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TEKNILLINEN TIEDEKUNTA

# ANALYSIS OF HEALTH, SAFETY, ENVIRONMENTAL AND QUALITY MANAGEMENT IN A NETWORK OF PORT OPERATORS

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**Tiivistelmä**


Barentsin alueella kuten muillakin arktisilla alueilla on valtavat suurelta osin vielä hyödyntämättömät luonnonvarat. Ilmaston lämpeneminen ja teknologian kehitys ovat viime aikoina mahdollistaneet pääsyn noihin luonnonvaroihin. Sen myötä alueen tuotannollinen ja kaupallinen elämä on kasvussa. Suomi on yksi kilpailijoista kasvavien logististen tarpeiden ratkaisuja vertaillessa. Maan etuna kilpailussa on sen tunnetusti korkeatasoinen terveys-, turvallisuus-, ympäristö- ja laatujohtaminen.

Oulun yliopisto on kehittänyt yhteistyössä suurten yritysten ja näiden sidosryhmien kanssa HSEQ-palvelutoimittajien arviointimenetelmän. Menetelmän etuina ovat vertailukelpoinen tieto arvioitavien yritysten johtamisen tasosta, samansisältöisten ulkoisten auditointien väheneminen ja tietotaidon leviäminen toimitusketjuja pitkin ja niiden välillä. Menetelmää on käytetty tähän mennessä lähinnä prosessiteollisuudessa. Tässä diplomityössä tutkitaan sen sovellettavuutta satama-alan yritysten arviointiin.

Tutkimuksessa perehdyttiin HSEQ-arviointimenetelmään ja sen käyttöön ja periaatteeseen. Myös siihen aihepiirien suomalaiseen ja kansainväliseen lainsäädäntöön sekä satamien toimintaan perehdyttiin kirjallisuustutkimuksen avulla. Empiirinen tutkimus suoritettiin tutustumalla kolmeen samassa satamassa toimivan yritykseen. Niiden terveys-, turvallisuus-, ympäristö- ja laatujohtamista arvioitiin laadullisten haastattelujen avulla ja vertailtiin tuloksia HSEQ-arviointimenetelmän käytön vaatimuksien tasoon. Myös menetelmän käyttöönoton tuomia muutoksia arvioitiin.

Tulokseksi saatiin, että arviointimenetelmä on hyvin sovellettavissa myös satama-alan yrityksiin ja sen käyttöönotosta voitaisiin saada hyötyjä satamissa toimivissa yrityksissä. Tuloksesta voidaan päätellä, että menetelmän soveltamista tulisi tutkia vielä laajemmalti. Sen käytön sopiminen satama-alalle tukee olettamusta sen mahdollisesta soveltuvuudesta myös muiden alojen yrityksiin, jolloin sen hyötyjä voitaisiin levittää laajalti suomalaiseen yritystoimintaan. Näin menetelmästä saatettaisiin kehittää jopa maanlaajuinen käytäntö.


**Muita tietoja**

# ABSTRACT
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**Abstract**

The Barents area has vast natural resources that are for the most part still untapped. Global warming and improvements in technology have recently made it easier to access those resources. This has created growth in the areas of production and business life. High level of health, safety, environment and quality management enables Finland to compete efficiently in the growing market for the novel logistics solutions.

The University of Oulu has created the HSEQ Assessment Procedure in cooperation with large companies and their interest groups. The Assessment Procedure is originally created for process industry and offers benefits like comparable data on the assessed company's management, reduction of overlapping external audits and spreading of know-how along and between supply chains. So far it has been used mainly in the process industry. This thesis studies it's applicability for a network of port operators.

The study explores the HSEQ Assessment Procedure, its use and main principles. A review of related Finnish and international legislation and the functions of ports were performed. The empirical part of research is based on three port operators of one Finnish port. Their level of health, safety, environment and quality management was evaluated and compared with the requirement level of the Assessment Procedure.

As a result it can be noted that the HSEQ Assessment Procedure can be well adapted to be used in port companies and its implementation could be beneficial. This means that further research of the applicability of the Assessment Procedure is encouraged. Having been tested on the port operations, the Assessment Procedure can be utilized for the other business areas. Thus the Assessment Procedure could even become a nationwide practice.


Additional Information

# PREFACE

This thesis was done as a part of the Barents Logistics 2 project for the Oulu Business School. I would like to thank all members of the Barents Logistics 2 team that were a great help and support to my thesis. Special thank you goes to Ulla Lehtinen, Hanna Alila and Jari Juga who presented the project as the comissioners and supervisors of this thesis. I was given a magnificent opportunity to see the project outside of the subject of my thesis as well, the trips to Luleå and Skellefteå and of course the trip to Murmansk were very educational as well as mind broadening experiences and I had a great time.

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Alongside with the official connections I would like to thank my parents and both brothers for always being there for me. A warm hug and thank you goes to my closest friends, your support during writing of this thesis and throughout my studies has been immeasurable. A loving thank you also goes to you Matias, your encouragement kept me going on despite all.

Oulu, 28.01.2014 Hanna Turunen

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# SYMBOLS AND ABBREVIATIONS

| | |
|---|---|
| BAT | Best Available Techniques |
| BEAC | Barents Euro-Arctic Council |
| BRC | Barents Regional Council |
| BREF | BAT Reference Documents |
| BS 8800 | British Standard 8800 for creation of occupational health and safety management systems |
| EIPPCB | European IPPC Bureau |
| ELY | Finnish Centre for Economic Development, Transport and the Environment |
| EMAS | EU Eco-Management and Audit Scheme |
| EMSA | European Maritime Safety Agency |
| ESPO | European Sea Ports Organization |
| LoLo | Lift on – lift off, type of ship |
| HSE | Health, safety and environment |
| HSEQ | Health, safety, environment and quality |
| IED | Industrial Emissions Directive |
| ILO | International Labour Organization |
| IMO | International Maritime Organization |
| IMS | Integrated Management System |
| IPPC | EU directive of Integrated Pollution Prevention and Control |
| ISM code | International Safety Management code by IMO |
| ISO | International Organization for Standardization |
| ISPS code | International Ship and Port Facility Security code by IMO |
| LRIT | Long Range Identification and Tracking system |
| MARPOL | the International Convention for the Prevention of Pollution from Ships |
| MoU | Memorandum of Understanding |
| OECD | Declaration on Fundamental Principles and Rights at Work and the Organization for Economic Co-operation and Development |
| OHSAS | British Standard for Occupational Health and Safety |
| OPA 90 | Oil Pollution Act of 1990 |

| | |
|---|---|
| PERS | Port Environmental Review System |
| RoRo | Roll on – roll off, type of ship |
| SDM | Self Diagnosis Method |
| SOLAS | the International Convention for the Safety of Life at Sea |
| STCW | the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers |
| SYKE | Finnish Environment Institute |
| TQM | Total Quality Management, quality management philosophy |
| TUOLATU | Title of projects involved in creating the HSEQ Assessment Procedure |
| VR | VR-Yhtymä Oy, Finnish state-owned railway company |
| VTT | Technical Research Centre of Finland |
| WHO | World Health Organization |
| WHP | Workplace Health Promotion |
| WTO | World Trade Organization |
| IMS | Integrated Management System |
| TQM | Total Quality Management |

# 1 INTRODUCTION

This thesis is a part of the EU funded Barents Logistics 2 –project that aims to co-operation between the Barents countries. Collaboration is stimulated through scientific research, business partnerships and general studies of the area. This thesis focuses on the subject of health, safety, environment and quality issues in ports and the management of all those areas. The northern area of Barents has been enjoying increasing attention in media and in scientific studies due to its vast natural resources and potential of economic growth. This predicts growth in industry and business which leads to the growing demand for logistical solutions in the coming years.

The HSEQ Assessment Procedure is a tool developed to evaluate health, safety, environment and quality management in process industry. It offers companies a neutral evaluation performed by an outsider and thus a bias free reference for companies in the process of comparing and choosing suppliers. Those suppliers have also an opportunity to ask for an HSEQ Assessment Procedure (later referred as HSEQ AP) to be carried out for their own suppliers. It allows embedding the procedure and associated benefits into the wider supplier networks and industry. Finnish companies have high level of knowledge and know-how in the fields of the HSEQ AP and thus it can be seen as one big asset in competition in the evolving business market.

This thesis focuses on the contents of the HSEQ Assessment Procedure, the practical application and the possibilities of using it in the operations of a port. The study concentrates on the information acquired from previous implementations of the Assessment Procedure and the standardized criteria and practices of evaluations. The fields of health, safety, environment and quality are discussed in other respects as well.

The research questions are:

1. How does the HSEQ Assessment Procedure work and what are its main principles?
2. Can the HSEQ Assessment Procedure be used to create solutions with additional value to port industry?
3. What kind of changes would the HSEQ Assessment Procedure bring to the Port of Kemi?
4. What can be said about the adaptability of the HSEQ Assessment Procedure to port industry according to this study?

## 1.1 Materials and methods

Previous research on safety of ports and marine logistics has been carried out both in Finland and abroad. The Finnish studies have so far been done in the southern Finland and thus focused on the southern ports at the Gulf of Finland. The largest research provider in Finland is Kotka Maritime Research Centre that includes groups of scientists from the University of Helsinki, Aalto University, Turku University Centre for Maritime Studies and Kymenlaakso University of Applied Sciences. Seafare and related forms of logistics are persistent targets of scientific research especially for the coastal countries. The countries in Europe to publish the most research on those are probably Great Britain and the countries of the Mediterranean Sea coast.

The HSEQ AP is a new subject of research as it is still a new method even in process industry. The tool is lacking previous research on logistic operations as it has so far been used only in process industry. The aim of this study is to show the adaptability of the HSEQ AP to ports and to describe the possible changes its implementation would bring.

The study is carried out by means of qualitative research, more specifically by means of interviews with three case companies operating in the Port of Kemi. The current situation of the Port of Kemi is outlined from the interviews and possible gaps or problems in implementing the HSEQ AP are analyzed. Then possible changes brought by an imaginary implementation are estimated and evaluated. This study is only a vision and draft of the changes to come but the actual realization of those is left to the Port of Kemi to decide on.

Valid research materials are available widely as the health, safety, environment and quality management are commonly studied although not through the HSEQ AP. There is a lot of printed and online material and more detailed information is to be gathered by interviews.

This thesis project started during summer 2012 when a research plan was ordered and delivered. During the end of the summer and the fall the subject and the research plan were edited to fit the project and the Port of Kemi and the exact realization was settled. The actual writing process was conducted during November 2012 and April 2013.

The author of this thesis is Hanna Turunen and the supervisor is Professor Seppo Väyrynen. The contact people and the instructors from the Barents Logistics 2 –project are Hanna Alila, Ulla Lehtinen and Jari Juga. The work is written at the premises of the University of Oulu using the resources available there. Interviews and survey is performed in the Port of Kemi, Havator's office in Oulu and the Commercial Port of Murmansk. The thesis is written in English to ensure the circulation across borders as well as within Finland.

This thesis is based on the literature concerning the Barents area and its logistics, the port business field and related occupational health, safety, quality and environmental management and regulations. After that the HSEQ AP is also presented. Then the case companies are introduced and the results and findings from interviews presented. Last the conclusions are made, the research questions are answered and avenues for future research are outlined.

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# 2 LITERATURE REVIEW

This master's thesis is built on health, safety, environment and quality issues, later referred as HSEQ issues, in ports. This theory part will address all these subjects and their management in multiple areas. As a part of the project Barents Logistics 2 the research will focus on ports in Finland but will try to find comparison points between Sweden and Russia as well. The relatively new HSEQ AP has been so far used in process industry and part of this thesis will assess if it can be adapted to be used in a network of operators in a port environment.

## 2.1 The Barents region

The Barents region is a vast area centered around the Barents Sea. The borders of the area vary but it includes areas of the northernmost parts of Norway, Sweden, Finland and Russia. The population is scarce as the area of about 1.75 million square kilometers is populated by about 5.23 million people. Besides the nationals of four countries there are three indigenous peoples, the Nenets, the Saami and the Veps. The largest cities of the area are Murmansk (300 000), Archangelsk (350 000), Rovaniemi (61 000), Oulu (190 000), Umeå (110 000), Luleå (75 000), Tromsø (69 000) and Bodø (48 000). (barentsinfo.org)

Although the area consists of four different countries and the history has not always been amicable, there is a lot of co-operation between the countries. The Barents Euro-Arctic Council (BEAC) was officially established in 1993. According to the official declaration it is meant to "serve as a forum for considering bilateral and multilateral co-operation in the fields of economy, trade, science and technology, tourism, infrastructure, educational and cultural exchange, as well as projects particularly aimed at improving the situation of indigenous peoples in the North" (The Barents Euro-Arctic Region 1993). The co-operation happens on two levels: intergovernmental and interregional. The BEAC includes Denmark, Finland, Iceland, Norway, Russia, Sweden and the European Commission as representatives enlarging its sphere of interest. The Barents Regional Council (BRC) is formed by more local groups, thirteen counties or similar sub-national entities. The indigenous groups of the Nenets, the Saami and the Veps have an advisory role in both councils. A map of the Barents region is presented in figure 1 below. (The Barents Euro-Arctic Council 2013)


Figure 1. A map of the Barents area with the regions of the Barents Regional Council (BRC) (Barentsinfo 2013)

Most of the trade between countries has happened between Russia and Norway as Finland and Sweden have considered the Soviet Union a threat. The Murmansk area was and still is heavily armed and was tightly closed during the Cold War. After the reformation begun in the 1990's both the willingness of the Russian government and the needs of the Northwest Russia encouraged warmer relations between countries, especially the neighboring countries. Russia expected the interaction to solve some of its problems related to socio-economic matters such as living standards, especially in the Northwest Russia. (Kozyrev 1994)

The area is famous and strategically important for its rich natural resources such as forest, minerals, fish, oil and gas. The climate is quite harsh as the location is in the northern fringe. The history of the area is interesting as there has been lot of trade and communication over the borders but the city of Murmansk is a nuclear military base. It had a huge strategic importance during the Cold War during which the border of the Soviet Union was tightly shut. The reformation of Russia has been a big stimulant for restarting interaction in the north. Due to the remoteness of the area there is much to do in developing logistics, infrastructure and protecting the fragile climate. In the future the area is likely to reach even higher strategic value. (Zimmerbauer 2013)

As the green-house effect is causing the Arctic sea ice to thin it allows using the Northern Sea Routa more intensively. So far the Route has been open for two months per year but the researchers predict that the time will increase. The Northern Sea Route offers a route from Europe to the Pacific Ocean that is

thousands of kilometers shorter allowing reduced shipping time and associated costs. The ports in the Barents area are likely to become more vivid and busy as more ships start to pass. Obstacles still exist as the coastline between Barents and the Bering Strait is practically uninhabited which means no stopovers and stock ups nor technical aid are available there. The challenges presented by the harsh climate are also a significant factor. (Verny & Grigentin 2009, Borgerson 2008)

The use of the Northern Sea Route has been estimated to produce large savings for shipping companies if opened for heavier use. The Russian government estimated the traffic via Northern Sea Route to be about 1.8 million tons in 2010 and to increase to 64 million tons by the year 2020 (Pilli & Uski 2011). An example of the reduced shipping distance by using Northern Sea Route is the travel distance by sea between Yokohama and Rotterdam which is currently 11 500 nautical miles via Suez Canal. It would reduce down to 6 500 nautical miles and also reduce the days spent on the sea from 22.2 days down to 15.5 days. Active utilization of the Northern Sea Route would create a need for more icebreaking equipment and create conditions for developing a ship fleet better suited for the arctic conditions. (Ómarsson 2010)

The EU shows interest towards the arctic and sub-arctic regions of northern Europe. They are included in the Northern Dimension, a policy framework aimed at fostering increased dialogue and concrete co-operation between northwest Russia, Kaliningrad, the Baltic and the Barents Sea, the Arctic and Sub-Arctic areas. It aspires also to strengthen stability and economic integration not forgetting ecologic sustainability in the sensitive area of nature. It has four different partnerships focusing on health and social well-being, culture, environment and transport and logistics. (The Barents Euro-Arctic Council 2013)

### 2.1.1 Barents Logistics 2

Barents Logistics 2 is an EU funded project focusing on the research and development of logistics within the Barents area. It is a sequel project of Barents Logistics which was carried out in 2006-2008. The first project focused on increasing the amount of transportation between Murmansk region and Western Europe. The duration of the Barents Logistics 2 project is from 2011 until 2014.

Before the Northern Sea Route becomes more utilized there are other transportation methods available within the area. Murmansk is the biggest commercial port in the Russian side of Barents although there are smaller ports all over the coast line. The port is very busy as it handles not only food supply for the area but also enormous amounts of raw materials such as aluminum, copper, nickel, coal and apatite. It was actually originally built to satisfy the need of a new harbor in Russia as St. Petersburg and Archangelsk did not have enough capacity for the growing amount of transports to western Europe. Murmansk also has a railway connection to St. Petersburg, commonly referred as Murmansk-

Kandalaksha-St.Petersburg railway, as well as road connection to St. Petersburg and to Kemi which are the two mostly used ports outside the Barents Sea coast. (SK-Consulting Ltd 1995)

Ports are a considerable factor when talking about logistics between Finland and Russia. The economic growth in the Russian Federation has increased the shipment volumes via ports in southern Finland to Russia. According to Pitkä (2009) the amount of container traffic in the Baltic Sea is predicted to quadruple before year 2020. Increased transportation and economic growth of the Russian Federation has led to the extensive use of the southern Finnish ports of Rauma, Helsinki, Kotka and Hamina. The cooperation with the Finnish ports is necessary due to the inadequate capacity of the Russian ports to handle the new vast amounts of traffic. (Pitkä 2009) The accession to the World Trade Organization (WTO) in 2012 has been one major thing showing Russia's eagerness to involve in the globalization and to improve its economic situation.

### 2.1.2 Barents Transport Corridor

At the beginning of the Barents cooperation soon after the Kirkenes declaration in 1993 many ideas were presented for open discussion and development. One of these was the matter of the Barents Transport Corridor. The Corridor refers to an entity of transportation possibilities between the Scandinavian Peninsula, the Finnish Lapland and the Murmansk region. It includes not only aviation, railway, road and sea connections but also telecommunication, energy transfer and the border check points.

Until the Kirkenes declaration most of the transport and communications were north-south directed in within each country. With the Transport Corridor project the aim was to create more activity across borders, east-west bound. For example, a lot of conversation has been spurred around the non-existing northern railway connection between Finland and Russia. This is one of the focal points of this study as it has been estimated that this railway connection might be a key factor for the port of Kemi to provide more transportation opportunities for the Russian part of the Barents region. Many studies have been carried out to estimate the costs and effects of connecting the existing railways between Salla and Alakurtti. The Sokli mines will start full operations in the coming years near the hypothetical railway and could be connected to it as well. Also possible tourism and passenger transportation might be increased across the borderline. (Kärkkäinen 2005)

Another transportation-related improvement is the railway from Kolari to Kemi. It has been repaired in recent years by VR and could be possibly used to transport ore via port of Kemi alongside with passenger transportation. Studies of the costs and effects of the improvements needed for this have been published. (Kärkkäinen 2005)

## 2.2 Ports

Ports can be defined to be the contact point between sea traffic and transport on land. This definition can include the equipment and buildings and also the service offered in the area. Often goods also need to be stored before leaving the port, either on land or at sea. It should be noticed that transportation can refer to transportation of both people and goods. The vocabulary used in EU and Finnish legislation uses the word port facility, which refers to the area where the actual interaction between a ship and a port happens. This includes docks, waiting slots and fairway in and out of the port. One port can include more than one port facilities. (Karvonen & Tikkala 2004)

As ports offer many things to its customers it also has many operators working in it. The goods meant for shipment might have to for example be transported to the port, stored and loaded on the ship and the necessary paperwork to be performed. These tasks require a lot of people to take care of fluent and safe operating. The network of these operators and businesses and their interest groups is called a port community. Not only are there private or municipal operators in a port but the state presents itself also in the form of customs and border guards. (Karvonen & Tikkala 2004) A sketch of port community participants is presented in figure 2.

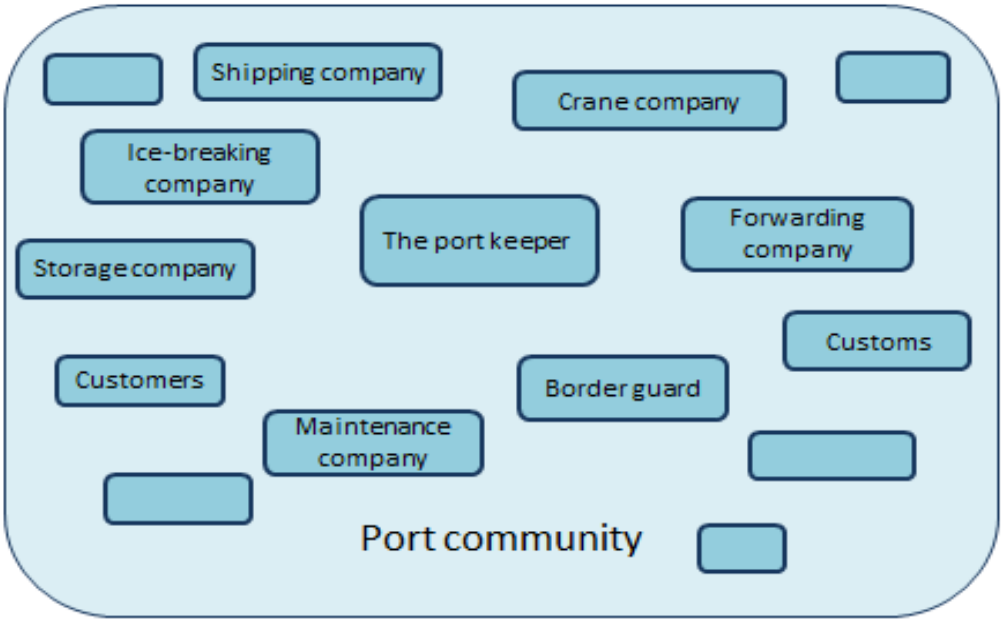


Figure 2. A sketch of likely participants creating a port community (modified from Karvonen & Tikkala 2004)

### 2.2.1 Ports of the Barents area

The Barents area includes multiple ports as it covers a large amount of coastal line. The biggest ports in the Finnish coast of the Bothnian Bay are Kemi, Oulu, Raahe and Kokkola. Measuring by tons of foreign trade transportation in 2012 the Port of Kokkola is the largest with 6.86 million tons. The Port of Kokkola is the fourth biggest port and the largest dry bulk in Finland. It plays an important role in the logistics chain of Finnish mines as it covers up to 70% of the port business. The thriving Kokkola Industrial Park is also a source of business for the port. (Port of Kokkola 2013) The Port of Raahe handled 4.88 million tons of foreign transportation in 2012 making it the seventh largest port on that scale. It was the first port on the Bothnian Bay to have automated machinery for container loader. The main user is the Finnish steel company Ruukki located in the area. (Port of Raahe 2013) The main traffic of the Port of Oulu is ensured by the forest industry and unitized cargo. It is the biggest importer of pulp in Finland and the largest container port in the bay. Most usual products next to pulp are industrial chemicals, liquid fuel and project related equipment. (Port of Oulu 2013) The Port of Kemi is more closely analyzed in chapter 3.3.1.

On the Swedish side of the Bothnian Bay there are four closely located ports that collaborate with each other. The project called North Sweden Seaport connects the Port of Luleå, Port of Piteå and Port of Skellefteå and a company operating in all of them, ShoreLink. The co-operation aims gain benefits from the competition between the ports and thus arise the quality of services offered. Co-operation with the University of Luleå is an example of local Arctic know-how utilized to bring solutions to the industry. (North Sweden Seaport 2013) The Port of Luleå is the largest of the four with over 7 million tons of yearly traffic. It is the biggest bulk handling port in Sweden. (Port of Luleå 2013) Port of Skellefteå and Port of Piteå handle about the same amount of goods, about 1.7-1.8 million tons. Most of them are forestry related bulk and solid materials such as pulp, chemicals and pellets. The Port of Kalix is much smaller, it handles only about 0.25 million tons of goods, mainly forestry related. (Shorelink 2013)

The coastal line of Norway has a few important ports. The Port of Narvik handles 14-16 million tons of goods yearly. A big part of that is the traffic of the Kiruna ore mines. The port has received the "Motorways of the Sea" status from the European Union in 2005. (Port of Narvik 2013) The Port of Tromsø is an important hub of logistics as well but its meaning is more focused on fishery. In 2012 the port handled 1.34 million tons of goods of which 0.53 million tons was fish. The meaning of oil is important as well as its portion of the goods was 0.37 million tons. (Port of Tromsø 2013)

The Russian part of the Barents coast has three major ports, Murmansk Commercial Port, the Port of Arkhangelsk and the Port of Vitino close to the city of Kandalaksha. The Murmansk Commercial Port will be more closely discussed in chapter 3.5. The Port of Arkhangelsk was the first Russian seaport, founded in 1584. Its importance to logistic connections to the rural areas of north-east Russia is high. It also handles oil as most of the Russian ports of the north coast freeze during winter. A new deep-sea port has been planned to be built in Arkhangelsk. The amount of oil exported from there in 2008 was 2.1 million tons. The Port of Vitino was the first private port in Russia with its first oil shipment in 1995. It

has been reported to try to change its focus from oil to other products such as gas. (Bambulyak & Frantzen 2009)

### 2.2.2 Basic Functions in Finland

Finland's economy has been historically based on export. Although Finland has mutual borderline with Sweden, Norway and Russia, most of the foreign trade is executed by seaways. Railway transportation between the neighboring countries is complicated by the varying track width in Sweden and Norway alongside with the fact that the mutual borderline is situated in arctic sparsely populated area. With Russia there are railway connections in the south but not in the north. (Jokinen 2010)

The ports of Finland can be categorized in many ways but the current laws are based on ownership and openness of operation. On this basis they are divided into common ports and industrial ports, industrial ports being a property of companies and used only for their shipping and common ports being owned by a municipality. In 1994 the communal ports were divided into communal ports and private communal ports as the private communal ports were given their own legislation (1156/1994). The fully communal ports have their own legislation (955/1976). The categorization can be made also based on the flow of the items, depending on for example whether the transported goods are mostly in containers, maybe not packed at all or if one product has a clear majority of delivery. Another categorization can be done on the basis of proportion of import and export. A port can be labeled as an export port if the ratio of export is substantially bigger than import.

According to the study by Karvonen & Tikkala (2004), in recent years even the communal ports have become more and more business-like. Although part of Finnish ports are still under the ownership of the municipality, more and more their funding comes from private companies making them resembling commercial enterprises. This means that they have a greater profit responsibility and they act more like competing businesses. Thus, the port owner fulfills a landlord role managing and supervising port activities, whereas their performance is subcontracted to the private owners. This leads to only few administrative people working for the port itself and services being performed by other companies. Many communal ports have become public utilities and some have gone so far that they have been transformed into limited liability companies. According to the study by Karvonen & Tikkala (2004) these public utility ports and limited liability companies are distinguished by faster decision making and willingness to constantly improve the services provided although the operation model does not have a big influence on the customers.

It must be noted that although this is an emerging trend, there still exist ports that operate most of the functions on their own. In ports owned by municipalities there always exist some form of municipal control. Usually there is a separate or related committee appointed by the municipal council to administrate the port under the supervision of the city or municipal government. Under that government

there is a port institution in charge of the port. In the ports that have undergone the process of becoming limited liability companies the administrator and port keeper are the port company and its CEO. In industrial ports the control belongs fully to the owning company. (Karvonen & Tikkala 2004)

In the history of Finland wood and wooden products have long presented a great proportion of foreign trade. Nowadays products of chemical industry, forest industry and metal industry are the biggest export groups. (Statistics Finland 2012) Some goods are being processed in the country of origin but some are exported in unprocessed form such as iron ore or wood chips. Some of them are packed in containers of different sizes, varying from small packages to large containers. Some materials are handled as bulk, in loose form, not packed at all. These different materials to be shipped require different kind of ships and shipping equipment. Examples of these are lift on – lift off (LoLo) ships and docks, when the goods are loaded on and off by lifting. Roll on – roll off (RoRo) ships and docks are for materials that can be rolled on and off the ship on wheels like in car ferries. Bulk carriers are ships specially designed for the transport of unpacked goods. Fluids and gasses are shipped in tankers that need specialized equipment for loading and unloading. Different kinds of variations and mixtures of vessel types do exist. (Suomen Kuljetusopas 2013)

Ports operate as a connection between ships and land. Both passengers and cargo can be shipped although the requirements vary according to their transportation needs. When thinking about shipping goods, quality refers to getting the cargo where you want it, when you want it and doing it safely. When considering shipping passengers, quality most likely refers to the things mentioned above but also to the customer experience. Sea cruises and ferries operate mostly in the southern parts of Finland, both in open sea and along the coast line. This thesis focuses on transporting goods.

In the North of Finland the climate is important factor in ports. During the coldest months of each winter ice breaking is needed in many areas, depending on the coldness of the year. Temperature affects also goods packaging as the temperature difference between a Finnish port and a destination port can be substantial. The regions around ports have always benefited from their existence all over the world. International transportation connections of goods make the surrounding areas appealing for business establishment. This creates more working places in the port, in new businesses around it as well as other companies that are needed for example transportation on land.

### 2.2.3 The rules and legislation in ports

In Europe over 90% of international transportation is done by sea. There is a big amount of ship docks in 1200 ports of Europe. Over 400 million people travel by sea in Europe each year. Some countries are more dependent on sea transportation than others but the importance of shipping is not likely to decrease. (European Sea Ports Organization 2014)

In any country the state has power over ports. Some of the rules and regulations come from even higher. Laws and directives executed by the EU do not become valid instantly unless it concerns primary justice that includes only the constitutional laws and the affiliation contracts of each member state. Any other law or directive must be aligned with the country legislation. Although there is a constitutional law about transportation and traffic, it does not include seafaring. This is due to the versatile norms given by the International Maritime Organization (IMO) that have been widely transformed and included in to the EU directives in order to keep the legislation similar even outside the borders of the EU.

The European Union affects also the establishment of organization that aim to improve safety, quality and environmental aspects of seafaring. The European Commission formed a Port Working group in 1974 which led to the birth of the European Sea Ports Organization (ESPO) in 1993. As an independent lobby, it aims to "influence public policy in the EU in order to achieve a safe, efficient and environmentally sustainable European port sector, operating as a key element of a transport industry where free and undistorted market conditions prevail, as far as practicable." So far one of the most remarkable initiatives has been providing material for the European Commission's port package in 2001 which will be renewed in 2013. (European Sea Ports Organization 2013B)

The European Union is one of the key factors effecting the change of the ports into more business operational environment. A directive concerning the opening the ports stowage activities for open competition has already been voted out in 2003 and again in 2006 and was proposed again in May 2013. The proposal targets in achieving increased efficiency, better connections on land, freedom of pricing, attracting more investments to ports and creating clear communication between employers and employees of the field. It still needs to be approved by the European Parliament and the member states in order to be transferred into a law. (European Commission 2013)

Finland has also executed norms from other international organizations. These have to be integrated into the Finnish legislation before becoming valid. This new law or regulation can either refer to the original norm without including it at all or include a translation of it. As it happens, most of these international norms usually deal with subjects related to work health, safety and environment. They and other legislation will be discussed later.

The Finnish legislation concerning ports is to be renewed soon. At the moment the legislation is scattered quite widely in many laws and multiple authorities are monitoring them. An example of different fields of safety and the governmental organs monitoring them and their effective practice in Finnish ports is presented in table 1. This relates to the ports being considered sometimes as a part of seafaring and sometimes as a part of logistic chain. Some laws of the seafaring apply to ports but so do some that consider it to be just like any warehouse or factory. According to the report by Salokorpi & Rytkönen port safety should be monitored by one official to decrease the possibility of contradictions. It is also

possible that the port legislation would be repealed and ports would be seen as industrial estates and operating could be carried within the existing regulations. (Salokorpi & Rytkönen 2010A)

Table 1. Some areas of safety and authorities monitoring them in Finnish ports (modified from Salokorpi & Rytkönen 2010A)

| Field of safety | Supervisory organ of government | Monitoring organ in practise |
|---|---|---|
| **Occupational safety, fire safety and rescue functions** | Ministry of Social Affairs and Health | Regional State Administrative Agencies |
| **Environmental issues** | Centre for Economic Development, Transport and the Environment, Ministry of Social Affairs and Health | |
| **Hazardous substances** | Ministry of Social Affairs and Health, Ministry of the environment, Ministery of Employment and Economy, Ministry of Transport and Communication | National Supervisory Authority for Welfare and Health, Centre for Economic Development, Transport and the Environment, The Finnish Safety and Chemicals Agency, Finnish Transport Safety Agency |
| **ISPS code** | Ministry of Transport and Communication | Finnish Transport Safety Agency |
| **Criminal safety** | Ministry of the Interior | Police, customs, border security |
| **Safety on ship, road safety, port operations** | Ministry of Transport and Communication | |

The relationship between an employer and an employee is supported also by insurance. The Finnish law (608/1948) requires the employer to cover all his employees by an insurance of industrial accidents. This is called the workmen's compensation insurance. The insurance must be valid from the point of starting the work and the duty to take out insurance involves all employees that perform more than 12 days of work per year, hours not affected. The choice of the insurance institution is free for the employer. There are 13 private institutions freely competing institutions. Separate State Treasury for State employees as

well as the Farmers' Social Insurance Institution for farmers exist. Other special groups are mentioned in the legislation. (TVL 2012)

### 2.2.4 HSEQ Management systems

For a long period of time managing occupational safety, health, environment and quality issues has been relatively unorganized and uncontrolled. For example environment protection has been supervised based on rules and regulations, laws and permits. There are also different certifications that a company can apply and receive but that are not legally binding. These kinds of voluntary agreements can be seen as a guarantee of quality in management. Many of them also show that the company is interested in constantly improving its performance and operation. The perks of the agreements are possible cost savings, public confidence and a response to the growing demand for environmental efficiency of the stakeholders. (Honkasalo 2000)

Studying the guidelines for different management systems in the fields of occupational safety, health, environment and quality from different sources and by different authors it is easy to see vast commonalities. No wonder that there were attempts to unify these systems under a common management system for quite some time. Nevertheless, these efforts have not led to the compilation of one management system to cover them all with precision and extension needed to become a widely known policy or standard. Many standards as in the ISO (International Organization for Standardization) system do exist but they are separate although partly overlapping each other.

Some studies place a lot of value on HSE management (Duijm et al. 2008) even after finding the similarities with quality management. So does the study by European Agency for Safety and Health at Work (2002). It announces that the management of safety and health issues can be easily combined with environmental issues but do not take into consideration quality at the same time. Some of the studies do combine all four HSEQ areas but disregard some necessary parts of management. For example a study by Karapetrovic & Willborn (1998) does create an entity of the four areas but ignores the scope and the culture of the company according to Wilkinson & Dale (2001). The fact still is that there is no major success in combining the health and safety management, environmental management and quality management under one system.

The standards of these matters such as ISO 9000, ISO 14000 and the commonly used OHSAS 18000 series are very fundamental and somewhat strict but some basic framework can be applied to form a basis for comprehensive integrated management systems (IMS). The HSEQ Assessment Procedure (HSEQ AP) is likely to work with both separate managements systems as well as an IMS and regardless of the size or field of business. At this stage HSEQ AP has not been used outside the process industry and the adaptability has not been the focal point of the study.

According to Niemelä et al. (2010), HSEQ AP is aiming to increase productivity and knowledge of the health, safety, environment and quality management and to gain advantage of controlling them, to encourage companies to develop well organized policies and to raise the level of management and welfare at work as well as serve both the ordering and delivering companies in competitive situations. More and more workplaces are now joint workplaces for many companies where suppliers and sub-suppliers operate. This is the case also in ports where the list of operations can be long: dock work, forwarding, transport, stocking, icebreaking, maintenance etc.

The HSEQ AP is not a management system but it supports the idea of an Integrated Management System (IMS), nowadays often referred and found in literature. The IMS has been greatly influenced by Total Quality Management (TQM) which emphasizes constant improvement in every part of the company, identifying and building upon best practices and being cost effective. In TQM quality is built in designs and processes and prevention rather than reaction. The company's operation should aim at standardization, systemization and simplification of work instructions, procedures and systems to reach sustainable improvement. (Dale & McQuater 1998) An IMS and a HSEQ management system can be regarded parallel as both represent and handle the health, safety, environmental and quality issues as one entity (Niemelä et al. 2010).

In the field of safety Levä (1998) has presented three reasons why safety, quality and environmental issues should be managed as an integrated entity:

1. The conformity of techniques, meaning a common set of tools and techniques which enables them to be used in handling problems of other areas
2. The structural conformity of systems, which refers to building one comprehensive management system for all three areas
3. The conformity of politics, aiming for shared strategic objectives and goals for all the areas.

As the lack of good management in one area is closely linked to causing problems on other areas it is critical that all four aspects of the HSEQ would be well managed and the easiest way to do that would be to integrate them into one comprehensive system of management.
The progress of HSEQ matters in seafaring has evolved in phases often linked to accidents and problems acknowledged in the responses. In the article by Winter (1995) he presents a study by Lavidas, who reports the following associations:

| | | |
|---|---|---|
| Titanic | - | SOLAS |
| Amoco Cadiz | - | MARPOL - STCW |
| Herald of Free Enterprise | - | IMO A 647 |
| Exxon Valdez | - | OPA 90 |

The legendary accident of Titanic in the northern Atlantic Ocean in 1912 took the life of more than 1500 passengers and lead to updates in the number of life boats required per ship as well as manned radio equipment around the clock on passenger ships. It led also to the founding of the still existing International Ice Patrol and the SOLAS convention. (Sekimizu 2012) Oil vessel Amoco Cadiz sank in 1978 near the French coast causing the largest oil spill up until then. It is reflected in the MARPOL convention related to pollution from ships and the STCW, the first international convention of safety protocols and training for mariners on commercial ships. Among other serious maritime accidents the sinking of RoRo-vessel Herald of Free Enterprise in 1987 led to IMO adapting the resolution A 647, Guidelines on Management for the Safe Operation of Ships and for Pollution Prevention and the creating of the ISM Code in 1993. Exxon Valdez was an oil vessel that sank in 1989 near the coast of Alaska causing devastating environmental problems. As a result the USA formulated a law to clarify the responsibilities for the accidents and to improve the level of preparedness to oil spills. Some of those advancements were only more or less regional but all to be in connection to the wholesome progress in the rules and regulations in the field of seafaring. The United States signed the Oil Pollution Act known as OPA 90 in 1990 as a response for those shortcomings revealed by the Exxon Valdez. (Sagen 1999, IMO 2014, United States Environmental Protection Agency 2014)

### 2.2.5 Health management

Occupational health care aims to prevent work related illnesses and accidents and to improve the quality of the working environment. Proper occupational health care leads to people being able to use their full potential in their job and stay in work life longer as full members of work force. The welfare of workers is sometimes seen as a softer value than economic aspects but good management of occupational health leads to better performance and reduced sick pay costs.

The World Health Organization (WHO) states in its Global Strategy on Occupational Health for All (1994) that “health at work and healthy work environments are among the most valuable assets of individuals, communities and countries. Occupational health is an important strategy not only to ensure the health of workers, but also to contribute positively to productivity, quality of products, work motivation, job satisfaction and thereby to the overall quality of life of individuals and society.” Also the United Nations, International Labour Organization (ILO) and others have stated that everyone should be entitled to healthy and safe work and work environment.

The European Agency for Safety and Health at Work have campaigned for Workplace Health Promotion (WHP) which means the efforts of employers, employees and society combined towards advancing health and wellbeing at work. It includes improvements in the working environment, commitments to the WHP process, support of workers in making healthier choices and motivation for personal development. Examples of such actions are involving and consulting workers, promoting healthy nourishment and exercise as well as providing health monitoring. (European Agency for Safety and Health at Work 2013)

Occupational health can be seen as a part of sustainable development as it can increase productivity in the form of undisturbed production and better use of resources. The high level of health at workplace also decreases the amount of emissions and waste making operations green and environmental friendly. (World Health Organization 1994)

Many health management systems have been developed in order improve occupational health care. In recent years it has become a trend to focus more on prevention and finding the source of work related health problems rather than just treating the consequences. As the work in ports can vary from light office work to heavy physical and machine work it is important to map all the different job descriptions and try to see what kind of strains exists within one work place. After that it is easier to examine what kind of health risks are caused by what kind of work. Even people in light office work can have job related illnesses, especially related to working with a computer.

As the working conditions vary according to the tasks there are numerous things to consider. The working hours, shift work, over time, the age and previous health situation impact the probability of a future health problem. Weather conditions are a great example of this as the temperature can change quickly and reach extremes which can cause more stress for the health of someone working outdoors and require special consideration when it comes to clothing and safety equipment. Often these circumstances are of great importance in safety management as well. The main cause of health problems is either accident or occupational diseases although occupational health care covers other medical needs as well. The problem seems to be that accident reduction is often given priority over preventing work related illnesses. In a study carried out by The European Agency for Safety and Health at Work (2002) which showed that occupational health and safety may be considered only as a compulsory activity or as a key element of the company's operating values.

In Finland the law obliges an employer to organize the occupational health services either in-house or by subcontracting them. (1383/2001) The law also obliges that the healthiness of the work and the work environment has to be evaluated by the provider of the occupational health care and to participate in improving it. From the above it follows that it could be stated that gaps in health management and in occupational health care can cause safety issues.

### 2.2.6 Safety management

The Finnish Occupational Safety and Health Administration have published a guide for safety management (Työsuojeluhallinto 2005). It states that there is a bigger entity of safety control that includes not only safety management systems but all other actions and policies outside it performed to promote safety. Safety culture reflects the basic values, norms, presumptions and expectations of the company. In the model pictured below safety management consists of two parts, managing techniques and methods and managing people. The idea is presented in figure 3 below.

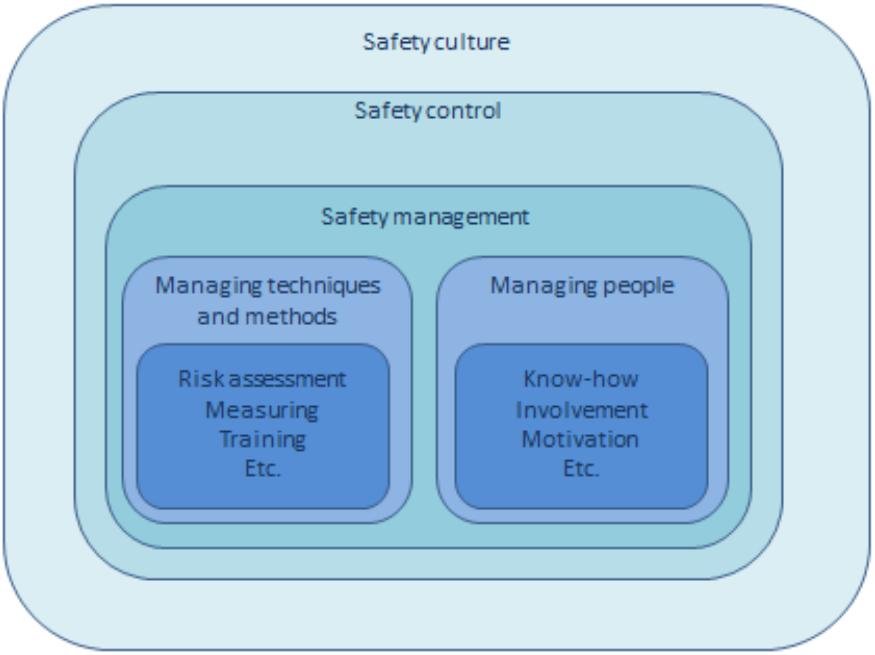


Figure 3. Safety management by Occupational Safety and Health Administration (Työsuojeluhallinto 2005)

According to Hämäläinen & Anttila (2008), the term safety management refers to a wider field of the wholesome company safety instead of just management of occupational health and safety. Safety management can be described in many ways, for example, as a way to implement the management of safety in practice (Levä 2003) or as a systematic and documented approach to controlling safety (Reiman & Oedewald 2008). Still many general areas of safety are often managed and dealt with separately which leaves the entity unprocessed. Some of these areas are closely connected together therefore managing them separately might be difficult. Also the legislation related to them is quite scattered. (Salokorpi & Rytkönen 2010A) The areas are typically categorized according to the Confederation of Finnish Industries (Elinkeinoelämän Keskusliitto 2013) as follows:

1. The safety of production and operating
2. Occupational safety
3. Environmental safety
4. Rescue operations
5. Preparedness planning
6. Information security
7. Safety of personnel
8. Safety of property and premises
9. Safety of foreign activities
10. Criminal security

In some cases also safety of contractors and suppliers is added to the list as many operators work in the same area like in ports (Reiman & Oedewald 2008). Salokorpi & Rytkönen (2010B) suggest that in case of ports four more points should be added as well as they are typically handled separately:

1. Safety of handling hazardous substances
2. Safety and quality of handling cargo
3. Ship safety
4. Traffic safety

This list can be used to estimate the safety of six categorized groups: personnel, property and premises, capital assets, environment, knowledge and reputation.

Safety management is used not only to detect hazards and risks but also to improve the existing processes and policies, the expertise, motivation and wellbeing at work. This leads not only to a safer work environment but also improves profitability and quality. (Laitinen et al. 2009) According to Kunttu (2009), a safety management system is based on systematics, orderliness and continuous improvement.

In many management models health and safety are often put together as they are highly interdependent. An effective occupational health care is needed in case of an accident caused by failures in safety management. An accident can be caused by the occupational healthcare failing to notice the hazards of the work. This makes it sometimes even hard to see where health management ends and safety management begins.

The Finnish law requires organizations to have safety management systems in just some operating fields. These requirements are present in the decree of safety management system of the ship owner and management measures related to the safe use of the ship (66/1996), the decree of safe industrial handling and storing of hazardous chemicals (59/1999) and the decree of safety and interoperability of the railway system (750/2006).

The law of occupational safety concerns working in a joint work place (738/2002). Joint work place is in question when there is one employer in charge of the area and more than one employer works in it. Of importance are the effects that the work of one operator can cause to the health and safety of other operators. The law states that there must be adequate communication between the operating companies. The main operator of the area is responsible for giving information to all other employers and their employees in the area. They must be trained for the hazards within the area, given the instructions concerning the area and its safety and be aware of the measures in cases of fire prevention, first aid and evacuation and the people in charge of those actions. The law demands each employer to take care of not causing health or safety danger to any employee and to give information about the possible hazards caused by their work. The main operator of the area has special obligations in managing the safety of the entity in the ways only possible to that role. This includes the consolidation of operations, organizing the

rules of traffic, responsibility of the general plan and the neatness and order within the area and the overall safety and healthiness of the work conditions and environment.

The most used safety system is the OHSAS 18000 standards and the BS 8800. In the OHSAS 18001:2007 a safety management system is described as a combination of parts designed to create and achieve safety policies and goals. It includes the structure of the organization, the planning activities, processes, resources, methods, policies and responsibilities.

Although safety management systems are not required by the law in any other work places, the legislation binds employers almost to fill the characteristics of a safety system. The process of a safety management system presented in BS 8800 (Finnish Standards Association SFS 1997) can be found in figure 4.

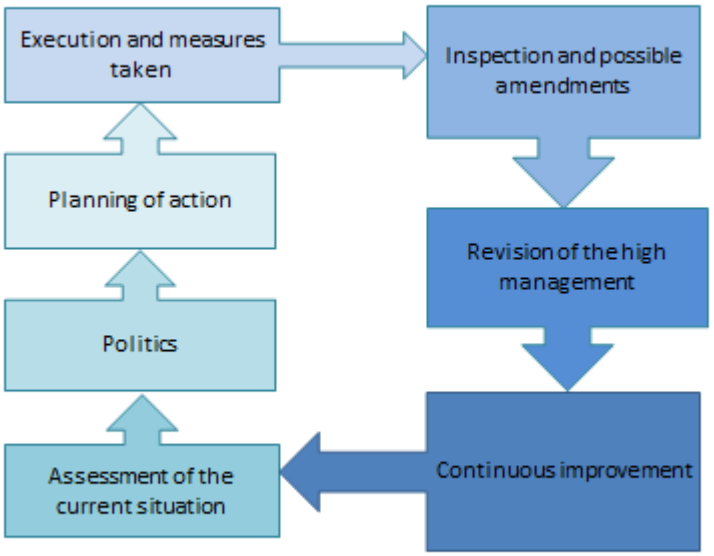


Figure 4. The process of a safety management system (modified from Finnish Standards Association 1997)

In the definition by Levä (2003), a safety management system requires identification of hazards, analyzing them and their origin and finding solutions for controlling them. Then the company using the system should agree on suitable indicators of controlling them and implementing those indicators and improve them if needed. This makes it possible to define the safety goals and the ways to reach them and to outline the requirements of activity and the follow-up needed.

In current legislation the references to a port official do still exist but the power of the port keeper has decreased as a result of the ongoing process of ports becoming more business-like. The official tasks of a port keeper include keeping records, handling hazardous substances and monitoring the order of the port

and general safety. Additionally the role is gaining more and more commercial characteristics which might conflict with the role of an official. According to the study performed by Karvonen & Tikkala (2004), some port keepers and operators in ports had noticed this contradiction. In an interview a lawyer of the Port of Helsinki states that the situation probably has not been changed as there has not been any major accident recently but if one should happen the issue would most likely be brought up. (Salokorpi & Rytkönen 2010A)

Safety management should not be left only for the safety organization. The principles and practices should be carried through the senior management as well. Safety management should be integrated into every basic duty of the workers. Involvement and commitment of the senior management sets an example and increases the commitment of others. Only commitment of people can lead to effective management and a good safety culture. (Occupational Safety and Health Administration 2008) The improvement of processes, working circumstances, expertise of the staff, teamwork and wellbeing at work is considered to be a part of safety management and leads to better quality, competitiveness and productivity (Salokorpi & Rytkönen 2010B).

A law affecting all Finnish ports is the ISPS (International Ship and Port Facility Security) code presented by IMO. The ISPS demands each ship within the range of the code to have a security plan based on a documented and approved security assessment. This is a good example of an international norm being integrated into the Finnish legislation. It was added into the chapter XI-2 Special measures to enhance maritime security in the International Convention for the Safety of Life at Sea (SOLAS) from 1974. The code was added to the international convention and made into a decree by the EU and then realized in the Finnish legislation in 2004. The code is an extensive set of measures to improve the security of ports and ships. It is closely related to the ISM (International Safety Management) code found in the same SOLAS convention that affects mostly ships and shipping companies. It was created quite rapidly in the aftermath of the 9/11 –crisis in the US. Although many indicators have shown results of it being effective it has also received criticism. Study made by Salmi (2010) showed decreased numbers of small scale accidents but no change in the accidents of bigger scale. The code has been said to be too indefinable and created with too little expertise in the area. This leaves the monitoring and measuring the success of the improvements ineffective.

### 2.2.7 Environmental management

As ports are a connection point between two logistics elements, water and land, there is a possibility of environmental pollution of both of those. Many of the transported substances are potentially hazardous chemicals if released to the environment. Chemicals can also cause air pollution if turned into gas. Continuous movement of ships, cranes, trucks, trains and people cause a high chance of substances being spread into the environment, either by accident or by normal actions.

The ISO 14001 standard can be said to be the most used voluntary environmental management tool. Its benefits are that it can be used in any company, regardless of the size or area of operating. It is true that the large size of an organization makes it harder to reach the levels expected to receive the standard. Because of the difference in size and thus organization model between ports and countries, the standard might be laborious to meet.

The EU Eco-Management and Audit Scheme (EMAS) is a voluntary environmental management tool created within the EU. It "helps organisations to optimise their production processes, reducing environmental impacts and making more effective use of resources" and is recommended by the EU to be implemented. (European Commission 2012A) It was originally designed for industrial companies in 1995, released for use in other economic sectors in 2001 and revised again in 2009. In practice it includes the ISO 14001 standard into its requirements of an Environmental Review and Environmental Statement. It makes the EMAS accreditation even harder to achieve than the ISO 14001. (European Commission 2012B)

EMSA (European Maritime Safety Agency) was founded in 2007 and is "tasked with assisting the Commission in monitoring the implementation of the EU legislation relating, among others, to ship construction and planned maintenance, ship inspection and the reception of ship waste in the EU ports, certification of marine equipment, ship security, the training of seafarers in the non-EU countries and Port State Control." (European Maritime Safety Agency 2014) The EU countries and Canada, Iceland, Norway and the Russian Federation signed an agreement called the Paris Memorandum of Understanding on Control of Ships by the Port States (Paris MoU) in 1982. It was incorporated into the EU law in 1995. The law requires the countries to inspect at least 25% of the foreign ships that call at their ports each year. To make the realization of this law easier the EMSA developed the SafeSeaNet system to track the vessels and their cargo in Europe and the EU LRIT Cooperative Data Centre for monitoring European ships worldwide. Since then memorandums have been created in many regions of the world including the Viña del Mar (or Latin American) MoU (1992), the Tokyo MoU (1993), the Caribbean MoU (1996), the Mediterranean MoU (1997), the Indian Ocean MoU (1998) and the MoU for West and Central African region (1999). The more recent ones are the Black Sea MoU (2000) and the Persian Gulf MoU (2004).

European Sea Ports Organization (ESPO) has created the Environmental Code of Practice (European Sea Ports Organization 2003) as a guideline for ports to follow in their environmental management. The code was revised in 2001 and again in 2003 for more recent, up to detail and inclusive guidance. Again in 2012 the code was revised and ESPO released the ESPO Green Guide; towards excellence in port environmental management and sustainability (European Sea Ports Organization 2012) to replace the previous versions.

ESPO's project Ecoports created an environment and community for port specialists to create new knowledge and policies by combining their expertise. It started as just the principle "ports-helping-ports"

but now co-operates with many bodies with port environment specialization like universities and research institutes. The project aims to create practical methods and tools for daily environment management in ports. As a result at least two well established tools have been created: the Self Diagnosis Method (SDM) and Port Environmental Review System (PERS). SDM is a tool for ports with no environment management system in use. It helps a port manager to review the present environmental management level, to compare it to the previous reviews and to seek for possible improvement areas. It includes a set of questions to answer and from those answers a possible need for improvement might be seen. (European Sea Ports Organization 2013A)

Although ISPS (International Ship and Port Facility Security) code has a lot to do with maintaining security and overall safety, it focuses on environmental safety as well. The maintaining of the Port State Control enables any port to check the ship and its recent activity from the database in order to allow or deny docking. The tracking system also produces a list of ships that have not passed the inspections and are being banned from the EU ports. (European Maritime Safety Agency 2012) A ship in poor condition poses a risk of contamination of the port area as well as the sea routes. The code does not determine what is to be considered hazardous enough for the ship to be refused to leave the dock before repairs. This is left for the port state and the port state control officers to decide. (DeSombre 2006)

The International Convention for the prevention of Pollution from Ships (1973/1978) (European Commission 1999) gives the port state the authority to inspect the docked ship; and also in the case of the ship discharging harmful substances anywhere. The right to examine ships has recently been put into operation in Finland with the ISPS code. Before that a right to investigate foreign ships was already mentioned in many other international agreements.

In Finland the state authority grants an environmental permit if the operation of the company causes a risk of pollution to air or water or contamination of soil. The permit can also be given to one person. Some actions may require only notification to the Finnish officials but different kinds of permits can be received from the environmental officials. The process of applying gives the people and the officials of the target area to react and voice their opinions before the permit is issued. The law and the decree of environmental protection (86/2000, 169/2000) give guidance concerning the prerequisites and monitoring of the permit. Next to being inspected, emissions and operations reports in every fixed period are required. Some permits do not set limits for emissions but may set restrictions of other sort that effect operations. The environmental permits are granted by either the Regional State Administrative Agencies or the environmental official of the municipality in question. (The Finnish Environmental Administration 2012)

The EU has created a directive of Integrated Pollution Prevention and Control (IPPC) (2008/1/EC) that was renewed in 2010. The original directive aimed at preventing pollution in industrial companies demanded the Best Available Techniques (BAT) to be used for the Environmental Permit to be granted. This does not only concern water, soil and air pollution but also for example optimizing the use of

resources, waste minimization and power efficiency. The renewed directive of 2010 called Industrial Emissions Directive (IED) (2010/75/EU) that affected also big combustion plants, waste-to-energy plants and industry using dissolvers and titanium dioxide was implemented into the Finnish legislation in the beginning of year 2013. The BATs are circulated inside the EC by the European IPPC Bureau (EIPPCB) in documents known as the BAT Reference Documents (BREFs). On the national level the Finnish Environment Institute (SYKE) organizes the research and communicates with the officials. The BREFs are discussed in Finland and sometimes improvements can be sent to EIPPCB by the Finnish BAT groups (see figure 5). The BAT groups are formed of representatives from industry and permit authorities and inspectors. SYKE also keeps record of each environment permit granted annually. (The Finnish Environmental Administration 2011)

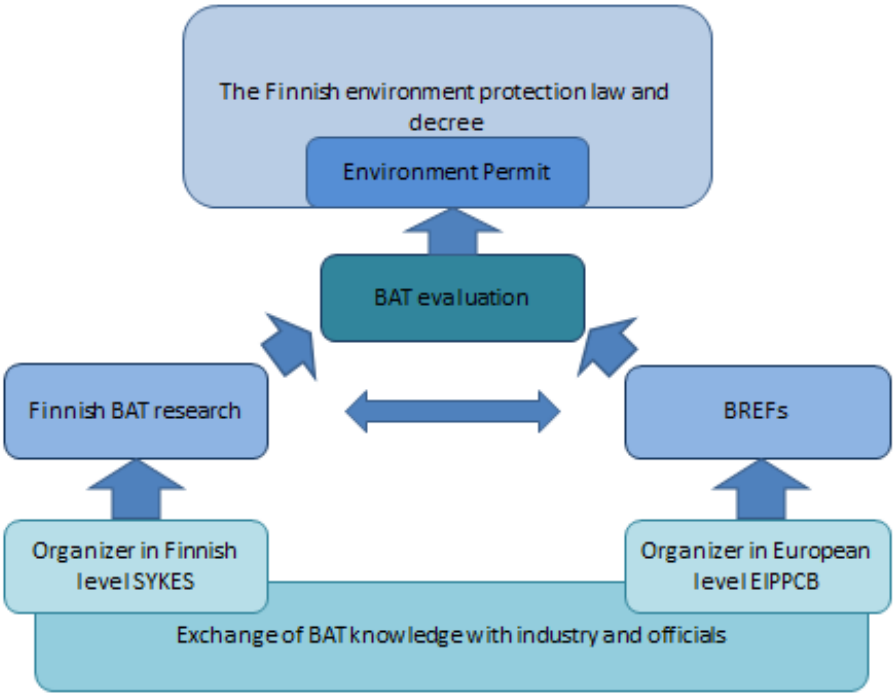


Figure 5. European involvement in the issue of Finnish environment permit (modified from The Finnish Environmental Administration 2011)

Safety and environment management are closely interrelated. On one hand environmentally hazardous substances can cause severe accidents and injuries if involved in an accident. On the other hand in case of an accident some of those substances can be released into nature and cause environmental damages.

The term “social responsibility” is under the umbrella of environment-related issues. According to the Finnish Ministry of Employment and Economy “a responsible enterprise complies with legislation and other regulations. For instance, occupational health, product liability, change security and environmental legislation are closely related to responsibility, forming the basis of voluntary responsibility. Moreover, a responsible enterprise exceeds the minimum requirements set by legislation e.g. by investing in staff

competence development and wellbeing at work, by attending to the state of the environment, and by taking account of stakeholder groups' expectations." EU has promoted social responsibility in its Green Paper in 2001 and Communications of 2002, 2006 and 2011. It is also a part of the new Europe 2020 strategy. Finland has agreed to be a supporter of social responsibility and to support the implementation of international codes of conduct. This means that Finland tries to encourage Finnish companies all around the world to act according to the voluntary codes. Such codes are for example the International Labour Organization's (ILO) Declaration on Fundamental Principles and Rights at Work and the Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises. (Finnish Ministry of Employment and Economy 2012) Also the International Organization for Standardization (ISO) has created the ISO 26000 standard to spread the knowledge about social responsibility. (Finnish Standards Association SFS 2013)

### 2.2.8 Quality management

Quality has long been one of the key targets of management systems. When it comes to tangible goods ways to measure them are often quite easy to find. In case of services the definition and measuring of quality might be more difficult to specify. Ha stated in his study (2003) that in the modern world of the Internet, ports strive to become more efficient and comprehensive logistics centers rather than being considered as merely "good handlers". In his study he recommends improving the quantity and quality of information flows and data availability, thus improving service quality.

Customer satisfaction is greatly important when it comes to succeeding in business as it has an obvious influence on the purchase repeating and the reputation of the company in the form of customer recommendations (Berkman & Gilson 1986). In business terms it has been identified as a determinant of a market share, return on investment and cost reduction (Burch et al. 1995 according to Ugboma et al. 2004). This means that when it comes to improving business and setting higher aims, investing in service quality is important.

In the field of quality no legislation exists, only voluntary standards as the ISO 9000. The ISO 9000 family of standards is the most used quality standard. As the standards are general and can be applied to any company. They also give guidance concerning management system functions that are to exist but do not tell how they should be organized. The previous versions of the ISO 9000 series focused on production and keeping the quality of similar products, the 2005 version is more focused on customers, continuous improvement and process approach. With no technical specifications it can be applied to producing services as well as goods. (Tapio 2007)

When considering a port and its operations it is obvious that all parts of HSEQ are of great importance. Ha (2003) divided the examples of service quality factors into seven groups: ready information availability of port-related activities, port location, port turnaround time, facilities available, port

management, port costs and consumer convenience and under each group there were from 3 to 7 factors. This shows that many factors can influence perceived quality.

## 2.3 HSEQ Assessment Procedure

The HSEQ Assessment Procedure (HSEQ AP) has been under development in cooperation with many representatives from industry, insurance companies, the Occupational Safety and Health Administration of Northern Finland, POHTO, the Finnish Quality Association, Tykes and University of Oulu. At present a cluster of principal companies is formed by Efora, Outokumpu, Rautaruukki, Nokian Tyres, Andritz, Inspecta, University of Oulu and POHTO. This cluster is open for any new member interested in the procedure and willing to accept the terms of membership. The principal cluster is involved in performing the HSEQ AP in their supplier companies. Industrial suppliers, branch offices and local organizations and their units can all be evaluated as any new company intending to become a supplier of the cluster companies. (Väyrynen et al. 2012, Latva-Ranta et al. 2012, HSEQ 2013)

The assessment is an evaluation of how well the health (H), safety (S), environment (E) and quality (Q) issues are handled in the company. For the members of the cluster the method offers a tool of comparison. It helps distribute know-how and thus raise the common level of management in the evaluated companies. It also aims to improve the productivity of the whole supplier network by encouraging suppliers to develop systematic and well organized methods and practices. The entity of the HSEQ AP is presented in the figure 6 below.

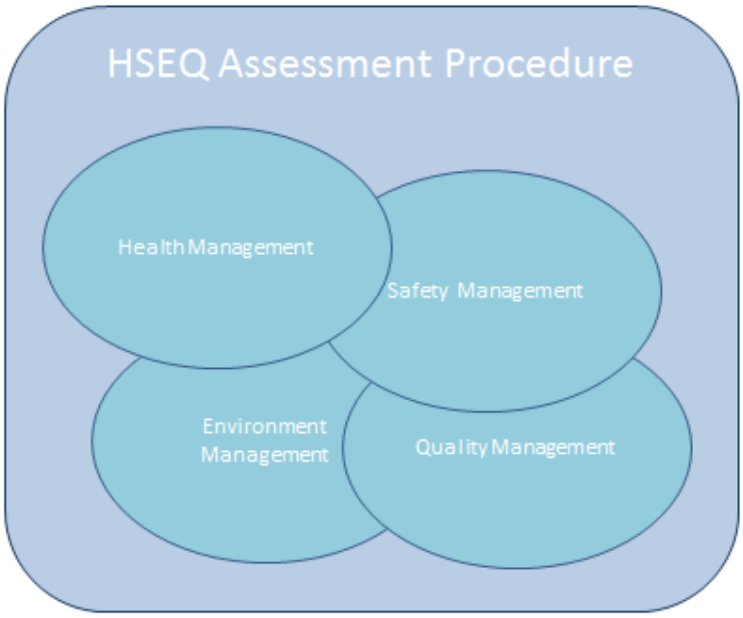


Figure 6. The entity of the HSEQ AP (modified from Latva-Ranta et al. 2012)

As it was mentioned above the cluster is open for any company to join. For an evaluation to be processed a company must be a supplier of the cluster companies or aim to become a supplier. The initiative or recommendation comes from a principal cluster member. The process of the evaluation can be seen in the following figure (figure 7).

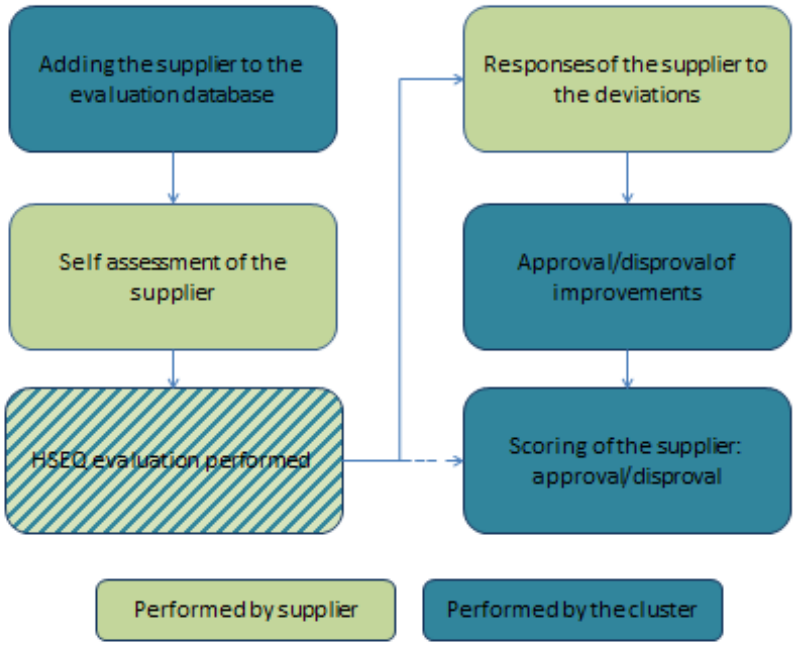


Figure 7. Process Diagram of the HSEQ AP (modified from Latva-Ranta et al. 2012)

The HSEQ AP must not be considered as a management system but only a tool to assess how well the matters have been handled. Of course the target is that the supplier improves its performance at least to the level required by the cluster company and preferably encourages the supplier to invest in the issue and exceed the demands set. Based on the evaluation, no action is performed. The buyer is to decide himself if the evaluation results correspond to his expectations. The evaluation is hoped to cause a "domino effect" and spread knowledge and information further beyond the head suppliers and into their supplier chains. By doing this the HSEQ AP could hopefully raise the level of expertise throughout the Finnish companies.

### 2.3.1 The use of the HSEQ AP

At the time of writing this thesis the HSEQ AP evaluations have been performed in over 90 companies, mostly in northern parts of Finland. So far it has been used only in process industry for which it was originally intended and designed for. This thesis aims to research if the method could be used in an environment not tested before, namely a port. Ports can be seen as service providers for companies and the management of HSEQ issues in ports has proved to be of high importance. If the method can be

proved to be applicable and useful in a network of port operators, even wider assumptions of its usability can be made. This will be studied more in the empirical part of the research.

The HSEQ assessment includes a wide set of questions in the fields of health, safety, environment and quality. Before the actual assessment takes place the supplier company receives a set of questions for a self-assessment to be performed. Self-assessment shows the supplier what kind of questions and subjects are covered in the actual assessment. During the self-assessment the supplier also has an opportunity to single out possible problem areas and improve its actions. The assessment is cumulative so answers required in order to get to the next ones. It should be noted that documentation of some sort should be available to prove the answers valid. The supplier receives also information concerning the documents necessary to present in the actual assessment.

From the answers and self-assessment score the actual assessment can be planned to match the current expectations of the supplier. The assessment is based on nine entities of questions and the occupational health, safety, quality and environmental activities. Questions that can be considered non-relevant for the supplier in question can be left out of the assessment and scoring. A lighter version of the assessment has been developed for smaller sized companies. An assessment management group plans and supervises the execution of the assessment. The management group is also in charge of all development and advancements of the HSEQ AP. It is formed by representatives from Inspecta, the University of Oulu and the principal cluster companies. The team performing the actual assessment includes one main assessor who is always from Inspecta and other assessors chosen by the principal companies of the cluster and trained to perform the HSEQ AP. The records and database are administrated independently by POHTO. (Latva-Ranta et al. 2012)

The assessment management group creates a schedule for each company to be assessed in order to avoid unnecessarily long assessment processes. The schedule ensures also that the supplier company has enough resources during the process. The time starts when the management group names the assessors and gives them the plan based on the results of the self-assessment. The assessment team then has one month to realize the actual assessment. The whole process including scoring should be done within six months.

If possible defects are found during the actual assessment the supplier is asked to deliver a proof of improvements made and a re-assessment can be settled. Severe defects causing immediate hazard during the assessment at the premises of the supplier can lead to instant discontinuation. These defects are to be improved before the assessment can be continued. In case of few minor defects the re-assessment can be performed by just one assessor or the improvements accepted with the proof and documentation of the improvements done. The assessment team gives their results of the assessment to the management group which decides if the supplier passes the HSEQ AP.

After passing, the HSEQ AP evaluation is to be performed again in every three years and in case any major deviations from the standards occur. In the two years between the assessments a self-assessment should be made and records of it delivered to POHTO. If these follow-up assessments are not provided, a supplier can be excluded from the list of the accepted companies. After passing the assessment a supplier company can use the approval to promote itself outside the cluster companies as well and use it as a competitive advantage. (Latva-Ranta et al. 2012)

### 2.3.2 Results from HSEQ AP

The HSEQ AP has been developed and studied in numerous projects. Between years 2004-2006 a group of main industrial companies and their suppliers from the northern Finland and the Kokkola-Pietarsaari region were gathered to create new ideas. This project named TALI lead to a questionnaire of basic requirements in the field of occupational safety and healthcare being created. Encouraged by successful cooperation also environmental and quality issues were added and HSEQ entity formed.

In 2007-2010 a project mostly funded by the Finnish Work Environment Fund was carried out to research the productivity of the HSEQ matters and whether the HSEQ AP can be implemented nationally. The project was named TUOLATU which is an abbreviation of Productive, High Quality and Safe Subcontracting Supporting Production translated from Finnish. A sequel TUOLATU II project was launched in 2009 to extend the use of the HSEQ AP and to follow the effects of its use. The focus was still on developing and improving the AP and in the evaluation of the possibilities of using it nationally. (Latva-Ranta et al. 2012)

Some of the feedback from the assessed suppliers indicated that the HSEQ AP was too heavy and demanding to pull through especially for small sized companies. The questions were considered too precise and detailed and scoring to rest too heavily on the documents. This has been a target for development and a lighter version of the questionnaire has been created. Also the questions were considered unclear causing problems and requiring constant improvements. Other challenges found have been the self-assessment and its guidance. The results of the self-assessments match the overall assessment group scoring quite well as 73.43% of the self-assessments got the same grade in the actual assessment. It shows that the self-assessment is not too hard to do but still the guidance has to be improved. It also shows that the companies are aware of how well they are doing. The time limits have been under debate as some considered them sufficient and some too short. The adaptability for sub-producers was also seen problematic as the process is designed for service suppliers. (Latva-Ranta et al. 2012)

Altogether the HSEQ AP has been considered to have potential to become a nationwide assessment system even though possibilities for improvements exist. It was seen that it increased communication between the supplier and the buyer companies. The assessment teams have gathered positive feedback on

their level of expertise and support and for giving good advice and recommendations since during TUOLATU they were seen highly critical.

# 3 EMPIRICAL RESEARCH

The research methods include a literature review using the most recent studies and articles possible and qualitative interviews. The interviews were performed in the Port of Kemi and in Oulu. Three companies that were interviewed were all operators of the port area: the Port of Kemi, Kemi Shipping Oy and Havator. Those three companies were chosen on the basis of their key roles in the port operations. The Port of Kemi is the port official, Kemi Shipping Oy is the main shipping company and Havator is responsible for most of the crane and lifting operations in the port. Three companies were chosen also as they form a small example of supplier chain inside the port. The Port of Kemi can be seen as the main actor as it owns the grounds. Kemi Shipping Oy is a supplier of stevedoring services of different kinds. Havator is a supplier of crane and lifting services. This gave an opportunity to observe also the relations between the companies.

A representative from the insurance institution If was also interviewed to get a view from a member of an interest group. An insurance providing company is of course interested in how an insured company manages its operations and special interest is obviously in the fields of HSEQ Assessment Process which pose a lot of the risks leading to insurance claims. Interview is covered later with the other interviews.

## 3.1 Operators of ports

Often ports have many different operators working in the area. There is a need for many actions when an item or cargo is loaded on or off a boat. According to the Finnish Maritime Society (2013) the interest groups of a port can be divided into four categories: port organizations, port users, service suppliers and authorities. The port organizations refer to the port authorities, the owner companies and the stevedoring companies. The port users are shipping companies, shippers and the land transportation companies. The service suppliers provide clearance, forwarding, provisioning, fuelling, maintenance and repairs, navigation and towing, inspections, seamen and consignment. The authorities in a port are maritime authorities, customs, police and environmental authorities of the state in question.

In Finland port organizations refer usually to the municipality or in case of a private port a private company that owns and uses the port. Although being part of a communal system, port authorities do not operate on governmental funding but aim to make profit. It differs from other public utilities by offering its services for parties outside of the municipality instead of attending the people close to it. Stevedoring companies are also considered as port organizations. They are responsible of loading and unloading the ships and moving the cargo close to the ship. The stevedoring companies usually own the light machinery and cargo handling equipment while the port organization usually owns the fixed structures and devices. (Santala 1989, Wallin 2012)

The port users can be defined as the companies that pay for the use the port, for example shipping companies and shippers. It is common for shipping companies and industrial companies to own stevedoring companies or parts of them as they enable the port to run effectively. Although the land transportation companies do not pay for using the port they are categorized in this group as they use the port and enable it to function. (Santala 1989, Wallin 2012)

The range of service providers in a port can vary greatly. They affect the functioning of the port and its attractiveness to ships. As shipping companies do not have offices in every port so shipping agents offer services of handling the necessary paperwork and informing the authorities, the pilot, the port authorities, the stevedoring companies and the receiver of the goods about the timetable and the necessary services required by a ship coming to the port. Forwarding agents deal with tasks related to customs, customs payments, handling of the goods from and to the port and creating necessary transportation documents. Provisioning companies provide the ship crew the opportunity to buy groceries, alcohol, devices, machines or equipment tax free. The provisioning company must have a license and the customs seal the purchases in stock to be used only after leaving the port. Towing might be provided by the port authorities or by a private towing company and refueling provided by tanker-trucks or small tankers and rarely by pipe system designed for the purpose. Also maintenance and repair services are often offered while a ship is docked and being loaded. (Santala 1989)

The authorities such as customs monitor compile statistics of the quality and quantity of transportation and collect the custom duties and any other required payments. The maritime officials are present to supervise the condition of the ship and waterway channels and safety. The police is usually contacted only in case of an emergency or safety and security problems but they also monitor passenger traffic. (Santala 1989, Wallin 2012)

Most likely all Finnish ports change their organizational form into corporation due to the decision of the European Commission on 11$^{th}$ December 2007. This decision known in Finland as Destia-decision after the incorporated Finnish road transport services aims to neutralize competition and open communally produced goods and services for open competition. This is to be performed by incorporation of public utilities which leads among other things to juridical autonomy, separate economy and income taxing. As mentioned above the decision tries to achieve fair competition as an incorporated company does not get financial support from the state and can go bankrupt as any other company in the competition. (Vainionranta 2009)

## 3.2 Effects on the Arctic environment

The Arctic environment poses some challenges when it comes to business and logistics. It is a tough business environment from the large scale all the way down to the daily operations. In a scarcely populated area it is more difficult to find skilled staff, enough customers and good infrastructure. The

cold complicates many things related to working. According to Risikko (2009), it demands more energy, machinery and equipment to be used and thus increases costs.

The cold environment poses problems when it comes to labor. The limit of the zone regarded as cold zone for labor is 15C degrees or the level when the cold is considered to hinder working according to the international standards. In Finland every third worker is estimated to be exposed to cold temperatures. (Risikko & Marttila-Vesalainen 2006) The most usual fields of work where workers are exposed to cold are construction, agriculture and forestry, seafaring, warehousing and forwarding and stevedoring. It has been estimated that nine out of ten people working in ports are exposed to the cold. (Työturvallisuuskeskus 2001) The cold is said to increase the likelihood of accidents as people tend to hasten the pace of work in order to get out of the cold. The cold also causes unpleasant feelings and decreases the level of motivation. Wind and moist increase the effects of cold and are almost always present when working in a port environment. (Merenkulkulaitos 2001)

Many work related illnesses are linked to working in a cold environment. For example respiratory symptoms such as shortness of breath and prolonged coughing, vascular diseases such as temporarily increased blood pressure, chest pain and arrhythmia, increased musculoskeletal symptoms and frostbites are common cold related health problems. Cold rarely is the sole cause for illnesses but easily aggravates existing health issues or activates latent illnesses. (Työturvallisuuskeskus 2001) The connection between low temperatures and the harmful effects of air pollution has been researched only a little but according to Kujala (2011) a synergy has been discovered in recent studies.

Arctic environment causes problems also to the logistic infrastructure. Frost and freezing can cause the ground to rise and break apart when the temperature of the ground goes below 0C degrees. In the spring time the water from the melting ice can cause saturation and thus softening of the ground. (Helaja 2010) These inevitable problems related to the Arctic environment cause challenges for preventive design and building of roads and railroads as well as need for active damage control. In the Arctic the winter improves road logistics in the form of ice roads and bridges but complicates the shipping of goods. (Hassol 2004)

The Arctic nature poses yet another limitation for business. It is undergoing changes caused by the global warming and seems to be more sensitive and more exposed to the warming than other areas of the world. The rising average temperature causes the Arctic ice to melt and to become thinner. Increased temperatures reduce the light and warmth reflecting ice surface accelerating warming. The sea ice is also important for the salt balance of the oceans which affect the existing currents of all the seas of the world. The areas formerly covered by ice are also likely to release large amounts of greenhouse gases. The changes in the Arctic ecosystems will have consequences all over the planet. Migration of birds, shifting of vegetation zones, insect outbreaks and forest fires are just some of the likely things to affect the earth. Animals both on land and in water are going to face habitat change and possible rivalry for nutrition. The

increased industrial activity is likely to cause environmental accidents causing irreversible devastation to the fragile nature. (Hassol 2004)

## 3.3 Description of case companies

The Port of Kemi consists of three ports: Ajos Port, Veitsiluoto Port and a separate oil port. This study focuses on Ajos as the oil port is focused only on oil transportation and Veitsiluoto serves mostly only the Veitsiluoto paper plant owned by Stora Enso. The port is located in the northern part of the Bothnian Bay close to the borderline between Finland and Sweden. Due to this Ajos offers port service and a route to northern Finland, the northern parts of Scandinavia and to the Russian parts of the Barents region. The port is mainly focused on export and has recently undergone incorporation. This change is likely to become common but so far only the Port of Kemi, the Port of HaminaKotka and most recently the Port of Uusikaupunki have done it. Current news in the port is also that Forest BtL Oy has been studying the possibility of building a biodiesel plant in the port. Funding decision from the EU has been approved but so far any decisions of executing the project have not been closed.

The simplified stream of goods in a port is presented in figure 8 below. The figure does not take into consideration the required paperwork or inspections, just the basic logistic functions in a port. A port is a link between transportation on land and on sea. According to Lun et al. (2010) a port is an essential part of the logistics infrastructure as well as a dealer of commercial infrastructure and a business gateway.

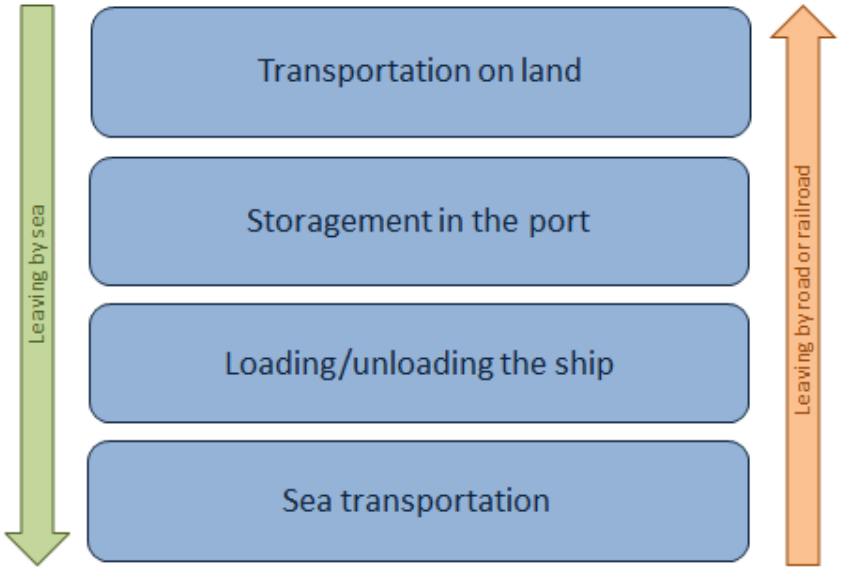


Figure 8. A sketch of the stream of goods in a port

### 3.3.1 The Port of Kemi

The Port of Kemi is fully owned by the City of Kemi although it was incorporated in the beginning of year 2012. It owns the land of the piers and other port structures in its area. It does not own the buildings or equipment within the area, only the land. The Port of Kemi does not handle cargo. The services it offers to ships are towing and icebreaking in the dock. Renting land is the biggest part in the port operations. There are five piers in the port with a maximum draught of 10 meters but plans for an expansion have been made.

The company has undergone some changes during the incorporation of 2012. It has changed job descriptions and roles and updated the organizational chart among others. For example the general attitude towards cost effectiveness has become more positive. The history of being part of the city still affects operations. As a result occupational health and safety operations are under the responsibility of the City Kemi. For example the occupational health care is still operated by the communal health services as no changes were made during the corporation.

The Port of Kemi is relatively small port in comparison with other ports around the world. In year 2011 420 ships from 20 states visited the port. The port is fenced and guarded by the port supervisors so that no unknown traffic is possible in or out of the port. Until the ISPS code had come into effect, the port was open for anyone to visit.

The role of the Port of Kemi in the port is similar to a landlord. It encourages free competition and thereby avoids monopoly establishment. As the landowner the Port of Kemi is required to supervise and maintain the facilities including the dock and the piers and all other infrastructure. This also gives it the right to collect the renting fees and port charges from the users. If cargo is kept in the port for a notably long time, rent can be charged for this as well. The Port of Kemi also has the authority to demand the ships in its area to move or to leave if necessary.

The port can be described as a common workplace which has its own legislation. When more than one operator works simultaneously at the workplace or one after another and there is someone with the main authority in the area, the workplace is called a common workplace. In Finland a common workplace has its own legislation which prescribes specific roles for the main authority and the other operators. All employers and employees of the workplace are liable to communicate sufficiently in order not to cause any dangers or threats to the health and safety of employees. The main authority is in charge of appropriately informing all employers and employees of the harms and dangers in the area, providing guidelines and directives of the work and the workplace and measures of fire prevention, first aid and evacuation and the people responsible of those. Vice versa, all the employers and employees in the area are liable for informing the others of the harms and dangers their work might cause. The main authority, the Port of Kemi is also responsible for consolidating the work performed in the area, the traffic control, the order and the tidiness and general planning of the workplace as well as general healthiness and safety.

Also the co-operation between the members of the workplace in occupational health and safety is to be initiated by the main authority.

An independent actor of a common workplace has to be aware of the harms and risks he causes, has to have the necessary permits and licenses in effect, has to use appropriate equipment and tools safely and to perform the necessary periodical and implementation inspections. The independent actor has to use appropriate personal protection equipment if necessary or required and to follow regulations on handling hazardous substances. Additionally he has to follow any safety instruction issued by the main authority. The common workplace model could be associated with an umbrella where the main operator is the umbrella offering safety to the companies in its shade, making sure that every company fits and does not harm others by its actions. An illustrative picture is presented below (figure 9).

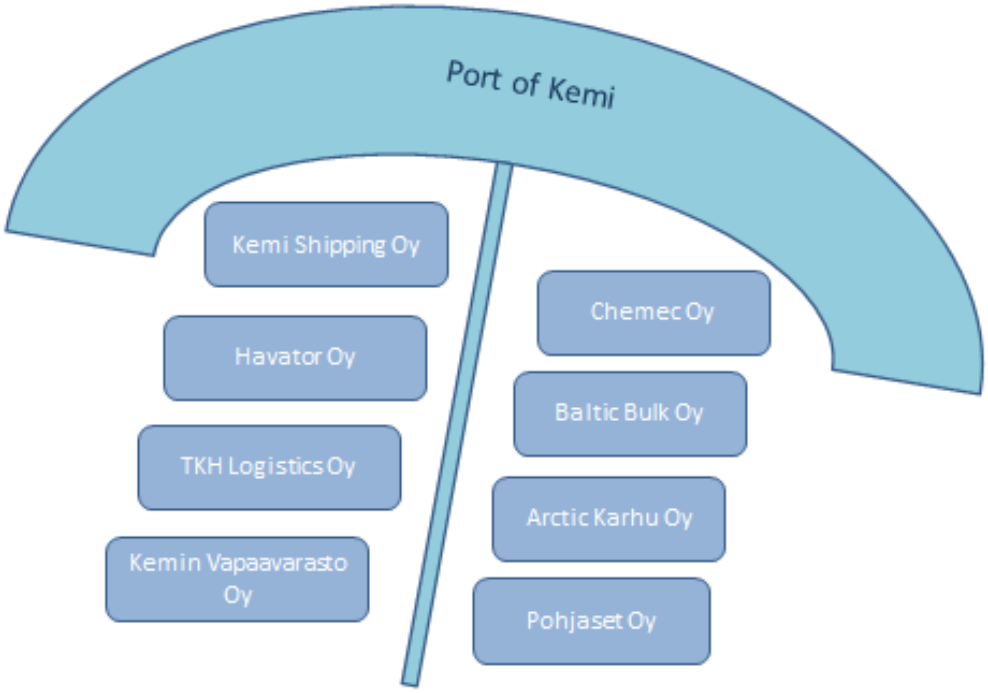


Figure 9. The main operator offers safety and order to the companies in the common workplace.

The Port of Kemi is a small company as it employs only about thirty people. The job descriptions vary from normal office work gravitating towards more physical and outdoor port officer tasks. The harms related to office work come mainly from static muscular tension that is commonly caused by using a computer. Disorder and untidiness indoors may cause tripping and thus injuries; slippery cold weather and inadequate gritting outdoors cause tripping as well. For port officers the job includes operating outdoors which exposes them to cold weather and accompanying problems. Operating on the piers and on the ships cause hazards of falling and traffic related accidents. The constant movement in the port

resembles that of a busy factory and so the risks are about the same. Being hit by car, train or moving lifting machinery usually causes severe damage.

The company does not produce much waste as a large part of the work is done in an office. As the main authority it has the responsibility to organize waste handling and the port officers monitor the amounts and kinds of waste that the whole port produces and how well it is sorted. It is also responsible for obtaining environmental permit for the port. This is an important fact due to the likely expansion of the port in the near future.

There is weekly regular traffic from Kemi to Sweden (Göteborg), United Kingdom (Tilbury, Immingham), Germany (Hamburg, Bremenhaven, Lübeck) and Belgium (Zeebrugge, Antwerpen). Regular lines exist also to the east coast of the USA, northern Africa and to the Mediterranean Sea.

### 3.3.2 Kemi Shipping

Kemi Shipping is the main partner in co-operation with the Port of Kemi as it does most of the stevedoring, forwarding, clearance and storage related tasks. It is the company that has most to do with the cargo while the ship is in the port. It owns the storage buildings and the lifting equipment. For larger scale or specific lifting it co-operates with Havator. It also provides repair work for the ships if needed.

Due to strong history in the Port of Kemi the company has achieved almost a monopolistic position in the port. It has created a situation where a company entering the market in Kemi would need to make huge start-up investments in order to survive the competition. Kemi Shipping is also in contact with other companies besides the Port of Kemi as it offers various services. It co-operates not only with Havator but also with the land transportation companies, port officials, customs, ship owners and other companies needed to make the cargo flow efficient through the port.

Kemi Shipping is owned by the biggest users of the port: 50% belongs to Stora Enso, 35% to Metsä Fibre, formerly known as Metsä-Botnia and 15% to Metsä Board, formerly known as Kemiart Liners. Most of the functions are executed in the Ajos port while clearance is mainly performed in Veitsiluoto and the oil port. The main cargo imported is raw materials for the local industry, mainly oil, pigments, lye, starch and raw wood. The main cargo exported is paper, cardboard, cellulose and lumber. (Maunu 2011)

Kemi Shipping is in close co-operation with the Port of Kemi. The law requires a common workplace thereby ensuring smooth transportation in the port. Kemi Shipping has its own environmental permit for its repair shop; additionally the company operates under the environmental permit issued to the Port of Kemi. This is a great example on how closely the companies are bound together. As Kemi Shipping is in charge of most of the internal traffic in the port it is vital that the rules and regulations by the Port of Kemi are in common use.

Like in the Port of Kemi at Kemi Shipping the job descriptions of the employees vary greatly. Some of the work is normal office paperwork, some is loading and unloading ships, trucks and trains using heavy machinery and some is manual repair work. In addition to the safety presentation by the Port of Kemi, Kemi Shipping gives full orientation to new employees.

### 3.3.3 Havator

Havator acts as a crane operator in the Port of Kemi. Havator is originally a local company as it was founded in Tornio although it started operating in trading with grains, lumber and war related rattletrap and operating mills and sawmills. The business changed fully to earthwork in the 1950s. The headquarters is still located in Tornio. Nowadays Havator consists mainly of four sections: Havator Cranes, Havator Montage, Havator Transport and harbour crane services. Havator Cranes is focused on crane services, for both long and short term individual projects. Havator Montage is specialized in installing and assembling large scale concrete elements and steel structures. Havator Transport offers specialized transportation services for extra-large and extra heavy objects. It offers also jacking and skidding services. (Qvist 2010) Polar Lift was previously a separate company offering harbour crane services but is nowadays a brand name fully merged to Havator Oy.

The company is specialized in project work and often performs it in co-operation with other companies. An example of its recent project work is mounting windmills at the coast line of the Gulf of Bothnia. Havator operates in Finland, Sweden, Norway and Russia that link the company to the Barents region and makes it relevant for the present study. Furthermore it operates also in the Baltic countries. Havator has become the biggest crane service provider in the Nordic countries and one of the biggest in Europe thanks to its recent acquisitions in Finland and Sweden.

Havator has a good reputation when it comes to HSEQ areas. As it turned out during this thesis project the company has already passed the HSEQ AP in 2011. Havator has been also granted the ISO 9001, ISO 14 001 and OHSAS 18 001. As Havator operates in several countries the certificates provide the proof of good quality, safety management and environmentally friendly operations on the international level international scale. The phrase "Safety First" has become a slogan for the company. As it operates in the Arctic region, it has also valuable operating experience in a climatically challenging environment.

## 3.4 The HSEQ AP in the case companies

The HSEQ AP could not be used in the full form due to the copyrights. This means that the HSEQ AP question set is not available for use. The next option was to use a list created for the companies to see whether they might be ready for an assessment. It was in a form of an answer list to the questions set used in the actual Assessment Procedure. The answer list is designed to show where the level of management should be improved to avoid getting zero points from the evaluation. This answer list was not publicly

available when the interviews for this thesis were conducted in the spring of 2013 but were published in Finnish in the renewed HSEQ web pages later on. (HSEQ 2013). The list of answers is later referred to as the answer list and can be found in attachments translated into English (Attachment 1).

This list was used in the interviews with the Port of Kemi, Kemi Shipping and Havator as a base line and the interviewees were encouraged to tell whether the answers were accurate in their case or if a better or worse condition existed. In a real HSEQ AP assessment the companies would be required to present documentation in order to make sure that the descriptions were correct at that time but in this thesis this was not seen necessary. It should be noted that the author of this thesis performed the interviews and has no experience of using the HSEQ AP nor has been trained to perform a full assessment in any way.

## 3.5 Murmansk Commercial Port

Working in the Barents Logistics 2 project the author was offered an opportunity to visit the city of Murmansk in the north-west Russia. The Barents Logistics group stayed there for five days and visited various logistic related companies and their representatives as well as regional and governmental logistics authorities and agents. The most important visit in connection with this thesis was the visit to the Murmansk Commercial port.

The Murmansk Commercial Sea Port is in the heart of the city of Murmansk and was first opened in 1915 but the company was founded in 1994. The port was built when it was realized that the two biggest ports in the north-west Russia at that time, St. Petersburg and Archangelsk, were not going to satisfy the needs of sea transportation. During World War I St. Petersburg and the Russian ports at the Black Sea were blocked and in the winter months Archangelsk was surrounded by ice leaving no west-directed sea routes free. As a solution the port of Murmansk was build and connected to the railway network. The port of Murmansk is not affected by winter as ice does not form due to the warmth of the Gulf Stream.

The state of Russia owns the company fully, only some of the stevedoring companies operating in the port are not owned by the state. The port is vast as the number of stevedores is around 1700. The Murmansk Commercial Sea Port is divided in three parts: one that handles mostly mineral nutrients, one that handles mainly ore bulk and the Murmansk Stevedoring Company.

The Murmansk Commercial Sea Port differs from the Port of Kemi in many ways. It is larger and the amount of transportation in tons is much bigger. It was reported to be about 17.7 million tons at the company presentation during our visit. The port has also grown rather quickly in less than 100 years as it was built for extending the logistical capacity and to overcome the location related limitations. Also the goods transported through the Murmansk Commercial Sea Port vary significantly from the Port of Kemi. The main cargo is raw materials: non-ferrous metals, ferrous metals, coal, apatite, alumina, and ore. Also food, chemical products and a variety of technological equipment are transported through the port. Most

of the natural resources are transported in bulk form but also containers are shipped from the port. In 2009 the biggest cargo transported were coal (12.2 million tons) and apatite (1.6 million tons).

Figure 10. A picture from the Commercial Sea Port of Murmansk (http://www.portmurmansk.ru/)

The port is the gateway to the Northern Sea Route and thus the traffic is expected to increase in the coming years. Plans of expanding the port to the eastern side of the gulf have been made. This new terminal would be used for handling coal and oil. Governmental decisions are being waited for as it would likely increase the interest of private companies to invest in the project. This extension and the improvement of the railways would increase the capacity of the port. The countries of destination for ships from Murmansk are in Western Europe, e.g. Spain, Belgium, Netherlands, France and Great Britain. Thus the receiving export countries are close to the ones of the Port of Kemi.

The HSEQ aspects of the Murmansk Commercial Sea Port are seemingly fine. The company described that they have over 15 official parties supervising the aspects such as occupational safety, labor conditions, circumstances of loading and unloading and fire safety. Seven people were told to be working in tasks related to managing these work aspects in the company. Also legal obligations of organizing those areas were reported to exist.

During our guided tour in the port area we saw signposts and posters of occupational safety and risks. Also safety equipment and protective gear could be seen throughout the tour but not used in action. It was visible that even though safety matters had been taken into consideration they were not on the level of the Finnish ports. The Commercial Port of Murmansk was told to have many employees working specifically

with ensuring healthy and safe working environment, good working conditions and overall welfare and safety. Unfortunately none of these people were available for interviewing during our short visit to the port. The people we got to talk to were still able to answer field-related questions as they had long working experience in the port in a variety of tasks.

The Commercial Port of Murmansk is an important part of the city of Murmansk as it is located in the central area and provides direct and indirect benefits to the community in the form of employment and rich business opportunities. The differences between the Port of Kemi and the Port of Murmansk were visible in the city as well as in the port itself. The loading and unloading of coal and minerals generates a lot of dust and grains that pollute the air in the port area as well as in the city. Especially during the winter months when the ground is covered with snow, the dark dust was visible in the city. In the port we were able to see an unloading of a train carrying apatite from the area nearby. It is obvious that inhaling airborne particles could cause health issues to the people working in the port and people living close by. A study regarding this issue and related to the thesis would be interesting. Good isolation, ventilation and monitoring of respiratory diseases should be critical to ensure that the working conditions are safe. No respirator masks or protective gear was seen during our visit even during the unloading of the train. The dusting of the apatite was obvious and being exposed to it was quite uncomfortable not to think about daily exposure. Wearing masks makes physical work more uncomfortable and challenging but the safety of the workers should be a priority in any circumstances.

Alongside with the impurity of air in the port, the traffic in the port looked also like a potential risk. As heavy machinery and vehicles move and operate in the port and a lot of kinetic energy is present, therefore serious accidents with grave effects could happen. The elongated form of the port and lack of open space create difficulties in controlling traffic in the port and offering safe environment to ensure the visibility of the other operators or vehicles.

The security of the port was very well taken care of. The key role of the port in the wellbeing of the city as well as the close proximity to the famous nuclear port must have their effects on the importance of the security matters. The port area was fenced and closely monitored. Before our visit all members of the group were asked for passport information for security check-ups. The gatekeepers seemed very professional and heavily armed. Our tour guides were very careful not to exceed the time limit previously granted to us and schedules seemed to be tightly monitored. Yet we were allowed to move quite freely and take pictures indoors and outdoors in the port.

The port had considered applying for the ISO 9000 series certification in the early 1990s' but after further consideration the application was seen unnecessary. Undoubtedly there is some sort of quality system in use but without external or international certification the management system is impossible to compare.

# 4 EMPIRICAL RESULTS

This research was carried out by a literature review to gather knowledge both on the HSEQ AP and on the port business field. The empirical part is built around three case companies operating in the Port of Kemi. A case study can be used when doing organizational and management studies. It is an in-depth investigation that uses qualitative research methods such as direct observation and interviews to gather information for analyzing. Findings can be then possibly used when creating a generalization or theories. (Yin 1989) This study is based on the semi-structured interviews. The method lets the interviewees to express their opinions and perspectives (Hirsjärvi et al. 2007).

During the HSEQ AP interviews in the Port of Kemi, Kemi Shipping and Havator no significant shortcomings in the answer list were found. The interviews were carried out using the answer list as the base for open discussion, not only to measure if the claims of the set were true, lacking or exceeded. All interviewees were done in the field. Every point of the question list was discussed in each of the interviews with the case companies in the order presented in the list. The conversations are cleaned and summarized to describe what was talked over. Although discussed, some parts of the discussion were left out due to their insignificance. Low significance means no major lacking or exceeding was discovered. A resulting summary and the most notable discussion findings are presented at the end of this chapter. A table of all the interviews performed is presented in table 2.

Table 2. Interview dates, companies and durations.

| Date | Company | Duration |
|---|---|---|
| 28.11.2012 | Port of Kemi | 1h 34min |
| 28.11.2012 | Kemi Shipping | 51min |
| 28.01.2013 | If | 40min+1h 28min |
| 26.02.2013 | Kemi Shipping | 1h 11min |
| 6.3.2013 | Havator | 1h 05min |
| 19.03.2013 | Port of Kemi | 1h 36min |

## 4.1 Interview with the Port of Kemi

The first company to be interviewed was the Port of Kemi. A short preliminary interview was carried out in December 2012 about the HSEQ issues but the conversation was light and kept open. The target was to clear the relations between the companies operating in the port and their roles.

The main interview with the HSEQ AP answer list was performed in March 2013. The interviewees present were finance and marketing manager Hannu Tikkala and head of transportation Jukka Kotajärvi. They both had an important role in the HSEQ related issues and vast knowledge of the area. As previously mentioned the conversation was open rather than having precise questions and direct answers. There were 49 responses in the list of answers for avoiding zero points in the assessment. The Port of Kemi showed most interest in participating in the study as Hannu Tikkala is a member of the Finnish project group of the Barents Logistics 2. HSEQ AP seemed to be of interest also beyond this interview.

The Port of Kemi has been granted the ISO 9001, the ISO 14001 and the OHSAS 18001 certificates which proved to be a good base for the interviews. Some of the answers of the list were quite obvious as they are a requirement for one or more of the certifications as well.

The Port of Kemi documents all trainings and courses as a part of their quality documentation. The Finnish Occupational Safety Card is seen as a minimum for all employees to have in relation to health and safety issues. No specific study backgrounds are required from employees and thus the qualification of each employee is seen to be satisfying on the base of hiring. In the case of ship personnel the captain is in charge of their job qualifications. The clerical workers are in charge of keeping track of their working hours but the port officers and maintenance personnel who have more variation in their working hours have more accurate bookkeeping of their work. The maintenance workers fill their hours using a form for clerical workers to be included in a follow-up system. This was seen as a possible target for improvement but nevertheless fulfills the demands of the answer list. The port officers have monitored their working hours with an enterprise resource planning system module specifically designed by Satamatieto Oy for port environment.

Due to the history of being part of the city of Kemi the Port buys its occupational health care services from the city. The services include the health check-ups and work place inspections required by the Finnish law. Employees are also free to take a health check-up sooner than required. The Port is still included in the occupational safety organization of the city of Kemi and both the occupational safety representative and manager are appointed via the city's organization. The Port of Kemi is interested in the occupational health and safety of operators in the port but requires no reporting as information is voluntarily shared. As the main operator of a common workplace the Port of Kemi organizes some basic orientation for any new operator in the area and training in case of some essential changes in the area. Once a year regular and temporary workers of the port are reminded of the safety and security issues and

the traffic rules of the area. All new operators undergo ISPS code training and its effects and the access to the area. A map to ease navigating in the port has also been created.

The environmental issues are taken care of. A comprehensive environmental mapping was done in the port in the beginning of 2000 as a part of construction to make the port a deep-water port. A few years later another mapping was done for the extension of the port and in connection with this. The Port of Kemi was granted an environmental permit in 2005. The permit requires the environmental aspects of operating to have been carefully looked through. As a part of the permit requirements the Port of Kemi has to provide and update a waste management plan and provide the docked ships with a waste disposal guide. Although the Port of Kemi employs about 35 people, it does not produce much waste. Mostly the waste is produced by the companies operating in the port or the docked ships leaving the Port of Kemi that are responsible to monitor and report according to the permit. All new operators of the port are informed about the permit restrictions and regulations and agreements are signed since all the operators in the port are operating under the environmental permit of the Port of Kemi.

For the port officers the waste monitoring is a part of daily routine. In addition the head of maintenance operations that has been more thoroughly trained in the screenings of waste goes through the waste containers once in a while and provides a report of his findings. The Finnish law on waste controlling (646/2011) was renewed in 2011 and required some updating in the port. Once every three months the provider of the waste disposal services compiles a report of all the waste. By measuring the amount of waste The Port of Kemi tracks whether they have reached the goals set in their plans. Boat discharges are measured and estimated with a discharge count system used in all Finnish ports created by Technical Research Centre of Finland (VTT) and Finnish Port Association. Particle measurements are taken every five years and the rain water system is inspected once a year.

Some chemicals are shipped through the port. The Port of Kemi receives material safety data sheet of each of the substance that provides information on the properties, risks and safe ways to use and store the substance. The responsibility for these chemicals is in the hands of the key persons: on board of a ship it is the captain, on land the head of each post, e.g. the head of maintenance operations. In case of a new hazardous substance to be transported via the port it has to be negotiated with the quarter that decides to grant the permit or not. Due to the new copper and nickel enrichments being transported via the port, the Finnish Centre for Economic Development, Transport and the Environment (ELY) demanded the material safety data sheets and a responsible chemical safety person to be appointed. This exemplifies the monitoring of chemicals transportation in Finland. The Port of Kemi has created a rescue plan in case of an accident and rescue trainings have been carried out although the amount of hazardous substances being transported through the port does not require them. All environmental aberrations are reported to the port officers and in case of large scale accidents, ELY is notified.

Information goes to the managers and the CEO who makes an overview and organizes trainings if needed. The Port of Kemi strategy and vision are part of the city of Kemi strategy and they have not been updated recently. As the services provided by a port are quite limited in respect to logistics, the update might not be even needed but might be still worth reviewing. Goals of different indicators are documented in the quality manual required by the ISO 9001 certificate and they include the HSEQ aspects as well as the administrative and economic indicators. The processes of the HSEQ issues are written down in the quality system and passed on to the employees. The companies operating in the port share systematically information regarding the HSEQ issues with new operators or employees. By perforce meetings with Kemi Shipping are organized with the emphasis on health and safety and with carriage operators with the focus on quality and environmental issues. Quality is also discussed with the cleaning service provider.

Introduction is carried out using an introduction manual originally created for the city of Kemi and later modified to fit the port environment. Employees of the Port of Kemi are interviewed concerning their job satisfaction and progress once a year. No systematical rewarding practices exist but casual rewards such as a free lunch might be in use. A customer satisfaction study is organized once every two years and has always provided initiatives and ideas for improvement. The focus used to be on marketing aspects but is now more customized and includes the HSEQ issues if relevant to the customer. Feedback is also gathered.

The facilities and working space are suitable and functional both for the clerical workers in the office as well as for the port officers. Construction and improvements are done on a constant base whenever seen needed. Equipment for working is also provided and lack of instruments should not make work impossible or complicated. The equipment is considered functional and improvements have been made to e.g. the shift system. The CEO gives permission and approves budgets for acquisitions by responsible employees. The orders are closely monitored.

## 4.2 Interview with Kemi Shipping

Kemi Shipping handles many tasks related to shipments moving through the port. All of the employees have the Finnish Occupational Safety Card and internal and external training is offered continuously e.g. for new equipment and machinery. Working hours are monitored with a resources management system as well as an overtime report is generated by the payment administration as a part of the occupational safety legislation. Staff trainings have been documented more closely during the last three to four years. The occupational health care service is bought from the private sector and the contract includes health check-ups and work place inspections required also by the law. Additional health care features such as massage prescribed by a doctor are financially supported as a big part of the staff works in physically demanding working conditions. Health check-ups are mandatory once every three years for other than administrative workers and work place inspections are carried out more than once per year.

Kemi Shipping has two occupational safety representatives, one for the stevedore workers that are in majority and another for managers and clerical employees. An occupational safety manager is named in the occupational safety personnel register as well as all other members of the company's occupational health and safety committee. The goals, responsibilities and competences of occupational health and safety are written down in the action plan linked to the OHSAS 18001 certificate.

Risk assessment is required by law and Kemi Shipping uses RiskiArvi, a web based risk assessment program provided by the Centre of Occupational Safety (the Centre of Occupational Safety 2013). About 30 job descriptions have been assessed and all new tasks go through the assessment process before implementation. Accidents are investigated to prevent new accidents. Bigger accidents are investigated by officials. Every accident is documented as the information is needed for the insurance provider and compulsory notification is submitted to the police and the Regional State Administrative Agencies. Notifications of dangerous situations are reported and handled every week. The good level of know-how in the HSEQ areas of supplying companies is inspected as a part of the Act on the Contractor's Obligations and Liability when Work is Contracted Out (1233/2006). A big company with international certificates is seen highly likely to have the HSEQ issues well taken care of. Kemi Shipping sees a high level of expertise in the HSEQ areas as competitive advantage when deciding on business partnerships.

Kemi Shipping has been granted the ISO 14001 certificate in 1999. Monitoring the Finnish legislation and any possible changes in it has been outsourced to a consulting company. Kemi Shipping gets the information of new or changed legislation and acts accordingly. An environmental report has been done and all environmental deviation notifications are studied carefully weekly. Chemicals are listed and material safety data sheets are provided concerning all chemicals. Mostly chemicals are needed in the repair work shop which produces most of the waste such as oil waste which is contracted to a specific waste handling company to handle. The repair work shop has its own environmental permit while all other operations are under the ports environmental permit, i.e. the permit of the Port of Kemi. In case of hazardous chemicals being transported or handled all the other operators of the port and interest groups are notified. The environmental situation is monitored weekly by means of an observation walk-through by clerical employees and managers in the premises which functions as an internal audit round with a varying subject of interest. Every four weeks a report card is produced to summarize the situation. The waste management company provides a monthly report on the screenings and the amounts are checked annually.

Quality is of major importance in Kemi Shipping as shipping could be thought as a final treatment of the products leaving the port. Much of the internal communication is about the quality and it is seen as an aspect that you can never master as there is always something to improve. Informing the staff is still seen as something that could be improved. Kemi Shipping has a management group which meetings are documented and a managerial review is provided. The CEO has been creating a new strategy to replace the five to seven year old strategy.

A summarizing folder for introduction was created two years ago which provides a check list of the things required by the law and the issues held important by Kemi Shipping. Employee satisfaction has been measured recently before this interview and is planned to be studied every two to three years. Rewarding is offered by the iniative committee for making iniative suggestions and from reaching one month without any work related accidents. Rewards can be in a form of a free lunch or a token for a cup of coffee and a bun at the Finnish Seamen's Mission in Kemi which has been chosen as a target of support and goodwill by Kemi Shipping. Healthy activities outside of working hours such as going to the sawdust track, gym or bowling are financially supported and rewarded with the option of participating in a lottery of gift vouchers.

All the operating processes have been documented in the quality manual. Shipping requires specific equipment which means that about 70 different gadgets are used for specific purposes. The facilities are functional and clean. Cleaning has been outsourced and the level of tidiness is good as no complaints have been received related to the numerous shipments that are stored in Kemi Shipping's facilities before shipping. New technologies related to work do exist and implementing them is to be improved. A recent example is changing to a new operating system. A resource planning system handles orders and communicates with customer companies. HSEQ issues of the supplying companies are communicated daily but not necessarily documented. The idea to involve Havator to participate in the current research was proposed by Kemi Shipping and should be seen as a part of HSEQ related communication. Developing and planning is seen as a part of every staff member's job but especially managers and foremen should observe work in a way that the level of safety and efficiency could be increased.

A customer satisfaction inquiry has been performed in cooperation with the Port of Kemi. Customer feedback is also gathered and possible reclamations are always processed. The operating is measured using ten different indicators that have been documented in the operating system and are monitored on an annual base linked to the management's review. The indicators include HSEQ related indicators such as work related sick leave days, waste controlling, hazardous incidents and accident frequency.

## 4.3 Interview with Havator

During the interview it was discovered that Havator had already been evaluated using the HSEQ AP some years ago but the assessment comprised all its functions in northern Finland. In this thesis Havator is positioned as last link of a supplier chain. It provides crane services in Finland, Sweden and Norway and the Baltic countries. Some project related work is also done in Russia, usually in cooperation with another company with previous activity there. Demand in Russia is limited but is slowly growing and can be easily met by Havator that has operating experience in the Arctic conditions. The climate poses limitations only to the machinery. The biggest challenges are the difficulties and intricacy of paperwork such as working permits and visas when transferring personnel to work in Russia.

In the Port of Kemi Havator employs about five to six people. It is a relatively new operator in the port but big investments have been made to acquire the necessary machinery and cranes when it started in 2012 in the port. The personnel are qualified and all trainings are closely monitored and regularly repeated. As the working equipment is highly specific, internal trainings are provided constantly. Managers have separate trainings but all members of staff receive safety training as a part of their work. Different work related trainings such as lifting work supervisor and safety harness inspector qualifications are also seen necessary and provided. As for the other operators in the Port of Kemi the Finnish Occupational Safety Card is required from each employee. Clerical workers of Havator keep track of their working hours themselves while the crane workers fill their hours manually on paper which after the managers' approval is sent to the payroll. Workers in the transportation side of the company have a mobile system for keeping track of their hours. Overtime is monitored once a month with a report from the payroll.

Occupational health care services have been purchased from one private health care provider but in southern parts of Finland separate contracts are also made. According to the law health check-ups and work place inspections are included in the contract but additional treatments such as physical therapy is sponsored for the employees. The company has one occupational safety manager who supervises the whole Finland in close cooperation with the local managers and the site managers who are better aware of the concrete facts and circumstances of each site. An occupational safety representative has been named for sites with over 10 employees and a safety advocate for sites with fewer employees. The responsibility has been assigned to each location separately as one person would not be able to handle all locations.

Risk assessments are performed for each site when changes occur and every five years even with no changes. The crane business requires a lifting plan to be made each time a lifting is done and all safety related requests from the client are also noted and considered in the individual lifts. So far Havator has not encountered any major accidents and an internal research has always been enough in the case of an accident. All investigations are documented and most of them have to do with the Nordic climate e.g. snow and ice related slips and trips. Hazardous incidents are also reported and presented in the meetings of the safety committee. In serious cases information is spread and preventive actions are taken. Some of the cases are also reported to the employees in the journal published for the personnel. The ISO 9001 related quality manual includes indicators related to the accidents and hazardous incidents which are published annually in the management review. Havator uses very little outsourced operations and the subcontracting companies have been known for a long time and seen competent in the fields of HSEQ.

Havator produces relatively little waste of which oil waste is seen the most problematic. Recycling and sorting of waste is not necessarily included in the orientation of new employees but all waste containers for different sections of waste are marked with a description of the waste as law requires and sorting is monitored in the occupational health and safety rounds. Documentation of toxic waste movement is filed for three years as required by law, other waste is monitored and documentation is available for the last

five years. The waste management provider offers waste statistics although no goals are set per each section. The environmental effects of operating were studied accurately six years ago in a research bought externally. Monitoring of the legislation compliance related to Havator's operating has been outsourced and updates are given every month and instantly in case of substantial changes. Environmental deviation notifications are gathered but received extremely rarely, less than once a year. The list of used chemicals and the material safety data sheets are a responsibility of the head of each site. The features of project work such as closed timeframe and changing circumstances create challenges for monitoring the chemicals. Environment related reporting is not substantial due to the low environmental harms caused by operating. Havator is more usually the receiver of environment related notification than the provider of it. Especially project related information is considered important.

The management board gathers eleven times a year and a summary of HSEQ areas is included in the agenda. Internal communication is mostly focused on orientations but all employees are informed about the safety-related goals. Orientations have a base form but are seen as something that could be possibly standardized as the person in charge has obviously a great impact on the values presented during an introduction. Strategic goals such as budgetary goals and other goals are reported in monthly meetings.

Employee satisfaction is investigated irregularly, once every two years. Development conversations with employees have been implemented quite recently, a couple of years ago and are still in progress. No agreed rewarding has been set but the top management has a bonus system and workers are offered a free lunch for every notified hazardous near miss case. The facilities are functional and clean enough. As usually in crane business the equipment is specific and thus functional and back-up machinery exist. Keeping track of equipment such as spare parts is possible. Customer feedback is collected from each site and reviewed in monthly meetings. Feedback on customer satisfaction is performed after projects.

Processes have been described in the resource management system and working methods and technologies used are good and fulfill the company's needs. Plans and operations development have also been documented in the system and are influenced by the feedback and customer requests. Havator has created the quality manual as a part of the ISO certification and Turvallisuus-Kymppi system has also been implemented. HSEQ areas are seen as a constant target for development with partner companies. The HSEQ indicators in the manual have been monitored more closely during the last five to six years. They are of special importance to foreign customers that want to evaluate company operations and its competitive position. Monitoring the basic economic indicators is considered to be obvious for a company as big as Havator. Every set of indicators is monitored weekly. Goals are set and revised if needed. An example of a metric that has reached its goal is the percentage of personnel absence which has dropped below the target limit of 3%.

## 4.4 Summary of the interviews with the case companies

All the interviewed companies gave an impression of having all of the HSEQ areas well managed and in control. That is largely due to the fact that all of them have been granted the ISO 9001, ISO 14001 and OSHAS 18001 certificates. In the conversations after going through the set of answers all interviewees saw the certificates as an excellent prerequisite for passing the HSEQ AP according to the answer list that was went through. Also the relatively high demands of the Finnish legislation were seen to back up some of the answers. Havator is the only company with experience of the HSEQ AP.

Some of the points of the answer list were found a bit unclear and assistance for interpretation was needed. As the interviewer had no previous experience or training in performing a HSEQ AP the understanding was left quite open, however the interviewee wanted to understand it. All points of the answer list were still commented, usually very amply and much conversation was created around the answer list. Documentation and proofs were unnecessary in these interviews but required in the real HSEQ AP. Still much documentation was presented as many systems and applications in use were mentioned, described and even showed in action during the interviews.

All companies were in contact with others about the themes and information seemed to be shared on the daily basis, even though not always officially and with documentation. The Port of Kemi seemed to be well aware of its role as the port keeper and the main authority holder in a shared workplace. The role extended to the environmental responsibility as well with the environmental permit granted. Havator seemed to be more in a role of information receiver. The forms of communication still seemed a bit blurry and were not clear in the interviews. It might be that some form of synergy is required and co-operative studying of the current procedures and developing and clarification could be needed. This is something that the HSEQ AP could be used for.

In industrial companies it is usual that a large scale production company has smaller companies as suppliers and the size of the company is likely to decrease when going down the supply chain. In this case it should be noted that the situation is vice versa: the Port of Kemi is the smallest of the companies when measuring by turnover or employees with the turnover of 5.962 million euros and about 30 employees in 2012, Kemi Shipping coming second with the turnover of 17.157 million euros and about 120 employees in 2012. Havator is the largest with about 110 million euro turnover and about 600 employees in 2012.

To summarize, the three companies are very well up to date when it comes to health, safety, environmental and quality management in their operating field. Pride was shown when telling about the areas they felt to be the strongest and when something felt a bit imperfect corrective ideas and possibilities for improvements were keenly given and went through with no shame or hiding. It came up that the practice of sending the HSEQ AP questions to the assessed company beforehand was seen helpful for preparation to the assessment, not only to gather and organize the proofs and documentation required

but also to check the current status of things and create a small group of people who are best suitable for answering the questions and best aware of any recent changes. This indicates that the opportunity to gain extra information from the actual HSEQ AP evaluators during the assessment would most likely be welcomed and the ideas and tips would be appreciated and put into use. It became clear during the interviews that the evaluators should be trained for performing the HSEQ assessment and additional knowledge and prior experience would be useful.

Providing a logistic link to the Barents area outside of Finland was described as a possibility but in most parts a highly unlikely. The companies seemed to prefer working across the border mostly in partnership with companies that had already established business in Russia. The biggest challenges were seen to be the excessive paperwork and the unpredictability of procedures related to working in Russia. The market seems to be there but there were no eagerness to reach it. All existing connections to Russia were project related and not numerous, even though their number is increasing. Although port business is of course an international field of business as it operates on the border of a country, the most likely business partners were seen to be from other Scandinavian countries rather than from Russia.

## 4.5 Interview with If insurance institution

An interview was performed in January 2013 with Ville Niemelä from If insurance institution. The point of the interview was to get an opinion and perspective of using this kind of evaluation method in the port industry from a party involved and fully acquainted with the port industry but not operating in port business. The insurance company sees measures taken towards improving occupational health, safety, environment and quality as very positive.

The ambiance of the interview was positive and encouraging. The outlook towards the HSEQ AP being adapted in the port industry was supportive and benefits from implementing it were broadly discussed. The method could be seen as a "best available technique" as it is seen to bring added value to the field. Increasing cooperation and communication between four fields of HSEQ were discussed to be beneficial for all parties involved.

The involvement in this thesis of If was welcomed but regrettably remained small. Due to the schedule problems If was not involved in any later steps as was originally planned. The interview and helpful attitude still showed belief in the future development and research on the applicability of the HSEQ AP. Insurance providing companies can be expected to speak up for all innovations likely to reduce risks related to occupational health and safety as well as environmental problems or quality issues. That is why positive feedback was seen worth mentioning.

# 5 CONCLUSIONS

With the knowledge gathered from the literature review in the field of health, safety, environmental and quality management, the HSEQ AP used to evaluate them, the empirical research done in the companies operating in the Port of Kemi and during the visit to Murmansk the following answers can be produced to the research questions posed at the beginning of this study.

1. How does the HSEQ Assessment Procedure work and what are its main principles?

The HSEQ Assessment Procedure encourages the company being assessed to look at its existing management systems of health, safety, environment and quality. After a self-assessment the company can perceive what are its strengths and weaknesses in respect of the issues connected to the question set. The process of gathering proof and evidence of current state of affairs makes the person or people in charge to gather the latest relevant information and become aware of all aspects. At this point the company can still do small changes and corrections if necessary.

In the actual assessment the company is assessed and provided with an outsider opinion concerning the current status of the HSEQ field. The outsider opinion secures that the evaluation is neutral and in no way biased as internal audits occasionally might be. Even with documentation gathered and presented to the evaluators the company's own perception and the assessment team opinions are likely to differ. The company's representatives are offered some guidance and tips on sections found defective. The evaluation is not developed and performed only to show the assessed companies their shortcomings and weaknesses but to help them to improve the areas found in need of improving or to offer different ways to look at things. This means the changes made are always a result of both self-assessment and external assessment. After the actual assessment the HSEQ AP provides support for any possible changes with the reassessment and follow-up. The HSEQ AP eliminates the need for separate external health, safety, environmental and quality audits performed by multiple customer companies that are likely to include same indicators and questions.

2. Can the HSEQ Assessment Procedure be used to create solutions with additional value to port industry?

The HSEQ Assessment Procedure provides the same benefits to the port industry as to other industrial companies: it reduces the amount of external audits. The HSEQ AP serves not only as an external audit but also an internal in the form of the self-assessment. The know-how in the HSEQ areas would be likely passed down the supplier chain and good practices and knowledge would be shared in the assessments. This would lead to rising amount of companies that are prosperous in all the HSEQ aspects. A port operates with many different kinds of companies. The HSEQ AP would ease comparison between

supplying companies and if agreed, ports could benchmark each other in order to foster collaborative learning.

The high level of HSEQ areas should also be seen as an asset in competition. It can be seen as an advantage in competition between not only ports but also between sea transport and other means of transportation. The HSEQ AP would be a good stimulus for competition that is not likely to have any negative impacts on the company's operation and would encourage continuous improvement.

3. What kind of changes would the HSEQ Assessment Procedure bring to the Port of Kemi?

Based on the research performed, three participating companies operating in the Port of Kemi have all paid attention to four aspects of HSEQ which can be stated from their existing ISO standards and success in the interviews. Integrating the HSEQ Assessment Procedure into at least these three companies would further improve the levels of know-how and increase the amount of cooperation and communication between companies. It might attract more customers who have been using other methods or transport suppliers. If the Port of Kemi, Kemi Shipping and Havator would all promote and encourage their suppliers to consider and implement the HSEQ Assessment Procedure, the expertise would spread even further. The Assessment Procedure would be likely to decrease the amount of external audits especially if more than one of the existing companies had implemented the Assessment Procedure as well. It could also be promoted as an indicator of interest in the HSEQ field and possibly even as an achievement similar to the ISO certificates.

4. What can be said about the applicability of the HSEQ Assessment Procedure to port industry according to this study?

The HSEQ Assessment Procedure received good feedback from all the participating companies of this thesis. From answer list used in the interviews the questions were commented to be wide-ranging but exclusive enough to handle all the aspects of HSEQ thoroughly but not too accurately. The companies saw the Assessment Procedure as very good and as a good fit to the port industry but of course some alterations might be necessary. As Havator has already previously been assessed it shows a good example of a company not directly operating only in ports but still acting as a critical player in the Port of Kemi. This indicates that industry and ports might share some suppliers and thus ports might already have suppliers with the HSEQ Assessment Procedure in use. The current trend of incorporations of ports would offer a great opportunity for ports to update and modernize their practices and the HSEQ Assessment Procedure would offer a good endorsement for it.

# 6 DISCUSSION

The port industry has a strong foothold in the Finnish economy as Finland has a history of export. As mentioned in the interviews, the port can be seen as an extension of the production line of a customer company as goods are handled, possibly stored and packed for transportation. Transportation should not be seen as a necessity of doing business but as an asset in competition as it offers possibilities for improvement of deliveries. Poor quality, lack of occupational health and safety processes or environmental practices are noticed not only by the company itself but by its customers as well. Investing in the HSEQ areas can be beneficial to the working atmosphere, well-being at work and decreased amounts of sick leaves or accidents. Thus it would reduce costs related to decreased working capacity, occupational health or accidents and getting substitutes for the personnel on leave. This makes it important for the customers of the port to get a proof of good skills and know-how in structured handling of the health, safety, environmental and quality management.

The likelihood of the business life in the Barents area is great if the current global warming frees the Northern Sea Route for active use. It is obvious that with more traffic and activity the Arctic nature is to be exposed to the greater environmental risks. The high level of environmental management would help to reduce the risks and soften the impact of heavy transport and industry. By removing some of the obstacles and easing the cross border traffic by land between Russia and its north-western neighbors, the load of the sea traffic maybe be reduced.

This experience of using the HSEQ AP in the port industry proves that the HSEQ AP can be used outside of the process industry as well and could be beneficial across many different types of companies but requires to be adjusted accordingly. Based on the research results, it can be stated that the HSEQ AP can be adapted to the port industry; however, it requires further investigation using multiple port cases. Repeating the interviews or performing actual assessments might provide useful information on the fits and misfits in the Assessment Procedure. As for the interviews in this thesis, the expertise of the interviewer was not as high as of those performing the actual assessments and some misinterpretations or misunderstandings might have altered the results achieved. It must be also noted that the Finnish ports have big differences between each other as some ports control almost all port operations and services and some port have outsourced their operations.

The ongoing trend of public utilities become incorporated companies might be a good area to study reflecting the companies' existing processes. The procedure of a communal company incorporating is likely to offer a good timing for auditing the existing activities as changes of management are plausible to take place in all levels of operations. Incorporation might also leave companies without new ideas to replace the practices used in the previous business form but felt in need of change.

Companies in Finland are required to pay a lot of attention related to the fields of occupational health, safety, environment and quality management. Laws already exist that require for example the insurance to cover all employees and occupational health care to be provided for everyone. Due to the high level of expertise, an assessment method created in Finland has potential to be published internationally and circulated between the neighboring countries. Currently some of the requirements mentioned in ISO standards are already covered by the demands of the legislation and are self-evident.

Safety is a multifaceted concept. During this research the environmental issues linked to safety were of key importance and it should not be forgotten to note when discussing safety. Including security as a part of safety or raising it even equal to it was an interest already when this study started. In ports the physical security has been already included in the ISPS codex which includes the fencing of the port area and close monitoring of traffic in and out of the port, both on land and by sea. The port has not encountered any outrage or troublemaking and none of the companies described any extra need for physical security. As the Port of Kemi is not located right next to the city, it might be safe from public nuisance. Security includes not only the gatekeeping and fencing but possibly a video monitoring system, decent lighting and locking systems. As no problems on this area have occurred the further study of this is not seen necessary but still recommendable at some point.

Nowadays virtual security must be seen as a critical part of security. Breaking into electronic information systems has increased and should be seen as troublemaking or physical offence. In some cases companies rely on common sense of employees that are believed not to post confidential information or to pass on any business secrets. Virtual security codes and instructions were not mentioned in the interviews to be put into operation but some guidance had been given to the new employees. In our time online activity has increased dramatically which might eventually blur the lines of what is accepted and not accepted and thus this might still be a good area to investigate even though considered not necessary at the moment. Guiding leaflets or online security advice might be included in the introduction and reminders are given every once in a while.

Virtual security might also be a potential aspect to be added to the HSEQ AP in the future. Its difficulties might be that companies of different sizes tend to have considerably varying levels of use when it comes to online programs and services. This option for developing HSEQ AP should at some point be investigated. Virtual hazards should still be considered as everyday risks when conducting business.

Getting the opportunity to visit the Commercial Port of Murmansk and trying to compare it directly to the Finnish ports was one of the remarkable experiences in this study. Unfortunately the language barrier and a tight schedule did not allow focusing specifically on the separate fields of HSEQ Assessment Procedure. Still it was clear that for example the safety culture is on a different level than in Finland. Perhaps Finnish companies could be used to set an example of how well these areas are managed

elsewhere and an interest of knowledge exchange could be sparked which is one of the goals of the Barents Logistics 2 project.

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# WILL MY COMPANY GET ZERO POINTS FROM THE HSEQ ASSESSMENT?

**Look over the list of claims below. If all of them are true you will receive at least 250 points out of 750 points.**

**HS - Health and Safety issues**

- The company is aware of the competence and know-how of the staff (documentation exists). Know-how is improved by courses and internal training.
- Managers and supervisors have received occupational safety training targeted to managers which includes the responsibilities of occupational safety.
- Working hours of the employees are monitored. A tracking system is in use.
- Occupational health care has been arranged according to legislation, work place inspections and health check-ups have been performed.
- A competent occupational safety manager is nominated. The manager supports and develops the cooperation in occupational safety and health matters supporting the line organization. The occupational safety manager has been notified to the Occupational safety personnel register.
- Occupational safety representative and deputy safety representative have been nominated.
- A systematic course of action of developing occupational safety exists. It includes the goals, methods and responsibilities of occupational health and safety as well as competences and description of occupational health care.
- Work related harms and risk factors (including the ones related to the environment) have been identified and the risks they cause have been assessed.
- Accidents are investigated and documented.
- There is a procedure for processing the hazardous incidents.
- Supplier aims to clarify if its own network of suppliers has the criteria and procedures to fulfill the demand stated in legislation.

**E – Environment issues**

- Waste sorting has been instructed and trained and containers for different sections of waste exist. Sorting know-how is included in the orientation.
- The company occasionally keeps track of changes in the legislation (e.g. checks the legislation related to an order).
- The company has mapped its environmental effects and acts to decrease them (e.g. acts required in legislation).
- A person has been named to be in charge of the maintaining the list of chemicals and getting the material safety data sheets.
- Environmental deviations are registered and dealt with. A list of actions is created if needed.
- The company takes responsibility of environmental issues and informs the interest groups.
- There is at least one indicator for societal results and it is locally compared. (Theses, internships, work hours of externals, environmental goals set by the customer, development of the amounts of waste, functionality of waste sorting or amounts of harmful substances).
- Functionality of waste sorting is checked (e.g. from the waste containers), maximum of one error per container is accepted.
- Different sections of waste are measured, some of them have goals and the trend is improving. Information for comparison is available.

**Q – Quality issues**

- There is a board or team of management and proof of its activity exist (records).
- The company's methods related to quality, environmental issues, occupational health and safety have been informed to the personnel.
- These aspects of operating are measured regularly and the essential data is informed to the personnel.
- Strategic goals, aims and actions have been documented in the company’s plans. The personnel and other interest groups have been informed about the strategy.
- HSEQ related goals, aims and actions have also been documented in plans.
- Orientation procedures exist and they can be proved to be applied.
- Satisfaction is measured (e.g. work satisfaction inquiries, development discussions)
- The personnel are rewarded for good performance.
- The company has evidence of systematically developing its own network of suppliers and partners in multiple fields of HSEQ.
- The working space is functional. Everyone takes care of the tidiness of their own post. The level of cleanliness is adequate.

- Work equipment is task specific. Spare equipment / parts exist. Traceability of measurement has been taken care of.
- Methods and technologies of work are functional and are developed in case of any problems come up. Problems have been analyzed.
- Processes have been identified and are documented with HSEQ aspects taken into account.
- The responsibilities of development and planning have been set and HSEQ aspects are included. The customer needs for example has been used as source information.
- Orders are recorded in an appropriate tracking system.
- Customer feedback is collected, summarized and informed to the interest groups.
- The entire system of processes has been documented (e.g. quality handbook) and commonly known evaluation methods of operations (e.g. Turvallisuuskymppi) have been implemented.
- Customer satisfaction is measured.
- Replies are given to all feedback and their reasons are taken care of.
- Barometers are placed in to active use and comparison material is available. Goals are set and the results are mediocre at the minimum.
- Frequency of incident reports is monitored and a goal is set. The frequency has improved in past years.
- Employee satisfaction is measured repetitively.
- Accident frequency is monitored. A target is set for it and improvement has been made during past years.
- Frequency of personnel absence is monitored. A target is set for it and improvement has been made during past years.
- Percentage of sick leave is monitored and a goal is set.
- Suggestive initiatives are received from personnel and teams.
- The realization of training investments is monitored, goals are set and comparison data exists (e.g. number of training days).
- Economic indicators, such as revenue, income, gearing ratio, revenue per employee etc. are in active use and comparison data is available. Goals have been set and the results are mediocre at the minimum.
- Other indicators that describe the activity well, such as comparisons of productivity, level of invoicing, comparisons of cost efficiency, realization of strategic indicators etc. are in active use and comparison data is available. Goals have been set and the results are mediocre at the minimum.