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Creating a Marine Cluster

From Product Supply to System Solutions

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Preface

Making this study for the Business Informatics Master's program has been a very educating and interesting experience for my personal and professional education. It has forced me to evaluate my opinions and professional view in a new way, which has been very informative. I believe that this experience will help me tremendously in my further career and life. Even though there were tough times and moments when the obstacles seemed impossible to conquer, the journey as a whole has been a very rewarding one.

I would like to thank my employer and my colleagues for their support and help during this process. Without their flexibility it would not have been possible to complete this program. I would also like to thank the interviewees for giving their time and expertise to help complete this thesis.

My special thanks go to Thomas Rohweder for his commitment in the program, support and good advice for this Master's Thesis.

I would also like to take the opportunity to thank my family for their support and firm but gentle nudges in the right direction when I was stuck.

Kirkkonummi, 19th January, 2014

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<p>The purpose of this study was to produce a cluster model for system supply of products and services for the case company, which is facing a changing market situation and the problem that this situation creates. The main aim was to create a model that would help the company identify the problems and risk and offer solutions for the transition phase to go through as smooth as possible. The study was carried out for a global provider of air conditioning products.</p> <p>The study was made as a case study which explored the specific business problem and the background leading to the situation today. Data was collected both from the case company and by using external experts for interviews. The existing data and the data collected for the study were analyzed to create the cluster model.</p> <p>The findings of this study show that there are a few key areas in the planning and initialization part of the process that will need special consideration. The study also identifies some problem areas that need to be tackled before implementing the model. These problems are mainly related to communication and internal leadership structures. Thus, partner selection makes a key process investigated in this study, and the study identifies the key features in the desired partner for the case company.</p>	
Keywords	Cluster model, system solutions, marine, offshore

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Acronyms

AHU	Air handling unit
ATD	Air terminal device
CRM	Customer relationship management
HVAC	Heating, ventilation and air conditioning
KPI	Key performance indicator
MOG	Marine, Oil& Gas
OEM	Original Equipment Manufacturer
R&D	Research and development

1 Introduction

European shipyards have a long tradition in designing and building ships. Over the last 200 years about ten thousand ships have been built in Europe. Due to this, there has been a big market evolving around the shipbuilding industry. The 1990s was the booming period for the European shipbuilding, with all the shipyards having full order books. However, this period of low rivalry and a big bargaining power of the suppliers, there was little development efforts made as there was enough work for all companies. This led to that the threat of entry became high as new companies with a high focus on R&D could introduce new solutions and penetrate the market easily. As illustrated in Porter's five forces (2008), this led to the rise of competition within the European market at the end of the 1990's. Many of the big players were forced into a position on the side-lines, or even forced out from the business totally. The last years of the new millennium changed the business in ways that have remained to this day.

In the 21st century, the marine market in Europe has been shrinking, due to decreasing volumes of orders within the shipyards as projects have been moved to Asian shipyards in effort to cut costs, and financing has been difficult to get for larger vessels. This is in spite of the fact that the amount of cruise passengers continue to grow with 7% yearly, and is anticipated to continue growing at least until 2017 (Cruise Market Watch 2013)

The turbulence in the order books has led to downsizing and outsourcing in most organizations throughout the marine segment. Labour costs comprise a major part of the production costs, and to be able to stay competitive against low cost countries, European companies have been forced to focus on their strongest products and sacrifice some parts of the business. The same trend is also visible within the European shipyards.

The purpose of the thesis is to explore the possibility for product suppliers within the marine segment to build a cluster and perform as a system supplier thus gaining access to the advantages which system suppliers have as compared to product suppliers. The thesis aims to evaluate how the vital parts, internal and external communication, partner selection criteria and leadership within the cluster can be achieved.

1.1 Case Company Overview

The case company is a global manufacturer of ventilation products and a major player within its field. The first AHU/ATD product delivery to Cruise ship was in 1937, followed by the first AHU delivery to a platform in the end of 1970's.

After this, the company continued as a strong system supplier, providing all major new building projects with HVAC until 2001 when the company was demerged and the marine section was split up and sold to different companies.

As only the production sites were kept, the marine products are still manufactured, but the engineering and commissioning side were lost. Presently, the company has marine and offshore offices throughout the world, and has tried to attack the market through local presence.

As the market took a downward trend in the beginning of the 2000's, price competition became especially heavy. Companies needed to adapt to the new situation, and cost saving initiatives were introduced everywhere. As a result, production costs and labour costs were cut down, resulting in very small organizations; and opportunity to use personnel in low cost countries was also considered. The possibility to utilize China as a production site was also explored, but fluctuation in quality levels led the company abandoning this idea. High inflation in China has also caused labour costs to increase by 15-20% by year, bringing the labour costs closer to a European level.

(BIS Working papers, 2013).

As some projects require products to be manufactured in Europe, the company's strength lies in the local production. Keeping a steady volume in the production facilities and ensuring as low as possible production costs has become one of the company's vital strategies. Larger volumes mean better prices for raw materials, and a higher efficiency per production unit.

As it has not been feasible to start building up a system supplying organization within the case company in Europe, the company has decided to look for other options to reach new customers and attack new markets. Working as a cluster with other strong brand names is a natural next step in this, and this thesis will determine if this makes a viable option for the company and how the dynamics within the cluster look like. This

thesis will also try to determine which features are the most important ones in the partner companies, and how to identify these.

1.2 Business Problem, Objective and Outcome

During the last 20 years, the work load within the marine market has been constant, until recent times when shipyards in Europe have started struggling to fill their order books. This has happened mainly because of the increased price competition, financing problems and a limited amount of new building projects started. Ship owners have also started focusing more and more on a green line in their new projects, and have become more interested in what kind of equipment are being installed on board their ships. Figure 1 below indicates how the shares of orders have been divided between different areas of the world.

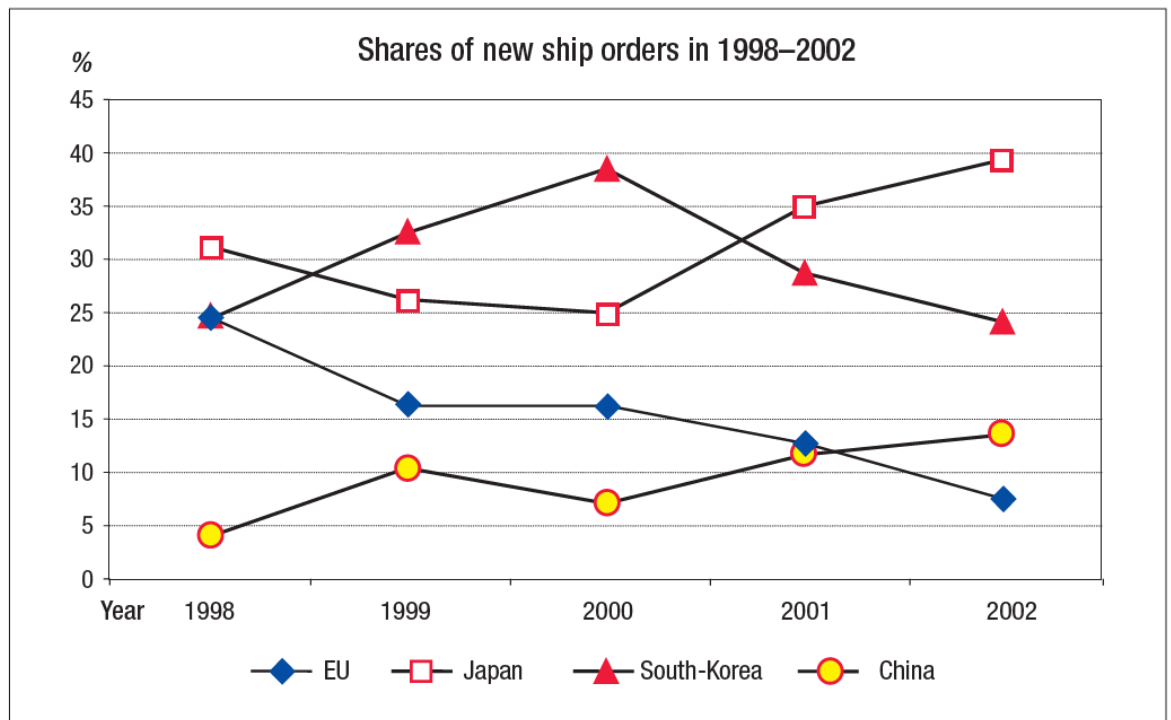


Figure 1 Shares of new ship orders in the world (AWES 2003: 4)

As seen from Figure 1, the amount of orders concentrating in the Asian market is ever increasing and the order share of Europe plummeting. This is a result of the cost competition that has been the driving factor in the new projects.

To achieve cost effectiveness, shipyards have been looking to cut the delivery chain as short as possible and in some cases, relocate the projects outside of Europe, in hopes of lower labour costs. Labour costs in China have been increasing by 15-20% yearly, bringing them closer to a European level. Still there are a lot of shipyards outside China with lower labour costs than Europe. Quality problems, mainly problems in keeping an even result in the production and a lack of experience in prototype vessels, have so far kept the big cruise projects in Europe, but it's only a matter of time before the first one is tried and carried out in Asia.

As another option, shipyards have started looking to buy from OEMs directly. Some companies have responded to this by building their own organization that can handle projects from a system design and delivery point of view. As well as cutting down on cost within the supply chain, this also gives the shipyards direct access to the product manufacturers. This arrangement also can result in product development together with the manufacturer, thus giving the system supplier in question an advantage towards their competitors within the shipyard and as long as the patent is valid, no other supplier can substitute that supplier.

As Porter's diamond model (2008) indicates, investing in technical excellence, such as a cooperation project, can give the company an advantage in engineering and create a cluster of expertise around that company. Even if it is not good for the shipyards to have a single dominant supplier, it has its advantages to have a supplier that has inside knowledge; and that bond might be very hard to break and enter that market at least for a limited time period.

As it is not possible for all companies for different reasons to build up an organization that can handle a project delivery of this magnitude, alternative options need to be explored. The next option to explore is building a cluster of companies with different services and components to fulfil this need.

The central elements of the cluster are the various networks. The cluster can be seen as a network of know-how, the value of which is increased by the other know-how networks integrated in it. (Finnish maritime cluster, Technology review 145/2003)

There have been a lot of studies on clusters, starting with Mikael E. Porter's study on competitive advantage of nations in 1990. Since that, a number of economic models have been produced, mainly with a view from a specific company or group. The data

from these studies will be used as a guideline to help determine the central parts in the cluster.

The objective of the thesis is to study how to build a cluster of companies working together as a substitute for a system supplying HVAC supplier. Main issues within the cluster is to understand how the communication between the different entities should function, who will assume the leadership role and why and which criteria are the vital ones for selection a viable partner. To determine it, these points will first need to be broken down and analysed separately before compiling them into a model of a working cluster.

Figure 2 below illustrates how a standard HVAC delivery to a new building project will look like after the cluster model is implemented.

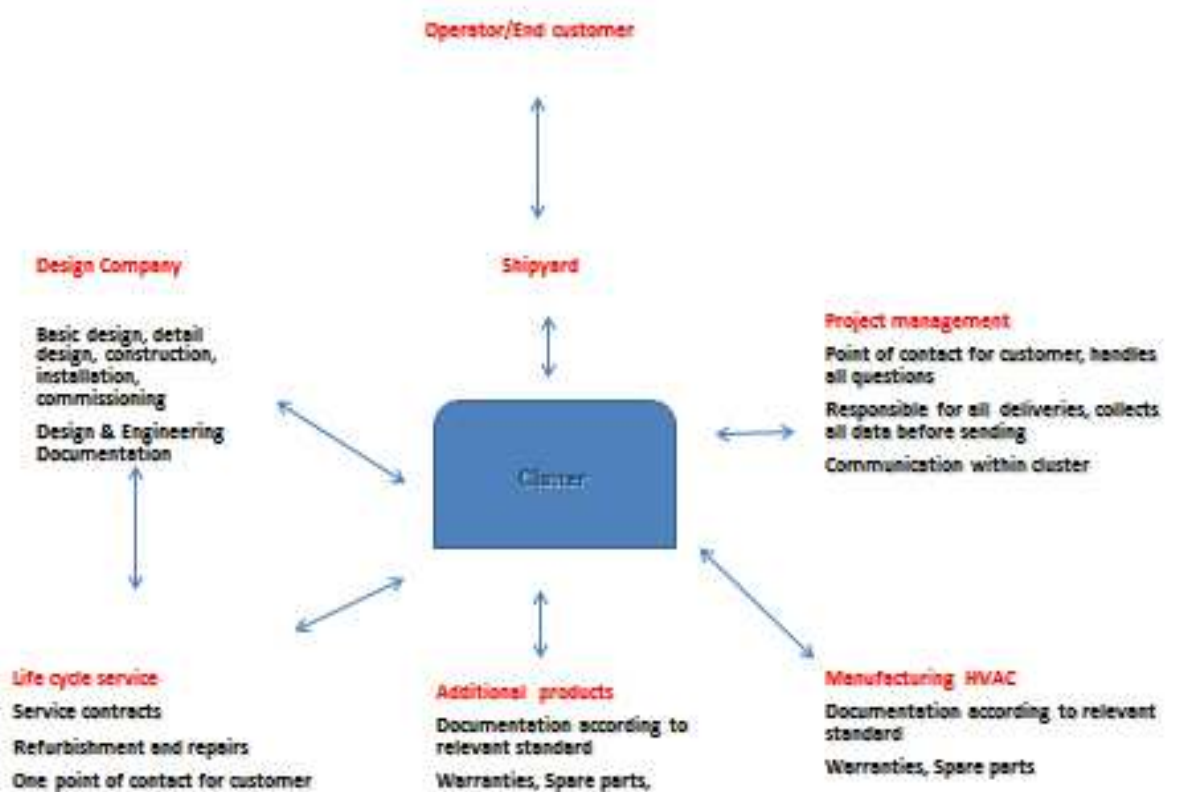


Figure 2 Cluster lay-out for system supplies for shipyards

Figure 2 shows the structure of a standard HVAC delivery to a new building project to a shipyard. It also illustrates the different components included in a package delivery. As the projects are big, communication within the cluster will play a central part in evaluating the success of the cluster, both on the internal and external levels.

To achieve these goals, this study will start with identifying the key functions for the cluster. After these are identified, the next step is to set up a model for the cluster. A model for how the functions within the cluster are handled is also needed to clarify the role for each partner and the communication levels and routes within the cluster. Some thought also needs to be given on cost, as there can't be overlapping costs between the companies. Overlapping costs will push the price to a higher level and make the package unsellable. To determine this, the 3Cs model created and developed by Ken-ichi Ohmae will be used to help define the cost structure. As this model focuses on both customers, competitors and the corporation itself, it can also be used to give insight on the internal processes in a cluster.

The outcome of this thesis is a model which can be used for setting up the cluster. The model is also intended to be used after the initial setup to help maintain the cluster and improve its functions.

The study was conducted in a time when the marine and offshore market is in a difficult economical situation, and the whole market segment is suffering from the market fluctuations and financial problems. If the study were to be carried out in a different time, for example during a peak period with a high work load, the outcomes might be slightly different. The operations today focus on streamlining the organizations and making the whole process as cost effective as possible. In some cases this will result in a lack of resources, and organizations have problems in coping with the workloads and response times. If this study had been conducted during a time of a big order flow, the focus might have shifted to the problems of finding enough competent employees instead of finding ways to get as much out from the small organization as possible. A person working for a different part of the case company might also place emphasize on some other aspects.

2 Research approach

This section describes the research approach towards the study, and how the research question was formulated. It also explains how the data collection was done and the main themes for the study.

2.1 Research Design and Research Process in This Study

The focus on the thesis is to identify the vital factors for setting up a cluster, and investigate how the internal processes within the cluster can be handled. In the internal processes, the special focus is placed on the internal communication and leadership structures which need to be set up and some preplanning for resources and operating methods.

The research question is formulated as follows:

Which factors are the most important in the cluster setup, and how should the internal communication and leadership roles be defined?

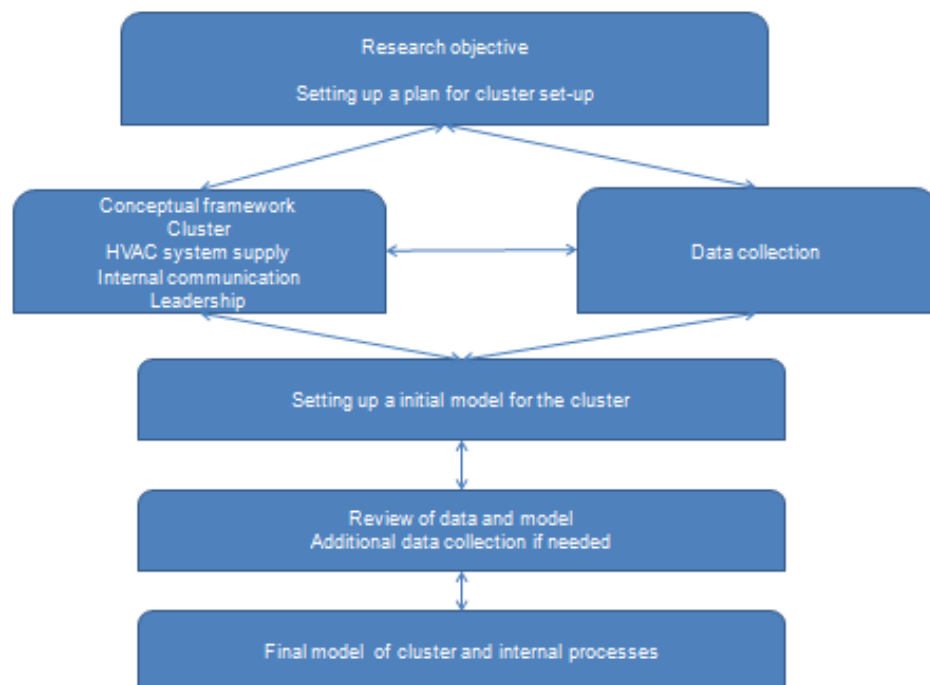


Figure 3 Research design in this study

Figure 3 shows how the research was carried out. First, the current data was analyzed and knowledge was gathered from the literature and applied to the supply process as it exists today. To collect the data, qualitative interviews were developed and carried out with key partners and customers; experts within the company were also asked to give their input to the data. With the data in hand, an initial model of the cluster was created for review. After the vital factors were identified and the cluster defined, it was determined how these affect cost, productivity and quality, This also required a basic understanding of how the cluster is set up, what the basic functions are and how the internal processes should be handled. After that, the initial model of the cluster was submitted for review. Corrections to this model were then implemented into the final proposal.

2.2 Data Collection and Analysis

The interviews were the main method to collect data in the thesis. The interviews were carried out as qualitative interviews by email due to geographical difficulties. Experts from customers and possible cluster partners were used to gain information on what they consider to be the most important issues. The interviews were carried out as semi-structured qualitative interviews.

As the main themes in the thesis are leadership, communication and partner selection criteria, these were also the key issues in the interviews. The interviews were divided in three different parts to help keep them separated from each other, and by that get answers that reflected the correct part. As the number of contacts that can be used was limited, the selected subjects were chosen to represent as many areas as possible.

The interviews were also structured to support the original research question and help to conclude how the final model should be designed. Even though it would have been interesting to have a quantitative amount of interviews, it was decided to only include the key companies at this point. This was mainly because the intention of the thesis is not to do the actual partner selection, but only create a model on how to do that selection in the future.

After the data was collected, the interviews were analysed and the most important topics identified and verified. As the interviews gave a new aspect on some of the issues,

they also helped with the construction of the model and helped me gain a deeper knowledge of the problem. Those topics were then transported to create the backbone of the model as they represent the key findings in the interviews. The results of the interviews can be found documented in the corresponding sections.

3 Best Practises in Supply Chain Clusters

This section overviews different parts of the cluster and discusses some basic concepts of how the supply chain works.

3.1 Basic Concepts

To fully understand the business problem, some light needs to be shed on the basic concepts in the supply chain. In this chapter, the basic HVAC supply chain will be explained, along with existing information on cluster and their function in the marine industry.

The material for this section was mainly collected for research reports and other scientific literature for marine clusters and marine industry. As there is scarcely any information on this specific issue, a more general overview of the problem was used.

A business cluster is commonly defined as a concentration of connected businesses and suppliers in a specified field. Clusters are considered to increase productivity and by that help the companies to compete within their field. This idea was first mentioned by Porter (1990) as a way to define the advantages of companies working together.

As illustrated in figure 4 below, Porter's competitiveness model (2008) can be used to explain the internal dependencies inside the cluster.

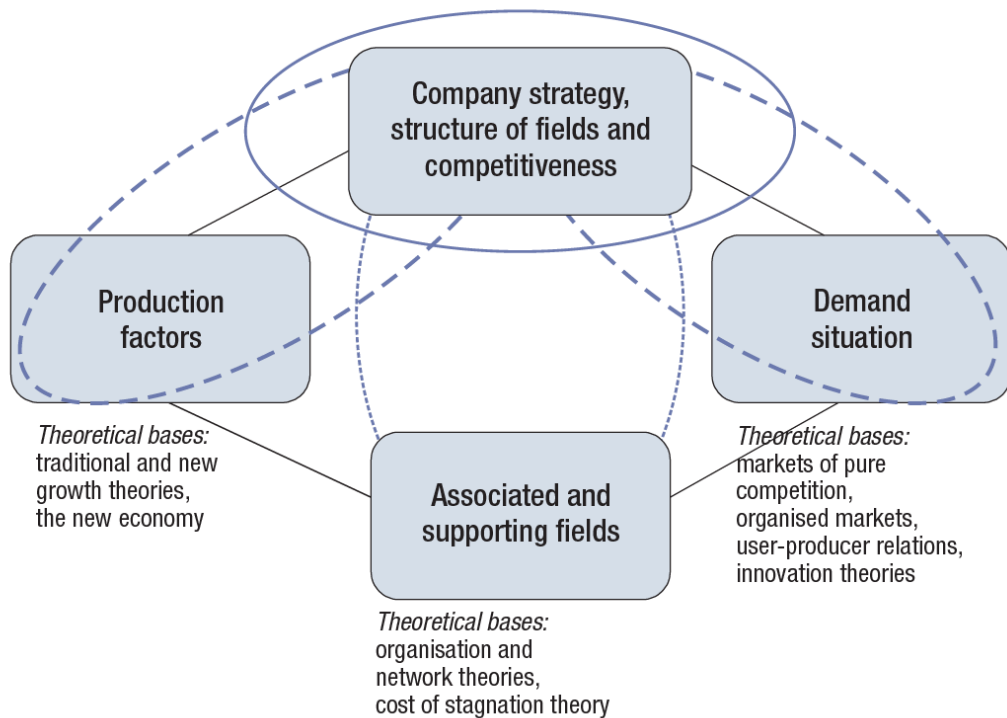


Figure 4 Porter's competitiveness model (Tekes 2003: 22).

As shown in Figure 4, the surrounding companies help to diversify the area of expertise, making the cluster flexible for the customer expectations. As each part of the cluster is specialized in its own field with its own organization, there should be very few points of overlapping operations, thereby increasing the production costs. As each company of the cluster is allowed to focus on their key competences, the resulting product is expected to be of better quality than a similar one, where secondary functions need to be carried out at the same time.

As the projects are very global, different companies may have local presence in different countries, making the access to spare parts and service easier for the customer, which can also be an advantage in the market.

3.1.1 Clusters

Clusters have been used to create new business opportunities and strengthen the competitiveness throughout the business world. The idea of a cluster was first introduced by Michael Porter (1990), and has since been analyzed and used in most fields. Porter's idea was that clusters can have a key position in a market, if enough resources

and competence is available. Three points are the central advantages within the cluster;

- Productivity can be increased inside each company
- Can be the innovator in its field
- Can create new business opportunities (Porter 1990)

Porter also claims that the geographical location is of importance, therefore it's vital for the cluster to have a correct location compared to its market.

In Porter's view (1990), a cluster is normally built up by companies working inside the same business, but without any rivalry. Basically they are companies supplying products that support each other's businesses. Figure 5 gives an example of a cluster within the Norwegian maritime industry.

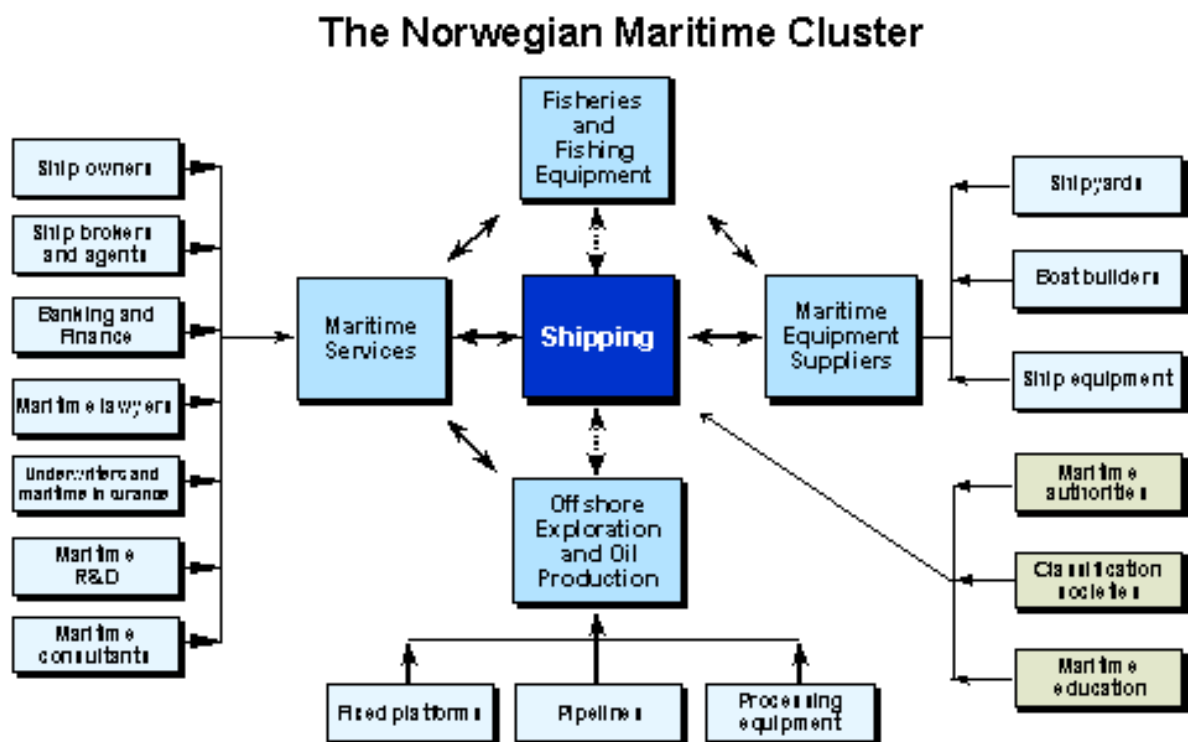


Figure 5 Example of a maritime cluster, (Porter 1998).

As seen from Figure 5, the example of a Norwegian maritime cluster comprises the vital functions needed for a successful setup. Although the business is slightly different, it gives a good idea of how the cluster is set up to help with the demand.

Innovation within the cluster is also of big importance. With the amount of competence that resides within each company, a cluster has the possibility to shape the market through new products and design. A high technical level in the products helps to fight low cost countries and possible subsidizing. This also helps to prevent product copying, which is an increasing problem in Asia that the European authorities so far have had little luck in battling.

Innovation is also closely related to the green building thinking that has become important during the last years due to increasing oil prices. With several product manufacturers working together, the whole heating, ventilation and air conditioning process can be streamlined and made as energy efficient as possible. This will increase the competitive advantage achieved by the cluster.

Paul Krugman (1991) also stated that a cluster is not merely a combination of companies, but the organization where social aspects inside the cluster also are of importance. When the members get to know one another, they create a social bond that influences the way of working in a positive way. Figure 6 illustrates other innovation factors inside a cluster.

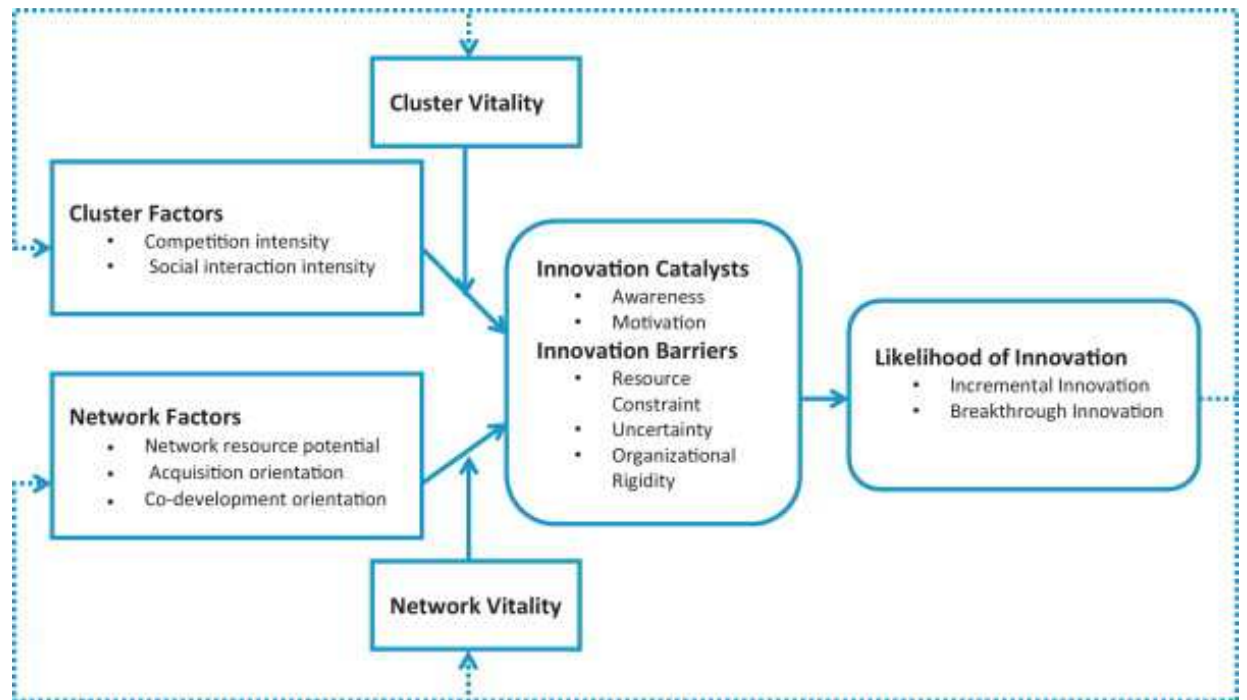


Figure 6 Innovation factors inside a cluster (Gnyawali & Srivastava 2013)

As each cluster is unique, the existing material also indicates that each cluster has its own life cycle, and that the appropriate time is needed for a cluster to start working. There are no shortcuts, and results are not likely to happen overnight, but only through well devised strategies and hard work.

3.1.2 Supply Chain

A supply chain is defined as a flow of materials or services from the manufacturer to the customer. Michael Porter (1985) also defines it as a value chain, based on the fact that it delivers a product that the customer needs and that is important to them. As illustrated in figure 7 below, each process that the product passes will add some value to the product itself.

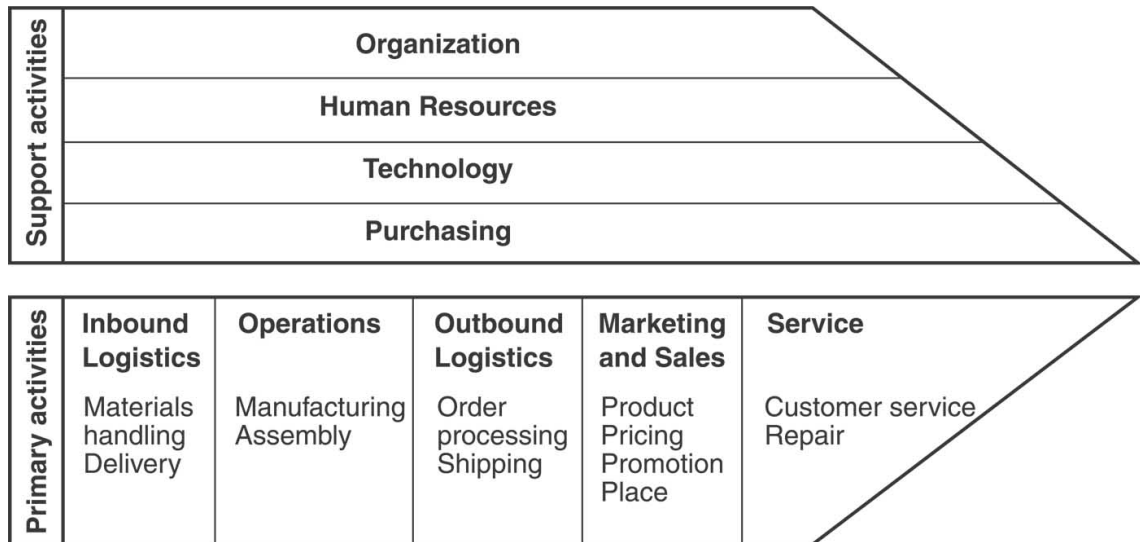


Figure 7 Michael Porter's model of value chain (Porter 1985)

As shown in Figure 7, each process that the product passes adds some value to the product. The same approach is applicable to a cluster, even though the products come from different companies. Each company adds their value to their part of the supply, creating a completed package at the end of the line. As the value chain model is versatile, it can be used to evaluate both product and service supply. Internally, the model can be used to evaluate the profit that the company produces, and externally the value to the customer that the supply chain creates. Globalization in the markets has led to a global value chain being introduced globally. It allows companies to evaluate the processes if the production is carried out in different countries. As this is going to be the case for the cluster in this thesis, this tool can be used to evaluate different parts of the cluster offerings.

According to the study carried out by Tekes (2003) in Finland on the Finnish maritime cluster, it would not have been possible for the industry to survive without the networking that the cluster has created. Sharing know-how and experience helps the increase the competitiveness of the whole cluster. It also helps to attract work force to the industry which with all companies struggling alone would be a challenge. The study also concludes that as most projects are for export, they are very important for the national economy of the companies. Adding all the supporting industries needed for large marine projects, the cluster can bring welfare to the whole community (Tekes 2003:179-187). To evaluate the cluster as a form of working, a risk analysis is needed to be made. This can help to identify potential hazards in an early stage and find appropriate solutions.

3.2 Risk Analysis

When evaluating the risks in a cluster, there are a few issues that rise above the rest. Risk analyses done on different types of clusters share the conclusion that the biggest risks that the clusters face are the stagnation in the knowledge flow and exhausting the innovation within the cluster.

According to a study done for the conference board of Canada (Munn-Venn and Voyer, 2004), there are both risks and opportunities to be found in clusters. They evaluate the advantages of a cluster for a local economy and consider if the government should help clusters survive due to the value they bring to the community both directly and through supporting industries.

3.2.1 Knowledge Flow

Clusters rely on the exchange of knowledge between the companies. The study also introduces the “local buzz” as an important factor. This relates to the community that the company is situated in, and the knowledge that resides within this community. A good interaction between the community and the company will result knowledge flowing into the company, knowledge that flow into the region from other areas and an advantage in attracting work force to the area (Munn-Venn and Voyer 2004:5).

If the cluster is unable to keep the interaction going, it may face the risk of destroying itself as the local support will stop. It can also become isolated as the channels it has been using to gain knowledge from other areas may be interrupted or cancelled. There is also the risk of the cluster becoming too orientated with its local information that it stops acquiring data globally, and thereby slowly removing itself from the market area it once started to serve and not receiving any innovations from the outside. A healthy balance between the local information and the global field is there for essential to maintain.

The study names Boston’s route 128 as an example of this stagnation (Munn-Venn and Voyer 2004:23). According to the study, the inability to communicate with its surroundings may have been the downfall for the companies here. The companies were started in the 1970’s, mainly by MIT graduates in the computer science field. The community was however built up on old strategies from earlier companies and were unable to sur-

vive with the rise of Silicon Valley. They lacked the flexibility to adapt to the change in the markets and products, and were eventually run down by their competitors. As Porter claims “if companies in a cluster are too inward looking, the whole cluster suffers from a collective inertia” (1999), meaning that if even a few companies within the cluster stops being innovative, they can stop the entire cluster from embracing new ideas.

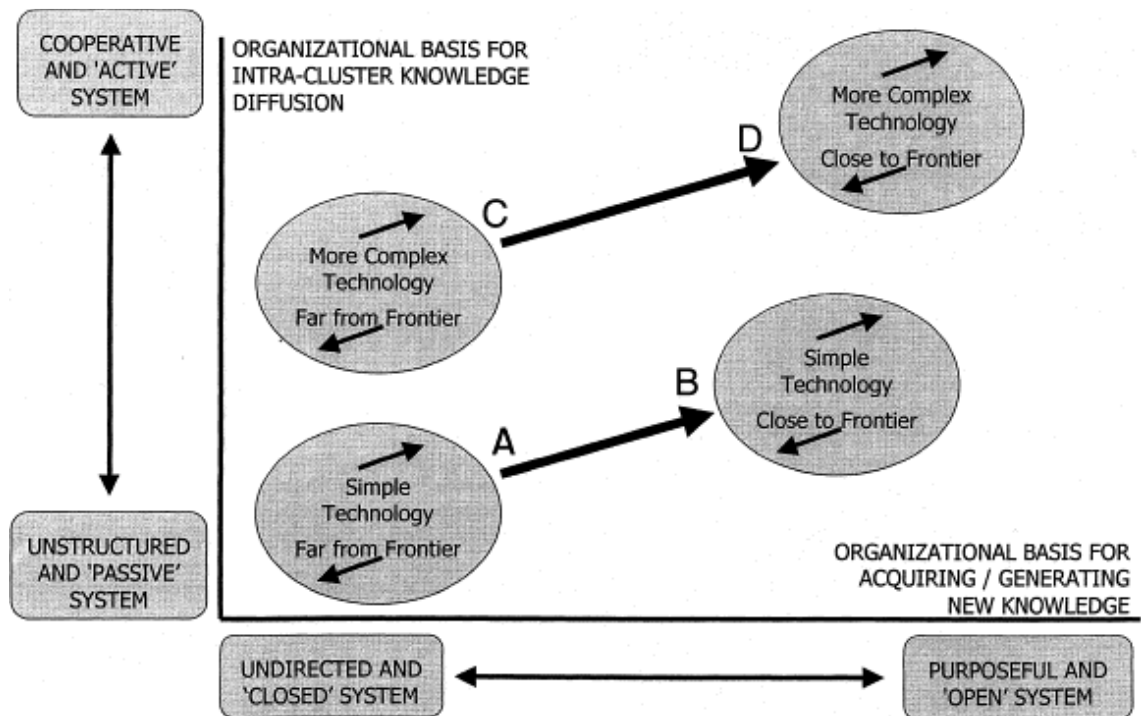


Figure 8 Knowledge flow in a cluster (Gnyawali & Srivastava 2013)

Figure 8 above shows how the competitiveness of a cluster develops and changes during the clusters life cycle, and the cluster may end up in a state of passiveness and possible breakdown if these factors are not considered.

3.2.2 Exhausting the Innovation Bank

According to the research materials, all clusters have a certain amount of knowledge within them to use. If the knowledge is used to extensively, there is a risk of the knowledge bank drying out. Again the study compares clusters to mining work done in the past. If you extract too much of the value, you will reach a point where the innovation stops and the replication of products begin (Trefor Munn-Venn and Roger Voyer, 2004:24). At the same time the cluster is affected by the surrounding economy and the stage in which the cluster is within its own life cycle. If these factors are positive, the

cluster can experience a big upswing, but with a negative trend, the results can be catastrophic. Worst case scenario with a depleted innovation bank is that a leader in the field becomes the underdog, its only option to compete with low cost products. With economies in Europe, this is not a very viable option, as labour costs are high compared to low cost countries i.e. Asia. Not investing in the R&D departments is a poor choice for companies as new innovations are a good way to compete in a highly competitive market.

Figure 9 below illustrates the life cycle of a cluster.

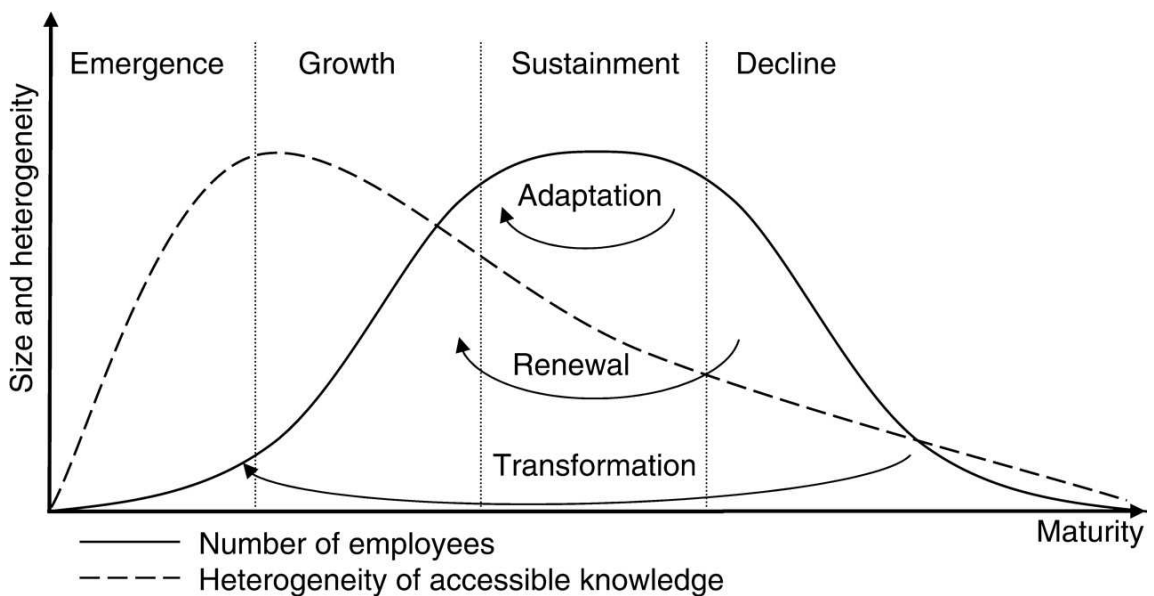


Figure 9 Cluster life cycle (Menzel & Fornahl 2009)

As seen from Figure 9, the problems with innovation depletion are usually a problem in the sustainment phase. This is also linked to the knowledge flow. If the knowledge flow stops, the bigger the risk for internal depletion becomes. With no new ideas and inputs coming from the outside market to help with the renewal of processes, the cluster is forced to rely solely on its internal competence. Some clusters may be able to do this, but in most cases it will result in burning out the experts within the companies.

When this point is reached, the company will have to revise its strategy urgently to avoid the company from entering the decline phase. In a cluster, this will require a joint effort from all the companies, as each rely on the other for continued success. Wether

this will mean investing fore capital in the company or an aggressive recruitment of additional personnel, is case sensitive and needs to be evaluated separately.

When the decline phase is reached, the companies will start to face other risks as well. For example, keeping up with competitors will be more difficult, as their products will continue to improve and at some point pass in quality and features. Also the customers expect to see new products and improvements at some interval. Employees will start leaving the company, taking their knowledge with them and in the worst taking it to a competitor. The research material refers to this as an intellectual property risk (Symantec 2013). According to a study carried out by Symantec (2013), close to 62% of the employees share sensitive information from their company on a daily basis and close to half take information with when leaving for a new job. Close to 40% of these intend to use that data in their new job

These risks create big problems for companies, and continuous renewal is needed for all companies, regardless of the field they operate in. This also applies to people, even experts in their field need to continuously develop themselves, both for the good of their own intellect as for the well-being of the company.

3.3 Planning the Cluster

This section of the thesis will focus on the different parts and processes in the cluster. The targets of the cluster need to be defined, as well as the internal processes in the cluster. An important part is also to define how the communication within the cluster should be handled. There are different models to help to determine this, as both external and internal communication needs to be clearly defined. The last section is how the cluster should be lead. Which company will assume which role, and how the responsibilities will be divided to exclude any grey areas?

3.3.1 Goals

For each project there needs to be a clear goals and targets. The goal for the cluster is to find a functional way of working and develop a competitive way to do a HVAC system supply to different customers. As each customer is unique and each project different from the other, an overview of the general goals for the cluster is needed. This re-

quires looking at both customer and company needs and goals, and defying what the best way is to fulfil these.

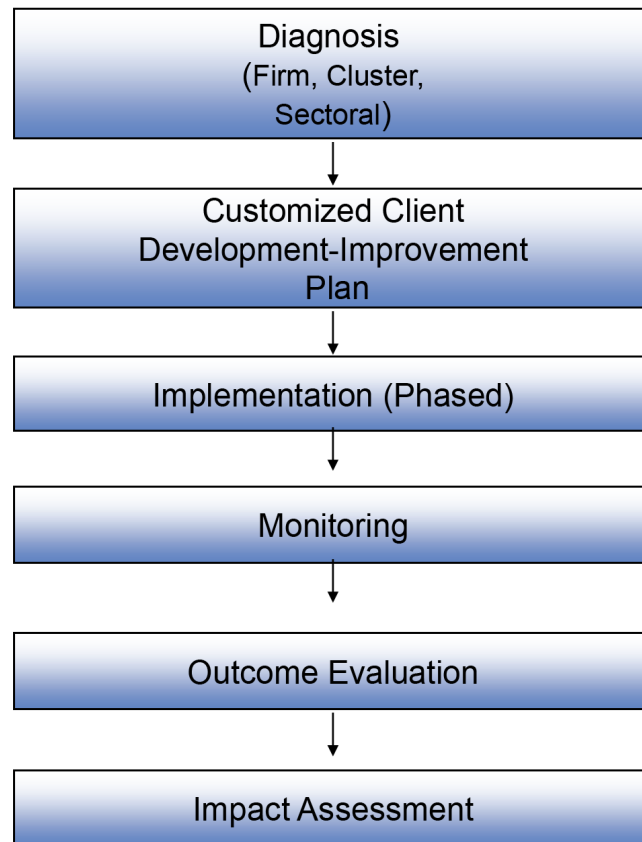


Figure 10 3C model used to define a process (Beeharry 2010:4)

As with all changes in an organization, a clear plan needs to be developed to monitor the change. As illustrated in figure 10 above, the 3C model can also be used to define a process such as this. As this thesis will concentrate on evaluating things with the help of this model, it gives a good way to consider the lay-out for the future cluster.

The first goal for the cluster is to make a plan on which companies are going to be included; basically those are the key parts to fulfil the delivery. Once this is completed, key customers need to be identified and a plan how to fulfil their needs need to be developed. Once done, the plan needs to be taken into operation, monitored and re-evaluated if needed.

There are different ways to evaluate how the goals should be monitored. This thesis has chosen to use the 3Cs model by Kenichi Ohmae. The model is based on a strat-

egy triangle consisting of the corporation, the customer and the competitors. This choice is motivated by the simplicity and accuracy in this model. The base functions in a achieving the goals for the business cluster, is that the customer's needs are met, and that the products and services provided exceeds the ones that the competition can supply.

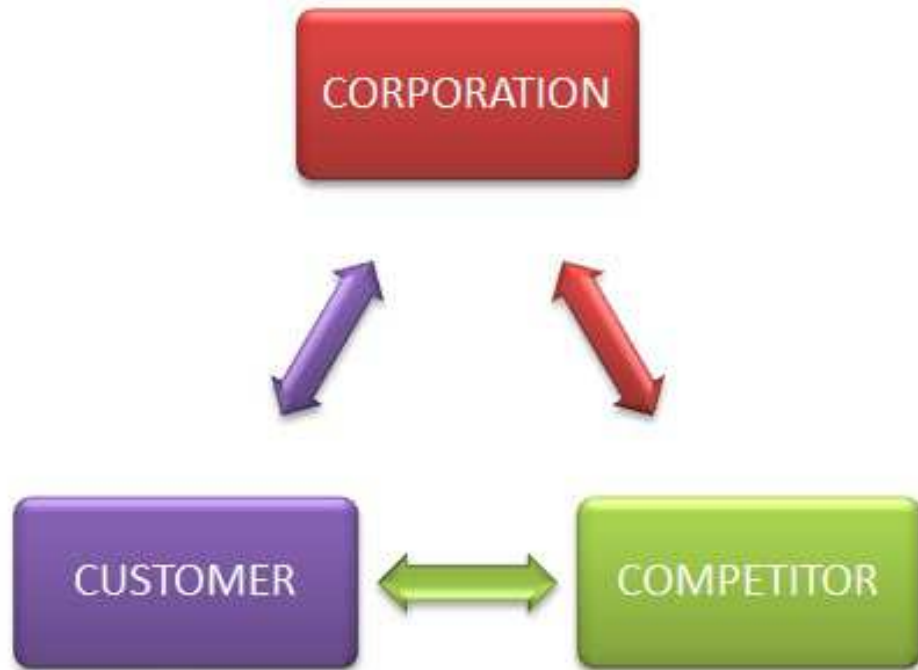


Figure 11 3C:s model (Ohmae 1997)

As seen from Figure 11, the model by Ohmae indicates that only when these three parts are in balance, a competitive advantage can exist. Depending on the lay-out of the cluster, different companies can basically be each other's internal customers and part of the same corporation; the idea behind this model is very useful in evaluating the goals for the clusters function.

In the long run, the goal of the cluster needs to be serving its customers and the fulfilment of the obligations towards them. However, this can be broken down according to Figure 11 above.

As the customer is the most important part in the process, and the basic services and products need to be up to standard. The needs of the customer will vary during the process, and the product offering needs to adapt to the changes flexibly. Understanding that the customer success is also the clusters success is also vital. If the customers

can be kept interested, that will also keep the investors interested according to Ohmae (1997). The first objective is to understand that the same product can be used in different ways with different customers. For one customer the product may be a simple necessity, but for others it may be a way to increase comfort. This is called *segmentation by objectives*. To understand the difference, each customer need to be listened to closely, and the product offering made based on a detailed pre study of the needs.

Marketing costs are a dilemma in a company. It is difficult to determine the needed input compared to the expected value. As the budget is usually fixed for the year, a strategy needs to be made according to customer location and possible competitor investment. This will also require an analysis on which customers are the key ones, and which market area has the most potential. This is referred to as *segmenting by customer coverage*.

As things change during time, these points need to be re-evaluated with a certain frequency. The situation may change quite rapidly, depending on the competition in the market. As the marine market is a highly competitive environment with many factors contributing to the outcome, the analysis would need to be made twice every year. As this is time and money consuming, allowance need to be made in the budget, and each analysis evaluated for its value.

The companies need to clearly define their strategies and goals for a short and long period. Only by having a clear strategy, can the company create an advantage towards its competitors. As no company can be the best in each part of its field, it is important to define the key processes and develop them to a maximum level. If the most important functions are at a market leader level, the company can gain a competitive advantage, allowing it to focus on the weaker performing parts later. Keeping this strategy clear, the company will be able to strengthen its secondary function later, until the whole process is optimized. For this, it is essential that the company has claimed a market leader role, and has the capital and opportunity to work on these issues. This is called *selectivity and sequencing*.

As a cluster, the companies have the luxury to some extent to divide the needed services between themselves. If there is a function that is non-profitable to one company, another one might be able to produce it for a lesser cost. If this option is not possible, the company can decide to outsource the product in question to a company that is

more competitive with it. Cutting an expensive and non-vital part of the process, increases the profitability of the process and removes unnecessary functions within the organization. This also relates to the previous chapter that a company can not be the best in each area.

Cost effectiveness is a key point to consider. There are different ways to achieve this, depending on the path the company chooses. The first option is to *reduce the basic cost*. Basic cost with raw materials are based on the volumes that the company purchases. With a high volume, the company will have a strong position to discuss the purchase prices. To avoid fluctuations in the volumes due to market instability, the companies within the cluster can *share the purchasing functions* and thereby increase their negotiation power. The third option is to *exercise selectivity*. This is the most difficult option as there is a very limited amount of suppliers in the market. Partner agreements can be made with suppliers in an effort to cut cost, but the main cost is still tied to raw material prices and the price for that can not be influenced by the purchasers.

To stand out compared to the competitors, the cluster needs to find an edge that the others do not have. As the products are quite standard and there are no quick solutions to gain a technical advantage, a different strategy needs to be considered. *Image* is a very useful item to use when being compared to competitors with similar products and services. Providing an image of a customer orientated company, can give the final advantage that will be the deal breaker for a project.

Another option is to *capitalize on profit and cost structure differences*. If the production costs are lower than the competitor has, the company can lower its prices and force the competitor out, or gain market share. This is a risky move, as it will determine the future price level in the market, and the previous price level might be hard or impossible to achieve once again. Dropping prices to increase market share should therefore be considered a last option. A more viable option is trying to develop a product together with the customer and thereby achieve a first mover advantage. Creating a new solution can give a long term advantage with patents protecting the new product for several years. A joint effort development also means less cost for the company as there usually is expertise and/or development money available with the customer.

Getting a long term contract with the customers is essential, as it will give the company time to develop its internal functions. Contracts continuing for several years also help to

keep investors confident in the company's future. This provides positive signal to the market and improves the company's brand and image. Having many strong brand names in the cluster will most definite give a competitive advantage towards the competitors.

3.3.2 Communication

Communication between the companies and to the customers is one of the most important functions in the cluster. Without a well-defined model there is a risk that vital information will not be shared internally to the processes that need it, and that the customer will not receive confirmations or other updates. In some cases payment may be bound to documentation or similar, and if this is neglected due to communication issues, there could be big financial consequences. This thesis has used the insights of the Business Communication University to help understand the different communication models.

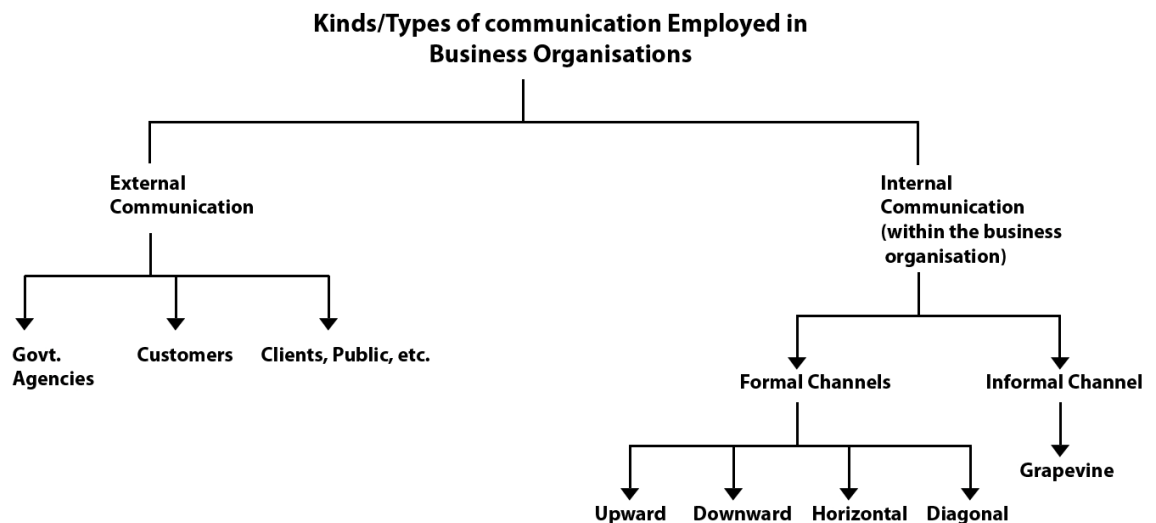


Figure 12 Communication model (Communication Theory 2010)

As illustrated in Figure 12 above, the *external communication* relates to all communication going outside the company. For this cluster, the most important external communication will be towards customers and classification societies. With customers, there is both formal and informal data exchange, as there is also a personal relationship forming with the personnel in the customer's organization. With classification societies, the

exchange is always formal, as this is an official bureau. Communication can be done in different ways, including letter, reports, emails, conferences, phone call and actual face-to-face meetings. Also exhibitions and similar presentations are a way of communicating, reaching a larger cliental than usual. The external communication should always be done in a professional way, as this is the company's way to face out towards its customers. Poorly executed it can end in a catastrophe, with upset customers or problems with getting products classified and approved.

Because of this, the cluster needs to have a very clear plan on how the external communication is done. Who has the responsibility and mandate to communicate, and to which extent. A different organization should be ready also for crisis situations as these require special attention and approach.

One of the first communication models was introduced by Claude Shannon in 1948.

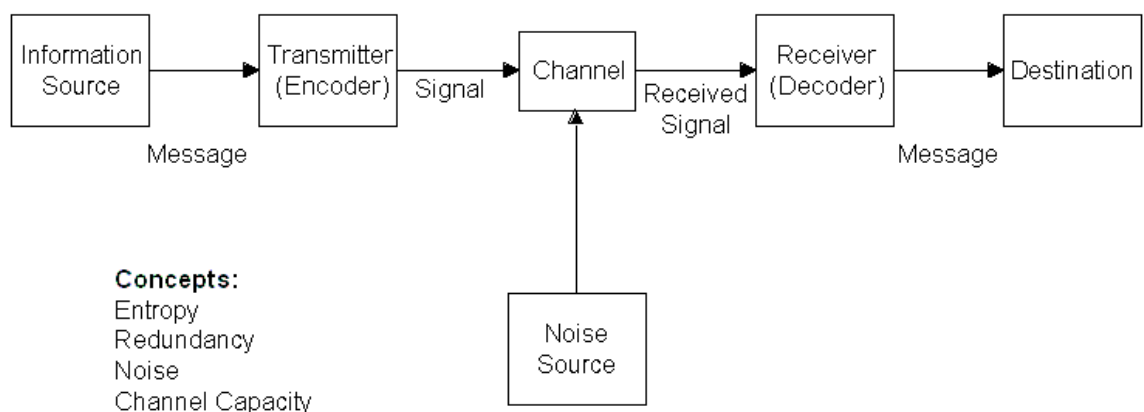


Figure 13 The Shannon-Weaver model (Shannon-Weaver 1949)

This model, as seen in Figure 13 above, already introduced the possibility of noise or other barriers interfering with the communication. As there are different ways to communicate, there are also different things that can influence the information passing from the sender to the receiver. The more noise is influencing the message, the more likely it is that the message will be misunderstood in the other end. This creates a barrier in communication.

There are different factors that can influence that the receiver gets a distorted message in the other end. In some cases there can be a *language* barrier, with one talking their

native language and the other not. *Technical content* is a difficult area, as in this case, the sender is a product supplier and an expert in his field, but the receiver is possibly not so familiar with the products. It is easy to be too technical, and use terminology that is incomprehensible to the receiver. If you are trying to send a message while upset, there is likely to be *emotional interference*. Especially with emails that are a quick way to communicate, there is a big risk of sending something out while the emotions have the best of you. If the subject is sensitive, reclamations etc., it might be a good option to always wait until the following day before addressing the issue. Taking a step back from the problem will give more clarity and avoid the risk of getting to personally involved in a business problem.

The *quality* of the information is also important. As messages to customer or similar are always an official statement from the company, it is important that the message is reviewed before sending. Wanting to simply get the task done by sending something out quick, can prove to be wrong decision that will complicate things are require more time to correct than it would have taken to communicate in the first place I a proper way. How information is sent also need to be considered.

The accuracy in the data is vital, if there is any thought that the data might be incorrect, that message should never be forwarded. Sending wrong data can influence the personal relationship to the receiver, and create mistrust. The language in the message should also be considered in the aspect of *cultural differences*, jokes or inappropriate language can be considered very offensive in some cultures. Lastly the sender should be able to listen to the feedback from the receiver in a good fashion, not just listening, but considering the information flow and reacting to problems or difficulties. Unattended issues in the beginning can come back in a later stage of the project as problems that can impact the whole delivery plan.

Although there are things that need to be considered when communicating externally, communication is not something that should be feared. It is the only way to keep clients and suppliers informed about products, progress and goals. As things change constantly and the project progresses, all parties need to have the latest data and information. Without a proper communication channel, that data will be lost, and other parts of the project might move forward with the wrong information, creating big problems.

There is also a need for *internal communication* within the cluster. The information needs to flow between different entities to ensure that the production stays on time and with the correct parameters. Although internal communication can be made a bit more informal, the same principles still apply. The data needs to be correct, the receiver must understand what the sender is trying to say, communication needs to be done in a professional way that does not create mistrust in the receiver and most importantly that the person gets the information on time and nothing is withheld. As the internal communication is sometimes informal, there are some ways of communication that is not standard in the business world. Rumors and gossip are likely to travel inside an organization, and discussions around a cup of coffee are a standard. As illustrated in figure 14 below, there are four different ways how information spreads internally. The *single strand chain* is one person spreading the information to a single person, who then possibly forwards the information to yet another person. *Gossip chain* is where someone goes around the office telling a selected group of people what he has heard. *The probability chain* is information shared to the whole office, regardless of personal relationship. When the selected group of people from the gossip chain in turn reveals the information they heard to their own group of people, this will become a *cluster chain*.

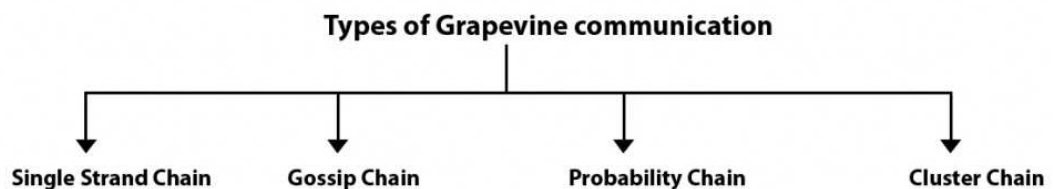


Figure 14 Grapevine communications (Communication Theory 2011).

Figure 14 above shows the type of grapevine communication likely to occur inside an organization. Although there is a risk with this type of information sharing, mainly in the fact that inaccurate information can cause speculation and sometimes fear, there are also advantages in this type of information sharing. It can be a good addition to the formal channels and give the feeling of partnership among the employees. This type of communication needs to be monitored to avoid that someone starts creating panic in the organization with inaccurate information.

Immediate information should also be supplied if the goals or strategies of the company have changed, or if there are changes in the organization that influences the project. Keeping openness in the company will help all employees to understand the goals of the company. With an open communication possible problems can be identified earlier, before they become blocking points. This will also strengthen the bond between employees and the management, increasing motivation and team spirit. Keeping everybody in the loop indicates that everybody is equally important for the company. When communicating from the management level to the employees, there need to be a certain authority and respect for the management, but feedback from the lower levels should also be accepted as the lower levels usually have a better insight to the problems on production level. Direct orders are sometimes a necessity, but should not be the only way of communicating. *Downward communication* is normally conducted in short announcements and meetings to relay information on a corporate level.

Upward communication is the flow of information to the management level. It can be problems that need to be solved on a higher level, suggestions for needed upgrades or resource question for example. Keeping an open mind towards suggestions coming from a lower level can sometimes prove to be difficult for some managers. Once again, the key is to try to communicate on a professional level, and not let emotions interfere with the information. Getting information from the production level can help the company to understand the possible problem points in the manufacturing process, and help to redefine the goals and the resources needed to achieve them.

As this thesis will focus on a cluster with different companies involved, *lateral communication* will be crucial to achieve. Information needs to flow between the different production facilities, and the sub departments in each factory. A chain of communication is required to share quality, transport, documentation and other production issues between the companies. Also, as one company will assume the overall responsibility to interact with the customer, there needs to be channel to share this information to all necessary departments throughout the cluster.

This will require both internal communication between similar departments, and a more corporate level communication on strategies and revised goals.

Figure 15 below illustrates how the communication travels inside an organization.

The ideal situation is that the idea from the figure can be implemented throughout the cluster, creating communication channels between companies. The departments with similar functions need to create a personal relationship to help with the interaction. If persons feel comfortable with each other, the threshold to take contact is much lower. A good communication flow prevents similar problems to arise in different processes as information can be shared and known problems eliminated in all parts of the project. Resource problems can also be helped, as similar professionals might be able to take some of the work load.

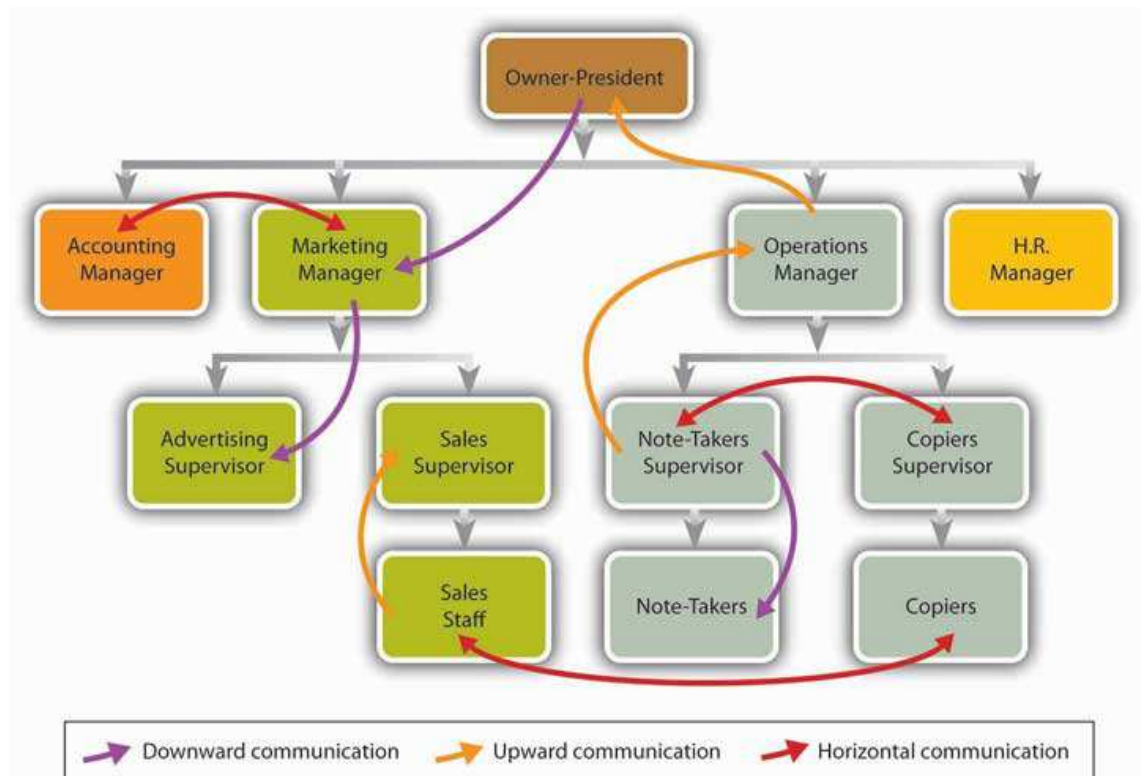


Figure 15 Communication forms inside an organization (Collins 2007).

As a summarization from Figure 15 above, it is important that all these ways of communication are used in a good way, as not only one form is enough to keep the information flow on a correct level. The communication part is the most critical part for any organization, without it, all projects are bound to fail from the beginning. Still, this is a problem that occurs in every organization and project. The relevant information is not passed on to all the partners that need it, creating a path where the execution can go critically wrong because of lack of feedback. Communication should be taken seriously

and the personnel should be educated and reminded of the importance of proper information sharing.

3.3.3 Partner Selection

Selecting the right partners can be made considering different factors, including for example such options as: strong brand names, suitable products or services, geographic location, global presence, resources etc. Various studies were done on the partner selection process, and many of them frequently cite the ideas developed by *Weber et al. (1991)* and *Dickson (1966)* as especially significant.

The model created by Weber uses both qualitative and quantitative data collection as various criteria to be used in the partner selection process. The model is meant to evaluate vendors rather than business partners, but is in many ways applicable to partner selection as well.

Dickson (1996) on the other hand suggests a rating system for vendors based on different factors, as illustrated in Figure 16 below.

Rank	Factor	Mean rating	Evaluation
1	Quality	3.508	Extreme importance
2	Delivery	3.417	
3	Performance history	2.998	Considerable importance
4	Warranties and claim policies	2.849	
5	Production facilities and capacity	2.775	
6	Price	2.758	
7	Technical capability	2.545	
8	Financial Position	2.514	Average importance
9	Procedural compliance	2.488	
10	Communication system	2.426	
11	Reputation and position in industry	2.412	
12	Desire for business	2.256	
13	Management and organization	2.216	
14	Operating Controls	2.211	
15	Repair Service	2.187	
16	Attitude	2.120	
17	Impression	2.054	
18	Packaging Ability	2.009	Slight importance
19	Labor relations record	2.003	
20	Geographical location	1.872	
21	Amount of past business	1.597	
22	Training aids	1.537	
23	Reciprocal arrangements	0.610	

Table I.
Dickson's (1966) vendor
selection criteria

Figure 16 Dickson's table for vendor selection criteria (Dickson 1966:5).

As shown in Figure 16, the rating system for a vendor is made of 23. These 23 factors were identified by out a survey to 170 purchasing agents. After collecting the data a rating system was created to determine how important each function is. Based on his research, the quality of the products and vendor was determined as the most important factor for purchasers. Surprisingly, the factors are also quite accurate in today's business world, even though a similar survey today would probably push the price to a higher rank.

As the number of criteria above indicates, there are many factors that influence the selection of vendors and partners. The partner candidate needs to be known to the organization, to be able to determine if the partner is a good choice. The financial data also needs to be reviewed before negotiating any contracts. The final stage of the process is to sign a contract.

Figure 17 below is a combination of the partner selection factors suggested by Porter (1190, 2000a, 2008). This model can be used to help identify a possible partner company.

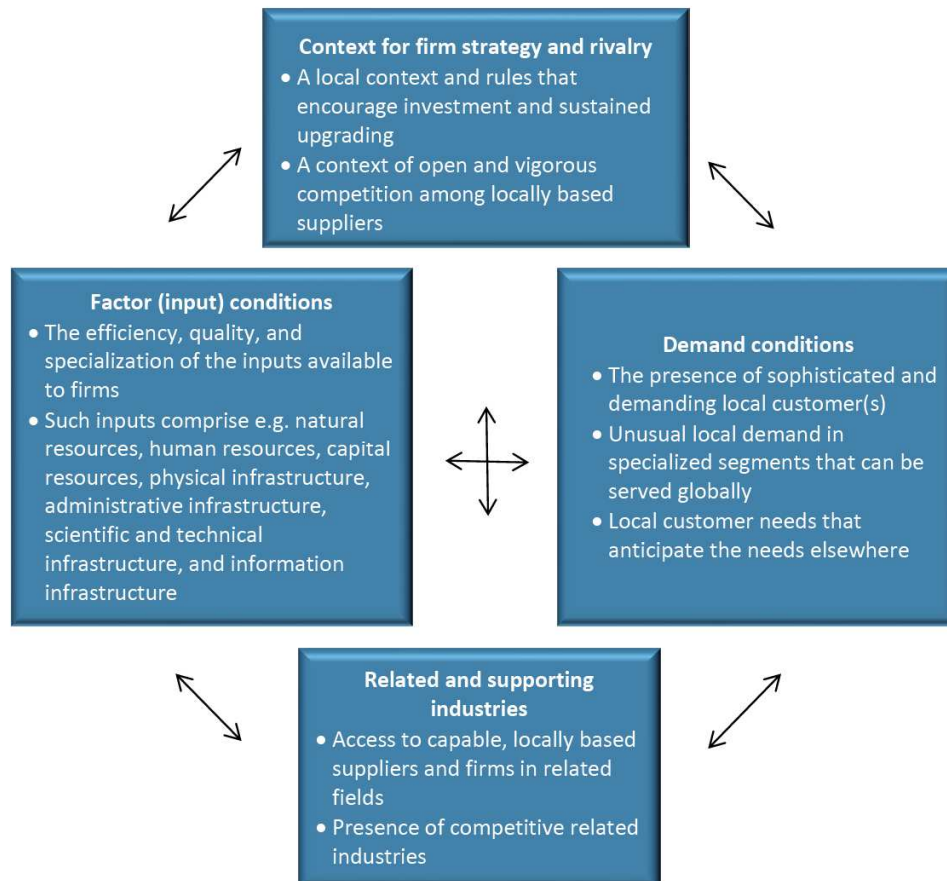


Figure 17 Selection factors, (Porter 1990, 133; Porter 2000a, 258; and Porter et al. 2008: 55).

As seen from Figure 17, the first part of the process is to identify a viable partner. The possible partner can be a known associate, or something that is identified through other partners or media. As presented in Figure 17 above, the cluster needs to have a synergy effect between the companies. Only with a good synergy effect will the cluster become successful in competing in the market both locally and globally. Porter (1990, 2000a, 2008) suggests that all partners need to fill the knowledge gaps that the other have, and the knowledge needs to be transferred between the partners also. All parts in the partner process from the selection until contract signing needs to be done with this evaluation in mind. If the process is done badly, the results will be increased expenses and decreased trust between the companies.

The role of the suggested partner might also change during this process, as illustrated in Figure 18 below.

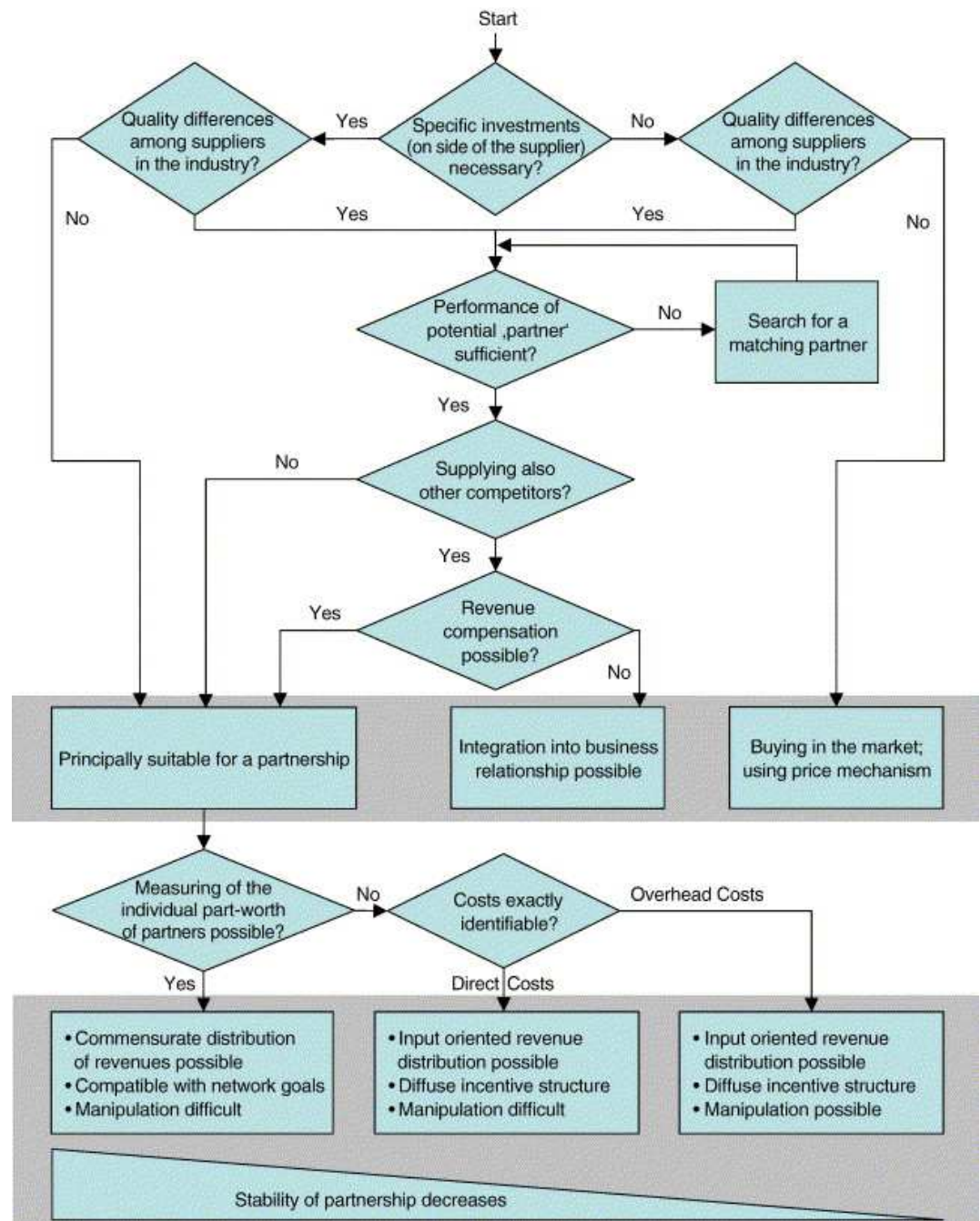


Figure 18 Partnership selection model (Bivanis 2006:23).

As seen from Figure 18, the role change can be used to the cluster's advantage if identified early enough and properly communicated between the companies. Slow reaction could end in eroding the stability of the partnership decreases, leading to a break-up in the cluster or internal problems, most likely accompanied with a breakdown in communication.

Thus, although the partner selection could be seen as the easiest part of the cluster set-up, it is also the most central part as the quality of the partners will determine the quality of the cluster and the products it supplies.

3.3.4 Leadership

When it comes to the discussion on leadership issues, there is a number of models available in the published research presenting different views on how things should be handled. Leadership is a very cultural thing, as there is a difference in the approaches how it is implemented depending on the region where the company is situated.

A recent research done by Scouller (2011), and the 3P model presented in Figure 19 that has become quite popular in developing leaders and their capabilities.

The Three Levels of Leadership Model

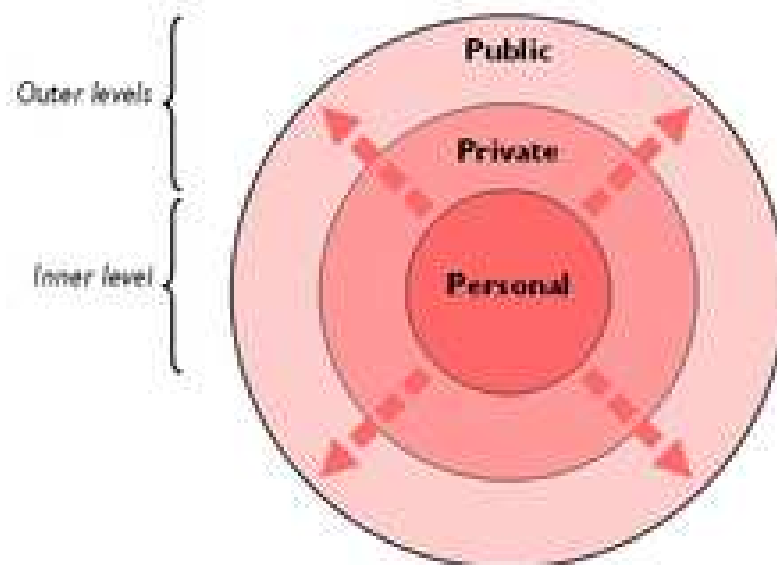


Figure 19 The three levels of leadership (Scouller 2011).

As seen in Figure 19, the leadership model by Scouller (2011) includes three levels of leadership. The first represents the personal level, the second makes the private level and the third is the public level. Since the cluster will consist of many companies and a lot of employees, the outer ring marked as *public* is the area affecting the cluster most of all. Scouller defines this as a way to influence two or more people at a time. To

reach a group of people effectively, the idea of *four dimensions of leadership* was introduced by Scouller (2011).

These dimensions define how a leader should act in order to reach his employees. According to the study by Scouller (2011) there are 34 leadership behaviours that can be broken down into four main dimensions as follows:

1. A shared, motivating group purpose or vision.
2. Action, progress and results.
3. Collective unity or team spirit.
4. Individual selection and motivation

According to Scouller (2011), the leader needs to be flexible and adapt to the fact that the surroundings change at all times. To stay in a right level, the leader needs to educate himself continuously and to make sure that his values and ethics stay firm even in difficult situations. Being untrue to one's organization will lead to the trust disappearing within the organization and the leader losing all respect, and following that, his leading position. At the same time it is important to be able to divide his time effectively between decisions and strategies. It is important for a leader to define which way the organization needs to go, but without sacrificing the day to day functions that need to be upheld. This may be referred to as the *personal level* in the model by Scouller (2011).

The private level makes basically the same model as the previous one, but mostly reflecting on how the leader handles situations on a one-to-one level. This is most applicable within the companies own organization, where the leader might have direct contact with the employees. Even though there is a group of people in the company that makes things happen, it is important for a leader to not forget the individuals in the group. Each member needs to feel that they are treated with respect and acknowledged for their personal input. Some leaders fear this interaction as you need to invest something of yourself in these contacts. According to Scouller, that is why a leader needs to invest his time into development of these skills to remove any personal fears that might influence his behavior.

Personal level of leadership is defined as the person's inner feelings, knowledge and skills according to Scouller (2011). The model indicates that this level shows what

leaders should do to keep improving in their role. Scouller has divided these skills to three points:

1. Developing one's technical knowhow and skill.
2. Cultivating the right attitude toward other people.
3. Working on psychological self-mastery. (Scouller 2011:37)

Scouller's conclusion is that a leader cannot be effective without working well in all three levels. He compares leadership as throwing a stone in the water, the ripples of the water will spread outwards, and in the same way a leader's inner values will spread to the organization (Scouller 2011:15). A leader's behavior will influence the whole group's behavior, and how they work to achieve the goals set. A group believing that all members are equally important and that their leader is working on the same level as them, will function much better than a group with a leader setting himself above everybody else. A leader should carry his organization in tough times to ensure that the trust and respect is there when things start going well and the work load increases. Thus, employees that are content feel that the leader is appreciating them will return that trust and show better performance and higher loyalty.

Even if charisma is considered to be a big part of a leader, Scouller suggests that this is in fact not the case. A leader that is there for his personnel will be more respected than one that is good on acting. A leader should concentrate on developing his inner presence in order to meet up to the standards. This includes being in control over one's emotions, have respect for others, be driven to be better, live in the present, have a good self-esteem and have a clear sense of the goal according to Scouller.

3.4 Conceptual Frame Work

Reviewing the collected data and the studies conducted before, it can be concluded that there are many factors that need to be considered to build a winning concept. According to a study by the European commission (2008), the strength of a business cluster is in its strong focus to find solutions to business problems and the ability to develop new technologies. It also identifies the advantage of a cluster in its single point of contact for its customers. At the same time, it also identifies the problems with decision making and communication due to the fact that the companies may not be in balance

with each other. The cluster also needs to make sure that their focus does not get too narrow, as this can lead to poorer performance in the whole sector.

Summing up, when building the cluster, the risks and potentials need to be clearly defined and evaluated. Each function need to be evaluated separately and the risks calculated. The partner selection criteria is of especially significant importance, and each partner needs to be chosen based on its competences as the company, and what value they can add to the cluster. The risks need to be recognized and evaluated before signing any contract, as terminating a contract while the business in running can cause serious implications to the whole process.

If visualized, the conceptual framework for this study will look like follows.

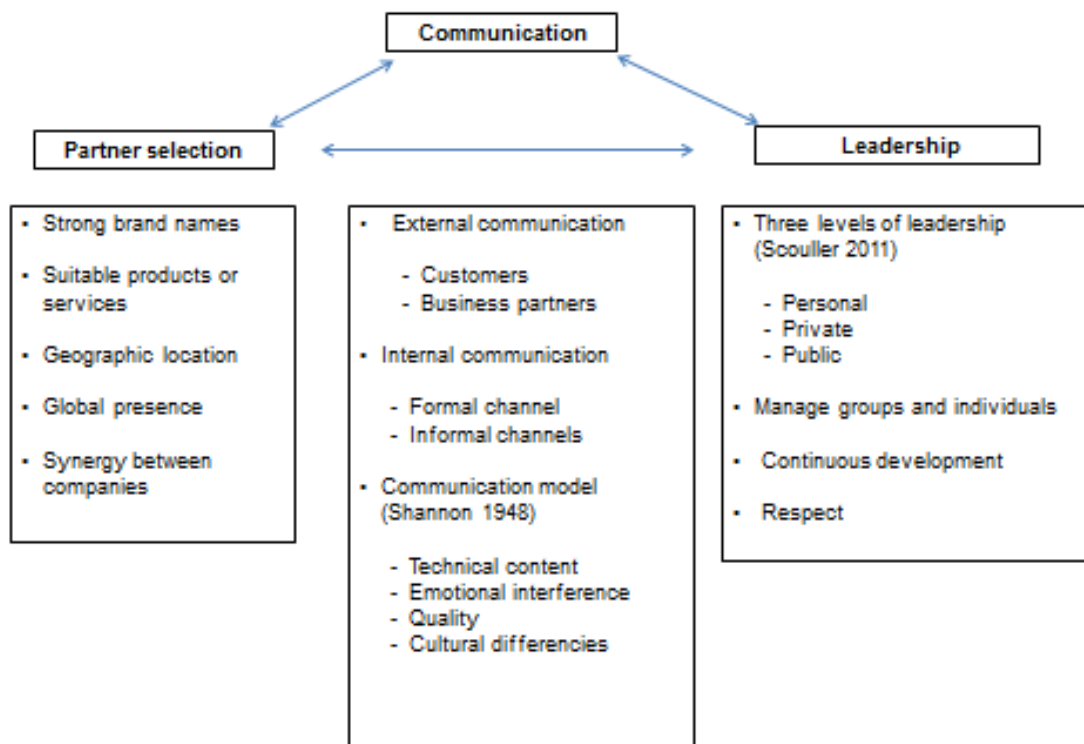


Figure 20 Conceptual frame work for this study

As seen from Figure 20, the three main components in building a cluster are leadership, communication and partner selection. The communication and leadership in the cluster need to be clearly designed before partner selection and taking the cluster into operation. There lies a big risk if anything is unclear with this part, as this is the direct

link to the customer. Bad communication towards the customer will send a signal of a badly run cluster, with further going implications e.g. through grapevine communication between different customers. If the leadership model is not determined, this will result in internal chaos with companies fighting internally for control. Consideration also needs to be put on the choice of person for the task. As the study on leadership by Scouller (2011) indicates, the leader needs to be a person that is interested in putting his employees first combined with interests in personal development.

The literature reviewed points towards that the 7S model by McKinsey (1980) would be a good model to consider when setting up the cluster. Strategy, structure, system, shared values, style, staff and skills are the elements in this model, which also make the basic components in a cluster. All these elements need to be investigated before putting the cluster in an operational phase, with placing special emphasis on strategy and structure. Also the focus should be placed on the skills of both the employees in the companies and the companies in the cluster to ensure that the correct products and services are provided. If these issues are handled correctly beforehand, the transition to the operational phase should go quite smoothly.

4 Results and Analysis

This section concentrates on building the cluster model for the case company. The key issues were identified in the interviews and found from the published research, and those points are implemented in the cluster model (section 3.4). The model is built based on the data gathered from these three different areas, the existing research, the external data from the interviews, and the internal data collected from the case company. The cluster model is intended to be used as a tool to help with the planning and execution of the new business model.

As the suggested cluster model is a new solution for the case company, there is no previous experience or internal expertise immediately available. Therefore, the target was to gather information from the companies having this information and produce a working model based on the qualitative interviews in the case company. To do this, the interviews concentrated on the three key issues in the process identified in the conceptual framework; communication, leadership and partner selection. Additionally the idea with the interviews was to identify the problem points that might occur during a project execution.

4.1 Data Collection in Qualitative Interviews

The thesis is made as a single case study, with the main focus to find a solution for the cluster model. The case study approach in this Thesis is based on the methodology by Yin (2009). Yin argues in his book that there are three main factors to keep in mind when deciding what research approach to use. These are the type of research question, the extent of control the investigator has and the focus of the study. Yin also reminds that there is a big overlap between these different methods, and that there may be different solutions to the same problem. Therefore according to Yin (2009), the most important thing is to make sure that the research question matches the research method you want to use.

The interviews were as the primary way to collect data for the thesis. According to the study by Gill et al. (2008), the reasons for interviews are to *explore the view, experiences and beliefs on specific matters*. Interviews are a good way to obtain this knowledge as there is no need for common beliefs, but deeper insights and knowledge is needed. Gill et al. (2008) also recommends that open-ended questions are to be used and that the interview should start with questions that are easy to answer and slowly build up the confidence of the interviewee. By doing this, it is more likely to get better answers to the sensitive or difficult questions. Gill et al. (2008) also stresses the importance of informing the interviewees in advance of the interview and that the answers will be handled in confidence and anonymity is ensured. If the interviews are done in person, the person conducting them should also create a productive atmosphere for the interview.

According to Yin (2009), the following questions most correspond to the strategy used in various research approaches.

Strategy	Form of Research Question	Requires Control Of Behavioral Events	Focuses on Contemporary Events
Experiment	how, why?	Yes	Yes
Survey	who, what, where, how much, how many?	No	Yes
Archival analysis	who, what, where, how much, how many?	No	Yes/No
History	how, why?	No	No
Case study	how, why?	No	Yes

Table 1 Relevant situation for different research strategies (Yin 2009: 10).

The data in the thesis was collected using *qualitative interviews* done with companies connected to the main business of the case company. As the companies chosen for the interviews possess a larger amount of knowledge on the system supply issue, the questions were formulated in a “how” and “why” manner to extract as much information as possible, according to the recommendations by Yin in Table 1. The questions were kept open to give the interviewees the possibility to answer as freely as possible. The idea was to only introduce the topic and allow the respondents to freely discuss the subject. Even though the questions were open-end, the interviews asked the same set of questions to get a deeper insight to the problems.

4.2 Interview Details

The interviews were the primary way to collect data for the thesis. Due to location and time limitations, these interviews were done by email, allowing the interviewees to answer in their own time. Four interviews in different selected companies were conducted in order to form a deep understanding of the problems and advantages for using the cluster model in the case company. The overview of the interviewees is presented in Table 2 below.

Date	Position	Method
18.8 2013	Sales Manager	Email, interview questionnaire
23.9 2013	Project/Sales Manager	Email, interview questionnaire
28.9 2013	Engineering Manager	Email, interview questionnaire
30.9 2013	Managing Director	Email, interview questionnaire

Table 2 Overview of interviewees

The interviewees were chosen based on their experience and business segment. All of them have long experience within the market and therefore a deep understanding of possible problems and solutions. The data collected from the interviews was stored and used to preserve the validity of the data for later use.

The interviewees were not only chosen for their experience and expertise, but also because of their direct contact with the customers. All of them work with issues of quality and response times. The interviews were done to gain access to the information they possess on how the work of the case company has succeeded, with focus on quality and partner reliability. Additionally the focus was to establish how the structure of the organization for the case company's functions today, and how it can be improved.

All these parts are vital for creating the cluster model, and the findings from the interviews were highly consistent. This also helped to validate the received data, as it was found in multiple sources.

4.3 Key Points When Building a Cluster: Analysis of the Results

After the interviews were collected, the data from them was verified and divided in different categories by using content analysis to help identify the key issues. The findings from these interviews are reported below.

4.3.1 Preparing for a Project

The first question asked was about the needs to be taken into account when preparing for a project, from the interviewees point of view. A key issue that everyone reacted to was that each project is different and has to be treated as such. There is no general approach that can be taken as appropriate for every single project, but the client's needs need to be considered and evaluated. According to the interviewees, the project approach is based on the complexity of the project, project location and delivery schedule. Each one of these characteristics, however, creates its own unique challenges. Different organization for different kinds of projects was suggested as a solution for this problem. The interviewees pointed out that today the projects are divided in different classes based on the complexity, and this categorisation might be a functional one when building the project organizations.

According to the interviewees, the customer expectations will vary depending on which market area the project is executed in. Geographical position will also determines the price levels and competition, which are specific for different areas. The positioning against the competitors should also be taken into account, as well as which are the key selling points and advantages compared to the competitors. The relationship with the end customer can in some cases be a deal breaker, and is something that needs to be considered. According to the interviewees, if the relationship is strong, the project is more likely to receive a positive feedback even with technical deviations. If the relationship is weak, price and meeting the specification will become even more important, as well as finding the key functions that the customer is looking for. The interviewees pointed out that the technical requirements and specifications should also be carefully evaluated to see if a more energy efficient or cost saving alternative can be found, as well as the delivery plan for the project. Being able to deliver products with shorter lead times can produce big cost savings for the customers and thus creating a unique selling point and competitive advantage for the company.

As suggested by the interviewees, the project schedule proposed to be used for the projects needs to be well-defined, but with flexibility to cope with sudden changes. When these changes result in extra costs, this needs to be clearly stated and the customer informed. Deviations to the technical specifications will occur, and the way they are presented to the customer will determine if the project is sellable. According to the interviewees, communication was also considered a key issue, as the MOG projects involve a large number of companies, often situated in different countries. Because of this, a clear and well defined path for communication should be defined before the start of the project.

4.3.1 Teamwork and Best Practices

The second set of questions focused on teamwork and best practises in the marine projects and market. The focus was to find the working solution available to use within the cluster model. As stated earlier, the projects in question are very diverse making it very hard to find a general solution to the problems. Due to this, the need for teamwork is very high, as a functioning organization can help to minimize or remove many of possible problems.

One of the points of teamwork discussed by the interviewees was related to the update of knowledge on the rules and regulations. The interviewees pointed out that maritime rules and regulations are given by the classification societies and other governmental agencies. These agencies have their own set of procedures and requirements that will determine how the project needs to be executed. These rules need to be followed accurately as the ship is not allowed to leave the port without classification society approval. As these rules are updated regularly, it is important for all parties to be aware of what is happening to avoid late changes in the project to comply with the rules. Even though there is normally an interim period before the new rules are enforced, the length of the MOG projects is so long that some changes might apply before delivery. Thus, the interviewees suggested that each organization should have a dedicated person that will keep track of new rules and regulations, and will then transfer this knowledge to his/her organization.

Another point raised by the interviewees concerned the teamwork in the planning stage of the project. The interviewees believed that all projects are done by teamwork, and that the completion and success of the project depends on an accurate and reliable

handling of the projects from all parties involved. A specific project organization was prompted for, as the differences in the projects, complexity and preferences of the stakeholders will need different approaches. The more complex a project is, the more essential it is with a good knowhow of the products. These differences are most detectable when comparing marine projects with offshore projects. A technically challenging project might need a more technically oriented organization with several technical experts involved. A project with a tight lead time might then again need more transport and production orientated persons. According to the interviewees, all these factors need to be evaluated to ensure a positive end result. The interviewees suggested that going through the project together will also help to eliminate possible gray areas, and determine where problem points can occur.

According to the interviewees, teamwork can also lead to new innovations, as different type of experts join forces, they can see the different sides of the project. Some special features might be needed under operation that has not been considered as there might not have been the correct feedback coming to the factories, but the problems have been solved onboard without consultation. This problem can be addressed by having people in the project organization from both the operational side as well as the product supplier. By doing this, the company can ensure that possible problems found onboard will reach the correct personnel in the factory, and that the information will be used for upgrading the product. Solving these types of issues and upgrading a product, can prove to be a key selling point for a future project as the need for corrections onboard will be obsolete.

The interviewees also suggested that working together can also give new ideas for business development. With the professional networks combined, the amount of available contacts will increase, giving new ideas and opportunities to the cluster. Networks can also help in finding outside experts or workforce when needed. Some customers may also have specific needs and preferences that are not known publicly, and the experience interchanges will help to spread this information throughout the cluster. This can again prove to be a key selling point in a future project when these preferences can be considered and implemented in advance.

The interviewees also pointed to some major disadvantages when working together. Some concerns were raised about a possible conflict of interest, but they were considered manageable as long as the partners trust each other and there is open communi-

cation. The second point raised was the time needed to respond to customer inquiries. Slow response times can lead to major problems in the project execution, and this item needs to be closely monitored and improved. Proper communication channels and issues as well as reaching the right person are vital to improving this problem.

One of the interviewees felt that it was important to keep the relationship fresh and make sure that the customer is not taken for granted. This is a valid point, especially with customers that have long series of ships or several projects ongoing. The supplier can get the feeling that the customer is not even going to look at other options because of the easiness to operate with the same supplier. The interviewees stressed that this needs to be monitored so that to ensure that it does not happen. For the supplier, being too content may lead to the lack of innovation and the decline in the quality of customer service. Thus, it is important to remember that there is competition between the suppliers for each project and constant renewing and development is needed.

4.3.2 Communication Flow

The next question was on the communication between the companies and how the situation is today, as well as its improvement.

All interviewees felt that it is vital to define the communication flow and procedures at the beginning of the project. If a clear model was created early enough, it was felt that most of the problems could be avoided. In some cases, it was felt that communication across more layers was needed, so that all parts of the organization would be engaged with their counterparts at an early stage, instead of waiting until problems occur. As a way to improve this, the interviewees proposed regular project meetings to keep the whole organization engaged. The interviewees stressed that the frequency of the meetings should be based on the project status and needs, not to just on a formal predetermined schedule.

The interviewees also suggested to conduct regular meetings to share market information were proposed. As the companies operate within the same segment, this would help to avoid competing within the cluster as projects should be openly discussed between the partners. From the interviewees' point of view, open discussions would help to build up the trust within the cluster and also make the information available to everyone. This may also reduce the need for resources to chase information out in the field,

as different sectors could be divided between partners and the information then shared. By doing this, the interviewees believed, more ground could also be covered and the possibility to find new projects and opportunities would increase.

4.3.3 Improvement Points

As stated in the previously, project meetings were suggested to be added to the agenda on a regular basis. As the different companies are situated around the world, the interviewees suggested that phone or web based meetings would be the most time and cost efficient alternative. The agenda should need to be confirmed before the meeting, and a chair for the meeting appointed to make sure the meeting keeps on schedule and issues discussed do not get sidetracked. Also a follow-up tool for the project was suggested to make sure that the problems and innovations worked out during the project are followed further after the completion of the project to benefit future ones. The interviewees also proposed a weekly activities plan for the project which could be implemented to the project planning schedule.

The interviewees also stressed on discussions regarding cost and delivery times. These are the items that at this point in time influence the buyer's decision the most. With all the experts of the project working together, some innovations could be made during the project. More dedicated staff to specialized areas was also asked for by the interviewees, as with a working cluster, this problem should be sorted out, as experts could be "borrowed" from different organizations to strengthen the problem areas.

A functional transportation department was also needed according to the interviewees, as the customer needs to have the goods in the speediest and efficient way possible. The logistics at the factories usually are the most suited ones to handle this as they are close to the product delivery and have direct access to the production schedule. Having a dedicated person tracking the completion of the products can help with improving delivery times with products completing ahead of schedule, and also alerting the customers of possible delays at an early stage. According to the interviewees, being able to handle all the logistics issues for the customer can add value to the process and give the customer a positive feeling about the project in the final stage, and by that increase the possibility for a second contract.

4.3.4 Indicators of a Reliable Partner

The final point and question asked was what makes a reliable partner. As the model will also concentrate on partner selection, it was very important to get the feedback from these expert interviewees on what are the qualities they are looking for.

Not surprising, the quality every interviewee mentioned was mutual trust. Working together, it is not possible to operate without being able to trust your business associates. The interviewees stressed that this also includes honesty between the partners, a cluster should operate without competition between the partners, and possible problems and other issues should be to be communicated openly.

The interviewees also pointed out that accurate information between all parties is important as well as proper technical support when needed. This comes back to the communication transfer on multiple layers and continuity in the organizations according to the interviewees. Sensitive negotiations need to be handled professionally. Making sure the questions are answered rapidly and confidentially was again considered a key point by the interviewees. On time deliveries and payments were also mentioned.

Finally, the interviewees made a last point of the need for product development and innovation. Some of the interviewees felt that the shared knowledge base is not utilized enough, and that the feedback from the field should be used more during the development stage. Even though this is not a key issue in setting up the cluster, it is a very valid point and should be considered how to improve. Product development tends to focus too much on new building projects and not consider the issues that arise during refurbishments and spare parts projects was a point that some of the interviewees felt to be a key issue. The feedback from the organizations handling the installations on-board should be reviewed more closely and implemented as much as possible. The after sales and refurbishment projects might be smaller ones, but they are more frequent and with a shorter turnaround time making them a good way to keep a steady volume in the factories and also keeping the brand name known amongst operators. Having different types of projects was considered to be an advantage amongst all the interviewees.

4.4 Conclusions

Based on the findings of the interviews it can be concluded that there are many points and issues that needs to be kept in mind due to the complexity of the projects. Geographical locations and different time zones create their own problems, as well as customer needs and demands. Most of the challenges described in the previous sections are problems that all organizations working inside the MOG segment tackle every day. This section discusses how these issues can be brought together to create a working model.

4.4.1 Communication Aspect

The conclusion for the communication part is that there needs to be a clear model and channels for communication. Regular meetings are needed to ensure the correct flow of information between the organizations, and avoid breakdowns. A specific project organization should be done for at least big or special projects to ensure the commitment of key personnel to the project.

For the cluster overall, the channels for lateral communication are very important, as there are a number of companies involved, and most situated in different countries. External communication responsibilities also needs to be determined, who will communicate with which customer, and on which issues. Also when direct contact is needed e.g. between technical departments, it should be specified how that communication is maintained and kept available for the rest of the organization. At the same time, the model should ensure that irrelevant information is filtered out to avoid excessive amount of information. One of the examples of the complicated information flow is the use of email today, which quite often includes a lot of people in the conversation, and though it is good that the information kept open, it can consume a lot of resources to go through a chain of email exchanges that does not directly concern all persons on the mailing list. A clear structure and discipline needs to be followed to maintain a good level in this type of communication.

4.4.2 Leadership Aspect

The conclusion for the leadership part is that there needs to be a clear leadership structure as soon as the partner selections are done and the cluster is formed. This is to ensure that all key responsibilities get transferred to the correct person and implemented as soon as possible. For the personnel to commit to the new project and the upcoming projects, they need to feel that there is a functioning structure in place, and that all day-to-day functions are working normally. If there are no worries about basic functions amongst the personnel, they are more likely to concentrate on the actual work load, instead of sharing grapevine information. This will reduce amount of rumors spreading in the offices and corroding the team spirit.

A strong leadership will also help to show to the market and customers a united face of the cluster. A good leader will become the face to the cluster and can function as a promoter for the whole cluster of companies. This will help the marketing and sales forces in their efforts on the field, as this will most likely help to strengthen the brand names.

4.4.3 Partner Selection Aspect

The most important part in the partner selection is to find a partner that can be trusted. When working closely together on projects, there is a lot of confidential information shared, and if the partner is wrongly chosen, the company can be exposed to information leaks. There for it is vital to ensure before entering the partnership that the partners share a mutual interest in the market, and are committed to working towards the same goals.

It also needs to be determined that the partner is capable to perform the tasks needed, and that they have a suitable product range. Global presence and location also needs to reviewed and verified. Strong brand names combining forces is a unique selling point that can open new opportunities in the market.

To keep the relationship strong, it is important for the partners to work with the relationship between the companies. If one of the partners feel that there is a issue of rivalry, the relationship is very likely to dissolve quite quickly. Setting up clear boundaries on which projects to chase and having an open dialogue between the companies will help

to avoid these situations. If this kind of situation should emerge despite of the safety measures, the project should be openly discussed and decided on the upcoming action plan, which company will move forward. Competing against each other will only reduce the sales margins for both parties and end the co-operation.

With these three elements: communication, leadership and partner selection working together, the cluster model will be easier to implement. As the conceptual framework in Figure 20 illustrated, these elements form the cornerstones that the model relies on. Each element interacts with the other one, thus improving both the internal functions as well as the customer experience as all elements include both internal and external structures.

5 Developing a Cluster Model

This section presents the cluster model and the theories behind it. The most critical elements for the cluster model are collected and evaluated in this chapter.

5.1 Cluster model

The cluster model was created based on the case company's needs and the feedback analysis and the data received from the interviewees and the internal experts. As all the interviewees were professionals with a long experience from the MOG market, their points of views were used as guidelines in the creation of the initial cluster model. After its review, the additions from the internal experts were integrated in the model to create the final proposal for the cluster model.

This model is intended to be used as a model for initialization and development of the cluster. During the life span of the cluster it may become relevant to increase the membership in the cluster or replace a partner. Since this possibility is also taken into account in the proposed model, the model can be continuously applicable during the whole life span of the cluster.

5.1.1 Initial Cluster Model

The model was created using the findings from the published research and the data collected from the interviewees. Elements and ideas were also used from *Munn-Venn and Voyer (2004)* when creating the model. This approach was mainly used for creating the initial proposal based on purely external information and expertise. During this stage, the case company experts were not involved. The findings from these interviews were integrated into the initial model to reflect its key features: leadership, communication and partner selection. The idea was to create a basic model that the case company experts could review and give their suggestions and recommendations. After that, the internal experts were interviewed to revise the initial model. These findings were then integrated into the final proposal as a guideline when creating the cluster. In the case company, the findings in the model may be used to create a functioning cluster.

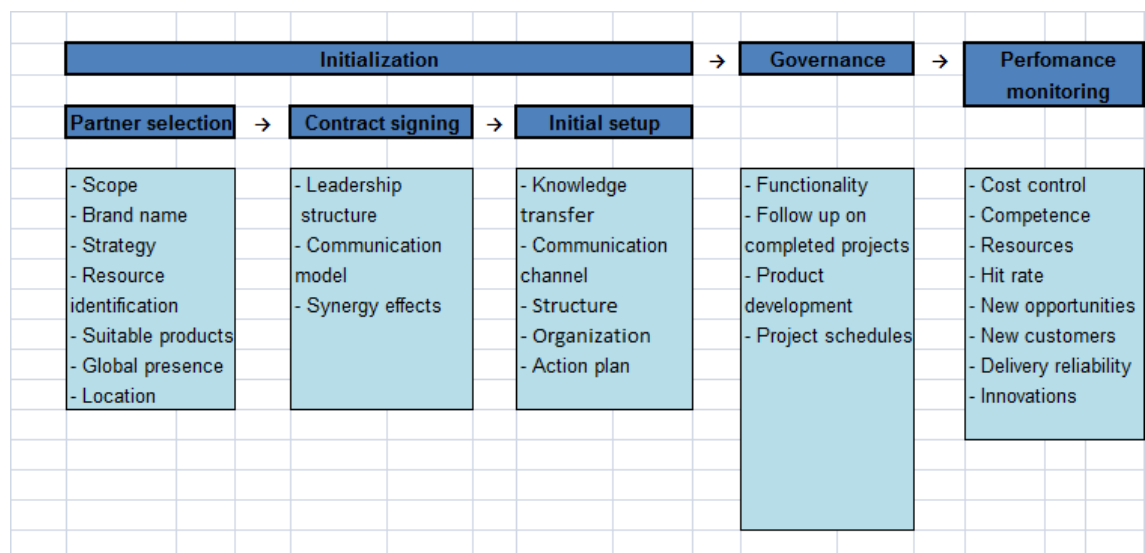


Figure 21 Initial cluster model.

As seen in Figure 21, the model is built up to reflect the different stages in the cluster setup. The first phase concentrates on the partner selection solely, as this is the logical first step, to find a partner that is able to contribute the needed attributes. Features such as brand name, suitable products, location and resources were identified as the most important factors in this stage.

After the partner is selected, the second phase begins. In the contract signing phase, the partner's commitment to the cluster is started, and the first structures for leadership and communication are initiated.

After these two stages are completed, the cluster moves to an active phase, the initial setup. This is the first stage where the model is tested in action. The structure and organization needs to function in a working environment, possibly with a first mutual project. The communication channels are tested, and the knowledge transfer between the companies should start latest at this point. As there are probably new partners still joining the cluster during these phases, the first three phases are likely to run simultaneously and continuously.

After the initial startup is done and all partners selected and brought into the cluster, the work will shift to maintaining and improving the functionality. In the governance phase, functions and projects are followed up, and possible problems identified are corrected and documented. Project schedules are defined based on previous experiences and product development is started as a joint effort.

The last phase monitors the performance of the cluster. This is a very important phase, as it determines the viability of the cluster, and how it manages compared to competitors. The last phase determines the KPIs that will be followed in the project, based on the interviews, the model suggests that cost control, resources, hit rates on offers, amount of new customers and delivery reliability, among others, could be the metrics to follow.

The cluster model is intended to be used in a continuous process of the functioning cluster. As new partners are going to be added to the cluster or existing partners changed, the model will still be valid and in use. For the sake of renewing the process and keeping the cluster viable, it is important to reevaluate the internal structures regularly and make sure that each function is optimized.

5.1.2 Review of the Initial Cluster Model

The experts in the case company were asked to review the initial cluster model and make suggestions and recommendations for improvement. These suggestions and feedback were collected in a face-to-face meeting, where the experts were able to give

their view on the initial model. A few suggestions were made, and the phases were more clearly defined during this meeting.

For the first phase of the model, the key features were found to suit the case company's profile for partners. Even though strategy was found to be very important, it is difficult to define at the first phase where the partner is selected as there is no clear mutual strategy created yet. Therefore it was suggested that the strategy should be moved to the initial setup phase, where the partner selections are already done and the mutual goals set. This was considered to be the more logical stage to create a clear strategy that include all partners, otherwise the strategy would need to be reviewed every time a new partner is selected and the contract signed. This would also remove some of the workload, as it is likely that not all considered partners will reach the contract signing phase.

In the second phase, some features were added to define the contract signing phase in more detail. Partner responsibilities were recommended to be clearly defined in the contract, as this will help to avoid confusion and possible grey areas that can cause problems during a project. Also partnership stability was recommended to be considered, to make sure that the partner is truly committed to the cluster when the contract is signed. Penalty clauses should be included in the contract, but also some sort of rewarding system if something is done that benefits the whole cluster.

In the initial setup phase, the key aspects were clarified and additional components were added. The key customer assignment was added to the list. This relates to that each key customer should have a dedicated person that handles all issues concerning the customer in question. Since the customer base is quite big, and the resources are limited, a solution would be to divide the key customers between the partners. This could be based on previous experiences and connections or with the regard to the product focus of the customer. To maintain customer satisfaction, the knowledge transfer is very important, as every partner should be able to do a basic presentation of each of their partner's products and services. If all partners share the same amount of information, it will enable more customers to be reached as each partner can cover a dedicated customer base instead of each partner having to make separate visits to each customer.

In the governance phase, the comments were mainly focused on the stability of the cluster. It was stressed that personal commitment from all key personnel is needed and will help with the unity of the cluster. The experts also pointed out that the unity of the cluster is important to make sure the cluster seems reliable to the customers and functions smoothly. Making sure that no competition arises between the partners is the most important thing in maintaining the unity. The experts also believed that team spirit will come through mutual projects and activities. The level of communication was needs to be checked at this point, as some initial work is already done, and the communication can be evaluated based on these projects and improvements made were needed.

In the final phase, the general consensus was that most of the things were already considered. Patents were considered as the only additional thing that could be a good way to monitor the performance, as innovations on their own can be difficult to follow up, in regards to what can actually be taken into production and what stops at design stage.

5.1.3 Final Cluster Model

The final cluster model was developed based on the improvement suggestions from the organization. The suggestions were implemented into the model, and the model was after that reviewed on a more detailed level.

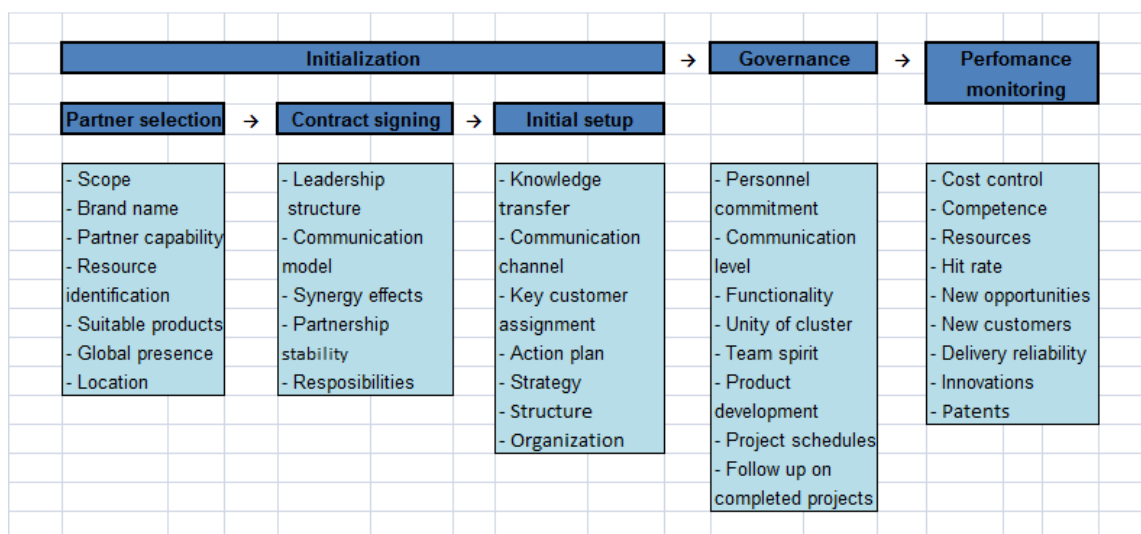


Figure 22 Final cluster model.

As seen from Figure 22, the phases in creating the final cluster model included the same basic stages: initialization, partner selection, contract signing, setup, governance and performance monitoring. To be able to view the model on a more detailed level, the key elements are presented separately in the table below.

Phase	Elements to be evaluated
Partner selection	Project scope Brand name Partner capability Product suitability Global presence/location
Contract signing	Leadership structure Communication model Synergy effects Resource identification
Initial setup	Knowledge transfer Communication channels Partnership stability Relationship with key customers Strategy for market Structure/ Project organization Introduction of team
Governance	Commitment of personnel Level of communication Functionality of cluster Unity of cluster Product development Project schedules Follow up on completed projects
Performance monitoring	Cost control Competence Resources Hit rate on projects New opportunities/customers Delivery reliability Innovations/patents

Table 3 Cluster model phases and elements.

In the *partner selection* stage of the final cluster model, the key element is to identify a partner with the desired qualities. As selecting the correct partner is one of the key processes in creating a cluster, this should be done taking time and effort. The project scope defines which products and services are needed, and the complexity of the project. Therefore, the intended markets should be identified before selecting the partners. Or in some cases it might be efficient to have different partners for different market segments. If this is done, the boundaries need to be clearly defined so that no rivalry will occur.

In the *partner selection* stage, there is a risk all together in selecting partners that operate in the same segment, and may compete each other. As a general guideline having competing partners should be avoided as far as possible to keep the cluster intact and avoid having issues that could disintegrate the whole cooperation. As also stressed in the study by *Munn-Venn and Voyer (2004)* indicates, continuous interaction will reduce the suspicion between the partners and will result in a common new code, that the partners can use with each other. The study also indicates that a partnership will function as long as the benefits of working together exceed the benefits of breaking the partnership. Therefore they also indicate that the partners should be clear in the penalties that will occur if the rules are broken. This is especially needed when the cluster has grown and all members are not previously known or invested in the partnership.

The brand name can be a key factor in opening doors to the new markets. Having a few strong brands working together makes it more likely to gain access to previously unknown customers and markets. Geographical location is also important, as some markets require local presence and content for market access.

Munn-Venn and Voyer (2004) also indicate that it could be viable to use partners with similar capabilities in the cluster. It indicates that more knowledge creation and exchange will occur when the partners are on the same level. It is easier to find common ground and in that consensus be more invested in the improvement and performance of each partner. In this case, it is easier to blame the performance of a company that is not known or is located far away, but when the company in question is a business partner, the whole cluster is affected by that performance, and corrective actions if needed are more likely to come collectively than that the producer will be left to face the problems alone.

All products produced in the cluster should be useable for the projects intended. It is preferred to build a cluster where all products logically fulfill the gaps in the overall supply rather than have a wide display of products that don't interact with each other. This is mainly to create a package that is easy to sell.

Most systems are divided to be handled by a specific person, and if there are products that are from another system, visiting the customer might lead to that the wrong persons are met since they do not handle some of the products. This will result in that the person actually met will have to forward the information to the right person, risk of losing something in translation, is the person motivated enough to transfer the information and will the person that the information was intended for feel offended for not being invited to the meeting where this was discussed. Having a logical set of equipment and services will help in finding the right person to engage, and explaining the function of the cluster to the customer.

In the second phase of the proposed cluster model, the partners are selected and the initial communication and leadership structures are defined. In this stage the actual contracts are signed and the cluster is formed.

The first priority in this stage is to define the leadership structure and the communication model. As the cluster will quickly need to establish itself in the markets and attain a workload for the partners, a person that will represent the cluster as a whole is needed to show a unity and functionality towards the market. Even though all partners are equal experts in their own field, an overall leader will show the market that the cluster is not functioning as separate companies, but are invested in working together and delivering services together. It can be decided together whether the cluster decides to promote someone from its own organizations or use someone from the outside for the role can be decided together. If someone from the outside is used, the question of who will cover the cost for that person will have to be determined. Using someone from the existing organizations will help to control the overhead costs as employing someone from the outside will make additional overhead costs. The internal leadership structures within the companies might be best to leave as intact as possible at this point in order to help with the transition and create less resistance inside the organizations.

The next stage is the resource identification. At the contract signing all resources from all partners should be identified to maximize the synergy effects from the cluster. Resources within the cluster may be utilized for common functions. Also the identification process will lead to not having similar functions in separate organizations, but utilizing the resources for other functions, thus again reducing the overhead costs and optimizing the organization.

At this stage, the communication model needs to be determined and taken into use. This is for both setting up the communication inside the cluster and towards the customers. For the latter part, having a cluster leader that will front the customers, might be the first point of contact during the start-up phase of the cluster. With just one point of contact for the customers, that handle the internal communication transfer, the threshold for the customer to make contact would be made as low as possible.

Later this point of contact could be defined in further details as, for example, different types of projects would have a different project organization based on i.e. project complexity, and each organization would have their own leader. Being able to have this type of organization requires that the customers are somewhat accustomed to working together with the cluster and know which organization leader to approach.

The last phase in the initialization stage is the cluster setup. This is the phase where all KPIs are defined, and the cluster functions are taken into operation. The cluster needs to be built on a stable basis and the relationship to the key customers should be initiated. This requires each key customer to be informed of their new point of contact, as well as a brief introduction to the new structure. Knowledge transfer between the entities needs to be initiated to ensure efficient project execution. A clear strategy for the market needs to be finalized here; an initial plan should be made during the partner selection phase. Also the project organization should be formed and the coming teams be introduced to another.

The second stage in the process is the governance of the cluster. In this stage, the key issues are the functionality and stability of the cluster. The personnel needs to be committed to the cluster, and all parties should be dedicated to improving the functionality. The level of communication is of great importance. In this phase the internal communication levels need to be in place, ensuring horizontal communication between the cluster partners as well as vertical communication inside the organizations. If the communication is working well, it is very likely that the product development is also

working. According to the study by *Cooke (2012)* companies working in proximity of each other will learn from another during the process just by observing each other, and therefore boosting the product development in the companies. As stated earlier, the geographical locations of the cluster companies might be global: therefore it is not enough to have a good way of internal communication, but the communication to the cluster partners is equally important. To help with the stability of the cluster, the partner should treat each other as the same company, thus enabling easy communication and knowledge flow.

The last stage in the proposed model is the performance monitoring. To keep the cluster competitive, this is a key stage in the process. The function of this stage is to gain information of completed projects, and evaluate how that information can be used to further improve the cluster functionality. This is done partly through cost control. The delivered projects are evaluated through the budgeted and the actual product cost. If there is a big difference between these, production and project handling should be evaluated to exclude any unwarranted extra costs. If the process is found working on an acceptable level, the quotation work needs to be evaluated to reflect actual costs. Delivery reliability can influence the final cost of the project. For example, if the products or documentation is delayed, this can result in significant penalties for the supplier. Sufficient resources are thus needed for the project handling. In conclusion to this stage, it is important to evaluate a completed project from all aspects and learn the lessons from both losses and successes.

From the sales point of view, a reliable tool to keep track of project hit rates should be implemented. Since quotation work is both time and resource consuming, and surprisingly big costs can be accumulated during a long bid process. A tracking tool combined with the CRM system could be such a tool to track the hit rates overall, but also on a single customer level. This tool is meant to identify which customer is the buying one, and which one only uses the services for price level indications. In the case of a non buying customer, the system would also alert the sales responsible to discuss the situation with the customer in question and try to turn them into buying customers.

The final point is the number of patents and innovations. As stated earlier, a good communication level between the companies will improve the development work and boost the product development. This is somewhat difficult to monitor, therefore a system giving accurate data is needed. A way to monitor this feature is proposed to be the

number of patents and new innovations that the cluster produces. This could be tied to the incentives for the personnel to keep them motivated and invested in the development process.

New innovations will also help with finding new customers and opportunities, as a new product can open markets that have not been open previously. This is also a function that can be monitored and documented, again within the CRM system. As the workload in the MOG market is fluctuating, having a few market segments that are active will help in keeping a stable work load for all partners and therefore avoiding layoffs and overcapacity in the factories.

6 Conclusions

The final section summarizes the findings of the Thesis. The research objective and process are firstly reviewed. After this, the validity of the study is determined. Finally future recommendations are given for the case company.

6.1 Summary

The research objective for this thesis was to develop a cluster model for the case company. The key elements also included finding the most important factors in creating the cluster, and finding the possible problem areas. The business problem was approached by using existing researches and knowledge, interviewing experts in the marine and offshore field and using company internal data as for existing problems and solutions.

The case study method was used as the research method for this study. The reason for choosing this method was that the case company does not have any previous knowledge in setting up this type of cluster, and it was not possible to test the functioning of the model in the company through iterative rounds.

The research process was conducted by dividing the process in smaller pieces. First the existing research material was reviewed and implemented in the study. After understanding the theory behind the business problem, external experts were interviewed. The data collected in these interviews was then analysed to form the backbone of the model.

The main challenges found in the interviews were identified as follows: the communication between the partners does not reach an acceptable level, response times are too slow, there is no clear structure in the organization and the responsible persons are not clearly identified to the customer. Based on the finding from the interviews and the research data, a cluster model was formed.

The cluster model suggested in this study includes the following key elements. Partner selection should be based on products and services complimenting each partner's scope of products and resources. it should be made sure that no competition will occur

between the partners. Clear leadership and communication structures should be implemented at the contract signing stage as these are critical to getting the information out to the market and customers.

Knowledge transfer and a mutual strategy for the cluster need to be initiated immediately after the contract signing as these will determine how the market is approached and by which partner. If partners are excluded or new partners brought in, these initial steps need to be repeated to ensure the continuing functionality of the cluster.

Finally, the functionality needs to be reviewed constantly, for example by the number of new patents and innovations, to determine the competitiveness performance of the cluster.

As there was no previous experience in the company, it was not possible to use any previous information for the creation of the model. In the future, as the model is intended for continuous use, the model itself also needs to be improved and updated during its life span, keeping in mind that the marine market is still going through a phase of constant change. For this purpose, the evaluation and updating of the model needs to be done once the model is taken into use. This lies outside of the Thesis and makes a direction for research in the future.

6.2 Functional Implications

As a result of the investigation into the current state and the possible cluster model for the case company, there are several functional implications that need to be taken into consideration, if the case company decides to put the cluster model into practice.

First of all, in the case company, functions so far have been focused on supplying only product deliveries, preferably only from the factory situated in vicinity of the office. Due to this preference, the organization in place today is not designed to handle deliveries from multiple locations, and the documentation and logistics connected with that. To help when implementing the suggested cluster model, special attention first needs to be given to **the internal organization**. The internal functions need to be streamlined and re-evaluated to ensure a smooth transition to the new business model. The key problems identified by the interviewees need to be taken into consideration and fixed before implementation and there is a need to oversee the availability of a sufficient amount of

competent resources. Resource allocation and building up a new type of project organization should be the first step before considering the partner selection.

Reviewing the **partner selection** aspect, the case company is in a good position of already having a few reliable partners that are working in close co-operation. Transferring these business partners to work in a cluster should be the next step. As these companies are already relatively used to each other's way of working, the implementation process should be easier to complete. They also have products that compliment the product base quite well. If additional companies are though still needed to complete the package, special consideration should be taken to finding companies with design, documentation and project management capabilities. As the case company is going to be the driving force in building the cluster, its internal structures also need to be set up to have the resources to find the viable partners in the field.

Concerning the **communication** aspect, based on the interview responses, this is the area where most work is needed. The interviewees felt that the biggest problems were the slowness in response and an overall lack of communication. Thus, this part of the case company needs to be thoroughly reviewed and possibly rebuilt completely. There needs to be a clear path for communication inside the organization, and clear allocation of roles and responsibilities. It should be clearly indicated who is responsible for which communication and add visibility, so that to avoid the situation where issues get stranded in a single person's email without response. There needs to be a clear communication chain built in the company, and an alternative contact designed in case of excess workloads etc. that prevents the first point of contact to answer the customer on time.

The interviews also pointed to the fact that there is no sufficient number of meetings kept between the partners, thereby making the communication flow more difficult. It was suggested that weekly meetings should be appointed between the project organizations. As distances between the companies are sometimes great, web and phone meeting possibilities should also be explored to make the meetings as cost and time effective as possible.

This also stresses the significance of the knowledge transfer within the case company. There is a lot of competence in the case company, but everything is kept mainly in the hands of a single person. This is a challenging situation as there is vital information

that, in a worst case scenario can leave the company with the person in question. There needs to be a designated method and responsible persons who makes sure that this information gets transferred in each competence area to a sufficient number of people. Also a system for transferring information between the partners needs to be developed, as there are intersecting fields of expertise between the companies. The responsible persons for each field also need to be appointed quite early, as they will need to handle the horizontal communication between the cluster companies.

In terms of the **leadership** aspect, the suggested structure is going to be a new organization for the case company. As stated in the model, it is important to have a leader for the cluster already in the early stage to be able to show a united face towards the market. Due to this need, the leadership structure in the cluster companies has to be set up very quickly, as the cluster represents a new market approach for the case company, and there is a need for pre-work in the market to promote the new way of working.

As the current organization in the case company is a product delivery orientated organization, there is a need for restructuring of the project organization to meet the demands of a system delivery. The organization has to be modified to be more of a project organization. An option might be to divide the project in different categories, and divide the organization so that different parts are responsible for different categories. With less complex projects, the organization can probably handle a larger amount of projects, but with very complex deliveries, the responsible persons need to have the sufficient time and resources to handle all the project aspects. If the focus is going to be on more complex projects, as was the trend in the past years, the organization needs to reflect this decision, and sufficient resources need to be allocated. An overall project manager should handle the project, but there also needs to be designated persons in the project to handle the different parts and aspects of the project.

Even though not chosen as a key aspect in the model, the **cost** aspect also needs to be looked into. For the cluster to be viable, the services offered need to be competitive. With the new structure of the cluster, not only the internal cost issues have to be addressed, but also the deliveries as a whole. Internally, the production process and the overall production costs have to be revised to optimize the process and cut costs where possible. Especially with complex projects, some work has to be outsourced, and there is an amount of indirect costs that will burden the project. A way to follow and predict these costs, and reduce where possible, has to be developed. Quality problems

will also quickly consume the sales margin, making the quality assurance in the factory and sub suppliers very important. As there has been an issue in the past with production costs not matching the estimated ones, the supply chain should be looked at and the alternative suppliers investigated and utilized where needed. Material flow could also be evaluated, as some components have long lead times; for short delivery times some components have to be ordered with higher costs for the case company. Thus, keeping some of these long lead time items in stock would relieve some of the problems in meeting the expected delivery times. As there is a cost issue in keeping a large stock, the critical components should be identified and evaluated if they are feasible to have in stock.

These points make the list of the most important factual implications for the case company, when putting the cluster model into practice. The list of implications may grow after the first evaluation round, after the model has been implemented.

6.3 Reliability and Validity in this Study

The reliability and validity issues in this study mostly concerned the data collection and data analysis methods, possible research bias and the implementation of the suggested solution into practice. Another important aspect concerned the fit between the goal set in the beginning of the study and the outcomes reached at the end. These points are touched upon below.

6.3.1 Objective vs. Outcome

This Thesis had the goal of creating a cluster model for the case company. The research question focused on the factors which could be identified as the most important in the cluster setup, and that question has been answered in the thesis. Based on research and interviews, the key factors identified were the leadership, communication and partner selection. The outcome of this study was a cluster model developed for the company.

While creating the model, a number of key challenges for the case company were identified related to the implementation of the cluster model as well as internal structural challenges. These problems were analysed, and corrective measures were suggested

to help the situation. Despite of this, this study has many constraints, mainly due to the number of interviewees which was quite limited and limited internal expertise on this particular issue. The interviewees were nevertheless undisputable experts in their field, and the knowledge that they shared represented quite precisely the situation in the field as well as that in the case company. Therefore, they may be considered as valid and sufficient enough to address the goals of the current study.

As for the practical implementation, the cluster model could not be immediately tested in the case company as the case company has not yet reached a point where the model could be put into practice in the daily business. If the model could have been tested in a realistic business environment, the outcomes of that test would surely have helped to improve and develop the model to a detailed level. Thus, the hope is that the cluster model will develop and improve during its usage also as additional data and experience will be added to it.

6.3.2 Reliability and Validity

Reliability is defined as the extent which an experiment or investigation can be replicated and the results obtained will point to similar conclusions.

Reliability in this study was increased by taking various measurements, for example by comparing the findings from two or more observers on the same issue and analysing how they agree on the observed phenomena and possible measures that need to be taken to improve the situation. In this study, the reliability of the information and data used was secured by using both, internal and external experts outside of the case company for interviews and knowledge exchange purposes. Their background and long experience ensured obtaining valuable information and provided a wide range of perspectives on the case company's business problem. External experts were involved for collecting data and information on system supplying issues and market intelligence. Internal experts were used to review the data collected and give their own input to the cluster model, and their feedback was added to improve the model. The interviews answered the questions in writing, and their notes were archived to maintain the validity of the collected data.

To further strengthen the reliability in this study, different sources were used to diversify the collected data. Internal, external and search in the recorded data was used to

ground the study in three separate foundations. Using different data collecting tools helped to increase the validity and reliability of the study.

The theories used for the background information of the existing knowledge in this study are described and discussed in detail, and can be re-evaluated if necessary. Each aimed at the outcome of creating a functional cluster, and the development process and argumentation was made as transparent as possible. In that sense the validity requirements for the study have been met.

Validity refers to the study actually measuring the subject that is examined. Validity is defined as *internal and external* validity. The internal validity relates to how well the study is built up and conducted, and how much alternative explanations have been taken into account. The *external* validity refers to the degree to which the results of the study can be generalized or transferred for different use. Qualitative studies are normally not designed to be precise measurements or evaluation of the phenomena and the study therefore concentrates more on how the findings can be transferred into action. This also points to the so-called Post-test effects, meaning that the *cause-effect relationships* can only be found when post-tests are carried out, and then this also limits the generality of the findings in this study.

As for possible research bias, the researcher has worked for the case company for five years and in the marine market for the previous twelve years. A long history with the case company and the marine market could to some degree influence how certain aspects are evaluated and some opinions are certainly the result of previous experiences. But this long experience can also be considered an advantage for the study, as it helps to understand the overall market problems and point to relevant problems in the processes,

The data, feedback and valuable information received from internal and external experts has helped to make the study more accurate and increase its construct validity. The validity of the internal information from the case company was validated by comparing it to the interview responses from the external experts, and finding similarities in both type of data. The same type of problems was also found in the published research used, in clusters in the field they operate in.

Finally, to improve validity, the study discusses an alternative way to operate in the marine market without making extensive investments in the organization by building a cluster. The projects are very complex and the project completion will take several years, adding to the complexity. This increases the need to keep the personnel invested in the company, as having the key persons onboard for the whole project is necessary for the successful completion of the project.

Thus, the study provides a solution related to the cluster model construction and can be used as a proposal for the case company on how to tackle a changing market in an effective way. The results can be used to actually plan and build a working cluster for the marine and offshore market in the case company environment. Further on, after the necessary adjustments, the cluster model can probably be in other organizations in the case company to build similar working clusters. As the existing studies indicated, all clusters, regardless of the business area, function in more or less the same way. This gives a chance for the study to be used as a tool to plan, maintain and recreate a cluster and replicate a study with other organizations. The final test for the validity of the study results can only be done through testing its different parameters in a practical test which would prove whether the findings in this study are valid.

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Appendix 1.

Sample of the semi structured interview questions

Topics of interview	Questions	Field notes
1. Starting point		All interviewees have long careers in the MOG segment
Describe the experience of the interviewees and their previous contacts with the case company	- What is your role in your company? - How have you been involved in the marine/offshore activities with the case company?	Most of them familiar with case company's ways to operate and products
2. Identify KPIs		
Important information when setting up the leadership structures for the cluster.	- What are the key factors when preparing for a MOG project? - Are there any existing best practises for the MOG projects that are followed in the cooperation? How is that utilized? What are the benefits in working together? Can you describe some? Do you see any disadvantages? Can you name and/or describe some?	No existing practises since projects are so different Teamwork very important Teamwork leads to innovations Conflict of interests?
3. Communication models		Response times need to be shorter
To help determine how the communication transfer would be handled the best way.	- How would you rate the communication transfer between the companies today? - What can be done to improve?	Clear model from the beginning Most problems avoided with clear information transfer
What the situation is today and how to improve	- Is there a clear model to use in regards of responsible persons? - Are the steps in a project clearly defined?	Project meetings Share market information Open channels create trust

	4. Reliability in a partner						
		- What are the most important				Honesty most important	
	This section of questions	features in a reliable partner?					
	determine which					No competition between	
	factors should be					partners	
	considered when						
	selecting a partner					Accurate information	
						Mutual development	
						Knowledge bank	
						Will to produce something	
						together	
						Team spirit	