



# Master's degree thesis

**LOG950 Logistics**

**Managing Industrial Buyer-Supplier Relationships:  
A Case Study of Ulstein Verft**

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## **Preface**

This master's degree thesis is the final stage of the Master of Science in Logistics degree at Molde University College, and has been written during the winter and spring of 2014. The thesis has been a part of the research project called SMARTprod, between Møreforskning Molde, Molde University College, Ulstein Verft AS, R&M Ship Interior AS and WestCoat AS.

During the course of writing this thesis, I have received guidance from two supervisors. Associate Professor Bjørn Guvåg has been my supervisor at Molde University College and research scientist Gabriele Hofinger Jünge at Møreforskning Molde has been co-supervisor. I would like to thank them both for valuable advice, discussion and guidance throughout the process of writing this thesis. It has also been a great motivation and valuable experience being able to participate in meetings and other events in the SMARTprod project.

Furthermore I would like to thank all of those who participated in the interviews at Ulstein Verft, R&M Ship Interior, WestCoat and Møreforskning. They all showed a great attitude and willingness towards participating in the research. Especially I would like to thank Runar Arne Toftesund and Eva Lande Rise for organizing interviews and visits to the shipyard, answering questions and providing me with other information during the project.

Molde 25.05.2014

Espen Rød

## Summary

Shipbuilding has a long history in Norway and in Møre og Romsdal. In the last few decades the shipyards, supported by a large network of maritime suppliers have become the world's leading builders of offshore vessels for the oil- and gas industry.

A typical feature for Norwegian shipbuilding is the outsourcing of work-packages in disciplines such as painting, electro, piping, interior etc. in the shipbuilding process. This research has explored such a relationship with two of Ulstein Verft's suppliers, WestCoat and R&M Ship Interior. The purpose was to find out how such buyer-supplier relationships are- and should be managed. In addition, an important aspect has been how the performance of such a relationship can be measured.

For the research design, an explorative case study was chosen, where primary data has mainly been collected through interviews at all three of the participating companies.

The relationships have been analyzed by use of several theoretical aspects in supply chain management as well as inter-organizational theories such as principal-agent theory, transaction cost theory and different resource based theories have been used. In addition network theory and theory around business contracts as well as how to measure performance. Findings show that these two relationships are concurrent with many of the theories used to analyze these relationships, but that there is many opportunities and potential for improvements. Mainly the findings show that there is a high need for information sharing in such relationship and if done properly this can improve both operational and managerial performance. Another finding is that there is too little focus on increasing value creation through leveraging capabilities of the supply networks, and early involvement of supplier can increase the potential for achieving this.

A final purpose of this thesis has been to find appropriate methods to measure performance in buyer-supplier relationships. A balanced framework approach was chosen, and adapted for use in buyer-supplier relationships. Based on the analysis some performance metrics have been developed, and a suggestion for a performance measurement system to measure the performance of these relationships is presented.

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## **1.0 Introduction**

The Norwegian shipbuilding industry has through a long tradition built a versatile and highly competent maritime industry, but because of the high salary levels in Norway, the industry struggles to compete with low cost countries. As a result Norwegian shipyards have become more and more specialized, and the focus is mainly on offshore vessels for the oil- and gas industry. With the shipyards success, the suppliers of marine equipment has developed into an even bigger industry, and they are now a leading actor in technological development within marine equipment globally (NOU 2005).

### ***1.1 Shipbuilding Industry in Møre og Romsdal***

The maritime industry in Møre og Romsdal consists of about 212 companies. Among them are 165 suppliers of maritime equipment and services, 14 shipyards, 15 ship consultants and 19 shipping companies. In 2012 this cluster had a calculated turnover of around 47 billion NOK in 2012, and has about 15000 permanent employees, and if hired labor is included there are around 20000 working in the maritime cluster (Hervik et al. 2012).

In a research about the ripple effect of STX OSV, a shipyard now known as VARD, Oterhals, Johannessen, and Hervik (2011) found that 66% of equipment and services were supplied by Norwegian suppliers. For suppliers in Møre og Romsdal, the share was 42%. The share purchased from low cost countries was as low as 34%, which includes outsourced production of the hull. This shows that the supplier industry in Møre og Romsdal is very important for the shipyards, and that the ripple effects are large.

According to Hervik et al. (2012) the interaction effect of the maritime cluster, develops the competitive power in the entire maritime industry. This is based on effective supplier sector that competes, exploit economies of scale and creates a functioning labor market of key personnel. Also, close relations among the actors creates effective information networks that supports reorganization, innovation and learning in an international competitive market.

According to Aslesen (2006) Norwegian shipbuilding are characterized by having a sequential processing of products leading to complete ship. During this sequential

processing several actors work simultaneously while the product is stationary for the outfitting phase. More and more of the work is outsourced to suppliers as work-packages. As the variations in the suppliers and the personnel can be high, shipbuilding in Norway is project based where each new ship gets a project number and an own project organization to control the project. Each project usually has unique technical solutions and a system of actors that are temporarily put together to do the building, and that this has similarities to the construction industry (Aslesen 2006).

Three actors from the shipbuilding industry, one shipyard and two suppliers, will be used for analysis in this case study. Some background information about the companies will be presented in the following sections.

### **1.1.1 Ulstein Verft AS**

Ulstein Verft AS (Ulstein) is a part of the Ulstein Group and was founded in 1917 in Ulsteinvik, Norway. Their main office is located in Ulsteinvik. The Ulstein Group has about 700 employees in 7 countries, which are Brazil, Netherlands, Croatia, Poland, Singapore, China and Norway. The group is known as an innovator within maritime equipment and ships, and their main business areas are ship design, shipbuilding, shipping and power and control, which include bridge instrumentation, control and monitoring systems, power packages and integrated communications.

Ulstein Verft builds a wide range of highly-effective and sustainably efficient vessels that include offshore support, offshore construction, seismic and research vessels. At Ulstein Verft they mainly produce “prototypes” of ships and usually only one or two ships with the same design are produced at Ulstein’s shipyard. The design is often sold to other shipyards after production at Ulstein Verft is finished. According to Ulstein (2013) they have a strong focus on innovative technological solutions and methods. They have high expertise within project management, effective logistics, and pre-outfitting techniques. They use a collaborative approach and have streamlined production processes which results in a high level of flexibility and quality. The main yard is based in Ulsteinvik, Norway. In addition, Ulstein Verft has a department in Vanylven, Norway, where steel sections for the main yard are built (Ulstein 2013).

Ulstein vision is: *“to create tomorrow’s solutions for sustainable marine operations.”* They have three key areas they focus on, which is innovation, expertise and quality. These three together is how they create added value for their customers.

### **1.1.2 R&M Ship Interior AS**

R&M Ship Interior AS (R&M) is a part of the fully integrated international company R&M Ship Tec GmbH with headquarters in Hamburg, Germany. The international corporation works as a full-service project partner and deliver interior outfitting of all types of ships and marine facilities. They have the organization to take full responsibility for the entire value adding chain, including services such as engineering, consulting, design, planning, implementation, and production of small and large project, in addition to turn-key programs (R&M Ship Interior 2014a).

R&M is one of Scandinavia’s leading contractors for ship outfitting and insulation. The administration is located in Molde, and the company has 15 project offices from Kolvereid in the north to Flekkefjord in the south. In addition they have a branch office in Romania and a project office in Brazil. The group connection with R&M Ship Tec GmbH gives them a valuable position in the market with increasing opportunities as the group forms a center of expertise. The most important market for R&M is new-builds in the Norwegian shipping industry, although they are moving into the international marketplace as well (R&M Ship Interior 2014a).

Today the company has around 65 employees, with an additional 200-300 hired workers from their suppliers.

R&M delivers design and installation of interior packages for all types of ceiling and wall system. They also deliver and install pipe insulation and engine rooms etc, as well as insulation for thermal, acoustic, fire and cold. In addition the deliver and install curtains and furniture for cabins and other rooms (R&M Ship Interior 2014b). Much of the products except steel, insulation etc. the group produces internationally, and the rest is sourced through a well-developed supplier network.

### **1.1.3 WestCoat AS**

WestCoat AS (WestCoat) is a Norwegian company located in Ulsteinvik, Norway. It has its main competence within surface treatment of ships. The company was founded in 2008, and in 2010 they merged with NorCoat AS, another company which had been in this industry since 2002. WestCoat have two employees in the administration as well as 80 employees in the operations. Today the company's only customer is Ulstein, and they are a full service supplier of the following services: sandblasting, painting, metallization and scaffolding. WestCoat delivers manpower and equipment for these services and are included on both new builds and repairs at the shipyard (WestCoat 2014).

## **1.2 Ship Procurement Process**

This section will describe the usual process, ahead of the time where the contract for a new ship is executed.

Usually the ship procurement process starts with an oil company which is developing a new oil field, and will need ships in the development and operation of this field. The oil company will then work out specifications for the ship and what equipment is needed. When the oil-company has the specifications ready, a tendering process begins. In this phase a tender is released to the market and shipping companies can bid on this tender. Before the shipping company can bid on this tender it turns to the shipyards and gives them the specifications of the ship and asks them to come up with an offer for the ship based on the specifications. The design company of the shipyard is usually included in this phase and they come up with a design that will match the specifications, and the purchasing- and the engineering department will make calculations on the price of the equipment and the price of building the ship. When this is done there is a discussion between the shipping company and the shipyard for the ship's actual contents, looks and price. When the discussion is settled they write a contract which includes a specification of the ship and what equipment will be needed. As mentioned, this is the most usual process of the ship procurement process, but other variations can happen.

When a contract is signed for a new ship the design and engineering department start working on the drawings and plans for the ship. At this point they must include their suppliers, especially for parts that has a long lead-time. This happens before they have

signed a contract with their suppliers. In one way the shipyard will want to keep a distance to their suppliers in order to create competition, but on the other hand there is a need for a close coordination with their suppliers in an early phase to tailor the specifics into the drawings of the ship, which can be a challenge. Usually, several suppliers are given the task of coming up with a price to the shipyard on what they can deliver, and the contract length are usually for one ship/project.

### 1.3 Engineer to Order

This section will describe some features of the engineer to order production type. As Ulstein Verft is an engineer to order company, some background information of this system will be described.

Many classifications have been made with the purpose to distinguish between different types of production. Most of the literature classifies companies within one of four production situations: make-to-stock (MTS) , assemble-to-order (ATO), make-to-order (MTO, and engineer-to-order (ETO) (Sjøbakk, Thomassen, and Alfnes 2013).

Generally the ETO supply chain is regarded as a supply chain where the ‘decoupling point’ is located at the design stage, so the customer order comes in at the design phase of a product. The decoupling point is often called customer order decoupling point (CODP) Primarily ETO-production is associated with large, complex project environments in sectors such as construction and capital goods (Gosling and Naim 2009).

Below is an illustration showing the different production types, and in which phase the related CODP is, can be seen in Table 1: Production types Table 1.

Table 1: Production types (Sjøbakk, Thomassen, and Alfnes 2013)

Product Delivery Strategy	Design	Fabrication and Procurement	Final Assembly	Shipment
MTS	----->			CODP →
ATO	----->		CODP →	→
MTO	- - - - ->	CODP →	→	
ETO	CODP →	→		

Upstream from the CODP all products are produced to forecast, down-stream from the CODP all products are pulled by the end-user (Gosling and Naim 2009). As the CODP in the ETO-production is in the design phase, this type of production is mainly order driven (Sjøbakk, Thomassen, and Alfnes 2013).

According to Christopher (2000) it is important to recognize that there are actually two de-coupling points. The first is treated above and should ideally lie as far downstream as possible in the supply chain and as close to the final market place as possible. The second decoupling point is the information decoupling point (IDCP). Ideally this should lie as far upstream as possible in the supply chain as this is the furthest point in which information on real final demand reaches. The challenge is to develop “lean” strategies up to the de-coupling point, but “agile” strategies beyond that point. By managing these two de-coupling points, a powerful opportunity for agile response can be created (Christopher 2000).

According to Hicks, McGovern, and Earl (2000) there are three stages of interaction between ETO companies and their customers. The first is marketing, which provides an opportunity for the ETO companies to identify market trends, technical, and non-technical customer requirements, and customer criteria for assessing competing offers. The second stage is tendering that involves the preliminary development of the conceptual design and the definition of major components and systems. A technical specification, delivery schedule, price and commercial terms are agreed. 75–80% of costs are committed at this stage. The third stage takes place after a contract has been awarded and includes non-physical processes, such as design and planning, and physical processes associated with manufacturing, assembly and commissioning. Supply chain management in ETO companies involves the co-ordination of internal processes across these three stages.

Tendering, design and contract management are considered to be core capabilities in ETO companies. This often leads to more attention being paid to product capability and features, than to design for manufacture or assembly. This results in increased cost and excessive variety (Hicks, McGovern, and Earl 2000).

According to Hicks, McGovern, and Earl (2000) engineer-to-order companies vary in terms of the degree of vertical integration in various levels of the product structure and two types of design and contract business is identified. In the first type, all items from suppliers are delivered to site and the ETO-company carries out the construction and commissioning phase of the work. In the second type, all physical activities are undertaken by either suppliers or subcontractors, and only marketing, design, procurement and project management are performed internally. The degree of vertical integration differ widely due to reasons such as reconciling customer delivery times with available capacity, reducing costs, the availability of capital for investment in equipment, potential utilization of the plant, internal and external capabilities and flexibility. These factors vary from firm to firm giving rise to differing levels of vertical integration, and this variability makes it difficult to prescribe best practice for supply chain management in ETO companies. (Hicks, McGovern, and Earl 2000)

According to Sjøbakk, Thomassen, and Alfnes (2013) the context around an ETO company is characterized by a high degree of uncertainty, with high fluctuations in sales volume and product mix etc. Customer requirements may be translated into specifications at product, subassembly and/or component level. Because of this the diversity of components, subassemblies and products in ETO is high (Hicks, McGovern, and Earl 2000). Another common feature of ETO-production situation comes in the form of change orders, which is an order that changes a feature that was decided upon at contract execution. The capability to respond to these kinds of orders is often a prerequisite for success for ETO-companies (Sjøbakk, Thomassen, and Alfnes 2013).

## 2.0 Research Problem

In this section the research problem for this thesis will be outlined. This includes the background for this thesis, what problems and challenges that Ulstein Verft is currently facing and the practical and scientific interest of this thesis. This will be summed up in the formation of three research questions.

This thesis is part of a project between Ulstein Verft, Møreforskning Molde and Molde University College and the supplier companies R&M Ship Interior AS and WestCoat AS. The project is called SMARTprod, and the idea behind it is to industrialize the shipbuilding process. The project will span over three years, and the main goal is to create an industrial shipbuilding strategy within a value creating supplier network. Within this main goal, there are three secondary goals that will be studied. These are:

1. Develop a strategic concept for industrial ETO-shipbuilding based on parallel outfitting of modules.
2. Develop supplier collaboration models to stimulate innovation in material and production technology, working methods and product improvements.
3. Develop interaction within the organization based on organizational and managerial procedures adapted to a multicultural workforce.

By developing an industrialized shipbuilding method where modules are parallel equipped and by having a closer integration with suppliers, the following is hoped to be achieved. A 10% reduction in internal production cost. The other main goal is to increase production from 3.2 to 5.2 ships a year. If this is achieved, a calculated potential is to reduce the costs by 57.6 million NOK per year, and increasing the revenue with 36 million NOK per year.

This thesis is one of the deliveries from this project, and the first to be delivered. It will have its focus within the second of the secondary goals in SMARTprod, and seeks to explore the relationship between Ulstein as the buying company, and two of their suppliers. These two suppliers are R&M and WestCoat. When discussing Ulstein's suppliers, this can be understood as subcontractors that come to the shipyard and delivers and install their products on the ship. This means that they are part of the actual production, and not only deliver goods or materials, but also performs the actual work of



preparing and installing their products on the ship. In this way, they are more service suppliers than suppliers of goods.

As mentioned in the introduction the work being done is sequential and done by several different actors (Aslesen 2006). At Ulstein the work the suppliers do on the ship works in the following way. Each of the suppliers gets a time slot to finish their work in a specific room or area on the ship. When one supplier is finished at one area, another takes over, and often there are several suppliers working side by side in the same area. This way of coordinating the work flow creates many challenges and problems in the shipbuilding process. According to Aslesen (2006) this demands a high degree of coordination and planning of the outfitting, partly because several actors are involved and partly because the outfitting happens inside the ship in physical limited space or in areas where several work tasks are performed parallel. Some of these problems were communicated in the kickoff meeting for this project with Ulstein. If the suppliers cannot start to the right time or is not finished within their time slot, that particular area of the ship will be delayed. Although not all delays are critical for the completion of the ship, there are examples of problems that can arise if delays occur. An example of this is that if one supplier is delayed this also creates problems for the other suppliers who are ready to do the subsequent work, but cannot start until the previous supplier is finished. The next suppliers have their workers ready to take over, but cannot start until the previous work is finished. The result of this can be that they will need to wait, or they can sometimes start working on other parts of the ship. In both instances this creates inefficiencies such as waiting, moving people and material around and changes in the plans.

Lambert, Cooper, and Pagh (1998) developed a framework for supply chain management, which consists of three closely inter-related elements. These are the supply chain network structure, the supply chain business processes, and the supply chain management components. These are visualized in Figure 1 below.

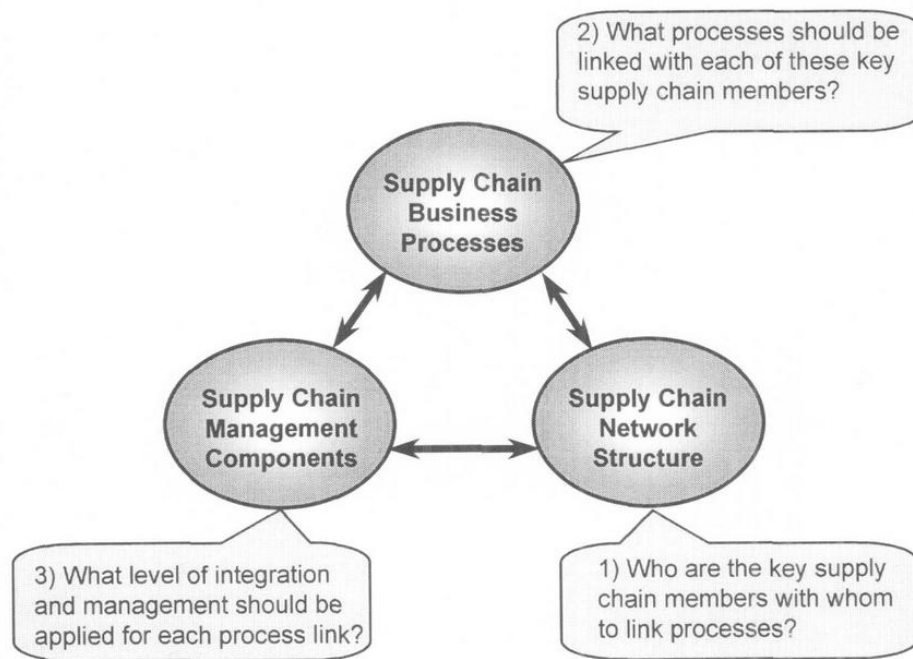


Figure 1: Supply Chain Management Framework (Lambert, Cooper, and Pagh 1998)

The network structure consists of the member firms and the links between these firms, while business processes are the activities that produce a specific output of value to the customer. The management components are the managerial variables by which the business processes are integrated and managed across the supply chain (Lambert, Cooper, and Pagh 1998). For this thesis the main focus of interest is the supply chain management components, and how it is connected to some of the supply chain business processes.

## 2.1 Practical and Scientific Interest

In the shipbuilding industry there is high competition both nationally and internationally. Norway is a high cost country, and the ship-industry in Norway struggles to compete with lower cost countries such as South Korea, Japan and China (Regjeringen 2012). To be able to stay competitive the need for and efficient operations and continuous improvements is very important. One aspect is to explore the relationship between Ulstein and their suppliers, and how to manage these relationships that can increase the efficiency of operations. Another aspect is how they can improve this relationship, and what Ulstein can do to increase the level of improvement and innovations at their suppliers. A research made by Guvåg et al. (2012), found that for STX OSV, (a competing ship-builder in Møre

og Romsdal), 83% of all their purchases was strategic items. These findings showed that it is necessary with close co-operation and partnership with these strategic suppliers.

According to Barringer and Harrison (2000) much research is done in the field of inter-organizational management, but this literature focus primarily on why inter-organizational relationships are formed and how they are governed, while very little research has been devoted to how these relationships are managed. Because of this, this research will look into how these kinds of relationship can be managed. According to Oosterhuis, Molleman, and van der Vaart (2013) measures obtained from one firm in a buyer–supplier relationship did not provide a valid assessment of dyadic relationships. Despite this, a recent review showed that nearly all surveys in the field of supply chain management relied on perceptual data from only one side of the relationship, either from an informant from the buying organization or one from the supplying organization. This thesis will explore the relationship from both sides, to find out how inter-organizational relationship can be managed in an ETO-environment, with high demands for quality and reliability of deliveries.

Because of the issues described in the previous sections, this research seeks to explore how to manage these kinds of buyer/supplier relationships, which leads to the title of this thesis:

**Title: “*Managing Industrial Buyer-Supplier Relationships: A Case Study of Ulstein Verft*”**

In order to explore alternative forms of managing these relationships the first research question is:

**Research question 1: “*How should buyer-supplier relationships be managed in an ETO-environment?*”**

This is a general question to explore what is important when managing industrial buyer-supplier relationships when operating in an ETO-environment. Not all products and services delivered by suppliers are ETO, but more standardized which do not necessarily differ much from project to the project. Even though what the suppliers deliver is standardized there are certain aspects with the ETO-production that creates an environment

that impacts also the more standardized activities within the production. An example of this is change-orders, which creates disruptions to the work-flow for the suppliers. Another examples is that the product have usually never been built before which makes planning more difficult and the need for flexibility is high. Because of this, the specific context of which the relationship takes place is included in the research question.

**Research question 2: *“How can Ulstein Verft manage their suppliers to be able to handle shorter production time and increase the level of innovation?”***

The second research question addresses the specific situation at Ulstein, and their relationship with their suppliers. This also takes into account the plan Ulstein has in increasing production from 3.2 to 5.2 ships a year as we saw from the SMARTprod description. Within the term innovation, there are several aspects involved. Finding new and innovative ways of managing the relationship to improve efficiency while still remain flexible as also was a goal in SMARTprod, and managing it in a way where suppliers have incentives to innovate in products, work methods and the use of materials.

**Research question 3: *“How can a buyer-supplier relationship be measured, and what factors should be measured?”***

Finally the last research question will be answered. This research question will answer how performance can be measured in buyer-supplier relationships and more specific to how Ulstein can measure the performance of their relationship with suppliers.

### **3.0 Literature Review**

This section will review the relevant literature for this research. This review is divided into five parts where each discusses different aspects to answer the research questions. The first section will give an introduction to supply chain management. The second section will describe the different mechanisms within buyer-supplier relationships. The third section will look into network theory, dynamic capabilities and value creation. The fourth section will review relevant literature regarding contracts in buyer-supplier relationships, and the final section will elaborate on how to measure performance of a buyer-supplier relationship.

#### ***3.1 Supply Chain Management and the Extended Enterprise***

According to Lambert and Cooper (2000) one of the most significant paradigm shifts of modern business management is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains. The supply chain is not a chain of businesses with one-to-one, business to business relationship, but a network of businesses and relationship. In this competitive environment, the ultimate success of the single business will depend on management's ability to integrate the company's intricate network of business relationships. Lambert and Cooper (2000) use the following definition of supply chain management:

*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 and Cooper 2000, p.66)*

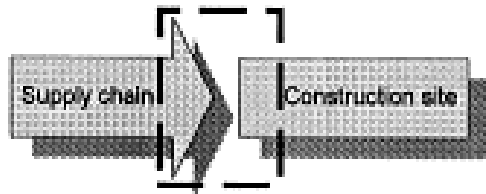
In this definition services are mentioned as one of the things suppliers can provide. Some research has identified some differences in the supply chain of services than physical products. Sengupta, Heiser, and Cook (2006) mention that physical handling of products such as in manufacturing, with standardized and centralized procedures are not entirely possible in a service supply chain as many of the decisions are taken locally and the variation and uncertainties in output are higher because of the human involvement. According to Ellram, Tate, and Billington (2004) one very important factor in supply chain management in services is the information sharing between the partners in the chain. Information flow is critical in

terms of identifying demand, sharing information, establishing expectations through a service level agreement or statement of work. Feedback on the performance of the service delivered should also be shared. To succeed with the delivery of services Sengupta, Heiser, and Cook (2006) found that high levels of collaboration and transparency can improve the operational performance and reduce disruptions in the chain.

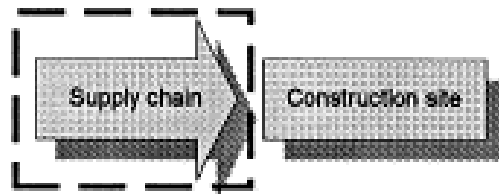
Although Ulstein is an ETO-company, the building of a ship has similarities to construction. According to Vrijhoef and Koskela (2000) the construction supply chain is characterized in terms of structure and function. It is a supply chain directing all materials to the construction site, where the object is assembled from these materials. There can be similarities between them, but mainly all projects create a new product or prototype. As Aslesen (2006) states, the Norwegian shipbuilding industry has similarities to the construction industry. The shipyard in itself works as the construction site where all materials are assembled and very rarely two identical ships are built.

For supply chain management in construction four roles can be identified. The goal within construction is to reduce costs and duration of site activities and the primary consideration is to ensure dependable material and labor flows to the site to avoid disruptions to the workflow. Second the focus is on the supply chain itself to reduce cost especially linked to logistics, lead time and inventory. Thirdly, a focus should be on transferring activities from the site to earlier stages of the supply chain. This is done to avoid some conditions such as the number of technical dependencies at the construction site which hinders a smooth workflow. The fourth focus is to integrate management and improvements of the supply chain and the site production (Vrijhoef and Koskela 2000). These four roles are illustrated in Figure 2 below.

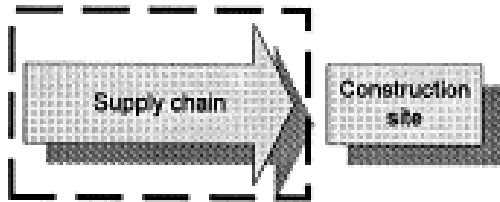
Role 1: focus on the interface between the supply chain and the construction site



Role 2: focus on the supply chain



Role 3: focus on transferring activities from the construction site to the supply chain



Role 4: focus on the integrated management of the supply chain and the construction site

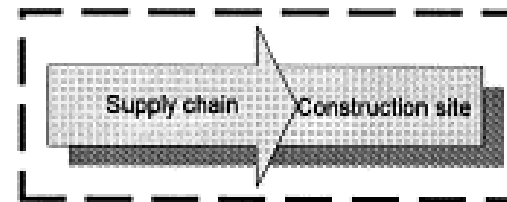


Figure 2: Four roles of supply chain management in construction (Vrijhoef and Koskela 2000)

This shows that the shipbuilding industry has some of the same challenges that the construction industry, which are different than those of other supply chains.

A value chain can be defined as:

*The linked set of value-creating activities all the way from basic raw material sources for component suppliers through the ultimate end-use product delivered into the final customers' hands (Dekker 2003, p. 4).*

The value chain framework can be seen below in Figure 3. The value chain displays total value, and consists of value activities and margin. Value activities are the physically and technologically distinct activities a firm performs. These are the building block by which a firm creates a product valuable to its buyers. Here, margin is the difference between total value and the collective cost of performing the value activities (Porter 2008).



Figure 3: The Generic Value Chain (Porter 2008)

In the value chain different types of relationships can be distinguished: relationships between activities, relationships between business units of the firm, and relationships between the firm and its buyers and suppliers. These linkages can provide opportunities for the firms to enhance its competitive advantage, by influencing the configuration of supplier's value chains to jointly optimize the performance of activities, or by improving coordination between a firm's and a supplier's chains, by which both firms can gain value (Porter 2008).

As mentioned in the research problem, supply chain management consists of the three elements and is the supply chain network structure, supply chain business processes and supply chain management components. Within the network structure, members of the chain can be divided into primary and supporting members. The primary members are those that carry out value adding activities, and supporting members are companies that simply provide resources, such as leasing of equipment and the likes (Lambert, Cooper, and Pagh 1998).

More important for this thesis is the supply chain business processes within supply chain management as shown in Table 2.



Table 2: Supply Chain Business Processes (Lambert, Cooper, and Pagh 1998)

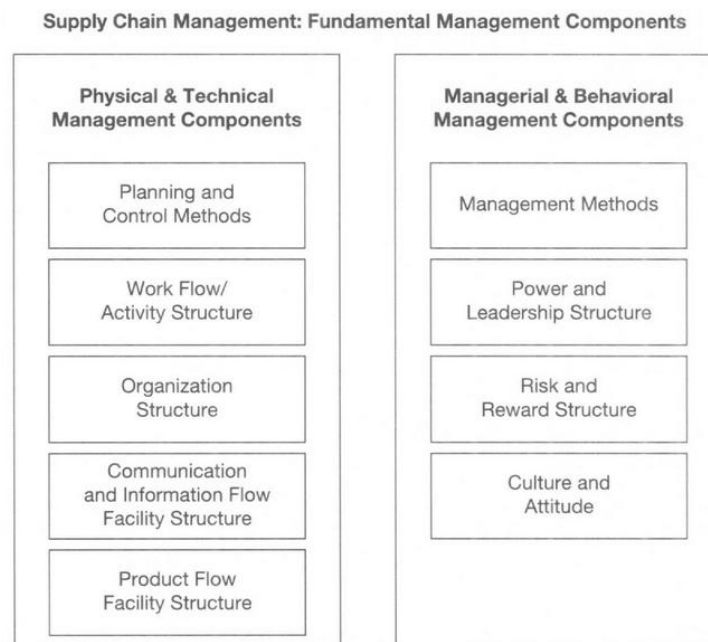
Supply Chain Business Processes
Customer relationship management
Customer service management
Demand management
Order fulfilment
Manufacturing flow management
Supplier relationship management
Product development and commercialization
Returns management

From these key processes, we see supplier relationship management as a key process in supply chain management, which shows the importance of building a good buyer-supplier relationship with supplier. Also, to a certain degree, order fulfilment is central to this thesis.

Order fulfilment is the first step in providing value to the customer, but involves more than just filling an order. A network and process must be designed that permits a firm to meet customer requirements while minimizing the total delivery cost, and involves coordination of key suppliers and customers to develop a seamless process (Lambert and Cooper 2000). Supplier relationship management is the management of suppliers, i.e. forging a close relationship with some suppliers, while managing arms-length relationships with others. For each relationship a product and service agreements are negotiated, which defines the relationship and relationship management is about defining and managing these agreements. The desired outcome should be a win-win relationship where both parties benefit (Croxtton et al. 2001).

Supply chain management components are the element of the framework which is most important in this thesis. According to Lambert, Cooper, and Pagh (1998) adding more management components or increasing the level of each component can increase the level of integration of the business process link. The supply chain management components consist of a physical and technical group, which is the most visible, tangible, measureable and easy to change components. The other group is managerial and behavioral

components, which are less tangible and difficult to assess (Lambert, Cooper, and Pagh 1998). The supply chain management components can be seen in Figure 4 below.



**Figure 4: Supply Chain Management Components(Lambert, Cooper, and Pagh 1998)**

Planning and control of operations are key to moving and organization or supply chain in a desired direction. The control aspect can be operationalized as the best performance metrics for measuring supply chain success. The work structure indicates how the firm performs its task and activities. Organizational structure can refer to both the individual firm and the supply chain, and team-work across members of the chain increases the integration of the chain. Communication and information flow is key, and the information passed among channel members and the frequency of information updating has a strong influence on the efficiency of the supply chain. Product flow facility structure refers to the network structure for sourcing, manufacturing and distribution across the supply chain (Lambert and Cooper 2000).

Management methods include the corporate philosophy and management techniques. The power and leadership structure affects the supply chain form, and usually some members are more powerful than others. Sharing of risk and reward across the supply chain affects long-term commitments of its members. Corporate culture must be aligned between members. This is important and should not be underestimated, as this can affect the chains performance (Lambert and Cooper 2000).

If the managerial and behavioral components are not aligned to drive and reinforce an organizational behavior supportive to the supply chain objectives and operations, the supply chain will likely be less competitive and profitable. On the other side, if a component in the physical and technical group is changed, management components in the managerial and behavioral group may have to be readjusted. Following this, the groundwork for successful supply chain management is established by understanding each of these components and their interdependence (Lambert, Cooper, and Pagh 1998).

### 3.1.1 Extended Enterprise

Another view has been presented in the field of supply chain management. This is called the extended enterprise, and takes supply chain management thinking one step further. The term extended enterprise suggests collaborative relationships among supply chain members, where buyers and sellers works toward a shared vision, while gaining competitive advantage and achieving greater end use customer satisfaction than other supply chains (Davis and Spekman 2004). The extended enterprise takes the collaborative approach further than what is suggested in the supply chain management theory. Below is a comparison of the differences between them.

**Table 3: Comparison of supply chain, value chain and the extended enterprise (Davis and Spekman 2004)**

Business Factor	Supply Chains / Value Chains	Extended Enterprise
<b>Environment</b>	More Stable and Static	Dynamic and changing
<b>Focus</b>	Tends to be industry centric	Finds partners who bring part of the business solution
<b>Value creation approach</b>	Leverage own competencies, more self-sustaining	Leverages the competencies of all members
<b>Relationship type</b>	A teaming approach with some aspects of partner-like behavior	Strong collaborative behavior with very solid partnering behavior
<b>Infrastructure thrust</b>	Cost-driven	Value Driven
<b>Profit Focus</b>	Increasing own profit is the default	Increasing profits system-wide
<b>Knowledge</b>	Shared carefully but tends to look internally	Shared widely over the system
<b>Orientation</b>	Tends to emphasize workflows, etc.	Emphasizes also knowledge and learning

We see from Table 3 that the ideas of the extended enterprise are even more holistic than the supply chain idea. In order to achieve the advantages of the extended enterprise there are many different aspects that will need to be aligned. First of all, technology can facilitate the flow of product and information to each member in the supply, but technology must be accompanied with people who are responsible for the information shared, its richness and its degree of sensitivity. Commitments from management at all partners are important, and they must be comfortable to the degree of transparency in information needed. When outsourcing parts of the supply chain this must be approached from a core competence perspective and the focus should be less on cost, but focus more on leveraging the capabilities of the firms. Combining and leverage complementary skills are essential to create more value and increase end-customer satisfaction. Another essential part of the extended enterprise and to create collaboration is trust. Finally, an essential part is to be able to measure the performance of the extended enterprise. This needs to involve both traditional performance measures and behavioral and enterprise-wide measures that measures the relationship qualities required. These are some of the key factors in the extended enterprise thinking, but they also include some key factors specific for outsourcing relationships. These factors are interdependence, stability, trust, mutual benefit and cooperation (Davis and Spekman 2004).

In an article on success factors in strategic supplier alliances, Monczka et al. (1998), found the following factors to be significantly related to partnership success: Trust and coordination, interdependence, information quality and participation, information sharing, joint problem solving, avoiding the use of severe conflict resolution tactics, and the existence of a formal supplier/commodity alliance selection process.

We see from these examples that many of the factors coincide with each other. Trust is mentioned as one of the most important factors. Cooperation and sharing of information is another important factor, along with factors such as mutual benefits, joint problem solving and leveraging the companies' capabilities.

In the following sections several of these key success factors will be discussed further.

## **3.2 Buyer-Supplier Relationships**

This section will describe some of the mechanisms of a buyer-supplier relationship. By using theories on governance forms, principal-agent theory, transaction cost theory, the resource based view and resource dependence theory, the different mechanism of such relationships will be described.

### **3.2.1 Governance Forms**

According to Heide (1994) governance forms can be divided into market governance, unilateral/hierarchical governance and bilateral governance. A distinction between these is that with the unilateral/hierarchical and bilateral governance forms there is a criterion of relation, which does not exist in market governance. To further distinguish between unilateral/hierarchical and bilateral this can be done by seeing how the different relationship is maintained. In the unilateral/hierarchical form, one of the actors has more power than the other. An example is that one of the companies has more bargaining power than the other, or that one company owns the other. In a bilateral relationship the two actors are equal and balanced with regards to bargaining power.

Williamson (2008) also mentions three governance forms, but do not use the term bilateral or unilateral, but instead the term hybrid and hierarchical, and makes the following distinctions among the three. The market mode features high-powered incentives, little administrative control and a legal contract law regime. This is well suited to implement independent adaptations, but poorly suited for cooperative adaptations. On the other side we find hierarchical, which uses low powered incentives, needs considerable administrative control and has a weak contract law regime as the firm needs to settle their own disputes. The hybrid is a compromise between these two modes, and is located between them on all the three attributes. The hybrid works in both independent adaptations and coordinated adaptations, but its viability needs credible commitments such as penalties for premature termination, information disclosure, and verification mechanisms, specialized dispute settlements and the likes.

Borys and Jemison (1989) have a similar view about hybrid relationships, although in the concept of hybrid relationships, they include mergers and acquisitions, joint ventures and license agreements. The focus of Borys and Jemison (1989) is how a hybrid relationship

should be managed to create the most value, and this will be discussed in later sections. For a hybrid relationship to work there are measures that needs to be made in order for the hybrid to be stable. First of all, the hybrid should be rooted in shared norms and values. Legitimacy and trust is also important features of a hybrid relationship, but these must continue over time to evolve. A second type of stability mechanism is represented by common and general practices in an industry, although they lack the normative force of shared values. The wish from the companies to not violate standard practices works as a safeguard for violation of hybrid agreements. A third mechanism for stability is the contract, which works well against opportunism but face problems because the hybrid should change over time and then the contract may be in the way of an efficient hybrid (Borys & Jemison 1989).

One method for analyzing suppliers and finding strategies for how to govern them is to use the Kraljic Matrix. This was developed to find strategies towards suppliers based on two dimensions which are profit impact and supply risk. The profit impact of a given supply item can be defined in terms of the volume purchased, the percentage of total purchase cost, or impact on product quality or business growth. Supply risk is assessed in terms of availability of the supply item, the number of suppliers, competitive demand, make-or-buy opportunities, storage risks and substitution possibilities (Kraljic 1983).

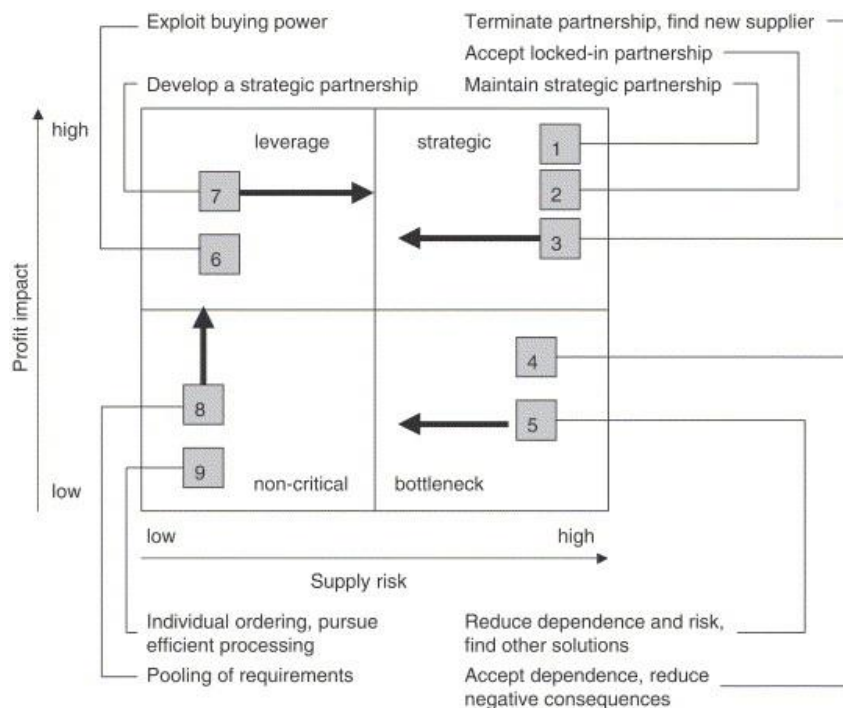


Figure 5: Kraljic Matrix (Gelderman and Van Weele 2003)

Based on what the profit impact and supply risk are, the supplier are placed in of the four categories shown in Figure 5, and for each category different strategies and purchasing approaches are required as seen in the figure. (Gelderman and Van Weele 2003).

### **3.2.2 Principal-Agent Theory**

According to Logan (2000) many attempts of outsourcing have proved unsuccessful and recent articles blame these failures on failed outsourcing relationships. She suggests that to engage agency theory can help design the types of contracts and relationships necessary to provide and support an environment of trust. Also Eisenhardt (1989) recommends to incorporate an agency perspective in studies where the problems have a cooperative structure.

Principal-agent theory is relevant to such problems because it analyzes the relationship between a principal and agent. Principal-agent theory investigates some of the problem in such a relationship. There are both human and organizational assumptions that the theory is built around. The human assumptions are self-interest, bounded rationality and risk aversion, while the organizational assumption are goal conflict between the principal and the agent, efficiency is the effectiveness criterion and information asymmetry between the principal and the agent (Eisenhardt 1989). The self-interest assumption is that people will, if given the possibility, act in a way that satisfies their own self-interest. Bounded rationality assumes that people are rational, but because of limitations on the information they have, the limitations of their minds and the amount of time they have to make a decision can result in non-optimal decisions (Milgrom and Roberts 1992). The assumption of risk aversion is that people have different attitudes towards risk. The problem arising from this is that the principal and the agent may prefer different actions, because of their different preferences towards risk (Eisenhardt 1989). One of the organizational assumptions is that the principal and the agent have different goals. This can lead to a conflict between the goals, which create a situation where the agent does not do the actions that will result in meeting the principal's goals, and it is difficult or expensive for the principal to verify that the agent is actually doing what he is supposed to do. The other assumption is information asymmetry between the principal and the agent. This is the situation where none of the parties have perfect information about the other. The last assumption is that efficiency is the effectiveness criterion. This means that finding the

most efficient contract to govern the principal-agent relationship, which takes into account all the assumption presented above, is the focus of this theory. There are two types of contract to govern these kinds of relationships, a behavior oriented contract and an outcome oriented contract. The theory suggests that an outcome oriented contract can reduce the risk of agent opportunism, while behavior oriented contract works well in high uncertainty environments (Eisenhardt 1989).

An agency problem is a case where the principal does not know exactly what the agent has done. Because of the agent's self-interest, the agent may or may not have behaved as agreed. This problem arises because the principal and the agent's goals are conflicting, and the principal cannot determine whether the agent has behaved as agreed upon. Here the assumptions of self-interest and information asymmetry are central, which causes two negative effects Eisenhardt (1989).

These two effects are adverse selection and moral hazard. Adverse selection is related to lack of information about the other part prior to the upcoming deal between buyer and supplier, whilst moral hazard is related to problems with information about the other part after the deal has been made (Eisenhardt 1989).

Adverse selection refers to the misrepresentation of the agent's ability. The agent might claim to have certain skills or abilities to get the contract, and the principal cannot verify whether the agent has these skills or abilities. In this example both the personal assumption that the agent will act in self-interest, and the principals lack of information about the agent create the adverse selection problem (Eisenhardt 1989).

Moral hazard is related to problems that can occur after the deal has been made with a supplier, and refers to lack of effort on the part of the agent. The argument here is that the agent does not deliver the effort that was agreed upon. The agent has agreed to do a certain amount of work, but as the principal has no way of controlling that he does the agreed upon work, the agent can work slower or deliver lower quality (Eisenhardt 1989).



### **3.2.3 Transaction Cost Theory**

Transaction cost theory aims to find the most appropriate governance form in order to keep the transaction costs between firms at the lowest possible (Arnold 2000). According to Williamson (2008) transaction cost theory views governance as the means to infuse order in an exchange relationship and by this mitigate conflict and realize mutual gains for those involved. This theory can explain many things related to the relationship between a buyer and a supplier. It is based on the assumption that humans are bounded rationally and can act opportunistic if they can in a situation with asymmetric information (Arnold 2000).

Two different activities are stated as cost by Milgrom and Roberts (1992), and these are coordination and motivation cost. They see coordination costs as the cost of transmitting information that is needed to determine an efficient plan, using this information to determine the plan to be implemented and then communicating the plan to those responsible for implementing it. It is not only direct cost related to this such as compiling and transferring information but also cost of delay while communicating and while determining the plan. This can be understood as finding the governance form that minimizes the cost of coordinating the relationship. Motivational costs are related to informational incompleteness- and asymmetries, and imperfect commitment. The motivational costs are similar to the adverse selection and moral hazard problems in principal agent theory (Milgrom and Roberts 1992). Usually the term opportunism is used in the transaction cost theory, and the need to safeguard for such behavior is important (Williamson 2008). The theory also explains what kind of relationship there should be between a buyer and supplier based on some attributes of transactions such as investment in specific assets, frequency and environmental uncertainty.

Milgrom and Roberts (1992) identify five attributes of a business exchange and related costs:

1. The specificity of the investment required to conduct the transaction
2. The frequency with which similar transactions occur and the duration of period of time over which they are repeated
3. The complexity of the transaction and the uncertainty about what performance will be required

4. The difficulty of measuring performance in the transaction
5. The connectedness of the transaction to other transactions involving other people

Specific investments made by one or both parties in a relationship are investments that would lose much of its value if not used by this specific relationship, and often induce sunk cost if the relationship ends. The parties must therefore safeguard against early termination or opportunistic renegotiation, and a contract to protect against such behavior is required (Milgrom and Roberts 1992).

When it comes to frequency and duration, the larger the frequency and the longer duration the parties can develop understandings and routines that reduce the need for explicit planning to coordinate their actions. Such practices can sometimes also eliminate the need for formal, detailed agreements, both because the parties know what is expected of them and because they have no need to need to document those understandings for outsiders to enforce. Cost savings from having a relationship with high frequency and long duration can be considerable (Milgrom and Roberts 1992).

Uncertainty about the conditions that will prevail when a contract is being executed, together with complexity of the task can make it difficult or uneconomical to determine in advance all contingencies that can occur. In situations like this, the contract that is being written should generally be less determinate than in a simpler setting. Instead of specifying for how much should be delivered to what time, the contract should specify who has the right to make which decisions and within what limits (Milgrom and Roberts 1992).

Unless performance can be measured accurately it is hard to provide effective incentives. It is therefore important to find the measures that can identify both good and bad performance in order to hold the responsible party responsible for their performance. This will presumably lead to more effort and better results (Milgrom and Roberts 1992).

Finally, some transactions are connected to other transactions. If one activity must be finished or delivered before another can take place there is a problem with interdependence. Ways to handle these kinds of issues can be to strengthen coordination mechanism such as having more meetings, or getting a better oversight of the activities.

Another way is to reduce the number of people involved so that fewer people will need to be coordinated (Milgrom and Roberts 1992).

### 3.2.4 Resource Based View and Resource Dependence Theory

The resource based view analyses four conditions that can create a competitive advantage for a company. These four conditions are resources that the company has, and that some of these resources are superior to those of other companies. The company that has the most superior resources will create rents that are higher than those with marginal resources, because they will have lower average costs. The profit, or rent will therefore be higher with the companies with lowest average costs. These four conditions can be seen in Figure 6 below.

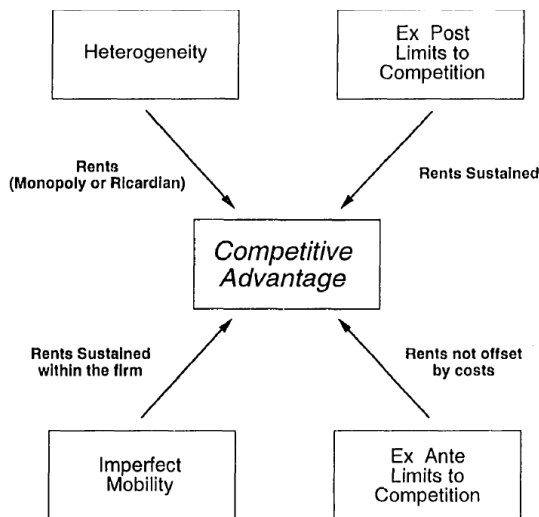


Figure 6: Resource Based View (Peteraf 1993)

Heterogeneity is that they have different resources. Ex Post limits to competition is that these heterogeneous resources are not short-lived and will carry on in the long term. Imperfect mobility is that the resources of one firm cannot be traded. They are also imperfectly mobile when they are specialized to firm-specific needs. Ex ante limits to competition is that prior to a firm establishing a superior resource position there must be limited competition for that position (Peteraf 1993). The resource based view focus on one firm and how this firm creates competitive advantage through their resources, but this view has been the basis for many researches trying to understand how resources of one or more companies can reinforce the competitive advantage of cooperating companies.

According to Paulraj and Chen (2007) resource dependence theory proposes that organization participate in exchange relationships with their environment to procure resources. There are two assumptions within the resource dependence perspective which is the following:

1. Very few organizations are self-sufficient in regards to strategic and critical resources, which leads them to depend on other firms
2. Firms seek to reduce their uncertainty and manage this dependence by structuring their exchange relationships and establish formal and semiformal connections with other firms.

The establishment of these kinds of inter-firm relationship, as we see from the second assumption, is a way of controlling the problem with uncertainty and dependence by increasing the coordination with exchange partners (Paulraj and Chen 2007).

In contrast to the resource based view, which focus mostly on internal resources, the resource dependence theory focus exclusively on resources that must be obtained from external sources for an organization to survive and grow (Barringer and Harrison 2000).

According to Barringer and Harrison (2000) the need to acquire resources creates dependencies between organizations and outside units. These outside units may be suppliers, competitors, creditors etc. To successfully manage these dependencies, researchers argue that organizations must acquire control over critical resourced in an effort to decrease dependence on other organizations on them, and acquire control over resources that increase the dependence of other organizations on them. In other words, an organization tries to increase its power and at the same time reducing its dependence relative to other organizations in its relevant environment.

Participating in inter-organizational relationships is one way for firms to achieve these objectives. Firms partner with other firms to obtain access to critical resources and to increase their power relative to other organizations (Barringer and Harrison 2000).

According to Paulraj and Chen (2007) resource dependence theory is based largely on the concept of interdependence, which exists when one actor does not control all of the conditions necessary for achievement of an action or a desired outcome . Following, the concept of supply management is grounded strongly on the notion that there is sequential interdependence among various activities and therefore need coordination. The needs and challenges of effective coordination and integration across different members in a supply chain present unique opportunities for competitive advantage. Therefore, by focusing on inter-organizational coordination and relationships in the face of resource dependence, supply chains are positioned to create competitive advantages.

### **3.3 Network Theory**

In the previous section, the mechanisms of buyer-supplier relationships were described. In this section measures to create value in such relationships will be explained. By creating value, several aspects, such as leveraging capabilities and resources are relevant. Several theoretical aspects on value creation based on the theories presented in the chapter 3.2 will also be discussed.

According to Castells (2000) the new global economy is networked. At the heart of the connectivity of the global economy and the flexibility of informational production, there is a new form of economic organization. This is the network enterprise, which is not a network of enterprises. It is a network made from either firms or segments of firms, and/or from internal segmentation of firms. Where large corporations are internally de-centralized as networks, small and medium sized businesses are connected in networks.

According to Gadde, Huemer, and Håkansson (2003) not only the dyadic relationships are important, but the context in which this dyad take place. Some say it is crucial for a company to relate its activities to those of other firms in order to enhance its performance, and it is through continuous combining and recombining of existing resources that new resource dimension are identified and further developed within business relationships.

When it comes to resources Allee (2008) separates between tangible and intangible assets. Tangible assets are financial resources and other capital-based resources that are controlled by the firm. Intangible assets include relationships, employee know-how and competency,

the effectiveness of the organization's work groups and structure, the efficiency of the organization's production and service processes, and the level of trust between the people or organizations forming the relationships. The question is how the companies convert these forms of value.

Purposeful networks, such as organizations, consist of specific roles and value interactions oriented toward the achievement of a particular task or outcome. These activity-focused networks can therefore be considered value conversion networks, or value networks. External-facing value networks include those between the organization and for instance its suppliers, its investors, and its customers. Value conversion is the act of converting or transforming financial to non-financial value or transforming an intangible input or asset into a financial value or asset. An example of intangible asset can be the knowledge and information exchanges which flow around and support the core product and service value chain. These include exchanges of strategic information, planning knowledge, process knowledge, technical know-how, collaborative design work, joint planning activities, and policy development. Although these intangibles may have a strong element of expectation, they tend to be informal, not part of the contract, and rarely deliberately negotiated. (Allee 2008).

According to Teece and Pisano (1997) this reflects that an important aspect within network theory is to exploit and to transform the resources within the network. Dynamic capabilities are central to this, and can be defined as: *"the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments"* (Teece and Pisano 1997, p. 244)

The definition shows that in the most general sense, dynamic capabilities are organizational processes and that their role is to change the firm's resource base (Ambrosini and Bowman 2009).

According to Ambrosini and Bowman (2009) dynamic capabilities processes comprise four main clusters: reconfiguration, leveraging, learning and creative integration. Reconfiguration is the transformation and recombination of assets and resources. Leveraging involves replicating a process or system that is operating in one business unit into another, or extending a resource into a new domain. Learning allows tasks to be

performed more effectively and efficiently as an outcome of experimentation, reflecting on failure and success. Finally, creative integration relates to the ability of the firm to integrate its assets and resources, resulting in a new resource configuration.

### **3.3.1 Value Creation**

Much of the research made on buyer/supplier relationship and outsourcing make use of the theories discussed in chapter 4.2. They combine certain dimensions from the theories and come up with models to help improving such relationships and create more value.

Borys and Jemison (1989, p. 241) define value creation as: *“the process by which the capabilities of the partners are combined so that the competitive advantage of either the hybrid or one or more of the partner is improved.”* This means that value creation is a joint effort that occurs when the hybrid is formed, and that the interaction between the firms only creates value if the competitive advantage of one of the partners in the hybrid is improved.

One of these theories is the relational view presented by Dyer and Singh (1998). They draw on the resource based view and extend this into a relational view where firm’s resources beyond firm boundaries are the focus of attention. The resources specific to a relationship are relational specific assets, knowledge sharing, achieving complementary resources and choosing the most effective governance form. We can see from this that they also draw on TCA as specific assets and governance forms are part of the resources. Through these efforts the companies are able to generate what they call relational rent, which is *“supernormal profit jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners”* (Dyer and Singh 1998, p. 662). This relational rent can be understood as value creation. In other words, they state that value is created not only by the resources and capabilities within the firm, but also include the resources and capabilities in the relationship between two or more firms and how these are used beyond firm boundaries.

Another theory that uses aspects from two of these theories is the “Governance value analysis” by Ghosh and John (1999). They define a framework for how value can be

created in relationships. They base this on transaction cost theory, as well as the resource based view. Within transaction cost theory, value is created when the companies are able to reduce the costs of handling these transactions based on their exchange attributes and governance form. When it comes to how revenue can be created, they take two things into consideration. These are positioning and resources. Positioning is the benefits they have chosen to produce and deliver to the customers, and resources are the skills owned by the company that makes them able to make the exchange. To sum up, Ghosh and John (1999) look at value creation as increasing the revenue through positioning and resources, and reducing cost through the governance form and exchange attributes.

According to Hammervoll (2009) value creation is the process by which the capabilities of the supply chain partners are combined so that the competitive advantage of either the supply chain relationship or one or more of the partners are improved.

According to Hammervoll (2012) value creation can be achieved in terms of collaborative learning in three types of interaction. These are unilateral supplier learning, unilateral supplier development and bilateral learning. An important difference between these is interdependence, and he distinguishes between two types of interdependence. Hammervoll (2009) defines sequential interdependence as a situation where firm A needs to act before firm B can act, and then again firm A cannot act again before firm B has acted. In contrast reciprocal interdependence involves mutual learning and ongoing mutual adjustments by both parties and continuous adaptation to each other circumstances.

### **3.3.2 Value Creation Initiative**

Ghosh and John (1999) suggest that value creation initiatives are “in-house” activities that the buyer wants the supplier to make in order to achieve value creation at the relationship level. In this understanding of value creation initiatives, the buyer does not take an active part in the supplier’s efforts, other than giving the supplier incentives by matching governance form and exchange attributes.

Borys and Jemison (1989) argue that a value creation initiative is learning and development. They say that even within a relationship of sequential interdependence, successful value creation requires technical and administrative coordination among



members of the supply chain. And under reciprocal interdependence even more extensive knowledge about each other, such as and understanding of decision making processes and policies are important.

According to Hammervoll (2009) value-creation initiatives are actions that firms undertake and that directly enhance value creation, which again can be achieved through the abovementioned collaborative learning types, unilateral supplier learning, unilateral supplier development and bilateral learning.

Successful value creation in unilateral supplier learning depends that the buyer actually transmits valuable information and that the supplier has the ability to receive and process this information to improve its operations and/or its buyer base. This kind of value creation has sequential interdependence. Unilateral supplier development is any activity that a buyer takes to improve a supplier's performance and/or capabilities to the meet the buyer's short or long term supply need. Here the interdependence is reciprocal and involves both parties engaging in a process that includes feedback loops. Bilateral learning is characterized by mutual learning through sharing of strategic knowledge. It differs from the two other interaction types, as both the buyer and the supplier learns. Value creation initiatives are actions that firms undertake and that directly enhance value creation, and the abovementioned sharing of information, improving capabilities and mutual learning through sharing strategic knowledge are examples of value creation initiatives (Hammervoll 2012).

Information supply and coaching in unilateral supplier learning and development were found as the main drivers of value creation, while strategic sharing of knowledge were not found to be a driver of bilateral learning. It also finds that relational governance form, or hybrid form as explained earlier, facilitates information sharing and coaching better than hierarchical and market form (Hammervoll 2012).

### ***3.4 Contracts in Buyer-Supplier Relationships***

In the previous section, the mechanisms of buyer-supplier relationships were described. This section will see how contracts should be formed in order to achieve a well-functioning relationship were mutual benefits and adaptation is handled.

According to Thompson, Cox, and Anderson (1998) a contractual relation often include the following four components:

- The relationship between the parties
- The responsibilities of each party within the transaction(s)
- The risk apportionment of the contract for given actions and events
- The reimbursement structure

These four components interact with each other and define the manner of contractual relations and the way in which the contract is linked to the relationship between the parties. Also, the relationship should be a driver for the division of contractual responsibilities and the how the risk is shared among them. Some contractual relations seek to impose strict liability in an arms-length approach, while others may encourage collaborative approaches with an emphasis on joint responsibility and risk-sharing. The manner in which responsibility and risk is apportioned will be reflected in the reimbursement structure of the contract. The reimburse structure can occur in two ways and two extremes of the first reimbursement mechanism is whether they use a fixed price for the entire work package, or pre-agreed prices for hours and material used. Second, the reimbursement structure will affect the price premiums that the suppliers add to their tendered sums to reflect the balance of risk and structure of power in the contract (Thompson, Cox, and Anderson 1998).

In the inter-organizational environment for executing various operations and maintenance activities, the development of appropriate contracts is essential to create an environment for innovations and continuous improvements (Panesar and Markeset 2008).

According to Baiman and Rajan (2002) successful supply chain management and buyer-supplier relationships not only require the ability to identify potentially valuable investments, but also the ability to design relations among the supply chain members that mitigate buyer-supplier incentive problems and thereby support the implementation of the investments.

Panesar and Markeset (2008), focus on how to increase innovation through an improved contractual relationship between the buyers and providers in maintenance and service in the Norwegian oil and gas industry. They find that the cooperation and collaboration amongst organizations are governed by different types of contracts that determine the fundamental inter-organizational relationship. The contract type influences the nature of communication between the organizations, and the flexibility in the contracts influences innovations. Some contractual relationships are discrete, while others are relational. In discrete relationships the organizations focus on individual gains from the transaction, while in relational exchange the focus is on mutual benefits from a relationship on longer terms.

In the service and maintenance sector, Panesar and Markeset (2008) found that the need for cooperation during the contract execution, reflects that these kinds of contracts should be relational rather than discrete, and that the contracts should be governed by relational norms. Also, short term contracts can have a negative impact on the supplier's motivation to make investments in competence development, using new technologies etc. A long term contract on the other hand does not necessarily assure an environment for continuous improvements, and can sometimes dampen the innovation potential with the supplier. This is because the supplier is in some way protected from competition for the contracted duration. This can result in inactivity with regards innovations and continuous improvements, and therefore the buyer needs to safeguard against this possibility.

While developing long term contracts, the scope of the activities should be carefully evaluated, and the contract duration must be balanced so that it is not too short to discourage investments and innovations, and it should not be too long as it may dampen innovation potential and continuous improvements in the execution phase (Panesar and Markeset 2008). The contract type as we saw from Thompson, Cox, and Anderson (1998), with payments for time and material used and the fixed price contract is also important here. The first type will motivate the supplier to focus mostly on the contracted activities and not on finding innovative solutions to improve contract execution effectiveness and efficiency. In contrast, the fixed price contracts, the supplier is in a self-motivating situation to improve contract execution effectiveness and efficiency (Panesar and Markeset 2008).

To sum up, Panesar and Markeset (2008) state that a good contract for operations and maintenance services should have a clear scope of work, goals and limitations, service delivery competence requirement, performance indicators, rewards as well as stipulation for recognition of contractual clauses during the contract execution phase. The contract must also address the contract type, the duration of the contract and the flexibility that lies within the contract as these are issues that influence cooperation and collaboration in the initiation, development and implementation phases. According to Panesar and Markeset (2008) incentives and bonuses linked to performance should be considered.

According to Williamson (2008) there are three leading styles of mediating the contractual interface for hybrid transactions, and are (1) muscular, (2) benign and (3) credible. The muscular approach assumes that one of the parties, the large buyer deals with smaller suppliers in. Muscular (1) buyers often do not only use their suppliers, but often “use up” their suppliers and then discards them. An example could be that the muscular buyer simply tells the supplier that “these are the specifications for the good or service to be provided. Give me your best price”. This kind of contracting can work for generic goods and services but are not applicable for hybrid relationships where some form of investment in specific asset has been made. The supplier will need some form of safeguarding of their risks, or they increase the price to reflect the added risk that they are being asked to assume.

The benign (2) contract approach requisite cooperation do deal with unforeseen situations, and thereby promote continuity and realize mutual gains. Trust is the key concept in the benign approach instead of power. But even though most people will do what they say most of the time, the contract as a cooperative framework cannot be stretched indefinitely. If an outlier arises and there is a lot at stake, the temptation to defect from the spirit of cooperation and insist on following the contract presents itself. The proposition for the benign contract is that if the “lawful” gains of following the contract exceed the value of continuing the exchange relationship, firms will stick to the contract. If this happens the cooperation eventually gives way to conflict and mutual gains are sacrificed unless countervailing measures have been put in place.

The credible (3) contracting approach differs from both the abovementioned approaches. It does not project a benign behavior if an outlier appears, and it is not mean spirited as the muscular approach. The parties are aware that all complex contracts are incomplete and that to achieve a cooperative adaptation, the parties need to exercise feasible foresight. They must look ahead, uncover potential hazards, work out the mechanisms and factor these back into the contractual design. Credible commitments are then introduced to mitigate the hazard. Williamson (2008) suggests that credible commitments governance should be introduced everywhere to a cost-effective degree. Critics of the credible approach state that in a contract negotiation, money should never be left on the table. The reason for this is that money left on the table is inefficient and the elimination of inefficiency is always good. Money left on the table presumably reflects carelessness or ignorance, but according to Williamson (2008) that is to oversimplify.

Constructive and strategic contractual refinements are sometimes difficult to distinguish, but three distinct terms and mechanisms can be found (Williamson 2008). One of these is the ones that both parties perceive to have the purpose of improving the bargain, and realize mutual gains. This kind will be approved by both parties. We also have those that are deeply problematic in respect of mutual gains and these which are perceived to benefit only one of the parties at the expense of the other will be priced out and withdrawn. The last mechanism is those that have asymmetric information. In this situation one of the parties will propose a contractual refinement that is skewed in its favor, yet represents otherwise and the other party is unable to ascertain the truth. Out of concern the other party will then respond with another proposal skewed in its favor where the information asymmetry runs the other way. This kind of behavior can jeopardize the joint gains from a simpler and more assuredly constructive contractual relationship. By contrast to the muscular and idealistic benign contracting the parties of credible the parties are hardheaded in that they expressly provide for credible commitment mechanism to which mutual benefits can be confidently ascribed. They are wise, and omit the introduction of the mechanism which in a world of asymmetric information will escalate strategic behavior and have negative effects (Williamson 2008).

Malhotra and Lumineau (2011) found two key impediments that are a threat to cooperation. These are exploitation by an opportunistic exchange partner and the possibility of coordination failures that can ruin the efforts of even well-intentioned

partners. When discussing contracts, they distinguish between contracts that function as a control provision and those that function as a coordination provision. Control problems stem from misaligned incentives, and coordination problems stem from misaligned expectations and behavior in exchange relationships. Trust is the willingness of a party to be vulnerable to the actions of another party based on positive expectations regarding the other party's motivation and/or behavior. They also distinguish between two types of trust, goodwill and competence. Goodwill based trust can be explained by that they have an intention to perform as expected, while the competence based trust can be explained by having the ability to perform as expected. They find that contracts can crowd out trust, and that the greater number of control-oriented provisions in a contract, the lower the subsequent level of goodwill-based trust in the relationship. Increasing the number of both control provision and coordination provisions lead to higher levels of competence based trust.

### ***3.5 Measuring Performance in Buyer-Supplier Relationships***

In the previous sections theories around buyer-supplier relationships have been presented. This chapter will discuss how the performance of such relationships can be measured.

In the first section in the theory review the idea behind the extended enterprise were discussed. According to Davis and Spekman (2004) the overarching objectives for the extended enterprise are to maximize the value generated for the ultimate end-customer and to minimize the cost along the entire value chain. Therefore, measuring the key metrics that are important in this way of thinking will influence the ability the companies have to initiate these concepts in their operations, and see how well it performs.

According to Panesar and Markeset (2008) a performance baseline is a good idea to work collaboratively with well-defined performance targets and with clear expectations. Regular interactions and periodic feedback can help understanding expectations, customize service delivery to the customer needs, and ensure that there are minimum understandings. The key performance indicator for each activity should be carefully selected to enable a quantitative or qualitative assessment of the quality of the services that are provided. Furthermore, these key performance indicators must be understood and agreed upon at the contract negotiation stage.

### 3.5.1 Balanced Scorecard

Davis and Spekman (2004) suggest using the balanced scorecard to measure performance. As previously mentioned, measurement in the extended enterprise thinking needs to involve both traditional performance measures and behavioral and enterprise-wide measures that measures the relationships qualities required. This reflects that both hard and quantitative measures along with softer and qualitative measures will need to be included.

The balanced scorecard was developed by Robert Kaplan and David Norton in 1992 and its purpose is to evaluate corporate performance from the financial perspective, the internal business process perspective, the customer perspective, and the learning and growth perspective (Bhagwat and Sharma 2007). The initial framework of the balanced scorecard can be seen in Figure 7 below.

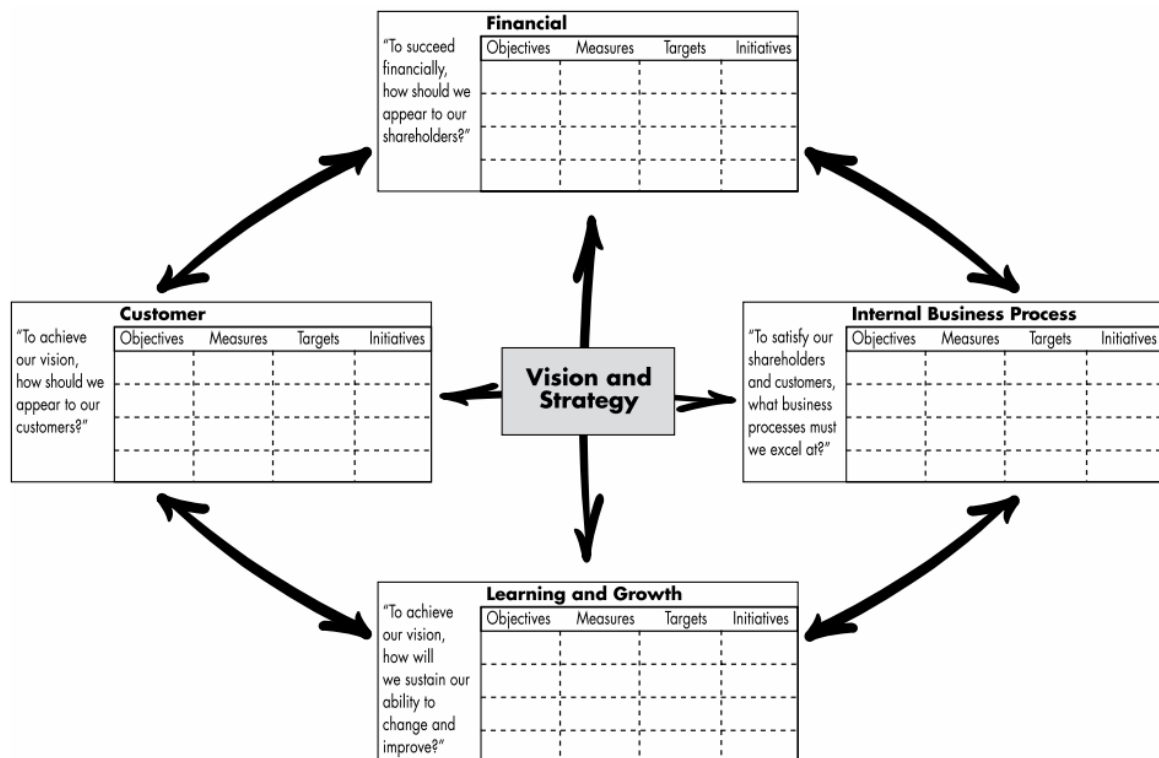


Figure 7: Balanced Scorecard (Kaplan and Norton 1996)

The balanced scorecard is based on the company’s vision and strategy and serves to measure the performance of the four perspectives mentioned above, with regards to how the company can achieve its vision and strategy. We can see that its measures performance on financial objectives, but also includes benchmark for performance in three key

nonfinancial areas, which are a company’s relationship with its customers, its internal business processes and its learning and growth (Kaplan and Norton 1996).

From it was first published until today, the balanced scorecard has been heavily researched and developed, and multiple ways of adjusting it towards the needs of companies has been developed. Brewer and Speh (2000) suggested to link supply chain management to the balanced scorecard in the following way.

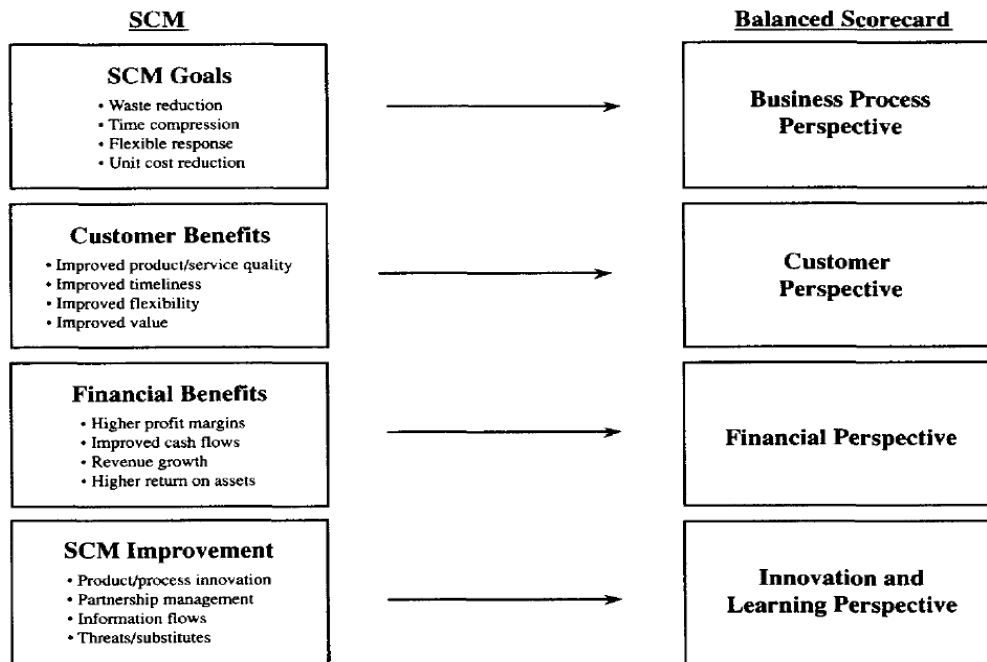


Figure 8: Adjusted Balanced Scorecard to SCM (Brewer and Speh 2000)

We see from the left column in Figure 8 some possible measures to be used in a balanced scorecard for evaluation of performance in supply chain management. Using this approach can offer several benefits. First, it emphasizes the inter-functional and inter-organizational nature of supply chains and recognizes the need to determine the extent of efficiency in the collaboration between firms, and the extent to which functions are coordinated and integrated. Second, it will increase the chance that a “balanced” management approach is practiced within firms and between supply chain partners. Third, the use of this approach can help employees and managers focus their attention on achieving goals that are beyond the typical measures of performance used within firms (Brewer and Speh 2000).



### 3.5.2 Performance Measures

According to Elrod, Murray, and Bande (2013) it is advisable to first select a method of strategy analysis and information sharing, such as the balanced scorecard method. After the strategy is outlined, appropriate supply chain measurements can be selected and assessed to ensure that outcomes and strategy are aligned. An important point here is that the measures fit the industrial application.

Elrod, Murray, and Bande (2013) have done a review on performance measures in supply chain management, and divided these into four categories which are cost measures, quality measures, time measures and flexibility measures. While Gunasekaran, Patel, and Tirtiroglu (2001) have divided measures into strategic, tactical and operational metrics.

According to Gunasekaran, Patel, and Tirtiroglu (2001), important metrics for evaluation of partnerships can be seen in Table 4.

**Table 4: Partnership Evaluation Criteria (Gunasekaran, Patel, and Tirtiroglu 2001)**

<b>Partnership Evaluation Criteria</b>
Level and degree of information sharing
Buyer-supplier cost saving initiatives
Extent of mutual cooperation leading to improved quality
The entity and stage at which supplier is involved
Extent of mutual assistance in problem solving efforts

An evaluation based on the above criteria will result in a win-win partnership, leading to a more efficient and integrated supply chain (Gunasekaran, Patel, and Tirtiroglu 2001).

When appropriate metrics for measuring performance, the next step is to actually measure it. TRADE (1995) suggest using a feedback loop as is shown in Figure 9.

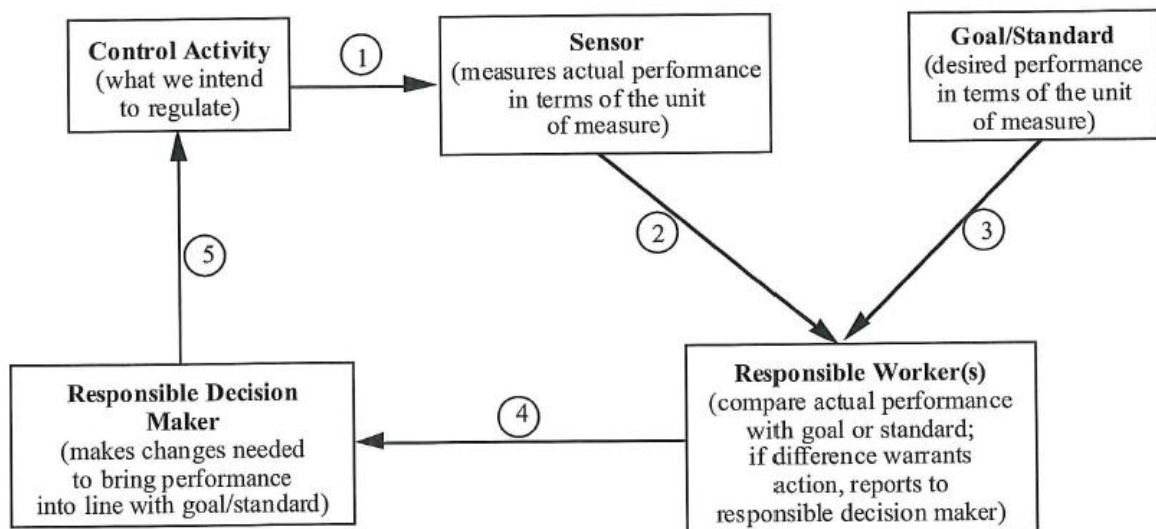


Figure 9: Basic Feedback Loop (TRADE 1995)

Figure 9 presents a systematic series of steps for maintaining compliance with the goals by communicating performance data back to the responsible party to take appropriate action. These steps should be continued until the company reaches the standard set by the goals (TRADE 1995).

## 4.0 Methodology

This chapter will discuss the research methodology of this thesis. First, the research design will be described, followed by the case study approach. Then the data collection process will be outlined, before the validity and reliability of this research are discussed.

### 4.1 Research Design

According to Yin (2010) the research design serve as a logical plan to involve the links among the research questions, the data to be collected and the strategies for analyzing the data so that the study's findings address the intended research question.

In Table 5 below, Ellram (1996) presents an overview of different research designs.

Table 5: Research Designs (Ellram 1996)

		Types of Analysis*	
		Primarily Quantitative	Primarily Qualitative
Type of Data	Empirical	Survey data, secondary data, in conjunction with statistical analysis such as: <ul style="list-style-type: none"> <li>factor analysis</li> <li>cluster analysis</li> <li>discriminant analysis</li> </ul>	Case studies, participant observation, ethnography. Characterized by: <ul style="list-style-type: none"> <li>limited statistical analysis,</li> <li>often non-parametric</li> </ul>
	Modeling	<ul style="list-style-type: none"> <li>• simulation</li> <li>• linear programming</li> <li>• mathematical programming</li> <li>• decision analysis</li> </ul>	<ul style="list-style-type: none"> <li>• simulation</li> <li>• role playing</li> </ul>

The type of analysis is divided into two different types, where one is primarily quantitative and the other primarily qualitative. According to Ellram (1996) qualitative results are frequently expressed verbally, often to create an understanding of relationships or complex interactions. Further she divides the type of data into empirical data and data from models. Empirical data is gathered for analysis from the real world, often via surveys or case studies.

According to Ellram (1996) the four primary objectives of research are exploration, explanation, description and prediction. In exploratory research, the issue could be how or why is something being done? A case study methodology would be desirable in those circumstances because it provides depth and insight into a little known phenomenon (Ellram 1996).

As this thesis will investigate the relationship between Ulstein and their suppliers, qualitative data will be most suited for this, as this is suitable to create an understanding of relationships or complex interactions. And as empirical data is suitable to describe real-world situations, this thesis will use empirical data. With this research the goal is to gain an understanding of how the relationship between Ulstein Verft and their suppliers work, and how this can be improved. This research has an exploratory nature as it wants to address how Ulstein currently manage their relationship with their suppliers, and how they can manage it more effectively. As they do not at have a clear understanding at the moment for how this can be done differently, this thesis seeks to explore this matter. Based on the above discussion, the research design will be a case study and use qualitative empirical data for the analysis.

#### **4.1.1 Unit of Analysis**

This case study wants to find out how Ulstein can improve their coordination with suppliers. According to Monczka et al. (1998) a general guide for the definition of the unit of analysis is related to the way the research questions have been defined. The research questions in this paper seek to find out how to manage buyer-supplier relationships in general, and the specific relationship Ulstein has with their two suppliers. In Figure 2 we saw the four roles of supply chain management in construction. The first role focuses on the interface between the supply chain and the construction site. The main focus is to reduce the cost and the duration of activities at the site, and primarily to ensure that dependable material and labor flows to the site in order to avoid disruptions to the workflow. The fourth role is on the integrated management of the supply chain and the construction site. With this in mind, this paper seeks to analyze the two relationships Ulstein has with regards to reducing cost and duration of their activities and to ensure a dependable flow of materials and labor to avoid disruptions. By focusing on this, the goal is to achieve improvement in the fourth role, an integrated management of the supply chain

and the construction site. So the unit of analysis is the two relationships/dyads. By analyzing and finding measures to improving these, the goal is to improve the overall supply chain and shipbuilding process.

## **4.2 Case Study Research**

Yin (2009) defines a case study as:

*A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. (Yin 2009, p. 18)*

A case study research consists of a detailed investigation of phenomena within its context. The aim is to provide an analysis of the context and processes which illuminate the theoretical issues being studied, and to understand behavior and/or processes and how this is influenced by the context (Hartley 2004).

Another important distinction with the case study method is that it copes with a distinctive situation in which there will be many more variables of interest than data points. It must therefore rely on multiple sources of evidence and the data must converge in a triangulating fashion (Yin 2009).

According to Hartley (2004) a case study must be defined in terms of its theoretical orientation, and the value of theory is key. Although a case study may begin with only a primitive theoretical framework, the researcher must develop this during the course of the research. This informs and makes sense of the data collected, and which can be systematically examined during the case study for plausibility. The case study theory building tends to generally be inductive, although not exclusively.

## **4.3 Data Collection**

According to Yin (2010) there are two types of data, primary and secondary. Primary data is data gathered for a specific analysis, such as surveys, interviews or observation, while

secondary data is data gathered by other people for other means than this exact research. Secondary data can be other studies, books, journals, statistics etc. (Yin 2010).

Qualitative interviews are a useful way to get large amounts of data quickly, but wide variations can occur in regards to how structured it is conducted (Marshall and Rossman 1999). According to Yin (2010) all interviews involve an interaction between an interviewer and a participant, but the interview vary into how scripted this interaction is. He divides different interview types into two, the structured interview and the qualitative interview. The structured interview carefully script the interaction and use a formal questionnaire that list every question to be asked, and then interviewer will try to adopt the same consistent behavior for the setting to be as equal as possible during all interviews. On the other hand, the qualitative interview differs from the structured interview in key ways. There is no questionnaire containing a list of question, but the researcher will rather have a mental framework of the study questions. The interview function more as a conversation, and questions are verbalized differently, and vary, based on the participant, context and setting. Questions being asked in the qualitative interview are open ended, and the researcher can follow up with additional questions if the participant talks of something interesting.

According to Yin (2010) interviewing and conversing as a data collection method is good way to find out about other persons explanation of behavior or action. As this thesis wants to explore the relationship in a buyer/supplier relationship, interviews seems as a good method to find out about the behavior and actions in this relationship.

In this research, a mix of the two interview styles has been used. Similar to the structured interview, a list of questions were scripted ahead of the interviews. The interview guides can be found in the appendix 1. The questions, on the other hand were similar to questions used in the qualitative interview, being open ended, as well as using follow-up questions if necessary to get the information needed. The point was not to get the same answers from everybody to see whether their opinions differed, but more on getting a clear overview of the entire situation, therefore no specific demeanor was used in all interviews. Instead a more conversational mode, was used, were the point was to get as much knowledge as possible about the situation.

To gather primary data, interviews have been done with Ulstein Verft, R&M and WestCoat and one researcher from Møreforskning. Hartley (2004) suggests that the first strategy in collecting data should be to get a general overview of the structure and functioning of the organization. In these interviews the researcher will learn something of the history and present functioning of the organizations. Another valuable aspect in this is to be walked round the organization observing the work flow and the work being undertaken. In the initial phase of the research an interview was held with the researcher from Møreforskning. This interview was helpful to gain an insight into the history and the current state of the Norwegian ship industry and how the shipbuilding process is. Through this, some insight was gained as to how to build the theoretical framework. After developing an initial theoretical framework for which the interview guide was based on, a second interview round was done with four participants at Ulstein, and one participant at both R&M and WestCoat. The reason for this interview round with the companies was to get a really clear idea of how work processes are, and how the relationship is between the actors. During these interviews a tour of the shipyard was also conducted, which was helpful in understanding how the actual work takes place in a shipyard. After these interviews an even more in-depth theoretical framework was built, and another interview guide was developed for use in the third interview round. In the third round two participants from Ulstein was interviewed, one from R&M and one from WestCoat. These interviews were based on the complete theoretical framework of this thesis, and to get more information around the relationships in regards to the theoretical framework. In addition it was looking to explore deeper the interesting points that were discovered in the previous round. These interviews were more in-depth than the previous and went more into the specifics of the relationship, both to see what works well, what does not work well, and what could have been better. The interview guides can be found in the appendix.

To gather secondary data, textbooks in related fields have been used. The main source of secondary data has come from scientific articles from journals. The third source of secondary data has been research made on the maritime industry in Norway and other internet sources.

#### **4.4 *Validity and Reliability***

For all kinds of research the key quality control issue deals with the validity of a study and its findings. A valid study is one that has properly collected and interpreted its data, so that the conclusions accurately reflect and represent the real world that was studied. Studies should therefore use design features that will strengthen the validity of their claims and findings (Yin 2010). According to Ellram (1996) good research design in a study, whether quantitative or qualitative, requires external validity, reliability, construct validity, and internal validity. External validity reflects how accurately the results represent the phenomenon studied, establishing generalizability of results. Reliability addresses the repeatability of the experiment, and whether one will get the same result if the analysis is repeated. Construct validity addresses the establishment of the proper operational measures for the concepts being studied. Internal validity is only a concern in explanatory case studies, where the researcher is trying to demonstrate that some outcome was caused by an independent variable. It is irrelevant for those case studies that are solely exploratory or descriptive in nature (Ellram 1996). All these concepts are important for my thesis except internal validity. Because this research is explorative, and not explanatory this is not relevant.

According to Yin (2009) there are three available tactics to increase construct validity. The first is to use multiple sources of evidence, in a manner which encourage convergent lines of inquiry. The other tactic is to establish a chain of evidence. The two first tactics is relevant in data collection. This has been handled with interviewing several people from all three companies. In addition using scientific literature together with the empirical findings a chain of evidence has been established between them. The third tactic is to have key informants reviewing the draft of the case study. Because of time pressure, in both writing this thesis, and for the informants the last tactic will not be satisfied.

According to Yin (2009) testing for external validity, deals with the problem of knowing whether the findings of the study are generalizable, beyond the actual case study. Using theory from textbooks and articles is a tactic that can help with achieving external validity. This thesis has a thorough literature review, in which the interview guide is based on, and findings from this research can therefore be generalizable to other similar cases.



The goal of reliability is to minimize errors and biases in a study. The best way of achieving this is to make as many of the steps in the in research as operational as possible, and to conduct research as if someone were looking over your shoulder. Therefore a good guideline for doing case studies is to conduct the research so that an auditor could repeat the procedures and arrive at the same result (Yin 2009). Throughout the thesis, references are made to the literature, and to other information sources. Also the procedure in which primary data has been collected is explained and copies of the interview guide can be found in the appendix. These measures have been done to make the research process as transparent as possible, and make it possible for others to review the work.

## 5.0 Case Study Findings

In this chapter, the findings from the interviews will be described. These are mainly related to the actual processes of the shipbuilding and what each supplier do in this process, how they do it and when it is done.

### 5.1 Work Process

In Figure 3 the value chain was introduced and defined as:

*“The linked set of value-creating activities all the way from basic raw material sources for component suppliers through the ultimate end-use product delivered into the final customers’ hands” (Dekker 2003).*

Below in Figure 10 is the value chain of Ulstein Verft. Support activities are seen in the top of the figure, whilst the primary activities are in the bottom. The following section will identify where in the primary activities the suppliers are involved, and to what extent.

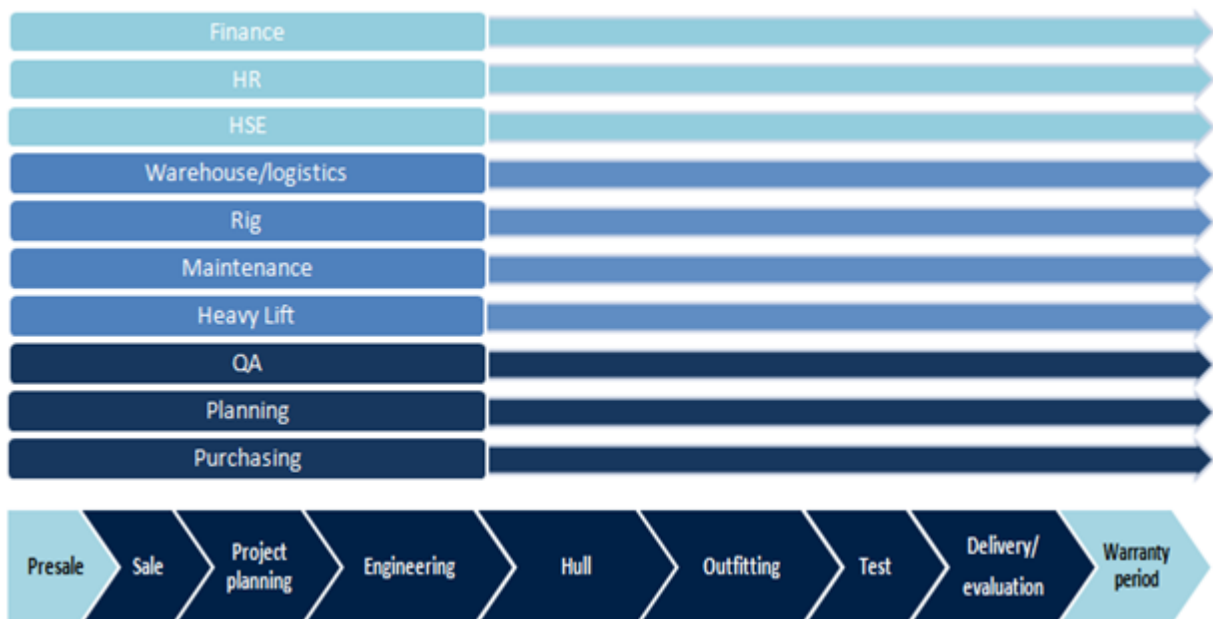


Figure 10: Value Chain - Ulstein Verft

According to Hicks, McGovern, and Earl (2000) there are usually large differences between the level of vertical integration in ETO-supply chains. Between the two extreme types they present, Ulstein is between those as both suppliers and the Ulstein deliver

materials, and both does some of the actual construction and commissioning phase of the work. Examples of this will now be further described.

The interviews revealed that the suppliers are included to a certain extent in the presale phase. The presale and sale phase was described in the introduction in chapter 1.3. The purchasing department says that the suppliers are included in the presales phase when prices are calculated for a new ship. WestCoat does not supply Ulstein with sand and paint for the ship, as Ulstein has other suppliers for this. R&M deliver some materials for the job. Today they deliver all isolation and steel plates for technical rooms, as well as some products for internal rooms and cabins. Because they are a large international supplier, they do have many other products that they can deliver, but does not at the moment. Both suppliers have a three year framework agreement, where prices are fixed, but Ulstein says that they usually check prices with a few other suppliers in the presale phase to make sure they get competitive prices. But in the last 5-6 years, no other suppliers have been used. The fixed price generally includes a square meter price for finished work, and an hourly price for work beyond the scope or for redoing work that is not caused by the suppliers. As the prices are fixed per square meter, they discuss and agree upon how many square meters of work there is on the new ship, based on the drawings from the design. When this has been agreed upon a scope for the suppliers work on the entire project is made.

After calculating prices, the planning and operations departments take over the communication and planning along with the suppliers. Each discipline, paint and interior has their own production/project coordinator at Ulstein, and this coordinator has responsibility of the corresponding supplier. In the project planning phase it differs between R&M and WestCoat. Ulstein has their own interior department with about 25 workers, while they do not have their own painting department. Because of this R&M are not included as much as WestCoat in the planning phase. R&M know that they will work on the new ship, but Ulstein plan their own interior department first, and then the additional work is given to R&M. One respondent said that R&M many times does not know how much work, and what they will do until the hull arrives at the shipyard. WestCoat are much more involved in the early stages of the planning. In the presales phase they calculated the number of square meters of the ship, and in the project planning phase general plans for the painting is made. After the general plans are made, the suppliers are

not involved at that particular project until the hull comes to the shipyard, which is the outfitting phase.

Accompanied by the general plan made in the project planning phase, they also plan continuously during the outfitting phase. Every sixth to eight weeks they have a project meeting involving all the different sub-departments at Ulstein. Suppliers are not in these meetings but have their coordinator at the shipyard present. In this meeting they make a plan for the next six to eight weeks. In addition to this they have a week plan meeting each week. Here they go through the plans for the past week and checks whether they are on schedule from the past week meeting. If needed, adjustments are made, and they make a new plan for the next week. In this meeting the suppliers are present with their own foremen at the plant.

In the outfitting phase both of the suppliers are largely involved. Both suppliers start their work when the hull arrives, and work until the ship is finished. They both do several different tasks. WestCoat sandblasts, treats and paints all tanks, indoor areas, and outside on the boat. R&M isolates the boat inside and get all cabins and indoor areas ready. For R&M much is done together with Ulstein own interior department, and it varies more from ship to ship what their scope is than with WestCoat.

During the outfitting phase each area or task are scheduled. WestCoat is the first supplier to start with sandblasting and painting of the steel. When they are finished in a room another supplier takes over if other work is to be done in that room. This creates a large interdependence between those that are executing the work. A delay in one activity, will delay the start on the next, and extra measures will need to be initiated to prevent this delay to further evolve. Part of the reason they have weekly planning meetings is to capture such events, and make adjustments so that those that are delayed are moved to another area, or that more people are moved to this area to make up for the delay. In a situation where a delay occurs, the information flow is supposed to be the following. The worker who finds out should inform their foreman, who informs either, their project manager in their own firm or Ulstein's coordinator in the related discipline. The coordinator is then supposed to inform the planning department. Both R&M and WestCoat have a Microsoft Excel system where they continuously track their progress in each area.

WestCoat shares this system with their project coordinator, while R&M only uses it for own purpose.

As mentioned the suppliers have fixed prices, and this is usually a price per square meter. If delays happen and they cannot start at the scheduled time, they do not get compensation, but are usually transferred to another area where they can start. Although, if they have finished their work in an area, but a change-order or some equipment has been forgotten and the work must be redone, they are compensated on an hourly rate.

In the outfitting phase, Ulstein has key performance indicators for which they measure. These are called the “healthy seven” and are tools, documentation, resources (manpower), areas, preceding work, materials and other causes. When a task is to be executed these “healthy seven” must be in place, or if a deviation from the plan occurs, which of these was the reason for the deviation.

The next phase after the outfitting is the test phase. In this phase all work to be done on the ship is supposed to be finished. Even though the ship is supposed to be complete, one of the respondents says it is usually something left to be done, but rarely critical for the delivery. When the ship comes back from the test, the suppliers once again enter the ship to complete the work that was not finished in the outfitting phase, or if a mistake was found during the test.

When the ship is completely finished it gets delivered to the ship-owner and Ulstein starts the evaluation of the project. In this phase all disciplines participates. R&M says that they in most cases are involved in these meeting, and have the opportunity to say what has worked good or bad, and how the cooperation with other disciplines have been. WestCoat on the other hand, are not included in these meeting other than having their project coordinator from Ulstein present.

Both of the suppliers are also involved in the warranty period and aftermarket at Ulstein. If a ship is to be repaired, improved, rebuilt etc, they do this work as well. The extent of work from these kinds of assignments differs a lot, but when this is extensive they state that they have some problems with capacity to both do the outfitting and the work in the aftermarket.

In Figure 11 we see the primary activities in Ulstein’s value chain, and where in these activities the suppliers are involved.

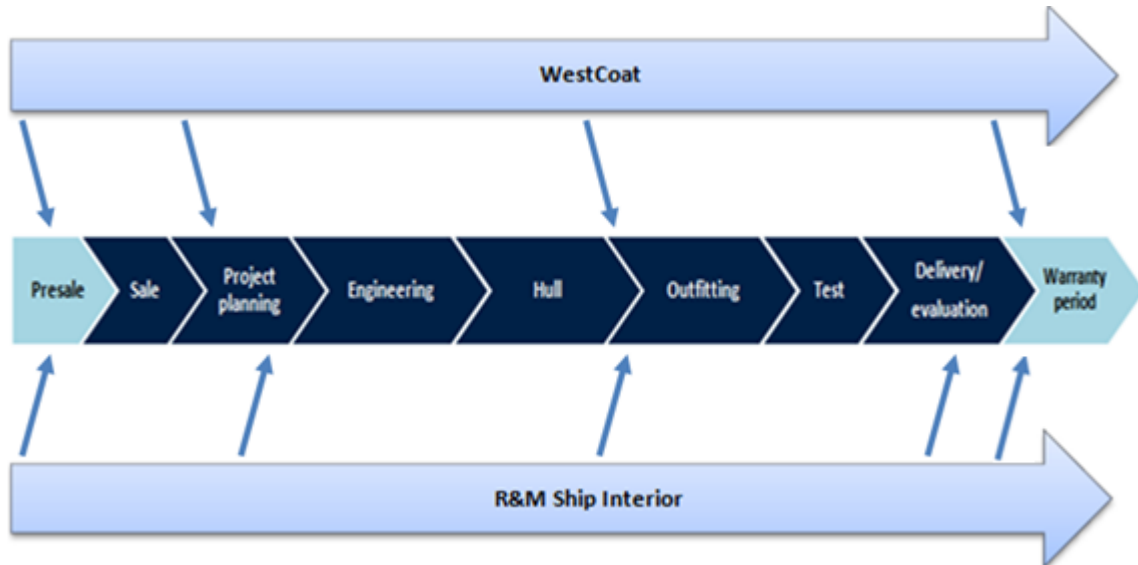


Figure 11: Value Chain including suppliers

In the introduction of this paper the terms CDCP and IDCP in ETO-production was introduced. The CDCP for the ship is in the sale phase as the contract signing is the situation where the order is pulled, but there are several different DCP in the rest of the value chain. As the suppliers are included in the presale phase, the IDCP also lies in this phase. But even though the main DCPs are placed here, not all contents of the ships equipment and all different solutions are decided at this time, but later in the value chain. This makes for several different CDCPs and IDCPs throughout the chain, in regards to equipment and solutions which are decided in the project planning and engineering phase as well as change-orders in the outfitting phase.

The outfitting phase is the main value adding activity where the suppliers are involved. In the following section, the processes of each supplier within this activity will be described.

### 5.1.1 WestCoat AS

When the hull and the different steel sections that constitutes the ship arrives, WestCoat starts the process of sandblasting the steel. Both the steel sections, tanks and pipes are WestCoats’s responsibility. When the sandblasting is finished they clean the area, before

the put on a primer. Then they paint several layers. This process is about the same for all areas that needs painting. Tanks are the most extensive work they do, and between all the activities of the paint process, the work gets controlled by the shipyard first before they include the paint supplier, and the customer in the control. On the out- and inside of the ship only the shipyard and the customer control the work. When the room is finished the room/area/tank gets signed off by the shipyard and the customer, and on tanks also the paint supplier needs to sign off.

Several problems were communicated by the respondents with regards to this process. The main concern was the quality of the steel that comes to the shipyard. The steel is supposed to have been controlled and perfect when it arrives at the shipyard so they can start working on it right away. The main problem was that the weld joints are not of a good enough quality, which is something WestCoat immediately identifies when they start sandblasting. If this happens they need to stop the sandblasting, move to another area, while Ulstein repair the steel. WestCoat says that this process sometimes happens several times at the same area and that after the repair, the steel is still not of a good enough quality. This creates problems for them such as the efficiency of their work is lowered and the cost rise for them and for Ulstein, as they get additional pay for this. Because they have a long experience in the industry they know that some quality defects with regards to this is unavoidable, but that they have seen a decline in the quality of the steel in the time they have been at Ulstein, and that this applies to both the steel sourced abroad and in Norway. Even though they get paid an hourly price for additional work, this is according to WestCoat not profitable for them, and that their profit has been reduced the last years. At one ship, the steel was of so low quality and the repairs was so extensive that WestCoat needed to hire in additional workers from other paint companies to be able to be finished on time.

### **5.1.2 R&M Ship Interior AS**

R&M mainly delivers two things to Ulstein. This is materials and installation of isolation on the ships, from the hull and into the walls. In addition they deliver and install interior in cabins, hallways, common areas, floors etc. While WestCoat delivers all the work related to painting, it varies more what parts R&M does and delivers and what Ulstein does or

deliver. Mainly R&M delivers materials to technical rooms, while Ulstein to other rooms. Often R&M also delivers some products such as furniture, shelves etc.

The main problems in the outfitting phase for them are that the interdependence with other work on the ship. Typical problems are that the areas are not ready when they are supposed to start, and that they need to do work over again, if something has been forgotten and must be repaired. One respondent says that their statistics on efficiency shows that this has not been improved the last 15 years, but rather is worse. This shows how much they get done per hour, and the consequence of this is that they need to raise their prices. If something delays their work the cost is raised, and when the deviation from the plans is so large, and the focus is more on flexibility than on following the plans, they say it is hard to identify the bottlenecks and find out what can be improved. Although this flexibility does not necessarily raise the cost on the specific ship, but in the long term it will, as it will not be avoided in the future and the efficiency will not be improved.



## **6.0 Discussion**

This chapter will discuss the relevant theory presented in chapter 3 and the findings from the case study in the previous chapter.

### **6.1 Supply Chain Management**

From the definition of supply chain management by Lambert and Cooper (2000), we can identify the most important aspects in supply chain management.

*Supply chain management is the integration of key business processes from end user through original suppliers that provide products, services and information that add value for customers and other stakeholders (Lambert and Cooper 2000, p. 66)*

Services are the main delivery from WestCoat and R&M to Ulstein. One aspect with service supply chain is that the variation and uncertainty in the output are usually higher because of the human involvement. Much of the work done in the shipyard is done manually by people, which leads to variation in the time spent on doing the tasks. This creates uncertainty for how much output will be created in the time it is planned. Having a good information flow is found to be one of the most important things in the supply chain of services. Because of the uncertainty there is also need to have high levels of collaboration and transparency in order to improve operational performance and reduce disruptions in the chain (Sengupta, Heiser, and Cook 2006). This is also the case with Ulstein and the suppliers, as they need to increase both the operational performance and reduce the number of disruptions in order to lower the time in the outfitting phase. Issues around this will be further elaborated on throughout this discussion.

Another important aspect in supply chain management is adding value. The supply chain network structure divides members of the supply chain into primary and supporting members. Each of the primary members throughout the chain adds value to a product or service delivered to the end-customer. Within the primary members of Ulstein's supply chain we find the suppliers R&M and WestCoat that this thesis analyzes. Within the scope of this master thesis, the entire supply chain of Ulstein is not the main focus, but mainly two suppliers. Even though it focuses on only two suppliers, other members are of

importance. Below in Figure 12 is a map of the supply chain which is relevant in this research.

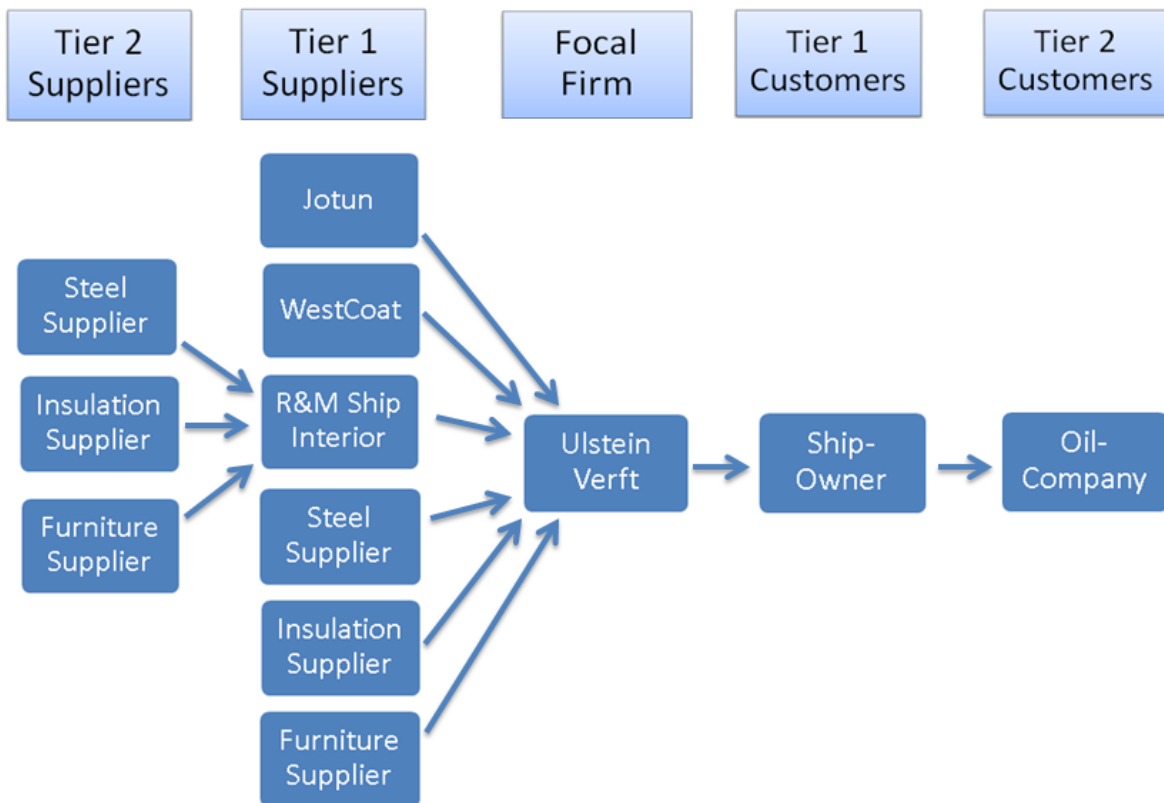


Figure 12: Map of supply chain

This is a simplified map, to visualize some of the relationships within Ulstein's supply chain. In the order fulfilment process, there should according to Lambert and Cooper (2000) be designed a network and process that permits a firm to meet customer requirements while minimizing the total delivery cost, and this involves coordination of key suppliers and customers to develop a seamless process. In the case study findings we saw the both the ship-owner, Ulstein and the suppliers are involved in the processes at the shipyard, and creating seamless processes here could meet customer requirement and have the potential to minimize the total cost. As both Ulstein and R&M purchase insulation, steel and furniture in the market, these suppliers are found both in tier 1 supplier and tier 2 suppliers. As they both say that they source this wherever they get the best price, there is no supplier used regularly for this. WestCoat and R&M are both tier 1 suppliers. Jotun is also a tier 1 supplier, and has been the preferred paint supplier for Ulstein for decades. The ship-owner is the tier 1 customer, while the oil-companies are tier 2 customers. This thesis

focuses mainly on the dyad of Ulstein and each of the suppliers R&M and WestCoat as seen in Figure 13 below.



Figure 13: Dyads

Previously the four roles of supply chain management in construction were discussed. The dyad's we see above is important in the first role as this is the interface between the supply chain and the construction site. The idea here is reducing the cost and duration of site activities and ensuring dependable material and labor flows to the site in order to avoid disruptions. By analyzing this, the purpose is to improve the fourth role which is the integrated management of the supply chain and the construction site.

With this background there are two key business processes from Table 2 which are of most importance to achieve this. These are supplier relationship management and order fulfillment.

The most important aspect for this thesis is the supply chain management components as shown in Figure 4. These are what affect the level of integration at the process level of the supply chain. Increasing the level of each component can increase the level of integration between a company and its suppliers at the supply chain management process level.

The first and the second research question is the following:

***How should buyer-supplier relationships be managed in an ETO-environment?***

***How can Ulstein Verft manage their suppliers to be able to handle shorter production time and increase the level of innovation?***

As these two questions in many ways will overlap, they will be discussed simultaneously.

## **6.2 Buyer-Supplier Relationships**

### **6.2.1 Governance Forms**

When it comes to governance forms in a buyer-supplier relationship, there is no best solution that fits all relationships. The market mode has high powered incentives, little administrative control and a legal contract regime, while hierarchical has low powered incentives but has considerable administrative control but no legal contract regime. While the market mode is well suited to implement independent adaptations, but poorly suited for cooperative adaptations, the hierarchical mode is opposite to this. In between these we find the hybrid. What the best governance form for a buyer/supplier relationship is depends on the attributes of the companies involved. Ulstein's relationship with R&M and WestCoat is a hybrid relationship. Cooperative adaptations are vital for an efficient operation, and the need for administrative control is essential at Ulstein.

When choosing a hybrid relationship Borys and Jemison (1989) mention some stability mechanisms for a hybrid. The hybrid must be rooted in shared norms and values, legitimacy, trust and general practice in an industry is important. Last we find the contract as a stability mechanism. In the interviews it was clear that the companies shared the same norms and values as their shared priority is to build high quality ships and deliver them on time to the customer. Both of the suppliers have had a relationship for several years, and this has had time to develop. As a respondent from Ulstein says, they have been there for so long time now that the workers from the suppliers know how things work, and that they are treated in the same way as their own employees. As they have all been in the shipbuilding industry for several years, all of them know what the general practice is and they have a wish to not violate these practices because this can harm their reputation. This shows an example of how the management components organizational structure and culture- and attitude from Figure 4 are in place. When teams from different members of the chain work together, there is a high need for an integrated supply chain which the organizational component describes. Also the culture and attitude of the channel members are aligned which according to Lambert and Cooper (2000) are necessary for a supply chain to perform. When it comes to the contract, both the suppliers have a framework agreement with Ulstein running for three years at the time. The contractual arrangement will be discussed more thoroughly later.

The Kraljic matrix in Figure 5 was reviewed in chapter 3. The matrix was developed to find strategies towards suppliers based on their profit impact and on the supply risk.

When placing R&M and WestCoat in this matrix this must be analyzed based on the two dimensions, profit impact and supply risk. On the profit impact, the purchase from these suppliers is of high volume as both suppliers work constantly in the outfitting phase. Although they have a high volume they are not the most costly purchase Ulstein does, which usually are the expensive equipment with long lead time. In the interviews the respondents said that the purchase of services such as those delivered by R&M and WestCoat are between 10 and 15% of the total purchase costs. When it comes to product quality they have a certain impact, as both of them does work on the entire ship, which are both important for the visible quality and durability. But none of them are as important for the quality such as the suppliers of engines, thrusters and other technological equipment which can cause breakdown of the entire ship. Based on this R&M and WestCoat are placed on a medium level when it comes to profit impact.

When it comes to supply risk, there are certain risks involved. The main risk is not related to the purchase of materials from the suppliers, but towards the services they deliver. As they both are heavily involved at the workflow in the shipyard, the supply risk is mainly related to this. Both of the suppliers primarily deliver workers to execute the work on the ship, and therefore Ulstein has the opportunity to purchase this other places. The problem with this is that the experience and knowledge of the workers is of such a high importance and has a high impact on the efficiency of the work flow at the shipyard. For other to gain the same experience will take time, and will reduce the efficiency for a period. Therefore, R&M and WestCoat are placed on a medium to high supply risk.

On a medium profit impact and a medium to high supply risk, the supplier will be placed between strategic and bottleneck items and this can be seen in Figure 14 below.

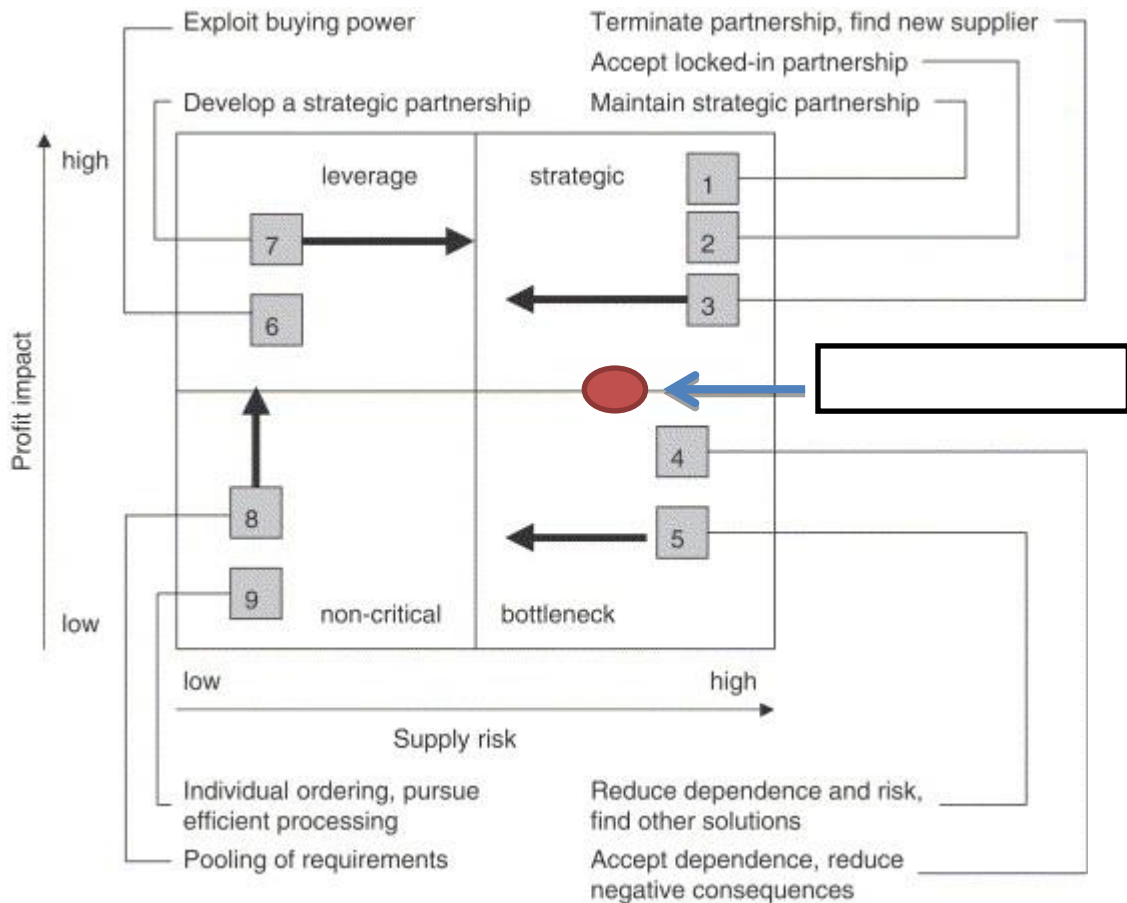


Figure 14: R&M and WestCoat in Kraljic Matrix

As there are no specific strategy to use when the suppliers are placed as it is in the figure, we can look at what strategy they suggest for those closest. From the strategic window we see strategy 3 is to maintain strategic partnership. From the bottleneck window, we see strategy 4 is to accept the dependence, and reduce negative consequences. We have seen some examples that this is the strategy already in that they have chosen to have a long term relationship with their suppliers, and that some mechanism is in place to reduce potential negative consequences. More on this will be discussed in the following sections.

### 6.2.2 Principal-Agent Theory

When two companies enter into a buyer-supplier relationship, they have the opportunity to gain their competitive advantage and become more efficient, but there are also some risks and problems that can occur in such relationship. A buyer-supplier relationship can be described from a principal-agent perspective, where the buyer is the principal and the supplier is the agent. The assumptions behind this theory are described in the theory

review and should be thought of when entering into a buyer-supplier relationship. It is important that both the principal and the agent have the same goals. If the goals are not the same, we have a goal-conflict which can lead to a situation that where the agent does not perform the actions that will meet the principal's needs. No examples of a goal-conflict between Ulstein and their suppliers were identified in the interviews, but it is important to be aware that this is a situation that might occur.

There are also other assumptions that can affect the relationship such as self-interest, bounded rationality and risk aversion. When choosing the suppliers to enter into a relationship with, asymmetrical information can lead to two problems. The first is an adverse selection problem. Between a number of suppliers that all is stating they can perform the work, it might not be the actual case that they can. Ulstein has now been in a close relationship with R&M and WestCoat for several years. They know that these two suppliers are capable of doing the work, but will find themselves in an adverse selection problem if they decide to change suppliers, and do not know whether other potential suppliers have the same abilities.

The other problem related to asymmetrical information happens after the suppliers are chosen, and relates to if the supplier will deliver the effort that was agreed upon. If the buyer cannot control that the agreed upon is actually performed a moral hazard problem occurs. In Ulstein's case the work done by the suppliers are controlled when it is finished, both by Ulstein themselves as well as the ship-owner which reduces the chance of this problem. Another way Ulstein has avoided the moral hazard problem is that they have a fixed price per square meter of work done by the suppliers. In this case, it is in the suppliers best interest to perform the work as quick as possible and with a quality good enough to get through the control, as they will need to redo the work if the quality is not good enough. This can be seen as an outcome oriented contract, where payments are made based on whether the predefined work has been finished. By using an outcome oriented contract, the risk is transferred from the principal to the agent. But by having an hourly rate for additional work outside of their scope and for uncertain events the suppliers are safeguarded against much of this risk. This shows that the contract between Ulstein and the suppliers have mechanism from both the outcome and the behavior oriented contract. By having suppliers with the same goals as Ulstein, and having control measures as well as a fixed price they have mitigated some of the problems of a principal-agent relationship.

### **6.2.3 Transaction Cost Theory**

Transaction cost theory aims to find the most appropriate governance form that will keep the transaction costs between firms at the lowest possible. As mentioned, Ulstein has a hybrid governance form with R&M and WestCoat. Within such relationships, Milgrom and Roberts (1992) identify some attributes of a relationship related to transaction cost.

Transaction cost arises from the attributes of the business relationship. The specificity of the investment needed to conduct the transaction is one of these attributes. When Ulstein chooses a supplier such as paint and interior, the suppliers will need some time to adjust to situation at Ulstein. Most of the respondents say that continuity with suppliers is the most effective way to increase efficiency in the operation. This does not only matter for the specific supplier, but also the workers the supplier uses. One respondent said that a few years ago R&M changed their supplier of manpower, and it took a long time before they worked as efficient as they did before. When they get continuity over time, the workers learn the processes, and the quality of work expected at Ulstein, which leads to more efficiency. This shows that investment in specific assets, which in this case is knowledge and experience, reduces transaction costs over time and that these investments lose much of its value if not used in this specific relationship, and induce sunk cost if the relationship ends. So if Ulstein changes their current suppliers, the investment made in time and resources on this relationship will be sunk cost, and most likely increase transaction cost with the new supplier.

Frequency of transactions and long duration is another way of reducing transaction costs (Milgrom and Roberts 1992). Ulstein has a framework agreements with both suppliers, lasting for three years at the time, and both suppliers have been there for 5-6 years now. Almost consequently a hull is being outfitted in the shipyard, which leads to a very high frequency in the transactions. Relationship with high frequency and long duration can reduce the need for explicit planning to coordinate actions. The respondents say that many times, small delays and the likes are handled by the foremen during operations. If they need to wait a few hours before starting in an area, they find other work they can do in the meantime, with no need for planning from the administration, which then can use their time on more pressing matters. Also the parties know what is expected of them and how the general practice is, so that problems that occur do not need to be enforced by the



contract. The frequency in these transactions and the long duration would reduce transaction costs, compared to if they changed suppliers for each new ship.

Uncertainty about conditions that will prevail in the contract execution period, along with complexity of the task is something that makes contract writing difficult, and can raise transaction cost (Milgrom and Roberts 1992). Building a ship of the standard they make at Ulstein is a very complex task, which makes it difficult to plan for all contingencies, and writing the contracts on what should be delivered to what time can be difficult and uneconomical. Ulstein has solved this issue by having frame agreements that have a fixed price for planned work, and to gain a certain degree of flexibility is solved by having an hourly price for additional or redoing work.

The performance, both good and bad, of the transaction must be measured accurately in order to provide effective incentives (Milgrom and Roberts 1992). Currently Ulstein does not have specific measurement system of the relationship, but an overall efficiency measures known as “the healthy seven”. When a task is to be executed these “healthy seven” must be in place, or if a deviation from the plan occurs, which of these was the reason. These “seven healthy” are tools, documentation, resources (manpower), areas, preceding work, materials and other causes. These are not very specific to Ulstein’s relationship with their suppliers, and cannot give a clear understanding of good or bad performance by the suppliers. According to Milgrom and Roberts (1992) accurate measurements of performance are presumed to lead to more effort and better result. This is why this thesis also seeks to find performance measures for buyer-supplier relationships. Issues around this will be raised during the discussion of the third research question.

Finally in this discussion on transactions costs, the connectedness between transactions can cause higher transaction cost. At Ulstein, the interdependence between each task is very high. All of those performing work at the site, are dependent on each other to be able to do their work. This is closely connected to the environmental uncertainty discussed above, where it is difficult to know in advance which problems will occur in the outfitting phase of the shipbuilding. Strengthening coordination mechanisms such as meetings and better planning and oversight of activities can help. Ulstein have many planning meeting. Each week there is a meeting with all involved disciplines and each morning with project leader and the project manager where many problems are captured. A report from both of these

meetings is sent to the suppliers. Even though Ulstein has many control mechanisms the information on a lot of the problems or delays are lost on the way to the right person, or is not even communicated at all. One respondent said that:

*“Early and proactive information of delays are crucial to be able to make changes in the plans and avoid delays and the need to redo work. But too often the information does not reach the right persons.”*

Another way of controlling the coordination of connected activities is according to Milgrom and Roberts (1992) to reduce the number of people involved so that fewer people need to be coordinated. At Ulstein the information flow is supposed to go from the workers, to their foreman, to the project leader at the supplier, to the project coordinator and finally to the planning department. With so many people involved, and that this chain is not followed consistently may be a reason for the information not reaching the right person, and problems and delays are not avoided. A clearer information chain, with a higher focus of following this chain might decrease the transaction cost related to these interdependence issues. This shows that the supply chain component communication and information is at a lower level than it should. This affects the planning component as well which needs the communication and information sharing to perform. According to Lambert and Cooper (2000) successful supply chain management is established by understanding each component and their interdependence.

#### **6.2.4 Resource Based View and Resource Dependence Theory**

According to Paulraj and Chen (2007) resource dependence theory argues that the establishment of buyer-supplier relationships happens because very few organizations are self-sufficient to strategic and critical resources. The need to acquire outside resources creates dependence between the organization and the outside units. By increasing the coordination with partners is a way of controlling the problem with uncertainty and dependence towards these resources. When outsourcing the painting and interior work to suppliers, Ulstein gets dependent on the suppliers for these services. So far they have been doing the purchase of materials and products for this job themselves. This might have been a way of decreasing the dependence on the suppliers and the power the suppliers have on Ulstein. By supplying materials and products themselves, they increase their power on the

suppliers, as they need materials from Ulstein to do the work. At the same time they decrease their dependence on them as it is easier to access only manpower for the job, than both manpower and materials, as they have an already established relationship with the material and product supplier if problems with the executing suppliers occur. As Barringer and Harrison (2000) state, to successfully manage dependencies organizations must acquire control over critical resources in an effort to decrease dependence on other organization on them, and acquire control over resources that increase the dependence of other organizations on them. This might be the reason for the reluctance from Ulstein to give the suppliers more control over the purchase of materials and products, so they keep their power and keep their dependence on the suppliers low. This is seen from a resource dependence point of view, where resources are something a company is dependent on and therefore most safeguard.

The resource based view says that a company with superior resources will create rents that are higher than those with marginal resources because they will have lower average cost. Another interesting aspect is how business relationships can create superior resources which are able to lower the average cost and thus create higher rents. An interesting point made by the respondents at R&M within these circumstances is that:

*“Ulstein has our best prices and much lower than what we can offer other shipyards, because we can work much more efficiently at Ulstein.”*

This shows an example of a resource with imperfect mobility. It cannot be traded to a competitor, and the rents achieved from this will stay within the firm. Running an efficient operation, is one of Ulstein resources which are able to lower the cost of their suppliers. This again makes the supplier capable of offering Ulstein lower prices, and they both gain a competitive advantage towards their competitors, and the supply chain in total are more competitive towards other supply chains because they have lower average cost.

An example which is not yet exploited in these matters is the resources of R&M. They are an international actor with lots of competence and products at their disposal. Today, R&M are mostly a supplier of manpower for the interior department, although they are supplying more and more materials and products, which also is their goal. By tapping into these resources, Ulstein might achieve ideas to how to increase efficiency and innovations, and

on the other side get better prices on materials and products, as R&M in most cases buy larger volume than Ulstein. This has the potential to further decrease the average cost of this supply chain relative to other supply chain.

From this point of exploiting the resources of others in the supply chain, this will be more thoroughly discussed from the standpoint of network theory and the idea of value creation in buyer-supplier relationships in the next chapter.

## **6.3 *Network Theory and Value Creation***

### **6.3.1 Network Theory**

Gadde, Huemer, and Håkansson (2003) state that not only each dyad in a network is important but the entire network. To combine and recombine the resources within this network, can create new resources which can further develop the network and each of the dyads. An example at Ulstein is how Jotun as the paint supplier collaborates with both Ulstein and Westcoat. Jotun has been a supplier for Ulstein for many years and use them to test and develop new products in ship-painting. For these projects Westcoat is the performing party, and from this Westcoat gain knowledge of the products and how to use them from cooperating with Jotun. Jotun have the opportunity to test and further improve their products, while Ulstein gets the most efficient and innovative ship-paint, to reduce water resistance and improve efficiency of the ships. This is one example of how combining resources from different actors of the network has been able to create larger value for the entire network.

From previous chapters we have seen how Ulstein's network of suppliers has many intangible assets, such as relationships in itself, employee know-how and competence, the efficiency of the production and service processes and the level of trust between the people and the organizations which forms the relationships. Converting such intangible assets into something tangible is according to Allee (2008) important. Employee know-how is said to be an important intangible asset and is something Ulstein is very dependent on. But as much of this know-how is owned by the supplier's workers, it is necessary that the supplier uses the same people every time to keep this intangible asset within the company.

Ulstein risks that this knowledge will be lost if some of the workers leave, and should therefore convert this intangible asset into a tangible one.

Dynamic capabilities are organizational processes, and can be used to change a firm's resource base. Above we saw an example of reconfiguration which is one of four main clusters of dynamic capabilities. Reconfiguration is the transformation and recombination of assets and resources. Leveraging is replicating a process or system from one unit to another or extending a resource into a new domain. R&M uses a Microsoft Excel-based system for tracking their performance throughout the building process where all activities are broken down into smaller parts. This is continuously updated along the process and shows clearly in percent how far they have come on an activity, an area or the entire ship from day to day. This is something they use themselves and the information from this is used to update the others in week plan meetings. They say that this is much more detailed on their current progress than what Ulstein have. Giving the planners at Ulstein access to such a system is something will be an example of leveraging the capability of one firm into another. The more detailed information Ulstein have on the supplier's progress the earlier they can capture this information. This will make it easier for Ulstein to plan sequential tasks ahead of time, where delays can be avoided and early starts can be initiated. Such a system is already in use between WestCoat and Ulstein, where the project manager at WestCoat and the project coordinator at Ulstein share access to this system, which both parties says is a success. As Davis and Spekman (2004) suggest, the information shared between members of the chain must have a high degree of transparency and that technology can facilitate the flow of this information.

Learning allows task to be performed more efficiently as an outcome of experimentation, and reflecting on the failure and success from this. As much of the work on the ship is done by the employees of the suppliers, and that they rarely build two similar ships the workers gain very much knowledge from these processes. The suppliers try to have the same people working from project to project, which according to the respondents make the tasks be performed more efficiently. But using the same workers one every project is not always possible, and much knowledge is lost when they are not able to use the same. WestCoat mentions that they do not participate in the evaluation phase of the project. As this would be a forum for reflecting on the failure and success of the project, Ulstein loses much of the potential for learning which this reflection can create. And as they do not get

to participate in this, they might lose the opportunity of increasing the efficiency of the tasks. This is clearly related to the transformation from intangible assets into tangible assets as discussed above, and using evaluation methods to capture the knowledge of the different actors can convert this from being an intangible asset, to a tangible asset, and go from informal to formal knowledge.

Creative integration is the ability to integrate the assets and resources of the firms, which results in a new resource configuration. An example of creative integration which is currently not made full use of is that Ulstein can integrate some of the resources of R&M, which have a large international group with large resources and solutions. R&M says that there are many products and solutions they would like to incorporate in the shipbuilding at Ulstein, but that they rarely get the possibility to do this. They say that the focus is too much on the current project, and this takes focus off on improving future projects. Because of this, the same solutions and methods are used in the future projects as they are not focusing on changing and improving future projects. Another aspect to creative integration is the purchasing process. As both Ulstein and R&M purchase the same materials from the same suppliers, they might get higher prices than if only one of them had this responsibility. As R&M is a big organization and purchase material for use at other shipyards they can achieve better prices if their volume goes up. This is also something they wish to do, and will at the same alleviate Ulstein of this which can spend their time on other matters. The same goes for WestCoat as they only deliver services and Ulstein purchase the paint. In this way they are not given any incentives to find methods to reduce the volume of paint they use. Mutual benefits are central in buyer-supplier relationships, and a way of creating incentives for reducing the use of paint or other material can be to share the savings between the companies.

A stronger focus on the four clusters of dynamic capabilities should be a focus of Ulstein and the suppliers to exploit each other's internal and external competences and resources to keep up with rapid changing environments, and a reduced lead time. As Davis and Spekman (2004) point out when outsourcing, the focus should be less on cost and more on leveraging the capabilities of the firm.

### **6.3.2 Value Creation and Value Creation Initiatives**

Several different definitions for value creation are given in the theory review. What are similar to them all are that value creation is defined as something that happens within the business relationship. For the definition of value creation in this thesis the focus is on how companies create value together, and not as individual organization. Whatever increases the profit, or decreases the cost of one or both in a buyer-supplier relationship can be regarded as value creation.

Dyer and Singh (1998) say a company can create relational rent through relational specific assets, knowledge sharing, achieving complementary resources and choosing the most effective governance form. Previously we saw how they have reduced transactions cost by investing in the relationship over time, where efficiency was raised by having experienced workers who knew the processes at the shipyard. When it comes to knowledge sharing and achieving complementary resources this was discussed in the previous section and we saw that in both instances there are large potential for improvements. In regards to knowledge sharing, transforming the workers intangible “know-how” into tangible knowledge for the organizations is an example. Achieving complementary resources is to focus more on leveraging each other capabilities and resources, such as the example of leveraging the resources of R&M’s international organization. Their governance form was found to be very applicable for these two relationships and by focusing on flexible adaptations and having the stability mechanisms from Borys and Jemison (1989) in place.

Ghosh and John (1999) have a similar view on value creation as Dyer and Singh (1998) where costs are reduced by exchange attributes and governance form, which have been discussed previously, and revenue can be increased through positioning and resources. Resources have also been previously discussed, but positioning is the benefits they have chosen to produce and deliver to the customer. Developing this could be to involve the suppliers much more in presale phase, where complete packages from the suppliers can be developed and presented to the customer. R&M says that they are to a certain included in this with Ulstein design, but would like to develop this much further.

When it comes to value creation initiatives Ghosh and John (1999) see this as activities that the buyer wants the supplier to make in order to achieve value creation at the

relationship level by matching governance forms and exchange attributes. From this view, a value creation initiative from Ulstein was made by entering into a hybrid relationship and investing in a long term relationship with their suppliers, instead of choosing among several suppliers for each project. As found in the discussion on transaction cost theory, investments in specific assets have been made in creating knowledge within the suppliers on how they should work, and as they have long term duration in the relationship they are able to reduce transaction cost.

Borys and Jemison (1989) on the other hand see a value creation initiative as learning and development. Similar to this is the definition of value creation initiative by Hammervoll (2012), where these are actions that directly enhances value creation through the three learning and development types.

Hammervoll (2009) differs value creation in whether this is sequential or reciprocal. In the work at the shipyard much of the value creation happens both sequential and reciprocal. As the interdependence is large at the shipyard, where one company or discipline does some work, and the other cannot start before this is finished. But often, they work in the same area at the same time which can be categorized as reciprocal, where mutual learning and mutual adjustments and adaptation to each other circumstances is important. Under reciprocal interdependence more extensive knowledge about each other and understanding of decision making processes and policies are important. Here, the respondents says that because there is continuity within suppliers and the people working at the shipyard this works well as they have good knowledge about each other and have learnt to cooperate with each other. They know who makes decisions and what policies they need to follow.

Borys and Jemison (1989) state that when there is sequential interdependence successful value creation requires technical and administrative coordination among the members of the supply chain. As they continuously plan the work in week and morning meetings, the coordination mechanism are in place. The problem according to the respondents is rather that the information the actors share with each other in these meeting often is not good enough and reduces the value creation as delays and redoing work are not avoided. When there is reciprocal interdependence unilateral supplier learning depends that the buyer actually transmits the valuable information and that the supplier receives and can process



this information to improve its operations. To achieve a greater value creation a better information flow must be developed.

Another example of unilateral supplier learning that is underdeveloped is in the planning phase of the interior, where R&M in many projects do not get information on the volume of their delivery until right before the hull arrives and they are supposed to start their work. Value creation can happen when the buyer transmits valuable information, in which the supplier receives and process this. Because this information comes too late, the supplier has little time to process this information and plan its work power, and thus is unable to improve its operations.

R&M mentions that in the presale phase, they do not have enough time to discuss what they can deliver. Ulstein ask them to come up with a price on predefined scope, and they do not have time to come up with an expanded scope or solutions. This is an example of an area suitable for unilateral supplier development, which is any activity that a buyer takes to improve a supplier's performance and/or capabilities to meet the buyer's short or long term supply need (Hammervoll 2012). To succeed in unilateral supplier development both parties should engage in a process which includes a feedback loop. One respondent at R&M says that much time is used back and forth with little structured processes. But this happens to late in the process so there is not enough time to discuss other solutions. This is related to the IDCP discussed earlier. The IDCP should according to Christopher (2000) be the furthest upstream as possible in the supply chain. In this case, the suppliers say that this IDCP should be further upstream to be able to discuss more thoroughly what they can deliver. Starting a dialogue at an earlier time would create more space for them to discuss such matters and could improve supplier's performance. Establishing a forum for these kinds of discussion would create the possibility of going from only having unilateral supplier development to include bilateral learning, where both parties mutually learn.

To achieve more value creation in the relationship between Ulstein and the suppliers, initiatives to achieve this should be executed. Some examples for what these initiatives could be has been mentioned, but several others should be identified and addressed which can create more learning and development, which ultimately can decrease cost and improve profits for all involved.

## **6.4 Contracts in Buyer-Supplier Relationships**

Contracts usually include the following four components:

- The relationship between the parties
- The responsibilities of each party within the transactions(s)
- The risk apportionment of the contract for given actions and events
- The reimbursement structure

According to the respondents the relationship between the parties is relational rather than discrete. Problems occurring in the project are almost exclusively solved without referring to the contract. They have a high degree of flexibility, and the main focus with both Ulstein, and the suppliers is to get the work done and be able to deliver the boat on time to the customer. This shows that there is a close cooperation between the parties and that they are flexible rather than following the exact terms of the contract is the focus. Respondents from both of the suppliers said that they know that building a ship is a complex task and that it is difficult to plan for all contingencies, so flexibility is necessary.

The contract between Ulstein and their suppliers last for three year periods. A short term contract can have a negative impact on the supplier's motivation to invest in competence development and using new technologies. While a long term contract does not necessarily assure an environment for continuous improvements and can dampen the innovation potential. Whether three year is long or short term is difficult to determine, but as Ulstein builds approximately three ships a year, the suppliers are included in at least nine projects, which cannot be regarded as short term. In building nine different ships the suppliers are given some incentives to invest in competence developments and use new technologies to improve from one project to the next. As they have an outcome based contract where prices are fixed any improvements will reduce their cost per square meter, and has the potential to increase their profit. As a long term contract has the potential to reduce continuous improvements and dampen innovation due to protection from competition, and Panesar and Markeset (2008) state that the buyer must safeguard against this contingency. The use of a fixed price per square meter is one way to dampen this effect, as it is in the suppliers own interest to improve as their relative cost per square meter will increase their profit.

With reference to the three styles of mediating a contractual interface by Williamson (2008), the frame agreement in the two relationships leans towards a benign approach in some ways but use some features from the credible approach. There is a high focus on cooperation to deal with unforeseen situations, such as delays, where the suppliers wait or move to other areas where they can work. Ulstein has trust in that the suppliers do what they are supposed to do, and as one respondent says:

*“We need to trust that they do what they says, as we do not have enough people to supervise and have the overview of everything all the time.”*

As Malhotra and Lumineau (2011) state there are two types of trust, goodwill- and competence based. This is one example that Ulstein has competence based trust towards their suppliers, as they know that they have the ability to perform as expected.

In this way, the framework agreement is similar to the benign approach, but on other matters it is more similar to the credible approach. Potential hazards such as the need to destroy already finished work and have the suppliers do the work over again. There are mechanisms in the contract to protect the suppliers for this, as they get an hourly price for redoing work. Another hazard is that the supplier does not deliver the right quality. In these situations they suppliers are not paid until the work has been controlled by Ulstein and their customer, and then the suppliers must repair what was not good enough.

As Panesar and Markeset (2008) found, flexibility in the contracts influences innovations. Being flexible as the benign approach suggests, while still have mechanism to safeguard both Ulstein and the suppliers for economic losses as the credible approach suggests, such a contract has the potential to influence innovation at the suppliers side.

One of the respondents at the suppliers mentions that the risk apportionments in the contract are wrong in some areas and mentions one specific example of this. Ulstein has a living facility for the workers to stay in when they work at the shipyard, which the suppliers pay a fixed price to rent. But, they do not guarantee place for all the workers so that the suppliers might need to find other places for the workers to stay. As they do not now the prices for alternatives and whether they will need to use these alternatives and to

what extent, they need to include risk premium in their prices to Ulstein. The result of this is that the price Ulstein receives will be higher than it could have been.

In Table 6, the discussion of the framework agreements has been summed up in relation to the contract components by Thompson, Cox, and Anderson (1998)

**Table 6: Contract Components in Frame Agreement**

<b>Contract components</b>	
<b>The relationship between the parties</b>	Relational with high focus on flexibility. Contracts lasting for three years at the time. Long enough to create incentives for competence development. Fixed price dampens the negative effect long term contract can have on continuous improvements and innovations.
<b>The responsibilities of each party within the transactions(s)</b>	Clearly defined in the scope they receive in the beginning of a project. Varies in the framework agreement.
<b>The risk apportionment of the contract for given actions and events</b>	Risks on the suppliers with delays and redoing work are decreased by having an hourly price. Should evaluate other risks that can decrease the risk premiums suppliers must add to their price.
<b>The reimbursement structure</b>	Clear reimbursement structure with square meter price within the scope, and hourly price for additional work.

### **6.5 Measuring Performance in Buyer-Supplier Relationships**

In the previous sections the discussion on buyer-supplier relationships and the specific relationship between Ulstein and their suppliers have identified important aspect for these relationships to function appropriately. Now these findings will be used to create one possible method of measuring the performance of such relationships.

### 6.5.1 The Balanced Scorecard

As mentioned in the theory review, the balanced scorecard measure performance from the financial perspective, the internal business process perspective, the customer perspective and the learning and growth perspective. As one research question of this thesis is to see how a buyer-supplier relationship can be measured, the original perspectives from Kaplan and Norton (1996) needs to be adjusted into a supply chain management approach. The performance measures should therefore be adapted to measure performance of a buyer-supplier relationship and especially Ulstein’s relationship with their suppliers.

Brewer and Speh (2000) suggest changing the original perspectives from Kaplan and Norton (1996) into SCM goals, customer benefits, financial benefits and SCM improvement. We then get the following balanced scorecard for supply chains as shown in Figure 15.

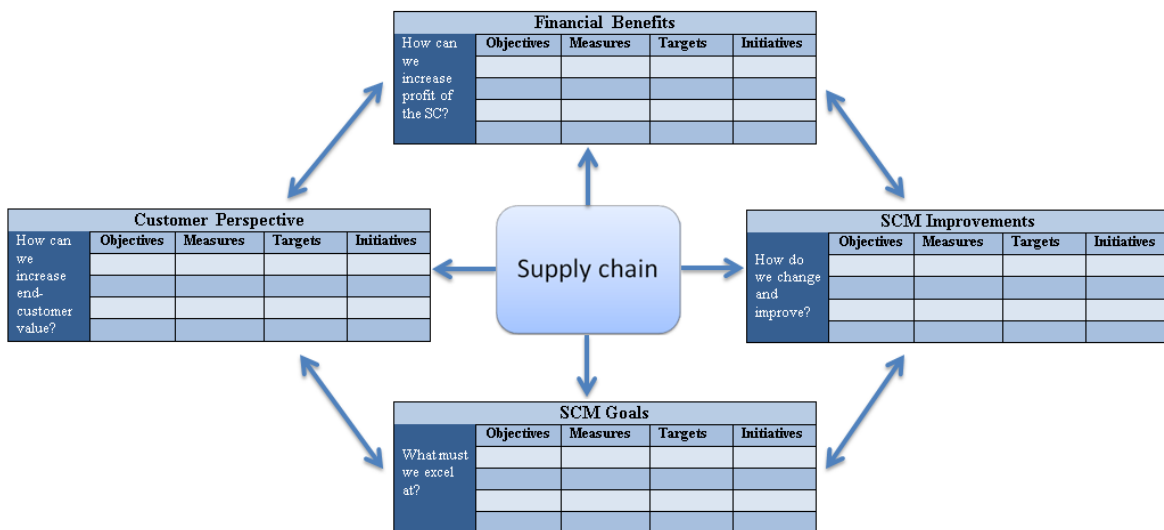


Figure 15: Balanced Scorecard adapted to SCM

For the purpose of measuring performance in buyer-supplier relationship the balanced scorecard have been further adapted into a scorecard for buyer-supplier relationship, and can be seen in Figure 16. An important aspect of buyer-supplier relationship is to focus on mutual gains that increase the joint profit of the relationship. This is shown in the table of financial benefits where the question of how to increase the joint profit is asked. The SCM improvements have been changed into buyer-supplier relationship improvements to see how the relationship can be changed and improved. The customer perspective is not changed, as this is already suitable for a buyer-supplier relationship to see how to increase

end-customer value. Finally the SCM goals have been changed into buyer-supplier relationship goals, to see what the relationship must excel at.

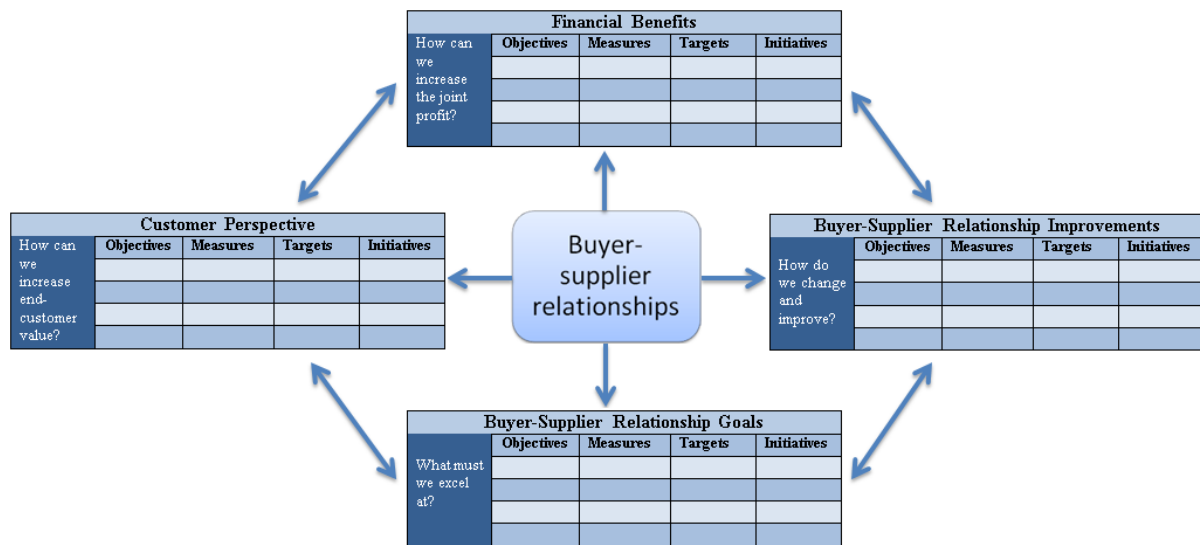


Figure 16: Balanced Scorecard adapted to buyer-supplier relationship

### 6.5.2 Performance Measures for Buyer-Supplier Relationships

In the previous section a balanced scorecard approach to measure a supply chain and buyer-supplier relationship was developed. Now, the actual objectives and performance measures must be developed. According to (Elrod, Murray, and Bande (2013)), an important point when developing performance measures is that the measures fit the industrial application.

According to Gunasekaran, Patel, and Tirtiroglu (2001) one important metric for partnership evaluation could be the level and degree of information sharing.

The discussion and analysis has revealed several challenges within the shipbuilding process and the relationships between Ulstein and their suppliers. One specific example is the delays caused by the high interdependence between activities. The suppliers say that this information should be given earlier. But several reasons hinder the successful sharing of this information. It was found that often the information flow does not reach the planning department before it is too late. Another reason is that some does not even inform others when they see that they might be delayed. According to Ellram, Tate, and Billington (2004) a very important factor in supply chain management of services is the information

sharing among the partners in the chain. So information is something that can be improved and should be measured, and will fit in the buyer-supplier relationship goals in the balanced scorecard. It is not easy to measure information sharing with regards to the interdependence problems. Measuring all the times information passes between the actors, might not give the measurement needed, and will be very time-consuming. A less time-consuming measure would be to measure the number of times a delay happens where information about this was not shared beforehand. This will highlight the importance of information sharing, and might identify where the delays happens, and create a larger focus among those involved in reducing the number of delays that are communicated too late.

Another partnership metric that Gunasekaran, Patel, and Tirtiroglu (2001) state as important is the extent of mutual cooperation leading to improved quality. WestCoat mentions that a lot of the reasons for the delays in their work is that the steel is not controlled and of good enough quality when they start sandblasting. These errors are usually spotted immediately by the workers of WestCoat after starting the sandblasting. Before they can finish, they steel must be repaired before they continue. This must often be repeated several times before the steel is of a good enough quality. This problem is something that needs to be solved in cooperation, as it is Ulstein who should control the steel ahead of the time where WestCoat is supposed to start. Therefore this is a problem which they need to solve in cooperation and could be an example of a measure where the extent of mutual cooperation leads to higher quality. An example for the performance metric here is to measure the number of times finished work must be redone. This should be measured in the buyer-supplier relationship goals in the balanced scorecard.

One of the partnership evaluation criteria by Gunasekaran, Patel, and Tirtiroglu (2001) are the entity and stage at which supplier is involved. Especially R&M mentions they should be included at an earlier point in the presales phase in order to discuss solutions they can provide, and have a good process ahead of the project planning. Measuring the entity and stage at which the supplier is involved could lead to improvements in both deliveries of the work, products and other solutions from the suppliers. Finding a measurement here is not easy, but one possibility is to measure when in the project the suppliers are included and what new solutions that comes from this. This is also related to the value creation initiatives discussed in chapter 7.3, where including suppliers early to increase unilateral

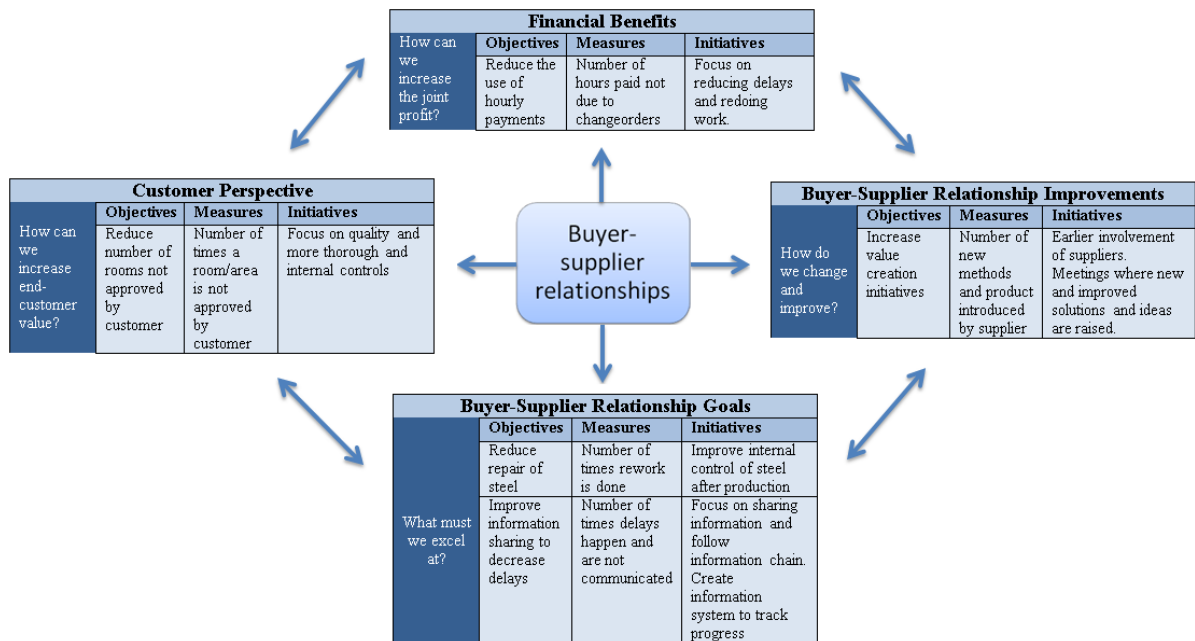
supplier development and bilateral learning. This is something that could be measured in the buyer-supplier relationship improvements in the balanced scorecard.

According to Gunasekaran, Patel, and Tirtiroglu (2001), another metric for partnerships are buyer-supplier cost saving initiatives. This is something to be measured in the financial benefits in the balanced scorecard. A suitable measure could be the number of hours paid to suppliers which are not caused by change-orders from customer, but by the delays or work that must be redone. We see that this is connected to both the measures in buyer-supplier relationship goals, and by having this measure in financial benefits we can see how improvements in the first two measures pay off.

Finally a measure is needed for customer benefits in the balanced scorecard. The ship-owner, which is the customer, controls the work done continuously through the project, and approves and signs off on rooms that are ready. Many times they find something that must be repaired later and therefore must control an area several times. A measurement for customer benefit can therefore be whether the customer can sign off on the room at the first time they control it.

Some examples of what could be measured in buyer-supplier relationships, and specific metrics for the relationship with Ulstein and their supplier have now been presented. In the balanced scorecard there should be found objectives, measures, targets and initiatives for each metric. To identify targets for these measurements has not been fully analyzed and will need further research to be appropriate. After inserting this into the balanced scorecard framework developed above it can look like the one showed in Figure 17.





**Figure 17: Balanced Scorecard for buyer supplier relationships**

According to Gunasekaran, Patel, and Tirtiroglu (2001), measuring and evaluating a buyer-supplier relationship based on the criteria this balanced scorecard has been developed from can result in a win-win partnership, leading to a more efficient and integrated supply chain.

Finally, it is important to not only measure the performance but follow up on the progress. TRADE (1995) suggest using a feedback loop which is showed in Figure 9, where the first step is to control the activity and measure the actual performance. The performance should then be compared to the target set ahead. If the performance is lower than the target changes must be made to bring the performance up to the target agreed. This loop should be repeated until the target is reached.

## 7.0 Conclusion

This research has explored the relationship between Ulstein and their two suppliers WestCoat and R&M. The first and second research was how to manage buyer-supplier relationships in an ETO-environment, and how Ulstein can manage their suppliers to handle shorter production time and increase innovations.

The findings show that the relationship between Ulstein and the two suppliers have had the time to develop shared norms and values. In addition to having a three year framework agreement stability mechanism for the hybrid are in place. Based on the Kraljic Matrix a suitable strategy is to maintain the strategic partnership, but reduce negative consequences of the dependence. The analysis in regards to principal agent theory showed that because all three actors share the same goals, in addition to having control mechanism and a fixed price contract has mitigated many hazards and negative consequences related to buyer-supplier relationship. Further they have been able to reduce transaction costs through investing in the relationship, and having a high frequency of transaction and a long duration on the relationships. Problems related to uncertainty in these kinds of relationship have been solved through having a fixed price for planned work, and an hourly price for additional unplanned or extra work. By doing this they can remain flexible, which is an important feature to remain competitive in ETO-production. The features discussed here are all important aspects that should be thought of when managing any buyer-supplier relationship in an ETO-environment.

Some issues in the discussion were found to be less optimal. One problematic issue was found in relation to communication and information sharing. Among several examples it was found that the information sharing during the outfitting phase are not optimal and many times important information are lost on the way to the right person. Shared access to the information systems the suppliers currently use could be one way to reduce the number of times important information is lost. In addition, a clearer chain of information should be developed, and a higher focus on the importance of information sharing should be communicated to everyone at the shipyard. This shows that to successfully manage a buyer-supplier relationship, there needs to be a high focus on information sharing, and to facilitate for systems for how this should be done.

Other examples of using the network's resources to achieve mutual gains have been discussed, such as the collaboration between Ulstein, WestCoat and Jotun, but all in all several areas were found where this could be improved. Converting intangible assets such as employee "know-how" into tangible assets, and knowledge that can be stored and shared to others should be done. This is related both in ongoing operations but also to the evaluation phase. WestCoat does not participate in the evaluation of the project, which can result in much important knowledge is lost and cannot be used to improve. Another example found is to leverage capabilities of their suppliers. For example does R&M have a large international organization with many resources in several areas and should be taken advantage of and used in this relationship. Moving the IDCP further upstream, and involving the suppliers at an earlier stage, and discussing solutions further ahead than the next project would create possibilities of increased value creation in this relationship. Many examples of possible value creation initiatives have been found and much is related to information sharing, creating knowledge and developing each other's capabilities. To succeed in managing buyer-supplier relationship focus on efforts that can create possibilities of mutual gain and innovation is important. Early involvement of the suppliers and constant discussion around how to be better is another example which is important.

When it comes to the contract it was found that the relationship between Ulstein and their suppliers are more relational than discrete. Within the contract there are mechanisms to create flexibility during execution and the duration is long enough to create incentives for improvements. The use of fixed price dampens the negative effect long-term contract has in regards to improvements and innovation. Several risk factors are handled by the contract by having the hourly price in addition to the fixed price, but other risk factors should be evaluated. Those that can impact the risk should also bear the risk, to avoid the need to include risk premiums. The reimbursement structure was clear with fixed square meter price for rooms and areas and additional hourly price for extra or redoing work.

For the purpose of answering the third research question on how to measure performance in buyer-supplier relationships, a balanced scorecard approached have been used. From the original framework, it was further adapted into a framework for measuring supply chains. Finally this was adapted into a framework for measuring performance in buyer-supplier relationships, and metrics for measuring performance in the relationships between Ulstein and their suppliers was suggested.

## **7.1 *Limitations of Study and Further Research***

The purpose of this research was to explore the relationship between Ulstein and two of their suppliers. Previously, not much research has been done in regards to managing buyer-supplier relationship in ETO and the shipbuilding industry. Therefore a more general overview of how these relationships are currently managed has been analyzed and compared to the theories focusing on how this should be done ideally. A lot of interesting findings have been made, but because of limitations in time and scope of a master thesis, some have not been further analyzed.

This master thesis is the first delivery from the SMARTprod project, which will continue the research until the end of 2016. Several interesting findings have been discussed in this paper, and can be a basis for the continued research in this research project.

A more detailed investigation of the current information sharing practices at the shipyard, revealing the flaws and finding ways to improve this to reduce the number of delays and interdependence issues could be an example. They currently have no good system for transmitting this information between the involved actors. Thus, one suggestion for further research is to analyze more in depth the information sharing currently happening at the shipyard, and developing tools that can organize, simplify and promote accurate information sharing between the different actors.

Another issue is the quality of steel on the hull and sections they source abroad and in Norway, a more thorough research on this, finding the reasons for why the quality is not good enough and improving this would be useful to increase efficiency and reduce delays.

Further this research have discussed value creation and leveraging capabilities. Examples of where this has been done successfully have been found, but also example of areas where this is not optimal. A more detailed analysis on how to create more value through leveraging resources and capabilities in the supplier network should be further researched.

A final suggestion for further research is to use the balanced scorecard developed here and measure the performance for a period of time in the project and see whether improvements are made.

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# Appendices

## Appendix 1: Interview Guides

### Interview guide 1:

#### Introduction:

- Thank the respondent for his participation and ask if the interview can be recorded.
- Ask the respondent what his position in the firm is and what his responsibilities is.
- Tell the respondent about the research and what it seeks to find out.

#### Shipbuilding:

- Can you elaborate on the history and present state of the shipbuilding industry in Møre og Romsdal?
- When a ship-owner is procuring a new ship, how is that process?
- If a ship-owner wishes to change something during the shipbuilding process, what consequences does this have for the shipyard and the suppliers?
- Are the shipyards using the same suppliers in each project? If not, how is the process of choosing suppliers?
- How long are usually contracts with suppliers? One ship? Several years?
- What do these contracts usually contain?
  - Is it a fixed price?
  - Are there incentives involved so that work is done at the right time and quality?
  - What happens if delays or other unforeseen events happen caused by a supplier?
  - If a change-order is placed, how is this handled in the contracts?
- Are the contracts usually followed or are relations usually most important?
- When delays or unforeseen events occur and another supplier is affected by this. What happens in such events? Who takes the cost?

## **Interview Guide 2:**

### **Introduction**

- Thank the respondent for his participation and ask if the interview can be recorded.
- Ask the respondent what his position in the firm is and what his responsibilities is.
- Tell the respondent about the research and what it seeks to find out.

### **Questions to explore the purchasing process and the work process at the shipyard:**

- When in the shipbuilding process are the suppliers included?
- Could you elaborate on the process between Ulstein and the supplier ahead of the time where the contract for the ship is signed?
- Could you explain the work process between Ulstein and the suppliers?
- How is the communication between Ulstein and the suppliers happening during a project?
  - Telephone, mail, meetings, IT-system?
- Does Ulstein making one complete order on the deliveries of the suppliers, or several?
- Are there many change-orders during the project?
  - How is this handled?
- What would you say are the biggest problems during execution of the work?
  - Do you have any examples of such problems?
- How are problems such as delays or other unforeseen events handled during execution of the work?
- Do you have an opinion of how such events could have been avoided?
- If a delay or other unforeseen event happens, does all involved supplier get information about this? How does this happen?
- Do you have any suggestions for how this could be handled differently?

### **Interview guide 3:**

#### **Introduction**

- Thank the respondent for his participation and ask if the interview can be recorded.
- Ask the respondent what his position in the firm is and what his responsibilities is.
- Tell the respondent about the research and what it seeks to find out.

#### **Questions related to development and improvements of suppliers and the relationship with Ulstein:**

- Is it a large focus on increasing efficiency in the work done by suppliers?
- Do you have any examples of this?
- Are there any improvement projects the suppliers and Ulstein are collaborating on?
- Are there any concrete projects the suppliers and Ulstein are collaborating on to reduce costs, time and use of material in operations?
- How is information shared between Ulstein and the suppliers if delays or other unforeseen events happen?
- Is it clear who should be informed if such events happens?
- Do you think enough information is shared when such events happens?
- Do you have any specific example where information was shared and solved a potential problem?
- Do you have any specific example where information was not shared and created further problems?
- Are there any specific efforts from Ulstein to develop the suppliers?
- Are there any specific efforts to save knowledge which are gained through the project to avoid making the same errors in the future?
- If something has been done differently and was a success, are this saved and communicate in any way for use in the next project?
- If something has been done wrong, is this saved and communicated to avoid doing the same mistake in the future?
- To what extent are the suppliers involved in the evaluation of each projects?

**Questions related to coordination and interdependence between activities:**

- How often does it happen that one activity is not finished when another is supposed to start?
- What problems does this create?
- Does it happen often that an area or roomed that was finished needs to be redone?
- What are the most common reasons for such events?
- What could have been done differently to avoid this?
- Do you have any suggestion for how Ulstein can gain better control of the coordination between different activities?

**Questions related to the framework agreement between Ulstein and suppliers:**

- How is uncertainty handled in the contract?
- Are the mechanisms in the contract which takes into account how to handle unforeseen events?
- Are there any form of compensation given to the suppliers if everything is completed on time and cost?
- Are there any form of penalty given to the suppliers if something is not finished on time and cost?

**Questions related to important factors in operations that should be measured and improved**

- In what way are the suppliers performance measured today?
- If they are, how are these used to create improvements?
- What are the most critical factors during operations that often lead to problems?
- In what areas of the shipbuilding process do you believe have the largest potential for improvements?