subject. This was to ensure as high accurate collection and correct data as possible under the circumstances. It is a weakness with qualitative research and open-ended semi-structured interviews that the respondents will not give the exact same answer to the same question twice. The same follow-up question might be difficult to ask, considering that the respondents might not give the exact same answers. It is difficult to replicate the exact interview setting and context, since the interviews were conducted in the middle of the supply base reduction process. This weakens the reliability somewhat.

3.4.2 Validity

Validity in qualitative research is concerned with whether or not there are compliance between the research question and the information that have been used to draw conclusions from (Repstad, 2007, p. 134). How valid are the conclusions? Validity is split into two types: internal validity and external validity. Validity concerns the integrity of the conclusions conducted from the research (Bryman, 2012).

The internal validity refers to the extent for which the researcher's results can be said to accurately represent the collected data (Sekaran & Bougie, 2016, p. 349). Internal validity refers to the credibility, authenticity and trustworthiness of the results and findings in the study. The external validity refers to the extent for which the results can be generalized or to be transferrable to other contexts or different settings (Sekaran & Bougie, 2016, p. 349). The degree of external validity of a study is important for other researchers, because it indicates if the findings are suitable for use in other research and or only as a case-study.

Beyond the case-company, it is not easy to generalize the results from a single-case study. This study has a very specific context, considering that the reduction process that is studied has not been completed. It will be difficult to generalize the result because result would most likely be somewhat different if a new attempt was conducted. Because the study was completed in the middle of the reduction process, this would be hard to transfer to other contexts and settings. This weakens the external validity. The results of this study can be considered to be applicable and transferrable to some degree to similar companies within the same or similar industry. The result might be very different in the same company if studied after the reduction is completed.

3.4.3 Conformability

Conformability is described by Bryman (2012) as the issue of ensuring that the researcher can be shown to have acted in good faith; that he or she has not overtly allowed personal values or theoretical inclinations manifestly to sway the conduct of the research and the findings deriving from it.

First and foremost, the fact that two researchers doing the case study compensate the risk of influence from personal values. There were questions in the interviews that may have been posted in a manner that could have led the respondent to answer in a certain way. Regardless, open-ended questions were chosen to allow the respondent the opportunity to reflect freely on the matter.

3.4.4 Ethical considerations

Early in the process an application was sent to the Norwegian Center for Research Data, applying for the approval of conducting this study with the use of audio recording. The interview guide was also sent in. This was approved short time after. A confidentiality agreement was signed with the company. This was informed to all the interview subjects before starting the interview, and that they would be anonymized. All the respondents were informed about the purpose of this study and the wishes to use audio recorder, which they all consented to. The transcribed interviews were sent to the respondents so that they could check for citation and correct quotation, to reduce the chance of misinterpretation. The audio recording was not stored on a computer, not being on a device that was connected to the internet. All recordings were deleted at the completion of this study.
When presenting the empirical findings, information about which subject said what in regard to findings of a sensitive character, has purposively been left out. This is to preserve the anonymity of the respondents, not put them in the spotlight due to any “negative” comments.

4.Empirical results

This chapter will display the empirical results for this research. First, a presentation of the case company followed by a brief description of the suppliers represented in the research. Further in this chapter, the findings from the interviews will be presented.

4.1 Findings

In this findings/analysis we will present the findings in a descriptive way. We will communicate what's been said during the in-depth interviews. To respect the anonymity agreement by the signing of the confidentiality agreement, we do not refer to candidates during the actual analysis, but we do refer to candidates for the quotation.

4.1.1 Supply Base Reduction

Back in 2017, Aker Solutions started a formal process of reducing its number of suppliers in their supply base. The reduction process started with a reduction initiative to remove suppliers that were not qualified and couldn't be purchased from in their system. Aker Solutions had at this point a very open system at this point in time, a system with few restrictions, which meant that you could purchase from an old supplier which haven't been checked or used for years. Over the past 10-15 years, no clear effort had previously been done to remove old and unused suppliers from the system, while new suppliers were being added into the supplier base.

> *"Until now there have been zero restrictions on getting new suppliers into the supplier base. The supplier base emerged as an organic growth"* – Candidate B

The global supply base had grown to a huge disorganized supply base with somewhere around staggering 45,000 suppliers openly in their systems, including direct and indirect suppliers. In the case of Aker Solutions, they refer direct suppliers as suppliers that deliver items which goes directly into the production, while indirect is referred to suppliers who supply products and services which are not involved in the production. Two of the respondents emphasized that with such a large supply base has too high complexity tied to it.

A joint internal agreement, realizing that actions had to be made regarding the number of suppliers in the supply base and its complexity. A supply base reduction had to be initiated.

4.1.2 Motive

There are several motivations for reducing the supply base of Aker Solutions. Motivations mentioned by the participants included: gain of control, reduce supply base complexity, cost-reduction, quality-focus, relationship development. There were some different views and thoughts on which ones were the most important of them. However, it seems that the overall goal and motivation for the reduction in the supply base was to gain control of the supply base.

> *"The motivation came from an acknowledgement of there being zero control and way too many suppliers. We have to do something about this. It is then control and quality which are obvious motivational factors"* – Candidate B

An overall motivation to gain control and reduce the complexity of the supply base stems from the fact that the supply base was allowed to grow and grow for years. To grow without any effort to keep it healthy by removing unused and inactive suppliers or suppliers which does not meet the standards of a supplier expected from Aker Solutions. The focus on cost savings was a recurrent motivation which everyone agreed on. It is very costly to nurture a larger supplier base. This is resources which can be used in developing and maintaining relationships with the suppliers. With fewer suppliers, it will be easier for Aker Solutions to focus on the quality of their suppliers and develop strong relationships. Quality of suppliers emphasizes the level of product quality delivered, delivery on-time, responsiveness and health, safety and environment commitment of the suppliers. All of the mentioned motivations were recurrent among the interview respondents. Some of the respondents weighted the motivational factors differently than some of the other respondents. This also indicates that there are different expectations of the effect of the reduction and its outcome.

4.1.3 Scope

The formal reduction process first started around two years ago, in 2017. First step was to start removing inactive suppliers and suppliers which no longer are qualified to be purchased from. When the reduction started, the global supply base had somewhere around 43-48,000 suppliers. Removing a large number of direct and indirect suppliers, the supply base was then reduced down to around 14,000 suppliers. This number is a bit uncertain and might not be perfectly accurate, but was a recurrent number mentioned by most of the respondents. One reason may be that the respondents were included and informed about the process at different stages and point in time.

"We have 48,000 suppliers openly in our systems. You can't develop that portfolio" – Candidate E

It was also mentioned by the majority of the respondents that the goal is to reduce it from 14,000 down to 3,000. There were also talked about reducing the supply base from 3,000 and down to 500. Some of the respondents thought of this as a high ambition, coming from the people at the Subsea-segment and that the extent of the reduction was too large. When the interviews were conducted the supply base consisted of approximately 7,000 suppliers, which 700 of them are direct suppliers. With the rest being indirect suppliers, which doesn't go directly into the products Aker Solutions produce.

4.1.4 Selection

In the first stage of the reduction, it was clearer what criteria to be used for the removal of suppliers. It was suppliers which was inactive in the system or had not been used for a long time. Looking at the ones that had not been used for three years, then down to two year, then one year and then the last six months. This was the easy part of the process, when selecting which suppliers to remove.

The hard part of the reduction has not yet been done. At this stage it becomes more difficult to select which suppliers to keep and which to get rid of. The majority of the respondents said that they had not started looking properly at the selection criteria's, which would be used for the further removing of suppliers down from 14,000. It will become even tougher when trying

to reduce from 3,000 and down to 500 suppliers. None of the respondents had a clear answer on what specific criteria to base it on, or how it would be weighted.

> *"It's the road from 3,000 and down to 500 suppliers that is the really difficult part, it is also where most discussions will occur"* – Candidate A

It became obvious that choosing the best criteria for this stage will be difficult, with different views and needs coming from the individual business-segments. Even though the criteria haven't been decided, most of the participants mentioned some potential factors they thought to be important to consider. The main factors mentioned is:

- Spending: How much Aker Solutions have bought from the suppliers, in money.
- Quality of supplier: Delivery, material/product/service quality, track-record (previous performance), capacity.
- A supplier's financial stability, HSE-commitment, different certifications.
- Last active/used in system
- Suppliers they have knowledge about, compared to the more unknown suppliers
- Supply base complexity

Choosing the right criteria to base the further reduction on is crucial for the whole reduction and the end result. Taking into consideration the different needs and situations for the business-segments can be decisive. Every respondent also highlighted the fact that Aker Solutions have other stakeholders than the three internal segments. One respondent explained that Aker Solutions receive clear guidelines to what suppliers should be included in the projects received by a customer. The respondents also expressed that this could be overlooked during the selection process but proclaimed the importance of safeguarding these interests.

4.1.5 Relationship

With a large supply base consisting of suppliers all across the globe, having a good buyer-supplier relationship with the suppliers is a challenging task. There are not enough resources to tend properly to all of them. A lot of them are scattered around different location on the globe, increasing the distance between the supplier and Aker Solutions. All of the respondents employed in the case-company reported that they feel Aker Solutions have a decent/good relationship with their suppliers.

> *"I would say we have a very good relationship (with Aker Solutions) that works very smoothly, we have good meetings together and it is long lasting and has been prolonged"* – Candidate I

The two suppliers expressed that they were satisfied with their relationship with Aker Solutions, categorizing it at a healthy and beneficial buyer-supplier relationship. However, both suppliers emphasized that they would like to be involved at an earlier stage in the project´s purchasing and planning processes in Aker Solutions. This was also mentioned by some of the employees also. Some of the employees also mentioned that having frame agreements, with many of the most used suppliers, made it much easier to maintain the relationship. Because with frame agreements everything related to the terms and conditions of purchasing is agreed beforehand. Elements like delivery, delay-clauses, packaging, quality and reimbursement etc. is already decided on. This is helpful when solving issues, and reducing the chance weakening the relationship. The supplier development is currently good, where the Accreditation-program that Aker Solutions is currently working on, contributes to the development. This was reported by several of the employees that had knowledge about this program.

4.1.6 Outcomes

Desired outcomes:

Desired outcome from the reduction is largely based on what the motivation was at the start of the reduction, it has nevertheless been asked this to see a clearer picture of what the motivation is and how the company will be after the reduction. An answer that frequently are mentioned through this section is that it is expensive to care for a large supplier base. However, the answers are largely the same as under the motivational part, where control of the suppliers, quality, and the desire to enhance the buyer-supplier relationship. The reduction will also give Aker Solutions more predictability and better performance of suppliers in regard to the quality.

> *"By being fewer suppliers, we achieve a stronger connection to them so that we can work stronger with them. It becomes a mutual dependency that will benefit both parties"* – Candidate E

So, the desired outcome mentioned by most of the employees, was that Aker Solutions would gain better control of its suppliers and that the quality of the suppliers in the supply base would increase. The removal of bad quality suppliers can then reduce the likelihood of purchasers buying from "shady" suppliers and of faulty delivery and quality. It is a consensus among the respondents, that are employees, that the reduction process will facilitate further work towards improving the cost saving, quality of suppliers and the development of the suppliers and the relationship with them. Several respondents emphasized the fact that Aker Solutions are aiming at having at least 2-3 suppliers in most of the product categories.

Challenging outcomes:

The respondents haven't only pointed out desirable outcomes of the supplier reduction, but also some undesirable outcomes. It changes the degree of dependency between Aker Solutions and its supplier, as well as leading to less competition among the suppliers. The ability to react is also one element that was mentioned.

> *"Something negative is that there may be less competition among suppliers"* – Candidate A

When reducing the supplier base, it reduces the available supplier options that the purchasers can buy from, and Aker Solutions will become more dependent on the suppliers that remains in the supply base. Several of the respondents highlighted the threat of becoming too dependent on some suppliers, especially where there is only one supplier of a certain product-item. The fact that the demand is so fluctuating, they also mentioned that some suppliers could become overwhelmed by spiky demand and not being able to cope with this. Also, the possibility that the suppliers are out-of-stock of some items. Two of the respondents mentioned that Aker Solutions' approach has changed due to the ups and downs in the market. When the downturn came a couple of years ago, Aker Solutions became more focused on choosing suppliers based on low price. This made the supplier more dependent on Aker Solutions. But now the market has turned around, leading to more work for the suppliers, which have made the suppliers and Aker Solutions more mutually dependent on each other. Another possible scenario from this reduction, highlighted by the respondents, was restrictions in the supply base system. If the purchaser could not get the items from the suppliers due to capacity issues, lack of stock or that the supplier simply has been removed from the system, difficulties using suppliers outside the system can occur. This is because a stricter qualification-process of suppliers has been implemented, as well as a higher threshold for increasing the supply base again.

4.1.7 Changes – Daily operations

The reduction will create effects in the case company in one way or another. It is clear that the representatives from the different segments look at the effects in a different way, where the representatives from the Brownfield-segment immediately looks at the buyers and how their routines at Aker Solutions will change as a result of this reduction. The respondents expressed that purchasers will have a smaller vendor list, making it easier for them to choose the right supplier within the product category. They will also find it difficult to adding a new supplier due to the stricter limitations for the supply base system as mentioned above. One of the respondents pointed out that the routines purchasing are practicing, particularly regarding buying in bulks for projects, brings with it some drawbacks that will not be solved by just a supply base reduction. This is drawbacks connected to the lead time of purchasing orders for projects. It was mentioned that changes in the procurement-routines and often bad habits of some buyers, could be beneficial for the projects use of time. This respondent believed that if the purchasing department don't adapt and change with the reduction, then the possible effect of the supply base reduction for purchasing would halt. Not letting the effect continue throughout the projects´ remaining life.

The interviewed employees within the Subsea-segment had a more future-focused view, where they look at how the work tasks will change over time. Aiming at achieving more fixed price-lists and more use of frame agreement, also trying to establish frame agreements on price. Some of them mentioned that the focus will shift towards less inspections of suppliers and more collaboration and development with suppliers. This is also some of what the parallel Accreditation-program aims at. Small purchase orders from certain suppliers will move towards being more automated, because the purchasing process from these suppliers will be more standardized. If some of the purchasing-processes become more automated, with suppliers already chosen, and fixed prices were in the system, there would be less need for so much manual aid. This means that the number of buyers needed would decrease, due to system-automation.

> *"Then we don't need all the people to do that anymore, people will move more towards supplier relationship, category management, managers type of roles, but I think that overall there will be a big decrease in headcount"*
>
> – Candidate E

Other participants mention that it is a matter of cutting the use agents, and rather contacting the manufacturer directly, skipping the intermediary. This is something mentioned by some of the participants, where they believe that this is a positive direction since they feel there is no added value from the use of agents. Others appear more divided, thinking the use of agents instead of many manufacturers will in the long run give greater cost savings and more value added than the increase in price for using agent would be. The reasoning behind the value-added lies in how the wholesalers manage a large number of producers, which Aker Solutions itself must have dealt with if the wholesalers were removed in the reduction. This is where "value-added" lies if there is no production at the wholesalers. One of the respondents from Brownfield indicated that it would be better to go directly to the manufacturer rather than through agents, implying that there is no added value gained from using agents. Also saying colleagues had the opposite view of it. It became apparent that the views of Subsea and Brownfield where somewhat very different when it came to the use of agents. The respondents referred to agents as a tier one supplier, who purchase all the items on the list from a set of second tier suppliers, before delivering all the items to Aker Solutions.

4.1.8 Parallel strategies and initiatives

Beside completing the reduction of suppliers, there are several other actions have been initiated or are planned to be initiated in the close future to supplement effect of the reduction. There is also the Accreditation-program, where they are trying to gather the top ten manufacturing suppliers, aiming at developing the suppliers and enhance their quality, and at same time improving the buyer-supplier relationship. This is also an effort especially from the Subsea-segment to move towards a higher degree of standardization. One of the ways that Aker Solutions manage their supplier relationships is by the use of frame agreements.

> *"It is also being helped because we are standardizing, we are making configurable standardized design for our products"* – Candidate G

Several of the respondents reported that there is a goal to increase the standardization of the specifications on products and materials used in production. This is something that get increased focus as the supply base is further reduced and easier to manage. They further emphasized that a reduction of the supply base would lead to more available resources,

because the resources used to manage and nurture a large supply base would decrease. This enables a reallocation of the resources to other important matters or to change the way of maintaining and creating buyer-supplier relationships is done and improve the supplier development.

5.Discussion

In this section, the discussion will be presented. We've decided to build up the discussion in a logical manner after the analysis. It will therefore follow the structure of the most important findings, from the previous chapter, in regards of the research question:

"What potential benefits and challenges are associated with performing a supply base reduction and what strategies can be applied to overcome these challenges?"

Research question for this thesis can be divided into the four following sub-questions:

(1) What are the risks and benefits associated with the supply base reduction itself?
(2) What risks and benefits are related to selecting the right or wrong supplier?
(3) What risks and benefits connected to the aftermath of a supply base reduction?
(4) What strategies can be applied to overcome the challenges and exploit the opportunities from a supply base reduction?

Motive

The literature highlights the importance of initiating a supply base reduction based on the right reasons. If the wrong motives are present from the company, the initiated reduction might lead to the opposite effect (Jüttner et al., 2003). The motivational factors will not cause a negative effect in itself, but the wrong purpose may lead to wrong decisions later on in the process, leading to potentially negative effects. The findings indicate that Aker Solutions initiated the supply base reduction based on the desire for better quality, better relationships and a more manageable supply base. The overall reason for reducing the number of suppliers, was to get better control over the supply base, in other words to reduce the complexity of it (Choi & Krause, 2006). The literature states the importance of doing the reduction based on own reasons. Conducting a supply base reduction just because it is a trend or because competitors do it, can do more damage than good, compared to doing it for the right reasons (Jüttner et al., 2003). Implementing a supply base reduction without knowing the market structure properly could be very problematic, the market structure involves knowledge on relationship type and how to advance in the industry itself.

The findings largely correspond to what the literature argue to be important in terms of motivational factors. The findings present that the respondents are motivated by control, quality, buyer-supplier relationship and costs, the distinction comes where the weight itself lies, where literature largely argue that buyer-supplier relationships as the root of factors such as quality and costs. The findings also indicate that Aker Solutions during the downturn had a more traditional approach where they had a large focus on costs when purchasing, but this has changed as it is upturn, where the approach is modernized focusing more on quality. This approach is supported by the literature where Goffin et al. (1997) argues that a modernized approach is needed towards the reduction, where increased quality can arise from a reduction if the focus is on a smaller number of suppliers. The fact that Aker Solutions have changed their traditional approach present in the downturn period indicated that the basis for a reduction is present.

At the same time, it appears from the findings that there is not that broad common agreement among the respondents. The answers bear the mark of different degree of information and knowledge about the process, where it may seem that the different segments within Aker Solutions possesses different information. It appears that several of the respondents, employed at Aker Solutions, might have been involved and informed about the process at very different stages in time. Having different information about the motivation, scope and communicated effect. Communication between the different segments in a company is highlighted in the literature by Ogden (2006) as a critical success factor. The reason for this terminology is because communication equals commitment. The point is not to speculate whether there are commitment issues among the segments, but rather to shed light on the importance of communication. The findings indicate that there might be some issues in regards of communication. It is important to communicate good internally and include several other stakeholders and members of the organization during a process like this, so that everyone is on the same page.

Before we went to the interviews, we had this theoretical foundation illustrated in chapter 2, and came in with expectations of what we should find. As the individuals were suggested from our contact in Aker Solutions, this strengthen the expectations that there was a clear consensus on the motivation and whether it was necessary to carry out this reduction, and why. One of the benefits of face-to-face interviews is that one also sees reactions and body language, and it was clear that not all segments had the same impact on the reduction.

Scope

The findings illustrate noticeable differences when it came to the extent of the reduction in terms of the number of suppliers. The answers ranged from person to person, even though the respondents summed up to some common numbers. This also emerges as a clear signal of the problematization earlier about information given and the communication internally. The findings present that there is the greatest disagreement in what the supply base was before the reduction was initiated. This may indicate that the different respondents have been involved in the process at different times.

The fact that the respondents have been involved at different periods in time may not be problematic. However, the literature emphasizes the importance of communicating during the implementation of the supply base reduction process (Ogden, 2006).

Further, it emerges from the findings that some believe the extent of the reduction is too large, where they believe too many suppliers will be cut, leaving the supply base with too few suppliers. There is no correct answer to what the optimal size of a supply base is, however, reducing the supply base too much will reverse the actual reduction as you have to obtain more new suppliers (Choi & Krause, 2006). As can be seen in Figure 1, reducing the number of suppliers to much, reducing the complexity, the supply risk increases as well as supplier innovation decreases. There is an imminent risk that a reduction may decrease the supply base more than sufficient. Reducing too much could also create problems for the Brownfield segment, which largely needs more suppliers in the different product categories than Subsea. This was problematized in the findings as well, where incorrect criteria for the reduction could cause problems for Brownfield in terms of losing suppliers they really need, but don't use as often. Segments like Brownfield will require multiple sourcing to a greater extent than the other segments. The findings indicate that the Subsea segment are working towards more standardization, and that the same supplier/manufacturer will do the same job over a longer period of time, making the same product, which also increase the quality according to the findings. This strategy is something that the respondents said would not work for the Brownfield-segment, as the projects they work on have are totally different and varies a lot, further specifying that every segment have different needs.

Selection

The selection is considered the most crucial part of the supply base reduction, and the reduction itself starts and consist of deciding on the best suppliers (Van Weele, 2014). The findings emphasized that Brownfield, Greenfield and Subsea have different needs from their suppliers. Besides the imminent risk of having to go back on the reduction if they have reduced too much, they can remove the wrong suppliers and thus have to reverse some of the effort (Choi & Krause, 2006).

Choosing the wrong suppliers is a very broad term, but the fact that they have different needs within the organization, causes a risk that cannot be ignored. It is also here the problematization around the aforementioned communication and involvement is central, where it emerges from the findings that it is people from the Subsea-segment that are responsible for conducting the reduction, where the other segments have become included and involved along the way. This can cause the other segments to feel overrun or bypassed. This is emphasized from the findings, that some respondents express their concerns that this may happen. The literature substantiates this with Ogden's (2006) critical success factors where he expresses the need for involvement during the implementation and conduction of the supply base reduction. Ogden (2006) also mention the importance of selecting the right suppliers, meaning the right suppliers for the organization as a whole, not only a portion of the organization.

Choi and Krause (2006) emphasize the importance of safeguarding the complexity in a reduction of the supply base. It became visible through the findings that Aker Solutions has complexity in mind when it comes to reducing the supplier base, but if they fail to find the right balance, four critical risk-aspects appear; supply risk, responsiveness risk, cost risk and innovation risk (Choi & Krause, 2006). This is further explained in the theory presented in Table 1. Respondents expressed that the complexity is something they need to safeguard through the reduction. However, it appears from the findings and the interviews, that there is not much focus on this, and maybe a lack of understanding the severity of it.

It comes from the findings that they want 2-3 suppliers per product category, in order to ensure an optimal level of complexity, Aker Solutions must be very careful when implementing the reduction. Both low and high complexity could lead to the aforementioned risks (Choi & Krause, 2006).

Another factor that is presented in the findings is the fact that there are other stakeholders for Aker Solutions than just the internal segments. They have customers who have clear preferences and requirement when it comes to which suppliers Akers Solutions need to use on certain projects. If they do not meet these requirements, it can become difficult for Aker Solutions in the bidding phase if they cannot use the suppliers their customers want. When they do not have these suppliers, they will either lose the contract or have to add new suppliers, as Aker Solutions has around 250 projects in progress at the same time, this could be many suppliers, which will reverse the reduction.

It is not as easy to just remove suppliers. Terminating suppliers does not make the suppliers disappear or cease to exist, which is something that is important for Aker Solutions to consider (Alajoutsijärvi et al., 2000). Alajoutsijärvi et al. (2000) argue to terminate suppliers in an orderly manner, because they might be needed in the future and you want to avoid problem because of this for potential future collaborations. This can turn out to be crucial for Aker Solutions as they might be depending on using these suppliers again on a later occasion, and with a bad "break-up" it might be hard to use these suppliers again and could lead to a risk.

As this reduction is a global reduction, not only for suppliers delivering to operations in Norway, it is also important that the selection criteria's being used take that into the considerations. As some of the respondents mentioned, it is important for Aker Solutions that many of the supplier they keep, have a global presence and can serve several locations of Aker Solutions. For example, a supplier in France must be able to serve other locations in Europe. It is therefore highly important to look at the supplier's capabilities in delivery and capacity. The remaining suppliers need to be able to handle increased demand, meaning they need the correlated capacity.

Relationship

Besides better control and a more manageable supply base, the reduction itself won't fulfill the motivational drivers nor desired outcomes (Goffin et al., 1997). Findings indicates that Aker Solutions has a desire to reduce the number of suppliers in order to create better control and at the same time it is easier to develop better relations with the suppliers with a smaller supply base. This is supported by the literature, where it argues that a reduction facilitates better conditions for developing improved supplier relationship. It is important to point out that a supply base reduction does not imply that the relationship with the suppliers will improve, but with fewer suppliers, Aker Solutions can then use the resources more efficiently and having more time for focusing on buyer-supplier relationships (Goffin et al., 1997; Ogden, 2006).

The findings show that Aker Solutions is convinced that a reduction will make them more dependent on their remaining suppliers, the dependency issue is confirmed by several sources in literature, where it appears that they have to choose the right suppliers to not experience so much problems (Choi & Krause, 2006; Cousins et al., 2008; Gules & Burgess, 1996; Wagner & Johnson, 2004). Aker Solutions must be aware of the time aspects associated with developing a better supplier relationship. If they do not arrange the right use of resources, this could be negative. This also applies to the reduction itself (Porter, 1997). In the literature, Porter (1997) argues that the reduction itself will be difficult. He points to the competitive situations between suppliers as a major problem.

From the findings it is clear that this is something Aker Solutions is aware of, but it also emerges that they want 2-3 suppliers per product category, as mentioned earlier, and the importance of choosing the right suppliers and creating a good relationship and having good frame agreements to support the relationship and the transactions is ever present.

The purchasing department is categorized as one of the most central parts of the supply chain, the findings also identify that the purchasing department will experience the greatest change, where the number of suppliers will be limited within each product category. This rise the question of sourcing, where the purchasers must take a stand on local or global sourcing. It comes from the findings that the sourcing is largely local sourcing as of today. Such a large number of suppliers indicates that each working site of Aker Solutions use local suppliers. To be able to perform such a drastic reduction of suppliers, it will require the remaining suppliers

to have a global focus. The remaining need to have a global focus because Aker Solutions are represented on a global scale, and with a reduced number of suppliers the remaining suppliers need to cover a greater area for Aker Solutions to have sufficient cover of supply on every location. This was also emphasized in the findings where Aker Solutions valued this criterion as important when reducing number of suppliers on inspections.

From the findings it was clear that some of the employees and the suppliers interviewed called for the suppliers to be involved earlier. For the supplier, being involved in the projects earlier then the communication would become better, as well as the forecasting in demand would improve. This is something that could be beneficial for both parties, as it could lead to improved lead time. This is something that would benefit also the buyer-supplier relationship between them.

Outcome

The outcome of a reduction can be seen in two parts, where there are outcomes that come directly from the reduction, and outcomes that are facilitated by the reduction, but which needs additional actions in order for that to happen. As stated earlier the findings identified that the motivational drivers and desired outcome were quality, relationship with suppliers and more control over the supply base. As literature suggests, these outcomes are highly achievable with the help of a reduction (Goffin et al., 1997). Back to the two parts mentioned above, only increased control will come as a direct outcome of the reduction, as reducing the number of suppliers will make it easier to manage (Choi & Krause, 2006). Increased quality, lower costs and a competitive advantage will possibly be achieved when you actively step in to improve relationships with your suppliers (Choi & Krause, 2006; Cousins et al., 2008; Ogden, 2006).

It is also apparent that the supply base reduction will lead Aker Solutions to become more dependent on their remaining suppliers. This is something that can pose a risk. There is a risk of supply disruptions, as fewer suppliers will be used, a higher dependence on the supplier having enough capacity and ability to deliver on-time emerges. This is somewhat contradicting what Brandon-Jones et al. (2015) indicate. With fewer suppliers, the complexity would be reduced and also the frequency of disruptions in supply and supply chain. But as Choi and Krause (2006) propose, is that the supply risk is reduced when the complexity is at a

satisfied level, but if the complexity becomes too low, then the risk increases. This can be seen in Figure 1.

It is also evident from the findings that Aker Solutions wants its suppliers to come earlier into the implementation of a project. This is also information that repeats itself with the suppliers for this study, where they indicate that they want to get into the projects earlier in order to more easily plan the desired amount of material for Aker Solutions. This may indicate that the suppliers are open and motivated to have a closer relationship and is categorized as a key to get the supplier relationship to work. Both parties must be able to see the benefits of partnering (Alajoutsijärvi et al., 2000). Besides the desire to arrive earlier in the projects, categorizes both suppliers and Aker Solutions that they have a good relationship, and both are positive for the further development. This positive attitude also suggests that both are motivated to develop the relationship.

Strategies

Early in the supply base reduction, it is important to choose the right suppliers and is categorized as a critical success factor (Ogden, 2006). However, before starting to reduce the number of suppliers, it is important to have good communication internally and including all stakeholders in the process (Ogden, 2006). In order to involve important stakeholders, it is recommended from the literature to implement several cross-functional teams that will act as the voice of each segment (Ogden, 2006). In this way, Aker Solutions will be able to involve all the segments and at the same time safeguard the various needs present.

Both the literature and the findings expressed the importance of basing the choices during the supply base reduction on the correct information. This applies to information regarding the suppliers, how they actually perform, but at the same time do not forget that they have customers to respond to, with clear preferences. Here is a return to the critical success factors of Ogden (2006) where he argue that one of the main challenges during the supply base reduction are in relation with the lack of historical data, knowing what suppliers each customer prefer, which suppliers perform well after important factors such as; on-time delivery, quality, less errors etc. In order to make the right decisions, it is important to have implemented a good information system. A good information system involving the suppliers is often a measure of performance. Performance measurement also act as a good foundation to

base the criteria's used to select remaining suppliers (Chan, 2003). Reason why the literature points to performance measurement is because it creates an opportunity to differentiate suppliers from each other on aforementioned factors important for the company. Further theoretical explanation on Ogden (2006) success factors can be found in Table 3.

The literature is very clear that in order to get the benefits of better quality, better responsiveness and less cost, Aker Solutions need to build up a good relationship with their suppliers (Choi & Krause, 2006; Cousins et al., 2008; Ogden, 2006). Implementing a strategy for earlier involvement of the suppliers could be one way to reduce the one-way dependency on suppliers. This can lead to more codependency. By getting suppliers earlier in the process, which the findings emphasize, it indicated that both parties agree on the importance of sharing information. Sharing information with each other indicates a more modern collaboration that goes away from the traditional method (arms-length relationship). Sharing information that benefit both through agreements will make it possible to achieve better quality, a closer relationship and lower costs (Gules & Burgess, 1996). Further advantages of a close collaboration are presented in Table 2. A strategy like this could also reduce the risk of supply disruptions, by better communication and information sharing, then the coordination could improve.

Knowing which strategy to implement in regard of sourcing and portfolio models can be difficult, at the same time, it will be effective when categorizing suppliers (Van Weele, 2014). The findings indicate that the situation of Aker Solutions does not make this implementation any easier considering three unique segments and that they conduct 250 projects simultaneously. The literature recommends using Kraljic's purchasing portfolio matrix when designing commodity strategies, where this approach analyze turnover and the supplier base on risk and profit (Van Weele, 2014). Kraljic's (1983) matrix refers to the importance of the suppliers so that the important choices in the reduction process is not based on wrong criteria. Aker Solutions may be highly dependent on suppliers, delivering bottleneck product or critical material, which does not necessarily come out best when looking at the performance, quality or on-time delivery. The findings indicate that this is problematized among the candidates from Brownfield who often have more bottleneck products than the two other segments, this can cause the projects at Brownfield to suffer if niche-suppliers disappear from the supply base. An additional theoretical approach will be found in Figure 6 and Figure 7 where Kraljic present the problematization more descriptive. Implementing a strategy that

focuses on categorizing the products and suppliers in a similar way of Kraljic´s model could prevent unnecessary issues with ending up with the wrong supplier. Helping to secure that the selection process is done more correctly. It will also enable Aker Solutions to keep an overview of what items could pose a risk in the future, making it easier to implement countermeasures. Applying such a strategy is also a way to improve the purchasing process.

6. Conclusion

In this chapter a conclusion will be given to the research question defined for the thesis. Further, limitations of the study and recommendation for further research will be presented.

6.1 Conclusion

The oil service industry is a unique and complex industry which is highly sensitive to the conditions of the global oil and gas market. Aker Solutions is a project-based company delivering engineering, procurement, construction and installation services to the oil and gas industry. The main purpose of this thesis was to find out wat benefits and challenges that are associated with a supply base reduction for Aker Solutions, and what strategies could be applied to try and overcome these. This reflects the research question:

"What potential benefits and challenges are associated with performing a supply base reduction and what strategies can be applied to overcome these challenges?"

In order to give an answer to this, we have performed a single case study in collaboration with Aker Solutions. We conducted nine in-depth interviews as main method of collecting data. The data was then transcribed, categorized and coded using NVivo 12, before being presented in chapter 4. We then discussed the findings in connection with the literature, looking more on the elements that reflects being benefit or challenge

We conducted an exploratory case study using in-depth interviews in order to explore the topic closely within the selected company. We wanted to get information directly from the source. The goal with this thesis is to gain more insight into the subject of supply base reduction, and at the same time assist Aker Solutions, giving them an input with a different perspective from outsiders. Attempting to identify benefits or challenges which themselves have not identified haven't thought about. And also see if there are some strategies that could be applied to help overcome these challenges.

From our research we have found a couple of benefits and risks that Aker Solutions should be aware of. With a reduction in the number of suppliers we have found that the benefits mainly are a reduction of the supply base complexity. Lower complexity and fewer suppliers will give Aker Solutions more control of their suppliers, it will increase the average quality of the

suppliers. A reduction in transaction cost might also be a result. There will also be freed more resources previously used for managing all the suppliers, which can be allocated in a different way. It also facilitates better opportunities for improving buyer-supplier relationships and supplier development. There is a high risk of reducing to many suppliers, getting a too low complexity. Exposing them for higher supply risk and being more dependent on some suppliers.

When it comes to the selection process, the benefits are connected to the motivation for the supply base reduction. If the selection process is not done properly, then there is risk related to it. If the selection is done using wrong criteria's, or criteria's that does not consider the different segment's needs, then there is a risk of removing wrong suppliers. This is something that can affect the daily operations of especially the purchasing department, and the segments. Poor quality suppliers might still be in the supply base, while good ones are removed. This can affect the quality, supplier responsiveness, delivery and capacity etc. The challenge is also that the reduction is performed by people from the Subsea-segment, which have a different approach and strategy than the other segments.

The benefits and challenges of the outcome of the reduction is also something we looked at. It will easier for the purchasers at Aker Solutions to find and pick suppliers to use. A challenge will be when the scenarios occur where there is a need for those suppliers which have been removed. At the same time, it will be challenging to maintain the changes, not going back to old habits. It is important that the changes will be locked in and followed up. There is a risk related to the whole reduction, if Aker Solutions lack in properly follow-up all the changes and challenges identified.

There are some proposed strategies and improvements that could be applied. We propose to look at the internal communication. There are indications that the communication related to the reduction process is not at its best. We suggest establishing cross-functional teams to be a part of the remaining process, with a focus on good communication with the parties being affected by the reduction. It is also important to involve people from all segments. Also, Aker Solutions should initiate a strategy for closer buyer-supplier relationships and increase the use of frame agreements, in order to reduce the risk of being too dependent on their suppliers, making the suppliers more dependent on Aker Solutions as well. This is something they

should do beside the current strategy to gather the top ten suppliers (Accreditation-programme). Actions to secure the company's supply is also important.

There are several benefits and risk associated with this supply base reduction, some more important than others. It is important to deal with the risk and challenges before they evolve into something with larger consequences for the supply chain. We have attempted to explore these.

6.2 Limitations of study

There are some limitations to this study. The purpose has been to identify risks and benefits associated with a supply base reduction in a highly project-based company in the oil service industry. We have conducted an exploratory case study and interviewing nine people. Since this is an exploratory study, we cannot give absolute conclusions. At the time of this study, Aker Solutions were in the middle of the reduction, making the result somewhat hypothetical. The scope of this thesis is limited to mainly focusing on the inputs from respondents situated in Norway. The result of this study is not something that can be automatically compared to other companies, but it shows similarities with previous research.

6.3 Recommendation for further research

Recommendations for future research are that it would be interesting to study the same reduction process after it is completed. This could give better indications of what risks and benefits the reduction brought with it. Other researcher could also study other companies in the same industry, or that are highly project-based. It would also be interesting to look at what the long-term effects are of a reduction in number of suppliers. There is also a need to study how the extensive use of projects in an organization are affect by the supply base complexity.

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8.Appendix

8.1 A: Interview guide - employees

Questions for employees at Aker Solutions:

1. Can you give a brief description of you and your role at Aker Solutions?

General:

Aker Solutions is planning a reduction in their supply base by reducing the number of suppliers.

Motivation for reduction:

2. What would you say is Aker Solutions motivation and reason for such a reduction? (Transaction costs, complexity, time and effort, buyer-supplier relationship?)

Approach/selection/reduction approach:

3. How many suppliers are currently in your supply base as of today?
4. Are you categorizing the suppliers in the supply base in any way? How is this being done? (By product category, or by location etc.?)

The process of reducing the number of suppliers in Aker Solutions supply base have not started or been done yet.

5. How many suppliers are going to be removed from the supply base? And how many is expected to remain after the reduction?
6. What is the scope of this reduction? Globally or only locally?
7. How are the suppliers to be removed selected, as well as those suppliers the company is keeping? What selection criteria are used?
8. How are you planning to remove/reduce the suppliers? Is there any strategy to it?

Buyer-supplier relationship:

9. How is Aker Solutions relationship to its current suppliers? How have it been the last years?
10. What will be done by Aker Solutions after the reduction with regards to the relationship with its suppliers? Are there any planned actions?

Expected Benefits and Risks:

You have mentioned some of what the motivation for Aker Solutions are for wanting to reduce its supply base.

11. What are the desired outcomes of the reduction? What potential outcomes gave motivation for this reduction?
12. How do you think the reduction of suppliers will affect the daily operations? What will change?
13. Which departments within Aker Solutions is expected to notice the most of this reduction? How?

Benefits:

14. What potential and desired benefits have been identified for Aker Solutions to expect from this reduction? What benefits are you hoping for? What are the positive outcomes expected of this reduction?
15. What benefits do you think a supply base reduction will have on your department and its daily operations?
16. Have there been made a plan over how to realize these potential benefits? If so, what is it?

Risks:

17. What potential risks or downsides have been identified as a result of a supply base reduction?
18. What risks do you think a supply base reduction will bring for your department and its daily operations?
19. Have there been made a plan for how to deal with those risks? What actions are being done to reduce the risk?

General about benefits and risks: Challenges

20. How do you think a supply base reduction would affect things like:
    - transaction costs?
    - Supplier responsiveness?
    - Delivery reliability?
    - Your dependence on some suppliers compared to before?
    - opportunisms from suppliers?

- complexity?

21. What actions are planned to be implemented to overcome these challenges?
22. Are some of these challenges more important to deal with than others? Which?

8.2 B: Interview guide - suppliers

Questions for Aker Solutions supplier base

1. How do you see your cooperation with Aker Solutions, and how will you describe the relations between you and Aker Solutions?
2. How long have you been working with Aker Solutions?
3. Have you heard about the reason supplier base reduction done by Aker Solutions? Do you feel like there is more responsibility added to your company considering the reduction?
4. The supplier base reduction is often done to gain a competitive edge over its competitors, how can you make this edge relevant?
5. In case of increasing demand regarding Aker Solutions, how ready are your company for this eventual increase?
6. Have you experienced some changes following the reduction of the supplier base? If yes, how are these changes acting out and what do you do to control these changes?
7. Do you think of Aker Solutions presence regarding maintaining a healthy environment? Would you like a clearer presence and better assistance regarding Aker Solutions?
8. How would you describe your relationship to Aker Solutions?
9. Would you say that there is an inter-relationship among the suppliers in the supplier base of Aker Solutions?
10. Supplier development is critical to maintain a competitive advantage in a rough market, do you feel that Aker Solutions are exercising this towards their supplier base? If yes, why is it good? Why is it bad?
11. What do you think is the recipe to accomplish with supplier development and to create a common developing culture? From your point of view? From Aker Solutions point of view?
12. Do you have some ongoing projects involving Aker Solutions at this moment?
13. If yes, how does this inspire you to work continuously improvement in your company?

8.3 C: Reflection notes

Reflection Note Fredrik Johannesen

This reflection note will tell you about my learning journey throughout the master program at the School of Business and Law at the University of Agder. Internationalization, innovation, and responsibility are themes that will be emphasized.

We have conducted an empirical study on the topic of supply base reduction. The aim of this thesis has been to locate risks and benefits associated with a supply base reduction process and strategies to overcome challenges found in the discussion. My personal goal for this thesis was to learn as much as possible about a topic that I find very interesting, to learn more about an industry that is very heavily represented in the region I grew up in, and an industry and market that I see as a field of desire to work within. This industry is largely the reason why Norway is regarded as a welfare state in 2019 and will be central for centuries to come.

Supply Chain Management has increased in popularity over the past few decades and more and more companies have understood the importance of a proper Supply Chain and what possibilities lie ahead when you relocate resources to improve this part of the business structure. Implementing a Supply Base Reduction is a great initiative for helping companies retain control of their supply base and make it possible to focus on fewer suppliers making a beneficial buyer-supplier relationship. A buyer-supplier relationship can lead to better quality of suppliers, better quality on products and a competitive advantage in very competitive markets.

The findings in the research was mostly in accordance to the literature on other types of supply base reductions for business ventures, however the industry is very complex, and risks and benefits revealed was extra nuances.

The conclusion was that there are clear pitfalls conducting a supply base reduction, but there are also some great advantages to be gained by reducing the supply base, especially in the situation of Aker Solutions. Aker Solutions have some internal problems making it challenging to conduct a supply base reduction without considering all the factors. Aker Solutions are a complex project-based organization with three unique segments that are all going to be reduced on the same reduction. Therefore, it is hard to compensate the reduction for all the segments without making some areas of the organization suffer. The conclusion can of course not be generalized, considering being a case study, but it would be interesting to

follow up with a larger research including several companies within the service and supply industry in an attempt to verify the findings of our research.

Innovation

Cyclical industries are a type of industry that is sensitive to the business cycle, meaning revenues generally are higher in periods of economic prosperity and expansion and are lower in periods of economic downturn and contraction. Aker Solutions in covered by that term, and such industries included as cyclical industries are subject to innovation because innovative activities are potentially capable to improve the quality of their products, as well as prevent damages, decrease expenses (cost), and increase efficiency. A large portion of the cyclical industries are profoundly mechanical, which implies that development is impossible without innovation. The importance of being innovative is more present in the organizations today rather than 20 years ago, this is solely based on the fact that the industries are changing so fast all over the world. Each company need to embrace new opportunities and be open for changes of doing things, as the technology enhances, and the world is getting "smaller". Every industry is facing hard competition, and the competition won't decrease in the near future. This research has focus on Aker Solutions based in Norway, where the Norwegian oil companies are considered among the most advanced and innovative companies in the world. A supply base reduction is an innovative approach to create a competitive advantage for Aker Solutions in a market consisting of contract biddings. There is of great importance for Aker Solutions to differentiate themselves from the multiple companies offering the same thing to stay relevant in the industry, and the reduction is an action of that sort.

Internationalization

As mentioned above on several occasions, Aker Solutions find themselves in the oil service industry, as a part of the much broader term oil and gas industry. The oil and gas industry are Norway's largest industry, where the service and supply industry are Norway's second-largest industry in terms of turnover. The industry itself includes 1250 companies and have developed cutting-edge expertise and is internationally competitive. 40% of the service and supply industry's turnover is coming from international markets, leading the industry to be highly international. Most of the markets that Aker Solutions serve, as of today, are international. That is the reason the conditions on international markets and fluctuations in oil prices, demand and supply conditions, and political regulations of oil production affect the thriving and survival of Aker Solutions.

The conditions have been changed for the companies in the oil and gas industry/service and supply industry where the previous downturn in the oil and gas industry led to decreased production and number of operating oil rigs. This affected the unemployment of engineers and personnel involved in the industry and caused the percentage of unemployment to reach the highest amount since the discovery of oil in Norway. Before the downturn these companies had been prospering for many years due to the lucrative conditions of the domestic market. The conditions have changed for these companies to not be that much affected by a future downturn leading the companies to think in innovative ways.

Responsibility/Accountability

Safety is important for every industrial sector, however, particularly so for the offshore oil and gas industry and supply and service industry where the potential for a major accident is ever present. Management of process safety is a cornerstone and core value across the whole oil industry. Service companies that produce equipment, fixes oil rigs etc. for the exploration of oil and gas are responsible for the workings of these matters, but they are also responsible for the lives of the personnel working in such a dangerous environment. Companies in this industry follow international and European standards of oil service and equipment production. This industry is unique because the companies competing is not competing on low prices, every bidder for a contract need to follow their customers' needs and preferences, including high quality certified products that are expensive.

The master thesis program at the University of Agder have given me a great amount of knowledge. In combination with my learning experience at Høgskulen på Vestlandet (HVL) I now seek to exercise all this knowledge in an exciting workplace. This master thesis has been the toughest, most challenging and most time-consuming part of my education, but it has also offered me new acquaintances and a great insight into the most important industry in Norway. The learning curve during this thesis have been steep, with some frustrating moments at times, but introduced me to new tools needed to conduct this research, including NVivo, ORIA, EndNote and recording apps. I also learned that things usually take longer time than expected, which became clearer and clearer for each day through this task.

Reflection Note Thomas Wigdel Fuglseth

My personal goal with this thesis was to learn and experience as much as possible how the supply chain is managed in a real company. To put what I have learnt from the master programme and the theory into a real-life context in collaboration with a self-selected company like Aker Solutions.

The purpose of this Master´s Thesis and the research has been to identify potential benefits, opportunities and challenges related to a supply base reduction for our case-company, which is Aker Solutions. We are looking at the potential effect, positive and negative, related to reducing the number of suppliers for a project-based company in the oil-service industry.

We have looked at the complexity of a supply base, in which how the complexity changes with a reduction in the number of suppliers, and what can change because of it. Reducing the number of suppliers is one way for many companies to gain control over the supply base, reduce costs, increase the quality of suppliers etc. Such a reduction does not only bring with it benefits and opportunities but can also expose the company to several challenges that can pose a risk.

After conducting nine in-depth interviews, we found that the main findings were mostly in accordance with what to expect from the literature. In addition, we found some extra elements during the interview process that we did not find in the literature. These elements were something that we formed an image of based on the impressions we got and what we observed during the interviews, which showed other challenges with the reduction.

The conclusion was that there are several potential benefits and opportunities that comes with this reduction process. The benefits are that the company gain control over the supply base, reduce costs of managing the supply base, increase average quality of the suppliers. It also facilitates opportunities such as better supplier development and improved purchasing process to mention some. There are also some challenges, internal communication (related to the reduction) across the business segments and to the employees involved and affected. Aker Solutions might also become highly dependent on some suppliers which can pose a risk of supply disruptions, or the wrong suppliers are removed leaving them with lower quality suppliers. There are not only all positive side-effects with a supply base reduction, there are challenges and risk either way. It has an effect on the whole supply chain.

Internationalization

The oil service industry is directly affected by the international oil and gas market. Where the fluctuations in the price of oil, supply and demand and political regulations affect the prosperity and survival of the oil service companies both in Norway and globally. Due to the recent downturn in the oil industry, fewer contracts was given to the oil service companies, forcing them to lay off employees and cut costs. This led to an international trend, where the oil service companies restructure their organization and supply chain to save money. This is something that continues after the market started on its upturn again. The competitive environment has changed because all the players are changing. The companies are forced to change and improve, or else they risk losing business to their competitors. For Aker Solutions to survive and continue their prosperity they have to adapt and change their supply chain so they can continue to be competitive and to better withstand the next downturn in the industry. International issues such as Brexit and the ongoing trade war between the US and China, affecting the price of commodities around the world. Such uncertainties in the external environment of a company can cause disruptions in the supply chain and operations. The suppliers can be affected and experience problems, which influence Aker Solutions. This forces the companies to react and safeguard themselves even more.

These issues reflect the importance of companies managing their supply chain and supply base, creating a strong foundation to deal with such international forces. You don't want to be the one lagging behind the rest of the competitors, being left behind.
I have learned about several large international organizations which have failed because their failure to change and adapt their supply chain and supply base. And those who succeeded while the other failed. Through the master courses I have learnt how important the management of the supply chain in a company actually is. The internationalization leads to more and more exposed supply chains, regardless of the industry.

Innovation:

The oil service industry mostly produces heavy equipment and installations that are durable, but also delivers maintenance and modifications services. There is a gap between the oil service companies and the oil and gas companies where the whole industry could benefit from a higher degree of standardization regarding parts and spare parts used in the production and in maintenance. It is not innovation per se, but a need for a change that would benefit both

parties in the whole industry. By trying to standardize which type of bolts and screws being used, then cost could be saved for both the customer and the company constructing and maintaining the constructions. It would be a change of practices, removing the necessity for storing a large supply of different types of bolts with different dimensions. It would be a way for the whole sector to reduce unnecessary use of materials, stockpiling so many different items in case it needs to be switched out. If a change towards more standardization regarding the little things, done by all the actors in the sector, then there could be huge environmental saving and cost savings in the long run.

Responsibility:
Companies in the oil and gas sector, being the large oil companies, oil service companies or their suppliers, have employees working in dangerous conditions on oilrigs or when building large modules. It is important to focus on health, safety and environment (HSE). This can for many companies be an ethical challenge, trying to meet deadlines, profit margins and other cost-factors, potentially affecting the health and safety in a negative way. From what I have learned during my work with this thesis and during the master programme, is that sacrificing the potential extra revenues and cost savings from pushing the limits of the employees, and having full focus on the health and safety of the workers and their working conditions can be more positive in the long run. It will give a competitive advantage, making your company earning better reputation. Actively working towards improving health and safety is a way of being responsible. And a company like in our case study, they have a responsibility to ensure that the suppliers they use also focus on safety and health. How well the suppliers manage the HSE, reflects over on the focal company, making it more or less attractive in the market. There is no correct answer on how to deal with this ethical issue, or how to ensure that every actor in the supply chain and industry is responsible. But in order to ensure that the company is being responsible, is to implement strict guidelines for internal HSE, and impose requirement for your supplier, that if they do not follow such and such HSE requirements, then they can´t do business with the company.

All in all, through this master programme, and working on this thesis, I have learned a lot. I have had the opportunity to use what I have learned in class and the theory towards a real-life situation.