

July 25, 2016



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LUT School of Business and Management  
Industrial Engineering and Management  
Supply Chain and Operations Management  
Master's Thesis

*Juuso Mikkola*

# **Generation of a Business Plan for a Logistics Service Provider**

Examiner: Associate professor Petri Niemi

Instructors: Associate professor Petri Niemi, CEO of Haanpaa Group Vesa  
Itkonen

## ABSTRACT

<b>Author:</b> Mikkola Juuso	
<b>Subject:</b> Generation of a Business Plan for a Logistics Service Provider	
<b>Year:</b> 2016	<b>Place:</b> Vantaa
Master's Thesis. Lappeenranta University of technology, School of Business and Management, Industrial Engineering and Management, Supply Chain and Operations Management. 94 pages, 6 figures, 5 tables Examiner: Associate professor Petri Niemi	
<b>Keywords:</b> Business plan, transportation, logistics service provider, waste oil, import, oily waste, port	
<p>The purpose of this Master's Thesis was to study the suitability of transportation of liquid wastes to the portfolio of the case company. After the preliminary study the waste types were narrowed down to waste oil and oily waste from ports. The thesis was executed by generating a business plan.</p> <p>The qualitative research of this Master's Thesis was executed as a case study by collecting information from multiple sources. The business plan was carried out by first familiarizing oneself with literature related to business planning which was then used as a base for the interview of the customer and interviews of the personnel of the case company. Additionally, internet sources and informal conversational interviews with the personnel of the case company were used and these interviews took place during the preliminary study and this thesis.</p> <p>The results of this thesis describe the requirements for the case company that must be met to be able to start operations. Import of waste oil fits perfectly to the portfolio of the case company and it doesn't require any big investments. Success of the import of waste oil is affected by price of crude oil, exchange rate of ruble and legislation among others. Transportation of oily waste from ports, in turn, is not a core competence of the case company so more actions are required to start operating such as subcontracting with a waste management company.</p>	

## TIIVISTELMÄ

<b>Tekijä:</b> Mikkola Juuso	
<b>Työn nimi:</b> Liiketoimintasuunnitelman luominen logistiikkapalveluntarjoajalle	
<b>Vuosi:</b> 2016	<b>Paikka:</b> Vantaa
Diplomityö. Lappeenrannan teknillinen yliopisto, LUT School of Business and Management, tuotantotalous, toimitusketjun johtaminen. 94 sivua, 6 kuvaa ja 5 taulukkoa Tarkastaja: Tutkijaopettaja Petri Niemi	
<b>Hakusanat:</b> Liiketoimintasuunnitelma, kuljetus, logistiikkapalveluntarjoaja, jäteöljy, tuonti, öljyiset jätteet, satama	
<p>Diplomityön tarkoituksena oli selvittää nestemäisten jätteiden kuljettamisen soveltuvuutta case-yrityksen palvelutarjontaan. Esiselvityksen jälkeen aihe rajautui jäteöljyyn ja satamien öljyisiin jätteisiin. Työ toteutettiin tekemällä liiketoimintasuunnitelma.</p> <p>Diplomityön laadullinen tutkimus tehtiin case-tutkimuksena keräämällä tietoa monista eri lähteistä. Varsinainen liiketoimintasuunnitelma toteutettiin tutustumalla ensin liiketoiminnan suunnitteluun liittyvään kirjallisuuteen, jonka perusteella suoritettiin asiakashaastattelu sekä yrityksen henkilöstön haastatteluja. Lisäksi työn toteutuksessa käytettiin internetistä saatavaa tietoa sekä epävirallisia keskusteluja, jotka käytiin esiselvityksen ja tämän tutkimuksen aikana yrityksen henkilöstön kanssa.</p> <p>Työn tulokseksi saatiin vaatimukset ja edellytykset toiminnan aloittamiseksi. Case-yrityksen portfolioon sopii parhaiten jäteöljyn tuonti Venäjältä ja sen toteuttamiseksi ei vaadita suuria investointeja. Tuonnin onnistumiseen vaikuttavat muun muassa raakaöljyn hinta, ruplan kurssi sekä lainsäädäntö. Öljyisten jätteiden kuljettaminen satamista sen sijaan ei ole aivan case-yrityksen ydinosaamista, joten sen aloittaminen vaatii hieman enemmän toimenpiteitä, kuten alihankintasopimuksen tekemistä jätehuoltoyrityksen kanssa.</p>	

## **ACKNOWLEDGEMENTS**

First of all, I would like to thank Haanpaa and Vesa Itkonen for providing me this opportunity to do my Master's Thesis. The whole process of writing this has been very interesting and educational. I also want to express my gratitude for the other personnel of Haanpaa for making me feel welcome and being very helpful. Additionally, I want to thank Petri Niemi for his guidance during the preliminary study and this thesis.

Special thanks go to all my friends that have spent time with me in Lappeenranta. Last but not least, I want to say that I am very grateful for the support of my family and especially for the support of my girlfriend during my studies.

Vantaa, July 25, 2016

Juuso Mikkola

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# 1 INTRODUCTION

This research was carried out because executive board of Haanpaa wanted to know more about the transportation of liquid wastes. Before this thesis, a comprehensive study of liquid waste types produced and transported in Finland was conducted and potential of each type was assessed from logistics point of view. After studying the volumes, transportation and treatment of the waste types, decision was made to generate a business plan to study the transportation of waste oil and liquid oily waste from ports more specifically. This decision was based on the total annual volumes of the waste types and it seemed that transportation of waste oil and oily waste from ports had the biggest volumes and therefore also the biggest potential.

## 1.1 Objectives and delimitations

The aim of this thesis is to provide information for managers of Haanpaa so that they are able to assess the attractiveness of the desired markets and make decisions about the future measures that must be taken to get into those markets and to operate profitably in them. Therefore, the business plan aims to answer the following questions:

1. How much potential is there in the transportation of waste oil and oily waste from ports?
2. Which measures must be taken to start the transportation of these waste types and operate profitably?

As already mentioned, this thesis is limited to two waste types. However, oily waste from ports can be further divided to three more precise waste types which are separation waste from fuel separation, oily bilge water and used lubricating oil. These wastes originate from ships that are calling at ports in Finland and the total volumes of different waste types are estimated in this thesis which makes it possible to assess the attractiveness of transportation of these types of wastes.

Assessment of the attractiveness of the waste oil transportation is mostly based on import of waste oil from Russia because it seemed to have the biggest potential whereas attractiveness of transportation of oily waste from ports is assessed from domestic point of view. Consequently, this thesis is geographically limited to transportation of liquid wastes in Finland and to Finland from surrounding countries. Domestic transportation of waste oil is mainly left out of this thesis. Additionally, collection of waste oil from garages and such is also left out because Haanpää is specialized in liquid bulk transportation.

## **1.2 Research methodology**

This thesis consists of two sections which are theoretical section and empirical section. Theoretical section is constructed by studying literature of subjects related to business planning. Literature review gave valuable insights about the information that is needed in business planning and the insights were exploited to form the questions for the interviews. Empirical section of the thesis is executed by doing a qualitative research and it is mostly based on interviews of the parties involved in business area under studying. However, multiple internet sources were also used especially in study of transportation of oily waste from ports. Additionally, empirical section is based on the business plan structure presented in the theoretical section of the thesis.

The qualitative research of this thesis is based on a case study in which, according to Hirsjärvi et al. (2009, 134-135), detailed information about a single case is presented and material is gathered from multiple sources, such as by observing, interviewing and studying documents. According to DiCicco-Bloom & Crabtree (2006, 314-315), interview is one of the most familiar methods of gathering data and it can be used either to test or generate hypotheses. Interviews can be categorized to structured, semi-structured and unstructured. The testing of hypotheses is often done with very structured interviewing format which often leads to acquiring of quantitative data. However, to gain better understanding of a situation or to generate new hypotheses, qualitative interviewing is needed.

Qualitative interviewing encourages the interviewee to give rich descriptions of phenomena of which the researcher can draw conclusions. Unstructured and semi-structured interviews are applicable methods in qualitative research.

The interviews conducted for this thesis were primarily semi-structured because it was seen to be the most suitable method of carrying out the research. Before conducting the interviews, the researcher familiarized himself with the implementation of semi-structured interviews. The semi-structured interview was the best option because according to DiCicco-Bloom & Crabtree (2006, 315) semi-structured in-depth interview is the most common interviewing format used in qualitative research and it is usually organized around a set of predetermined open-ended questions. In addition, semi-structured interview still leaves room for questions arising during the interview. According to Turner (2010, 755), these follow-up questions are often useful as interviewee's responses allow the researcher to change the pre-constructed questions. Adaption of pre-constructed questions enables more personal approach to each interview.

However, some informal conversational interviews were also conducted during the research process. According to Turner (2010, 755) informal conversation is described as spontaneous generation of questions in a natural interaction. This interaction often occurs during the fieldwork of researcher and it is related to researcher's own observations.

### **1.3 Structure of the report**

Theoretical part of this thesis starts with the description of the content of the business plan. Then two business planning tools are described in chapter 3. After that business model for services is introduced in chapter 4 and it includes, for example, competitive advantage of the firm and sustainability perspective. Chapter 5 at the end of theoretical part introduces different aspects of the operating model of logistics service provider.

Chapter 6 is the business plan itself and it follows the business plan structure described in chapter 2. Chapter 6 begins with the short summary of the content of the business plan and it is followed by external environment analyses of both targeted industries. After the external environment is analyzed with PESTLE analyses the description of the company is given and it includes such aspects as core competencies and detailed service information. External and internal analyzes are then used to identify the strengths, weaknesses, opportunities and threats of Haanpaa in the precise markets.

After the analyses, financial data from the import of waste oil would be presented to assess the possible income from the operations but due to confidentiality of the information the financial data is left out of this thesis. Additionally, financial data of transportation of oily waste from ports is excluded from this thesis because to start operating, Haanpaa must take part in the competitive tendering and invitation to tender usually includes an estimation about the volumes and routes which allows Haanpaa to assess the profitability of transportation before making an offer. It would also be quite difficult to estimate costs and income as they are dependent on the contract between waste management company and Haanpaa. Additionally, the waste management companies weren't willing to give information about their operations.

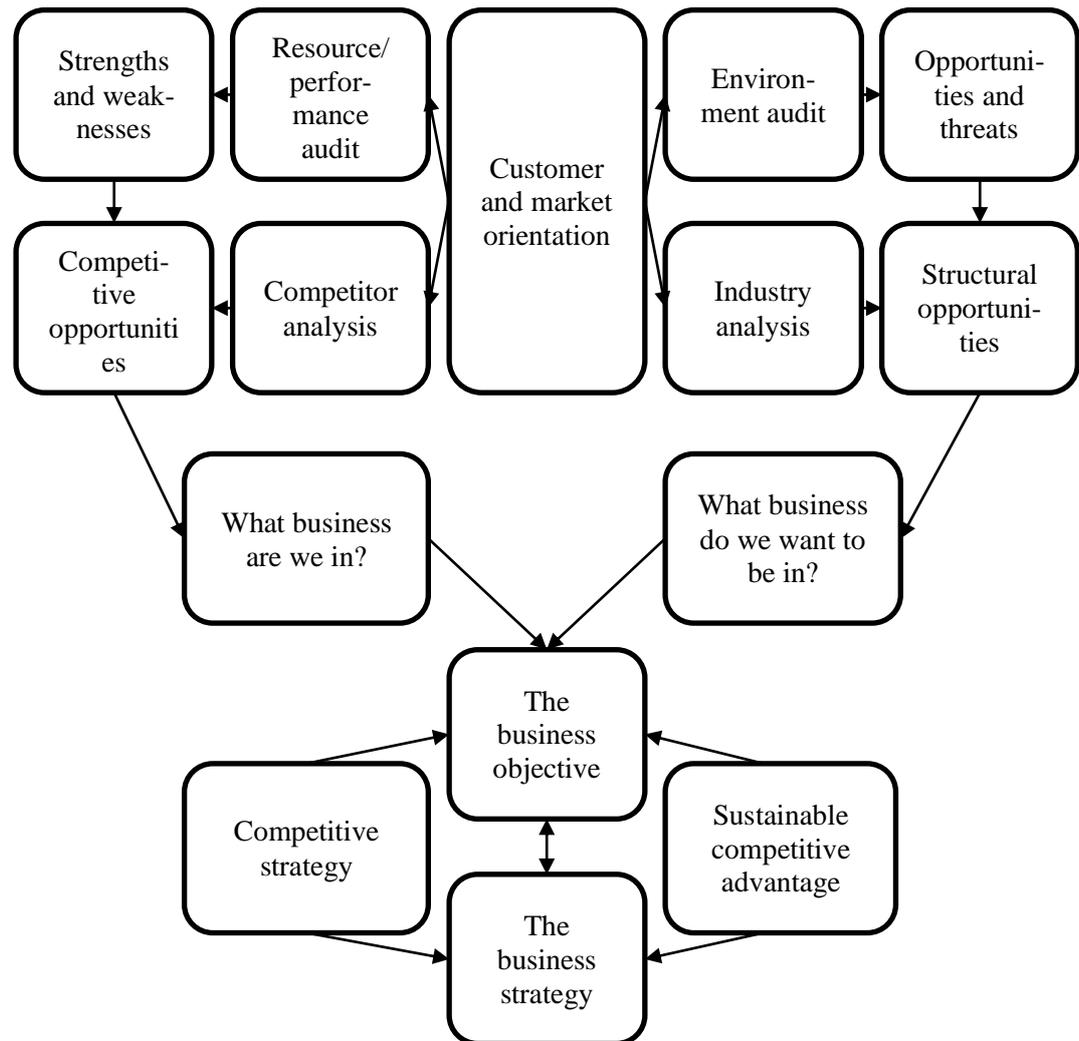
Chapter 6 ends with supporting information which includes risk analyses of both target markets. Conclusions at the end of the thesis in chapter 7 presents the summary of the most important aspects of this thesis. It includes also the recommended actions for the company that should be put into practice to get into the markets.

## 2 BUSINESS PLAN DESCRIPTION

A business plan is a written description of current state and presupposed future of an organization. The plan should also be rooted in the marketplace in order to be relevant. However, good plan is not enough because the implementation of the plan is the most important factor in determining the goodness of it. (Fifield 2012, xxviii; Honig & Karlsson 2004, 29).

Defining the business and explaining in detail how the company will operate in the current market are the main purposes of the business plan. A well-developed plan provides unlimited benefits for a company because planning gives an opportunity to identify potential problems and work out solutions without consequences such as losing money. A business plan also helps the business to stay focused on its objectives and communicates goals throughout the organization. (Hormozi et al. 2002, 755) A business plan is also used externally to attract investors and other potential stakeholders such as customers as well as internally to sell a project to organization's internal stakeholders (Wall & Envick 2008, 117; Osterwalder & Pigneur 2010, 268).

Figure 1 presents a flow chart which structure is followed in this thesis. First of all, the customer and market orientation is decided. Then based on these orientations, the external business environment and industry as well as the resources and performance of an organization are analyzed. Competition analysis is also performed. Environment audit is done with PEST analysis which is described in detail in chapter 3.1. Audits are followed by the SWOT-analysis which gives a view of organization's strengths, weaknesses, threats and opportunities. SWOT analysis is described in chapter 3.2. When competitive and structural opportunities are recognized, both the present and the future business positions are compared. This leads to business objective formulation which is followed by business strategy. The business strategy is generated through assessment of competitive strategy and sustainable competitive advantage.



**Figure 1.** Flow chart for evolving a business strategy (adapted from Fifield 2012, xxix)

## 2.1 Content of a business plan

Business plans tend to follow accepted format and contain similar sections (Hormozi et al. 2002, 756). This widely accepted format is also known as the template model (Rogoff 2003, 23). Most business plans consist of three sections (Bangs 2002, 3). First section is the business, which includes information about business itself, product/service, market, competition and core competencies. Second section takes into account the financial data which includes such aspects as cash flow projections and income statement. Section three of the business plan, in turn, provides information about anything else relevant to the plan such as risk

analysis. (Bangs 2002, 3; Friend & Zehle 2004, 12) A full list of the content of the business plan is presented in table 1.

**Table 1.** Content of the business plan (adapted from Bangs 2002, iii-iv; Friend & Zehle 2004, 12)

The Business analysis	<ol style="list-style-type: none"> <li>1. Description of business</li> <li>2. Markets</li> <li>3. Product/Service</li> <li>4. Core competencies</li> <li>5. Management and personnel</li> <li>6. Strengths, weaknesses, opportunities and threats</li> </ol>
Financial Data	<ol style="list-style-type: none"> <li>1. Cash flow projection</li> <li>2. Projected income statement</li> </ol>
Supporting Information	<ol style="list-style-type: none"> <li>1. Risk analysis</li> <li>2. Contracts</li> </ol>

### 2.1.1 The business analysis

The business section should provide information about status and trends of the industry, detailed product/service and development information, a management team description and a marketing strategy. An overview of the industry the company is entering should be provided because information about the growth or decline as well as the size of the markets is valuable. It's a lot easier to enter growing markets than compete in stationary markets. Realistic view of the markets is much better than overly positive. Therefore, negative information of the industry should not be excluded. (Hormozi et al. 2002, 756-757)

Industry overview is followed by information about the company. This section includes such aspects as core competencies and definition of current business. Identifying core competencies help a company to choose an effective strategy and gain competitive advantage (Rogoff 2003, 31). Core competencies of an

organization are defined as competencies associated with the success of the organization, whereas identification process of competencies at individual or organizational level is called competency modeling. (Garman & Johnson 2006, 14) Core competencies can be considered as an engine of new business development and they can be used to guide the market entry (Prahalad & Hamel 1990, 82). Organizational level core competencies are a collection of knowledge, skills, abilities and other characteristics that can be recognized as strengths of an organization. (Lahti 1999, 61)

Company information should also include company's overall vision or a mission statement and business objective. Mission statement is a short description of the type and purpose of the business. The purpose should be very clear because a focused business has a higher probability of success in the marketplace. Business objective tells, for example, if a company intends to purchase an existing business, start a new company or expand existing operations. (Hormozi et al. 2002, 757)

The product or service is the next thing that needs to be analyzed (Hormozi et al. 2002, 757). The services that most businesses are offering are generic and most businesses are built around services already available in the markets. Differentiating the service from those competitors are already offering is, therefore, very important. The differentiation starts with thorough service knowledge and it is essential to give markets reasons to buy company's services instead of those of competitors'. (Bangs 2002, 21) A firm should also recognize the core competencies which set it apart from the competition (Hormozi et al. 2002, 757).

Personnel must also be analyzed. For instance, it is widely recognized that managers need to have a good understanding of how the business models work in order to make their organization thrive. Studies also show that top management must seek ways to improve their business models and at the same time find new abilities to both create and capture value. (Casadesus-Masanell & Ricart 2010a, 195-196) Value can be also created with personnel differentiation. Hiring and

training better people than competitors give competitive advantage for an organization. (Kotler 1997, 291)

Market section includes evaluation of target customers and competition (Hormozi et al. 2002, 757). Knowledge of the needs and wants of the customers may determine whether the company succeed or not (Bangs 2002, 23). Important customer data includes such aspects as target market, economic structure, location and buying motivation of customers (Bangs 2002, 27; Hormozi et al. 2002, 757). Competitor section also indicates where the service fits in the current environment. (Hormozi et al. 2002, 757) A careful insight of competitors' strategy may help the company to alter its own basic strategy and change existing operations to be able to compete more effectively (Bangs 2002, 44).

Pricing is also an important part of business plan (Hormozi et al. 2002, 757). Pricing is a misunderstood tool and it isn't the only thing driving the purchasing decision because price and perceived value go hand in hand (Bangs 2002, 36). It should be decided how much will be charged for a product or service and recognized from where does that price originate. The most important thing to do is to inspect where the pricing strategy places the business compared to the competition. (Hormozi et al. 2002, 757)

When the service, pricing, competition and customers have been defined it is time to combine all these factors into a marketing plan (Hormozi et al. 2002, 757). Marketing plan can be defined as a logical sequence of activities that leads to setting of marketing objectives and the formulation of plans to achieve them (Whalen & Boush 2014, 454). A marketing plan explains the plans to attract, educate and retain customers. Attracting customers includes details about how to inform the target market about the product or service and educating means the content of the marketing materials which usually includes core competency of the service. (Hormozi et al. 2002, 758)

Personal selling is often used in the sales work of business to business markets. Therefore, B2B marketers must develop and communicate points of difference, such as firm's technical competence and the strength of the reputation of the company. This way they are able to create differentiation and to provide superior value. Marketers in the highly competitive logistics industry must be able to create a brand with a meaningful point of differentiation for it to be truly useful. This can be achieved by focusing on distinctive customer experiences with the brand. (Marquardt et al. 2011, 56) Marketers of a service provider are also able to take advantage of the quality certificates in selling (Moeller et al. 2013, 483).

Analyzing threats and opportunities as well as strengths and weaknesses regularly will help a company to gain competitive advantage. SWOT analysis is a tool that can be used to assess internal and external environment of a company. It also helps to get a larger picture of the business environment. (Bangs 2002, 50) Content of the SWOT analysis will be discussed in more detail in chapter 3.2.

### 2.1.2 Financial data

Management of resources is essential to any business enterprise and therefore providing financial data in a business plan is often necessary. The financial section begins with projections of expenses and net income and it's substantiated with financial statements such as income statement which reports the profitability of the operations for the reporting period. It starts with revenue statement from operating activities and these revenues are measured by the amount of cash received or expected to receive from transactions. Net income is calculated by subtracting the costs and expenses that have incurred in generation of revenue. (Hormozi et al. 2002, 758) Financial documents can be used as a planning tool, budgeting tool, an early warning system, a problem identifier and a solution generator if they are used correctly. However, inconsistent or incorrect use makes them worthless. (Bangs 2002, 70)

### 2.1.3 Supporting information

Business development is naturally risky and risk varies from business to business. Many of the potential risks can be identified during the business planning process. However, there will also be some unforeseen risks that a business must be able to deal with when they arise. When identifying as many potential risks as possible during the planning, the results from SWOT analysis and PEST analysis can be used. In particular, the weaknesses and threats detected in conducting a SWOT analysis can provide an overview of risks facing the business. In addition, the results of PEST analysis provide information about political and financial risks. (Friend & Zehle 2004, 236-238)

Risk analysis consists of four steps: risk identification, risk assessment, decision and implementation of risk management actions and risk monitoring (Hallikas et al. 2004, 52). Risk, in the context of supply chain management, include operational uncertainties in the supply chain activities. These operational uncertainties originate from environmental risk factors, infrastructure risk factors, service delivery risk factors and organizational and relationship risk factors. (Cheng & Kam 2008, 347-349) In risk analysis, it is also pivotal to understand and identify probability of risky events and losses (Hallikas et al. 2004, 50).

When an organization is outsourcing its logistics activities it must make a contract with a logistics service provider. This contract must clearly state the rights and responsibilities of both parties and include a description of such things as quality standards and price. According to studies, subcontract conditions are seen as the most critical risk that affects the subcontractors. Therefore, subcontractors must take the risk into account in their tenders. (Uher 1991, 495-496) Lowest level of such contracts are the short-term contractual relationships between LSP and their client which includes just transportation or warehousing. Higher levels include some value added activities, such as planning and transportation management and they are often long-term contracts. (Hsiao et al. 2010, 77)

## **2.2 Differences of business plans for goods and services**

The traditional business plan is incomplete because services are different from goods. A business plan for a service organization should provide a clear description of how the business aims to connect with the customers and manage their experiences with the organization. In other words, traditional business plan outlines do not include customer experience management which should be integrated throughout the different sections. (Wall & Envick 2008, 117)

Including customer experience management in the business plan is imperative in today's competitive environment and there are three factors that play an important role in creating the customers' service experience. These factors are technical performance of the service, tangibles associated with the service and the behavior and the appearance of the service provider. By including these three factors into the business plan, a service organization has a better opportunity of succeeding. (Wall & Envick 2008, 117; 123)

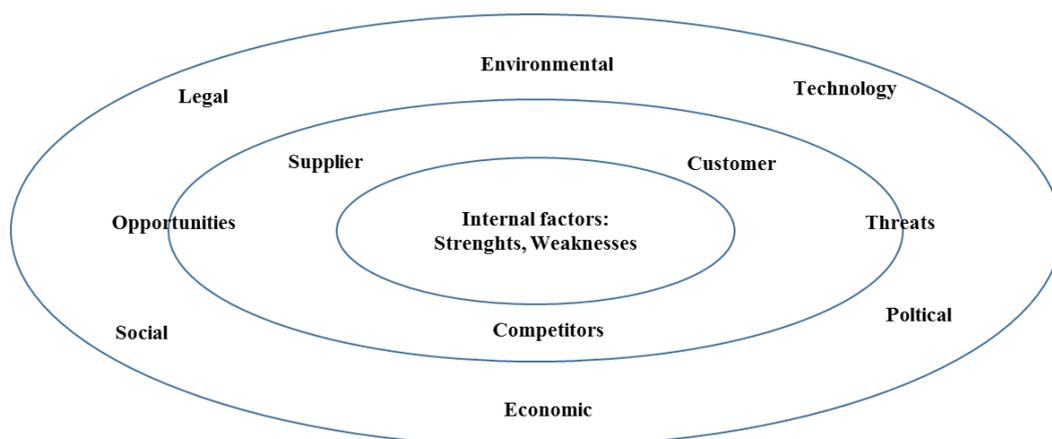
It is also essential to remember that customers experience intangibles and services are performances instead of object. This drives customers to look for clues that they can evaluate both before and during the service performance. The overall experience is created for the customers by all three factors. By definition, a good customer service comes from a good customer experience and the experience itself is the service. (Wall & Envick 2008, 123)

### **3 TOOLS FOR BUSINESS PLANNING**

A successful business plan must address the overall context in which the organization will be operating during the planning period. Environmental assessment must be focused especially on organization's present and future services, market analysis and customer analysis. External environment analysis on market opportunities should be assessed not only by the attractiveness and success probability of the opportunities but also by the seriousness and probability of occurrence of threats. (Kotler 1997, 81; Truitt 2002, 75) In addition, the feasibility of market opportunities should be assessed (Laukkanen & Patala 2015, 5).

Attractiveness of market opportunity refers to potential cost savings, expected income, positive image effect and responding to customer needs. The feasibility, instead, takes into account the expected implementation costs and complexity of the technology and organization. In other words, the feasibility assessment deals with the question of how challenging the planned actions are to implement. (Laukkanen & Patala 2015, 33)

This chapter presents the theoretical tools for environment analysis. First the content of the PEST analysis and purposes for its use are presented. Then the four factors in SWOT analysis are discussed and they are divided to internal and external factors. These two tools form a framework for the environment analysis and they are later used to study the present and the future environment of the case company. Factors and stakeholders behind the business analysis are presented in figure 2.



**Figure 2.** Factors and stakeholders of business environment analysis

### 3.1 PEST analysis

Letters in PEST stand for Political, Economic, Social and Technological and all these factors are used to assess the markets for business. (Goodman & Hawkins 2015, 32) PEST analysis identifies the environmental elements that may affect an organization's performance and that should be considered during the planning process. (Friend & Zehle 2004, 40) In other words, the four factors can be used as a framework for reviewing a situation and also to review strategy, direction, marketing proposition or an idea. (Goodman & Hawkins 2015, 32-33) According to Hamid et al. (2014, 121) PEST analysis can also be used as a tool to identify and evaluate external opportunities and threats.

Political factors may affect the business operations of an organization (Armstrong 2006, 11). They take into account the intervening of the government and they include such areas as tax policy, environmental law, trade restrictions and tariffs (Goodman & Hawkins 2015, 33). Also stability of government as well as change of political leader or party may affect to operations of a company (Steffan 2008, 64). In addition, regulation can have a huge impact on the business environment and on certain markets local practices can complicate business operations. For instance, bureaucracy or corruption can be difficult to handle for organizations. (Friend & Zehle, 2004, 33)

Economic factors consider, for example, areas like economic growth, interest rates, exchange rates and inflation rate. These factors impact on how businesses operate and make decisions. Additionally, economic development of a country also affects to the nature of services that can be marketed and the level of infrastructure supporting the performance of business activities. (Goodman & Hawkins 2015, 33; Friend & Zehle 2004, 34) Economic factors need to be carefully monitored both on domestic and international level in order to exploit any opportunities and to be aware of any threats that require any actions from the company (Armstrong 2006, 11).

Trends in social factors may affect the way that company operates. Social factors include cultural aspects, such as population growth rate, education, habits and concerns about the environment and sustainable development and they have an impact especially on market demand. However, changes in social and cultural values of a country occur over many years. Therefore, these changes do not pose a big threat for a company's operations. (Friend & Zehle 2004, 34; Goodman & Hawkins 2015, 33; Gupta 2013, 13; Steffan 2008, 65)

Changes in technology may affect dramatically on an economy. Technological factors include, for example, research and development activities and technology incentives and the rate of technological change and these factors can determine barriers to entry. Technological shifts might also affect costs and quality. (Goodman & Hawkins 2015, 33; Friend & Zehle 2004, 34)

PEST-analysis can also be expanded with two additional categories which are legal and environmental factors. Legal factors can affect the company's operations and costs and they include, for instance, anti-competition law, employment law and health and safety law. Environmental factors consider environmental aspects, such as climate change. The awareness of the impacts of the climate change have an impact on how companies operate and what they offer to the customers. Legal and environmental factors turn PEST analysis into PESTLE analysis. (Goodman & Hawkins 2015, 33-34)

PEST analysis will reveal several external environmental influences on business' performance. However, even though PEST analysis is an important part of a business plan, some assumptions need to be made because of the uncertainty of the available data. Therefore, it is important to remember that no matter how carefully the analysis is conducted, there still remains some uncertainty in factors included. (Friend & Zehle 2004, 32; Steffan 2008, 65)

### 3.2 SWOT analysis

SWOT is the acronym that refers to the strengths, weaknesses, opportunities and threats. Strengths and weaknesses are internal factors of an organization that can be used to situation audit and further to reevaluation of vision and goal-mission-strategy statements of an organization. (Gandellini et al. 2012, 78; Truitt 2002, 63) Internal factors are in relation to the potential opportunities and threats in organization's operational context which is the external environment, industry or market of an organization. (Gandellini et al. 2012, 78) In short, the business environment of an organization consists of large variety of forces beyond the control of the management and these forces pose threats as well as provides opportunities to organizations (Chi 2006, 31). SWOT analysis matrix is presented on figure 3.

	<i>Positive</i>	<i>Negative</i>
<i>Internal factors</i>	<b>Strengths</b>	<b>Weaknesses</b>
<i>External factors</i>	<b>Opportunities</b>	<b>Threats</b>

**Figure 3.** SWOT analysis matrix (Friend & Zehle 2004, 86)

An organization's strengths and weaknesses should be analyzed in terms of marketing, finance and organization. Market section includes, for example, company reputation, service quality and effectiveness of pricing and distribution.

Financial aspects are, for example, availability of capital, cash flow and financial stability. Organization section takes into account such aspects as leadership, employees and flexibility of an organization. Strengths and weaknesses should be assessed and organizational competencies recognized among these factors. (Kotler 1997, 82-83)

Opportunities and threats originate from trends and developments in macroenvironment and microenvironment. Macroenvironment forces – political, economic, social, technological, legal and environmental – are already presented in chapter 3.1 but, in addition, significant microenvironment actors should also be monitored. These actors are customers, competitors, distribution channels and suppliers. The purpose of environmental scanning is to find new marketing opportunities from profitable markets and evaluate threats posed by unfavorable trends or developments. (Kotler 1997, 81)

## 4 BUSINESS MODEL FOR SERVICES

The purpose of the business model is to define the manner by which an organization brings value to the customer, attracts customer to pay for value and how those payments are converted to profits. Consequently, it is a reflection of management's hypothesis about what customers want, how they want it and how the company is going to meet those wants and get paid at the same time. (Teece 2010, 172) Osterwalder & Pigneur (2010, 14) defines business model as a description of how a firm creates, delivers and captures value. It is also like a blueprint for a strategy that must be implemented throughout the organization.

Value proposition is essential to the definition of internally and externally relevant strategic documents. Internally, the purpose of value proposition is to prepare the ground for discussion on the opportunity to investment especially when the top management need to be assured to get their permission to proceed with the operation. This is an important step and it explains the feasibility of the operation and make sure that it is in line with the values and mission of the organization. From an external point of view, value proposition describes the added value to the customer and helps to define the marketing plan. (Cinquini et al. 2013, 59)

It is a big challenge for a service provider to understand customers' evaluation of service and the contribution of different elements of value to customers' perception of created value during the service delivery process (Rahikka et al. 2011, 357). Value created for the customers as described in the value proposition can be quantitative or qualitative. Quantitative value can be, for instance, price or speed of service and qualitative, for instance, customer experience and design. The value is created through a distinct mix of elements catering the needs of the specific customer segment. For example, performance has been a common method to create value because customers appreciate improved performance. Customization is also a good way to create value. Tailoring products and services to meet the requirements of the customers or customer segments and customer co-creation have gained importance. For example, based on buying behavior and service needs of

the customer segments, separate supply chains can be designed to meet their specific needs. “Getting the job done” is also a viable value creation method. It means that an organization simply helps customers to get certain jobs done which allows them to focus on their core competencies. (Osterwalder & Pigneur 2010, 23-24; Bask et al. 2010, 153-154).

To be successful, the business model of an organization must be able to fulfill two tasks: it has to provide stability for the development of activities and be flexible enough to allow changes. Flexibility and adaptability to changes enable a firm to exploit new opportunities. When an organization adapts to changes, a business model must also change. Business model change can happen in four ways of which the first is creating a business model from scratch. This is a process of putting a new business model into action. Second type of business model change is extension which means adding activities or expanding core processes to an existing business model. Third way of business model change is revision which removes something from existing business model and replaces it with a new process. The last type of business model change is business model termination. It means closing down a unit or even an entire company. (Cavalcante et al. 2011, 1328)

Competitiveness of an organization is in relation to how well its business model interacts with the environment to produce offerings that add value. Therefore, a firm to be able to add value it must have a proper business model. Added value makes it also possible to capture value and as a result an organization can sustain its existence. (Casadesus-Masanell & Ricart 2010b, 124-125) For example, setting the right price for each segment and defining how the company creates value for itself while providing value to the customer is a profit formula and a blueprint for revenues of a business model (Johnson et al. 2008, 53). In addition, business models do not act in isolation. They are in interaction with the other industry participants, such as customers, suppliers, competitors and producers of substitute and complementary products or services. An organization’s ability to continue value creation and capturing is affected by shifts in external environment and tactical and

strategic moves of other industry players. (Casadesus-Masanell & Ricart 2010b, 124-125)

#### **4.1 Competitive advantage of the firm**

Competitive factors can be divided roughly to two categories of which the first one includes factors based on price, efficiency and standardization. The second category consists of factors that answer to specific customer needs, such as quality, flexibility and tailored services. Organizations that have chosen their strategy from the first category are taking advantage of cost leadership strategy, whereas companies that executes strategy from the second category trust on differentiation strategy. Companies in cost leadership category gain competitive advantage from four different sources:

- lower level of prices,
- simpler selection of services,
- lower costs of business and
- more efficient use of capacity.

Lower costs of business and more efficient use of capacity can be obtained through economies of scale. Especially bigger service providers can gain advantage in this area. (Hillman 2010, 13; Solakivi et al. 2014, 110)

Organizations in differentiation category, in turn, take advantage of seven factors in pursue of competitive advantage and the factors are:

- stronger brand,
- larger selection of services,
- tailoring of service,
- marketing communications,
- superior quality
- faster operations
- more flexible operations. (Solakivi et al. 2014, 110)

Teece (2010, 173) states that in order to gain competitive advantage the business model must be sufficiently differentiated and hard to replicate by competitors.

Companies have to be able to anticipate the emerging trends to gain or maintain a competitive advantage (Gandellini 2012, 50). Therefore, they must be capable to adapt rapid changes especially in the logistics industry (Neubauer 2011, 69). To realize a true competitive advantage, an organization must also commit in the following actions:

- focus on your customer – know who you want to target and understand customer needs
- know your competition – identify your competitors and understand their strengths and weaknesses
- coordinate all marketing efforts with other functions within the organization – marketing is not an isolated function. Information should be shared throughout the organization.
- market orientation – orientation enhances the overall performance. (Leventhal 2005, 3)

An organization can obtain competitive edge with the help of business model's building blocks. This can be gained by configuring the building blocks to execute strategy on the markets. Competitive advantage can be obtained especially, when an organization has a unique value proposition. Therefore, the business model itself can become a source of competitive advantage in addition to just creating and delivering value to the customers. Consequently, the business model is a direct outcome of strategy but it is not a strategy itself. (Boons & Lüdeke-Freund 2013, 10)

An organization's competitive position is determined by its competitive scope and competitive advantage. Competitive scope is an answer to a question where the organization is about to compete and competitive advantage an answer to how it is going to compete. In order to recognize competitive advantage possibilities in a specific industry, the firm need to identify the critical success factors that are the most relevant in that industry. A company may also obtain competitive advantage through customer value creation. However, customer value construct is very difficult to measure accurately due to its complex nature. Customers determine the

value of product or service differently and therefore it is pivotal for a company to develop a deep understanding of what customers seek. (Vanderstraeten & Matthysens 2012, 657)

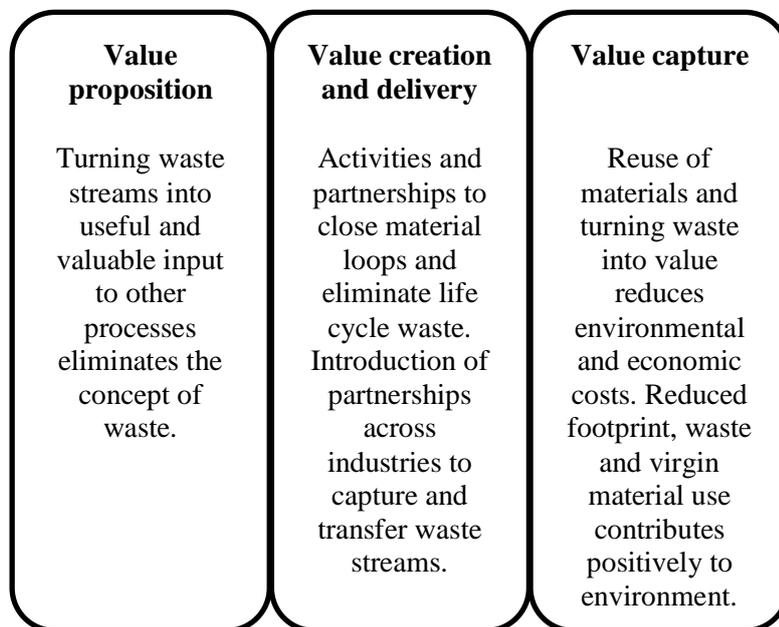
## **4.2 Sustainable business model**

A sustainable business model is a business model that contributes to a sustainable development of the company and creates competitive advantage through superior customer value (Lüdeke-Freund 2010, 23). Value creation is considered as one of the central means through which a company is able to gain competitive advantage in the marketplace (Woodruff 1997, 140). Therefore, sustainable competitive advantage is created by offering better value than the competition (Landroquez et al. 2013, 236). A sustainable business model also considers environment and society as key stakeholders and aligns interests of all stakeholder groups. However, it is not always clear how to translate social and environmental value into profit and competitive advantage for an organization. Therefore, the biggest challenge in sustainable business model planning is designing the business model in a way that enables a company to capture economic value through sustainability. (Bocken et al. 2014, 44)

Bocken et al. (2014, 48) divides sustainable business models to three groups – technological, social and organizational. These groups consist of eight archetypes based on the way the sustainability is put into action. Technological group includes such archetypes as creating value from waste, material and energy efficiency maximization and substituting non-renewable with renewables and natural processes. Social group includes three archetypes – delivering functionality instead of ownership, adopting a stewardship role and sufficiency encouragement, while organizational group consist of two archetypes which are repurpose for society/environment and developing scale up solutions. However, Laukkanen & Patala (2015, 10) state that the sustainability often requires a combination of different archetypes and many of the archetypes also require cooperation between different

lines of industries and stakeholders. Bocken et al. (2014, 54) say that combinations are almost essential to be able to achieve real sustainability.

As this thesis aims to develop a business plan for transportation of waste oil and oily waste from ports, the archetype of creating value from waste in technological group is discussed in more detail. According to Bocken et al. (2014, 49) archetype of creating value from waste aims to reduce environmental impact of industry with closed material loops and using waste streams as valuable inputs to other processes. This reduces the demand for virgin raw materials and resource depletion as well as cuts the amount of waste. In addition, emissions can be reduced when creating value from waste. Figure 4 presents the value proposition, value creation and delivery and value capture of the creating value from waste archetype.



**Figure 4.** Sustainable business model archetype: creating value from waste (Bocken et al. 2014, 49)

Goals of environmental sustainability cannot be accomplished in isolation. Therefore, organizations form networks of social, professional and exchange relationships with other organizational actors. These industrial networks that advance environmental sustainability through inter-organizational collaboration are called eco-industrial networks. They aim to take full advantage of by-products and

reusable materials. Eco-industrial networks balance environmental concerns with performance across the supply chain which leads to better operational efficiency in transportation and less wasted resources as well as development of reverse supply chains for recycling and reusing used products. As a result, the network can obtain sustainable competitive advantage. (Patala et al. 2014, 166-169) Drivers behind the operational efficiency improvements and minimization of waste in supply chains are cost savings, customer demand and legislation (Laukkanen & Patala 2015, 46).

## **5 LOGISTICS SERVICE PROVIDER'S OPERATING MODEL**

The use of logistics service providers (LSP) is a result of logistics outsourcing. Lambert et al. (1999, 165) describes logistics outsourcing as “use of a third party provider for all or part of an organization’s logistics operations.” Logistics outsourcing has gained momentum due to the fact that logistics service providers can operate more effectively than the manufacturer, because logistics is their core business. Hence, proper utilization of core competencies and specialization effects lead to lower costs in the supply chain. (Deepen 2007, 22)

Logistics service providers provide their customers a selection of traditional and supplementary services of which traditional services include transportation and warehousing and supplementary services include, for example, administration and track-and-trace services. (Forslund 2012, 296-297) Usually, when management decides to use an outside party for firm’s logistics activities, it forms a long-term relationship with the third party service provider. This relationship is often called a partnership. (Lambert et al. 1999, 165) Partnerships are used to strengthen supply chain integration and provide sustainable competitive advantage. Partnering also allows partners to leverage from the unique skills of each other. (Lambert et al. 1996, 1)

### **5.1 Third party logistics service providers' strategies**

The term third party logistics (3PL) service provider can be used as a synonym for logistics service provider (Stefansson 2006, 76). Third party logistics services are industrial services and they are a subset of services in general. When industrial services are compared with other services, several distinguishing characteristics can be found. Industrial services are customized for a specific customer and they are performed to goods instead of people. In addition, industrial service relationships are often long-term and continuous which make the prediction of the demand of customers easier than in the consumer services. (Lukassen & Wallenburg 2010, 25)

Logistics service providers usually act as intermediaries between supplier and customer and as they handle a large share of customer's activities, they are significant actors in supply chains. Logistics performance in supply chain is created by all three actors and therefore responsibility should be shared and cross-company relationships should be formed. (Forslund 2012, 296-297) The three-way, networking relationship among buyer, supplier and logistics service provider is called logistic triad where logistics service provider is responsible for moving and storing the goods between supplier and buyer. This kind of three-way relationship leads to improvements in operations, such as better customer service, lower inventory levels, lower transportation costs for the buyer and an increase in on-time deliveries. (Larson & Gammelgaard 2001, 71-72)

The interest for contracting has increased in supply chains. A contract is defined as an agreement between two parties under which they promise to do something for each other and both are obliged to fulfil their part of the agreement. Traditionally, most contracts in the supply chain are made to deal with purchasing volumes and risk sharing. (Forslund 2009, 131) One of the most important instruments of contracts is agreed-on price model. In long-term arrangements well fitted price model enables further development and success in relationship. (Lukassen & Wallenburg 2010, 24-25) Contracts can also be applied to logistics service performance regulation (Forslund 2009, 131). Thus, performance capabilities are considered essential for LSPs' competitiveness. Performance can be measured with a wide range of variables, such as on-time delivery, responsiveness, flexibility, costs, on-time shipments and capacity utilization. (Forslund 2012, 297-298)

Traditionally, customers of 3PL services have appreciated cost advantages and delivery performance. However, due to competitive pressures customers have recognized that these two factors are not enough in the modern business world. Some studies even state that, for example, performance, quality, technology and price are taken for granted. As a result, such attributes as level of information technology capability is a differentiator in the eyes of the customers of logistic service provider. (Anderson et al. 2011, 99; 110) In addition, increasing concern

about the environmental impact of the business operations increases the interest of customers of LSP to evaluate and select suppliers from sustainability perspective (Lam & Dai 2015, 317). From the logistics service providers' point of view, contracts will be won by being able to differentiate the service offering from the competitor's offering and presenting unique capabilities and embedding superior knowledge. However, the most important attribute greatly depends on the characteristics of the industry the customer is positioned (Anderson et al. 2011, 99; 110). The most relevant attributes recognized in studies are presented in figure 5.

**Reliable performance:** consistent "on time" delivery without loss or damage of shipment

**Delivery speed:** amount of time from pickup to delivery

**Customer service:** prompt and effective handling of customer requests and questions

**Track and trace:** transparency and "up to the minute" data about the location of shipments and end to end

**Customer service recovery:** prompt and empathetic recovery and resolution of errors or problems concerning customers

**Supply chain flexibility:** ability to meet unanticipated customer needs, e.g., conduct special pickups, seasonal warehousing

**Professionalism:** employees exhibit sound knowledge of products and services in the industry and display punctuality and courtesy in the way they interact and present to the customer

**Proactive innovation:** this activity refers to the provision of supply chain services aimed at providing new solutions for the customer

**Supply chain capacity:** the ability to cope with significant changes in volumes, e.g., demand surges and deliver through multimodal transport services including: international express and domestic, by air, ocean and land

**Relationship orientation:** characterized by sharing of information and trust in the exchange partner

**Figure 5.** The most relevant attributes affecting the 3PL selection decision (Anderson et al. 2011, 101)

However, firms are often forced to make trade-offs because of limited resources. Moreover, many requirements of customers may be conflicting in nature, such as lowest cost and highest quality. It is important to resolve these trade-offs in a manner that answers to most important customer requirements. Additionally, these trade-offs have an impact on the development of LSP's strategies and the overall performance development of LSPs. (Lam & Dai 2015, 317)

## **5.2 Partnerships in logistics**

According to Sanchez (2011, 8) there are four different types of partnerships: networking, cooperation, coordination and collaboration. This division makes partnership a parent category with subcategories that distinguish the depth of partnership. These subcategories also differ in purpose, strength of linkage and formal agreement. The loosest type of partnership is networking and the main purpose of it is to share information and contacts. Network partnership is easy to leave for organization as the depth of partnership is quite low. Cooperation and coordination, in turn, are often tighter relationships than networks. However, organizations usually partner to ensure that their own organizational objectives are met which means that partners don't share a joint objective. The strongest type of relationship is collaboration in which organizations share a common goal that wouldn't be achieved by either organization on its own. Governing processes of collaboration are quite complex as organizations share responsibilities, risks and rewards in their shared vision.

Carbone & Stone (2005) presents a fifth type of partnership, a logistic alliance. However, it is comparable to collaboration described by Sanchez (2011). Logistic alliance is a relational strategy where two or more companies, that share a common business objective, has a formal or informal agreement. This type of partnership is encouraged by the fact that no firm has all the capabilities to achieve its goals in the logistics provision. When logistic alliance involves customers and third party logistics service providers it is called vertical logistic alliance. Vertical logistic alliance is based on long-term relationship between customers and third party

logistics service providers. Usually logistics service provider handles all or at least a considerable amount of its customers' logistic activities and, therefore, logistics service provider sees itself as a long-term partner in this customer-LSP-relationship. A vertical alliance includes planning and handling inbound and/or outbound freight flows in the nodes of the logistic network. Logistic alliance aims to improve service levels, inventory management and order processing. (Carbone & Stone 2005, 502-503)

Logistics service providers need an advanced understanding of different forms of collaboration because, for instance, value creation is a cooperative effort. Inter-organizational interaction can happen either by combining organizational resources or collaborating across company boundaries. Value creation logic of a professional service is problem solving instead of production or sale of physical product or alternatively linking of actors who wish to be interdependent. When intermediary service provider links other actors the value network is created. Partnerships in this network refer, for example, to efficient allocation of activities and resources to reduce costs but they can also be functional which means that the activities and functions are coordinated and adjusted in a supply chain over company borders. Linking of supply chain functions over company borders can achieve economies of integration which includes such forms as sharing forecasts or other information and joint planning efforts. (Wang et al. 2016, 117-119)

### **5.3 Cross-border supply chains**

Successful outcome of transboundary operations may be significantly contributed by proper management of cross-border logistics flows and paying attention to supply chain relationships and integration. Studies also confirm that there are positive effects of supply chain collaboration to operational performance. Collaboration may involve such components as planning, joint operating controls, communication, risk/reward sharing, trust and commitment, contract style, scope and investment. Supply chain integration can also be achieved through local presence and market commitment and local presence is often crucial in creating

market knowledge. In addition, having managers that are experts on the local business culture and practices is very important. (Lorentz 2008, 246-250; 260)

While the flow of goods and collaboration across national borders between European Union countries is quite simple and smooth, in many parts of the world the cross-border flows are not always that simple to implement. Such is the case of Finland and Russia where national and cultural differences in many aspects are significant. There are, for example, such differences as opacity of doing business and international trade logistics performance. Finnish companies experience the biggest challenges in Finnish-Russian business in the areas of customs regulation, bureaucracy, uncertainty, financial flows and logistics and transport. Some of these difficulties result from the fact that Finnish-Russian border is also the border of European Union. International markets represent a whole new market where cultural barriers as well as differences in political, legal and currency regimes make human interaction more difficult. As a conclusion, cross-border context requires high levels of supply chain collaboration in order to balance out the uncertainty caused by environment and controllability of operations and to maintain good operational performance. (Lorentz 2008, 247-248)

According to study of Lorentz et al. (2008, 259), most effective areas for collaboration are supply chain design and joint-planning. Supply chain design collaboration streamlines the logistics flows in an uncertain cross-border context. Joint-planning, in turn, should include such aspects as facility location, mode of transport, carrier selection and general flow management related decisions.

#### **5.4 Empty flows and backhauling**

Freight prices play a key role in trade. Therefore, they determine the transport activities both regionally and internationally. Hence, the deep understanding of freight prices is essential to understand the freight transport. Problems in the pricing of the transportation arise because often the volume of transported freight is not in balance between two locations. As a result, transport flows are mainly to one

dominant direction which means that logistics service providers are faced with the difficulty of finding freight for their return trip. This imbalance in volumes of transportation is called a backhaul problem. Additional imbalance is often generated between two locations because logistics service providers are specialized in the transportation of certain type of freight. (Demirel et al. 2010, 549-550)

In freight business, some routes are more profitable than others because in the imbalanced transportations the price of the return trip, the so called backhaul price, is zero as there is nothing to transport. This will lead to a situation where logistics service providers are forced to drive unprofitable empty backhaul. Therefore, the costs of transport are equal to the round trip which means that all the costs are fully borne by the customers of high demand location. However, if the logistics service provider is able to transport at least some freight to both directions, the fronthaul price is still higher than the backhaul price due to the difference in demand. (Demirel et al. 2010, 550-551; Arcelus et al. 1998, 201)

The exploitation of backhaul opportunities is promoted by multiple studies. For instance, Dejax & Crainic (1987, 237) propose that backhauling should be used in multiple town systems where full loads are carried to a client by trucks and they are able to take full loads from another town nearby on their return trip, instead of returning empty. In this case the, the backhauling addresses the situation where the routes are already established and a load is searched only for the last leg of the trip.

## **5.5 Modes of transportation**

Transportation of freight can be executed by using a single mode of transportation, such as road transportation, or multiple modes of transportation. When multiple modes of transportation are used, it is called intermodal transportation. Intermodal transportation, also known as combined transportation, is a door-to-door service provided by a network of companies. It includes at least two modes of transportation, which can be road, sea or rail. The purpose of intermodal transportation is to reduce road transport by shifting to use of some other mode of

transportation. Therefore, intermodal transportation requires a waterway or rail infrastructure to be set up and sufficient volumes of geographically concentrated flows. In addition, organizing door-to-door intermodal transportation requires, for example, freight handling at the maritime terminals. As a result, price is a critical factor in the intermodal transportation because high level of coordination is required in integrated freight transport systems. (Lehtinen & Bask 2012, 97-102; Frémont & Franc 2010, 548-549)

The characteristics of the transportation mode and service used may influence performance. Road transport is the most flexible mode of transport and it is able to integrate maritime, rail and air transportation. For instance, when road transportation is used, a shipment may be released at any time provided that a vehicle is available, whereas, when either maritime or rail services are involved the release of a shipment must match the scheduled departure times of the ship or train being used. There are also restrictions in the capacity depending on the type of transportation service. In the case of road transportation, there are usually less capacity restrictions, given that vehicles are more readily available. However, in maritime and rail transportation the number of available container spaces on ships and trains is limited which restricts the capacity. (Bookbinder 2013, 510; Mariotti, 2015, 3)

## 6 BUSINESS PLAN FOR HAANPAA

In this chapter, first the trends that affect the transportation of waste oil and then the attractiveness of it are discussed. After that the external business environment of Haanpaa is analyzed with PESTLE analysis. They are then followed by similar analyses of transportation of oily waste from ports. As described in chapter 3.1, the PESTLE analysis includes political, economic, social, technological, legal and environmental factors that affect the environment of an operating company. The effect of each factor is assessed by analyzing the results of conducted interviews and additional information is collected from internet sources. The PESTLE analyses of this thesis were made to study the impact of different factors to either the amount of liquid waste or the transportation itself.

After the PESTLE analyses, the different features of the company itself are analyzed. Chapter 6.3 includes such aspects as core competencies, detailed service information, management and personnel, customers and competition and marketing strategy. Company description is followed by SWOT analyses of both transportation of waste oil and oily waste from ports. Rest of the chapter presents the financial data and supporting information.

Data was gathered with interviews and from internet sources. The conducted interviews were used to get an overall picture of the business environment. The aim of the interview of the customer was to find out which attributes are the most important to them. This helps Haanpaa to determine which measures must be taken for added value. Additionally, interviews of the personnel of Haanpaa gave valuable information about the transportation and helped the researcher to estimate the costs and income of the operations. Strengths, weaknesses, opportunities and threats were also based on the results of the formal and informal interviews. Therefore, also the own observations of researcher, which were made during the preliminary study and the research for this thesis, are presented as most of the observations were made during the informal conversations with the personnel of Haanpaa.

## **6.1 Status of the waste oil management and trends affecting it**

Trends affecting the waste management and transportation of waste originate from circular economy adopted by European Commission as well as increased environmental awareness among people. The circular economy is based on sustainable use of resources which includes such actions as monitoring, minimizing and eliminating waste flows by circulating. (European Commission 2016; Sitra 2015) Re-refining used lubricant oils is a good example of actions taken to move towards the circular economy.

In Finland waste oil management has improved over the past few years. Formerly, waste oil was used as fuel in industrial installations but changes in legislation has improved the handling of the waste oil. Nowadays most of the oil is re-refined to base oil. According to the website of Finland's environmental administration (Ymparisto 2015), used black lubricant oils are re-refined by STR Tecoil which facilities are located in Hamina and used bright lubricant oils are remanufactured to new lubricants in Jämsänkoski by Ekokem. Unfortunately, illegal burning of waste oil still happens and around 10 000 tonnes of waste oil ends up somewhere else than to proper treatment (Uusioutiset 2015).

### **6.1.1 Attractiveness of waste oil transportation**

Amount of generated waste oil has remained quite stable for the past few years and even though some illegal burning of used oil still happens in Finland, collection in general is on a relatively high level. Due to the high collection rate and stable amounts of waste oil generation, growth in domestic waste oil transportation should not be expected in the near future either. However, possibilities outside the borders of Finland should be considered when a logistics company aims to increase the transportation volumes. These possibilities can be considered quite attractive for Haanpaa as Kares (2016) said in the interview, that Haanpaa transports several truckloads of liquid substances to both Russia and Sweden but there is not enough cargo to haul back to Finland and therefore trucks are often empty when they return.

Route from Russia to Finland is especially troublesome since as much as eight to nine trucks out of ten are empty when they get back to Finland. The balance between Finland and Sweden is not that bad. However, it is often the case that there is more cargo that needs to be transported to Sweden than cargo that needs to be backhauled to Finland.

Attractiveness of waste oil transportation lies in the possibility to balance the imbalance between countries. Kares (2016) stated that the profit of the company is very closely related to the percentage of driving empty. The possibility to bring full load of waste oil back to Finland after the trip, for example, to Russia decreases the percentage of driving empty and increases profits as the customer, the oil is delivered to, will pay the expenses. The enabler of deliveries to both directions is the fleet of trucks of Haanpaa because waste oil can be transported with exactly the same trucks as the other liquid substances transported to Russia. This increases attractiveness of waste oil transportation and makes also the expansion of operations in the field of waste oil management quite easily feasible. However, because of legislative issues, Russian trucks aren't allowed to transport hazardous waste to Finland and therefore implementation of importing needs some cooperation between the Finnish parent company and the Russian subsidiary. Legislation that have an impact on the transportation of waste is discussed in more detail in chapter 6.1.2.

In an interview with the representative of STR Tecoil, the development director Pekko Kohonen (2016) stated that the prices of the deliveries of waste oil from Saint Petersburg and Moscow are very high at the moment. He had discussed with the representatives of Haanpaa and they had told him that it would require back and forth truckloads to decrease the logistics costs. He also said that at the moment, STR Tecoil is paying about 100 €/t for waste oil including logistics costs and some financial compensation of the waste oil itself. Logistic costs being something between 60 and 80 €/t, it is noticeable that they are a big part of the total costs of raw material deliveries of STR Tecoil. So if Haanpaa was able to take advantage of the deliveries of freight to Russia and the empty trucks returning back, then maybe

it would be possible to lower the prices and make it profitable for STR Tecoil to start the deliveries of waste oil from Saint Petersburg and Moscow to Hamina.

There is huge potential in Russian waste oil transportation because in Saint Petersburg alone there is almost as much people as in the whole Finland. According to the results of Master's Thesis of Pleshkova (2012, 47) approximately 20 000 tonnes of used lubricating oil is generated in the area of Saint Petersburg and according to Kohonen (2016), import potential from Saint Petersburg is around 5 000 tonnes annually. In addition, import potential from Moscow is between 10 000 and 20 000 tonnes annually. Additionally, from Moscow it would be possible to import 700 tonnes per month and from Saint Petersburg 200-300 tonnes per month immediately.

There is only one regeneration plant in Russia which is located near Moscow, in Ryazan (Kapustina & Horttanainen, 2012, 4). This increases the attractiveness of importing of waste oil especially from the area of Saint Petersburg since Hamina is much closer to Saint Petersburg than Ryazan. However, it might affect the willingness of producers of waste oil in Moscow to hand it over to Finnish regeneration company.

Kohonen (2016) said that building an infrastructure for waste oil collection is a long-term process and both warehousing and ensuring quality of waste oil are top priorities. The high quality of waste oil means that nothing is mixed with it. In the beginning of the building process, truck deliveries are extremely competitive compared to other modes of transportation because they are flexible. In addition, they are good in terms of quality control because one truckload is fairly small batch in comparison to, for example, train delivery. After small batch of low quality waste oil, it can be decided that another load won't be delivered from that source before the quality is high enough. And as already said, building of the infrastructure takes years and before the volumes increase to high enough level to start deliveries with train or tanker ship, truck deliveries remain competitive. Additionally, STR Tecoil cannot receive trains directly to its production plant, so if they wanted to import

waste oil on rails, the containers would have to be handled somewhere else in Finland and loaded on trucks anyways. On top of that, Kohonen said that also corruption of Port of Saint Petersburg is beneficial for Haanpaa because STR Tecoil is not willing to pay the port authorities and therefore they are not able to make use of shipments of waste oil from Saint Petersburg to Hamina. As a conclusion, STR Tecoil appreciates flexibility of its logistics partners and this is something that Haanpaa must invest in.

### 6.1.2 PESTLE analysis of waste oil transportation

Politics has a great influence on transportation of hazardous waste because it is regulated by legislation. At the moment, Finnish government as well as European Commission is aiming to increase the awareness of potential of circular economy among companies and consumers. Finnish government has set the circular economy to be one of the top priorities of the current government programme and it has its own role to play in promoting circular economy by changing regulations to support it and shifting the focus of research towards it. European Union is also preparing a new circular economy package which is more ambitious than earlier. It aims to create an operating environment that enables the transfer to a circular economy where waste management plays a central role as it determines how the EU waste hierarchy is put into practice. The waste hierarchy aims to encourage the options that deliver the best overall environmental outcome. (Sitra 2015, 67-68; Valtioneuvosto 2016; EUR-Lex 2015) Kohonen (2016) stated that also Government of Russia has become increasingly interested in environmental protection and Sweden is as well slowly moving towards circular economy in the field of waste oil management. Russia has improved its waste oil management legislation and Sweden is about to develop a new collection system to increase the quality of the collected waste oil so that it can be regenerated instead of incineration. However, according to Kohonen (2016) waste hierarchy doesn't work at the moment in case of waste oil because even in Finland authorities give permits to incineration of waste oil even though its illegal according to waste hierarchy. Waste hierarchy states that waste oil should be regenerated if it is technically and financially feasible

and Kohonen (2016) said that they have the facilities that makes it technically possible and they are also capable of collecting oils for free.

What can be deduced from this is that governments have an important role in attitude changes and in the process of putting circular economy into action. If they make decisions in a way that, for example, waste oil management improves both in Finland and especially its surrounding countries, the potential of waste oil management is greatly increased. As a result, it may provide income potential for the whole networks that are involved in waste oil management. In the case of waste oil, network includes such actors as collector of waste oil, logistics service provider and regenerator of waste oil among others.

From the logistics service provider's point of view, the type of treatment of used lubricating oils is indifferent because it just transports the waste oil from point A to point B and gets paid according to it. However, tightening regulations steer the treatment of waste oil to the direction of regeneration and transportation distance of used lubricating oils increases because there is only one regeneration plant in Finland in comparison to several plants capable of incinerating waste oil. This increases the attractiveness of waste oil transportation since longer distances allow logistics service providers to gain more income from transportations.

The biggest impact to economic factors is caused by the economic downturn. Demand for crude oil has reduced which has resulted in collapse of oil prices. Regeneration of used lubricating oils is not as profitable as it could be due to the fact that at the same time, the price of regenerated base oil has dropped. Low base oil price decreases the profitability of the waste oil regenerators and lowers their capability to pay the logistics cost originating from import of waste oil. Higher prices of crude oil would reduce the impact of logistics costs since regenerators would get higher prices for base oil. On the other hand, price of crude oil has also a direct impact on costs of logistics service provider because it affects to the price of fuel. As a conclusion, it can be stated that the price increase of crude oil would affect both price of base oil and costs of logistics. However, price of base oil would

be affected more greatly and the profitability of regeneration of used lubricating oils would therefore increase. One assumption has to be made though. At the moment, the crude oil price affects also the price paid to the producers of waste oil in Russia because waste oil is used as fuel but this effect can be left out of the equation since legislation is changing and, hopefully, in the future the good quality waste oils won't be incinerated anymore. Legislative factors are discussed in more detail later in this chapter.

Social factors that have an impact on transportation of waste oil are presented next. Social factors include such aspects as habits and concerns about environment and sustainable development. In Finland most of the people are aware of, for example, environmental impacts of waste oil and therefore the collection of used lubricating oils is working properly. It is also made very easy for Finnish people to hand over the waste oil for collecting companies as they are picked up free of charge if the batch is at least 200 liters and smaller batches can be delivered to municipal recycling center for free. However, this is not the case, for example, in Russia where the awareness of environment and sustainability are on a lower level. Lack of regulation in Russia is also affecting the attitudes and habits of individuals for as much as 55 % dispose waste oil via municipal waste management by placing waste oils in municipal waste bin (Kapustina & Horttanainen 2012, 5).

According to Kapustina & Horttanainen (2012, 5) in Russia, 50 % of the car owners change their motor oils by themselves and only 9 % of these people deliver the used lubricating oil to a proper recycling center. This means that in Saint Petersburg and Leningrad region alone up to 10 500 tonnes of waste oil end up in the environment and when added to estimated amount of waste oil burned in small-scale heaters or stockpiled in warehouses and garages, the total amount of waste oil that is not collected is around 14 000 to 21 000 tonnes per year.

As a conclusion, social factors affect the amount of collected waste oil since it is highly dependent on attitudes, habits and environmental awareness of people. In Finland attitudes towards collection of waste oil is on a fairly high level but there

is a lot to improve in Russia. Kohonen (2016) stated that Swedish have also some work to do with the attitudes towards recycling. They have high collection rates of waste oil but waste oils are often incinerated instead of regeneration and for example representatives of Stena, collector of waste oil in Sweden, have said to Kohonen that it would be nice to do the treatment of waste oil in an environmentally friendly way but still they sell it to the incinerators since they get paid more that way. What comes to the transportation of waste oil, it is important that especially in Russia the attitudes change and people start to bring waste oil to recycling centers from where it can be transported to treatment facility. Hopefully, increase in collection rates of waste oil in Russia will realize rapidly and Haanpaa is capable of exploiting this increase in cooperation with STR Tecoil.

Technological factors also affect the amount of waste oil produced. New technology enables the treatment of waste oil. STR Tecoil's facility is capable of re-refining the waste oil to higher quality than the base oil refined from crude oil is. STR Tecoil's facility is high technology and there is no competition at the moment nearby. However, development in technology may lower the costs related to the construction of similar facilities in the future. Establishment of such facilities in Sweden or Russia may cease the imports of waste oil to Finland and therefore also decrease the amount of transported waste oil. However, Kohonen (2016) stated that Russians don't really want to establish regeneration plants because their priority is to refine crude oil. On the other hand, new facilities would increase the competition over raw materials and it could be beneficial for logistics service providers such as Haanpaa. New facilities will shorten the transportation distances, though, resulting in decrease of income for logistics service providers.

Shift in technology leads, for example, to the use of electric cars which lowers the amount of used lubricating oils as electric cars don't need any motor oil. However, transition to electric cars is happening in a long time span so it won't have an immediate effect on waste oil transportation. Still, also the renewal of the present fleet of cars will probably decrease the quantity of produced waste oils as new cars do not need as much oil as the old ones and motor oils do not need to be changed

as often as they used to (Öljy & biopolttoaineala 2016). Biggest changes may result from the transition of public transport to electric vehicles. According to VTT Technical Research Center of Finland (VTT 2014, 37), public transportation is also starting to use electric vehicles. For example, public transport authority of Paris aims to replace all diesel buses with an electrified bus fleet by the end of 2025. Also in Finland, Helsinki Region Transport strive for carbon neutral society by the end of 2050 and one milestone is replacing 30 % of the fleet with electric buses by the end of 2025 (HSL 2015).

All in all, there still exists a lot of waste oil to transport for Haanpaa in the coming years as the time span of transition to electric vehicles is very long and the transition will take place gradually. However, even though public transportation is just one example of vehicles that are transitioning to electricity the heavy vehicles produce lots of used lubricating oil at the moment so they may have a large impact on the amount of produced waste oil and therefore also to the need for waste oil transportation in the future. Still, it must be remembered that automotive oils represent only 50 % of the waste oils delivered to STR Tecoil so even if all the cars ran on electricity, waste oil from marine lubricants and industry lubricants would still be produced. (STR Tecoil 2015)

Transportation of waste oil is also affected by legal factors as the import of waste oils both from Russia and Sweden is regulated by international regulations. Transboundary movements of hazardous waste need to be regulated because earlier developed countries got rid of hazardous wastes by shipping them to less developed countries which had no proper regulatory system or sufficient technology for waste handling. Shipments of hazardous waste stemmed from high prices of handling of hazardous waste in developed countries. The controlling of the transboundary shipments of hazardous waste was agreed on Basel convention. Therefore, importing waste oil is demanding for STR Tecoil and its logistics service providers such as Haanpaa even though waste oil is used as a raw material and it is treated with an environmentally friendly way. Regulations, for example, demand that 72 hours before import of waste oil is intended to take place, the importer of waste is

obliged to report to authorities about the upcoming transfer of waste oil. Transboundary transfer also needs to be made in a certain timeframe after the report. (Kohonen 2016) These things complicate the work of traffic planners at Haanpaa because they need to anticipate the waste oil deliveries three days in advance instead of just providing the trucks when they become free from another transport. Therefore, close cooperation with the foreign collector of waste oil as well as with STR Tecoil is needed in order to ensure smooth flow of transports.

Legal factors have also an impact on collection of waste oil especially in countries where the present legislation is not as strict as it is, for example, in Finland. Legislation of other countries has an indirect effect also on Haanpaa because stricter legislation on waste oil management allows utilizers of waste oil such as STR Tecoil to increase volumes they receive. This is the consequence of forbidding the incineration of waste oil which forces the producers of waste oil to hand it over to regeneration facility. As a result, waste oil utilizers need more services from their logistics service providers including Haanpaa.

Changes in legislation of Russia are already taking place as Kohonen (2016) stated that in the beginning of the year 2015 Russian government enacted a law that presented a waste hierarchy similar to the one in European Union. According to the waste hierarchy the incineration of waste oil is illegal if there is a more appropriate method available. Unfortunately, this new law didn't change anything because oil companies resisted it. However, on July 1, 2016 Russian government is illegalizing the incineration of waste oil which forces producers of waste oil to get rid of it some other way. At the moment waste oil is used as fuel in various industries but after July 1 waste oil should be regenerated if possible. This is a huge opportunity for Haanpaa because closest regeneration plant for producers of waste oil, for example, in Saint Petersburg is in Hamina. In the best case scenario, prices of waste oil would turn negative after the law comes into force which means that waste oil producers would have pay for someone to pick it up or at least give it for free. This would greatly increase the profitability of waste oil importing from Russia because at the

moment STR Tecoil is paying for its raw material. According to Kohonen, at the moment price of the waste oil is comparable to the price of heavy fuel oil.

Environmental factors can be considered as one of the stakeholders of operating company's business model. However, the biggest challenge is how to turn environmental value into profit of a company. In case of Haanpaa, value is created from waste in an environmental friendly way by delivering waste oil to regeneration plant which re-refines it to high quality base oil. This makes Haanpaa an important part of a value network where value is created from waste and usage of virgin raw materials is reduced and resource depletion is prevented. Value network is enabled because of cooperation between different lines of industries and this cooperation leads to closed material loops where waste streams are used as a valuable input for other processes. In other words, Haanpaa's value proposition in waste oil transportations is enabling of turning waste streams into useful and valuable input and helping to eliminate the concept of waste. Value creation and delivery is done by partnerships across industries and value capture is done by enabling the reuse of materials and turning waste into economic value.

Value network around waste oil also prevents climate change because used lubricating oil is used according to waste hierarchy and it is reused as a material after regeneration instead of incineration. Reuse of waste oil also decreases the amount of crude oil used for refining of base oil. Regeneration is also CO<sub>2</sub> negative which means that it produces less CO<sub>2</sub> emissions than what traditional refinery would produce if the same amount of base oil was produced from crude oil. Therefore, Haanpaa is doing its part in prevention of climate change as it makes it possible for STR Tecoil to regenerate waste oils and decrease the use of virgin raw materials and reduce CO<sub>2</sub> emissions.

## **6.2 Status of the management of the oily waste from ports and trends affecting it**

According to directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues, ship calling at port shall deliver all ship-generated waste to a port reception facility before leaving the port (EUR-lex 2000). Law is in effect also in Finnish ports and therefore it is mandatory for ships calling at Finnish ports to deliver their ship-generated waste and cargo residues to port reception facilities. The directive applies, for example, to such waste types as oil residues from machinery and cargo base and bilge water, unless the ship is equipped with a bilge water separator. However, oil residues from the engine room need not be delivered to reception facilities if the slop tanks are only 25 per cent full or the amount of oily waste is less than 5 m<sup>3</sup> but this applies only if there is sufficient capacity for waste generated during the following voyage. (Trafi 2012a)

Trafi can exempt the ships engaged in regular service from mandatory delivery of ship-generated waste and cargo residues and the obligation to provide notification. The ship is in regular service if it operates on a schedule or a pre-confirmed route between designated ports and it visits one of the designated Finnish ports at least once a fortnight. In order to get an exemption, the ship must have concluded a waste management agreement with a qualified waste management company or port. (Trafi 2012a) Therefore, Haanpaa is not able to conclude an agreement straight with the ships or shipping companies and the only choice to start the transportation of bilge water and other oily wastes is to operate as a subcontractor of one of the waste management companies.

### **6.2.1 Attractiveness transportation of oily waste from ports**

Oily waste from ships can be divided to three different types of waste: separation waste from fuel purification, oily bilge water and used lubricating oil. (Kohonen 2016) To be able to estimate the attractiveness of transportation of oily waste from ports, it is important to provide some information about the quantity of them. For

instance, Port of Loviisa (2014) has presented the amounts of liquid oily wastes in its invitation to tender. The amount of separation waste was in an example year 407,2 m<sup>3</sup>, amount of oily bilge water was 93,6 m<sup>3</sup> and amount of used lubricating oil was 55,1 m<sup>3</sup>. Statistics provided by Port of Loviisa are most likely from year 2013. According to Finnish Port Association (2013), there visited 305 ships in Port of Loviisa in 2013. Data is presented in table 2.

**Table 2.** The volumes of oily waste from Port of Loviisa (Port of Loviisa 2014)

Range of delivered volumes [m <sup>3</sup> ]	Separation waste		Bilge water		Used lubricating oil	
	Average volume of waste per delivery	Number of times waste is delivered	Average volume of waste per delivery	Number of times waste is delivered	Average volume of waste per delivery	Number of times waste is delivered
0-2	1,3	10	1,1	9	1,0	10
2-4	3,2	17	3,6	7	3,3	5
4-6	5,0	22	4,5	3	5,1	3
6-8	7,2	6	7,5	4	0,0	0
8-10	9,4	13	0,0	0	0,0	0
10-12	11,5	2	0,0	0	0,0	0
>12	13,8	3	15,0	1	13,0	1

Loviisa is used as an example because the data they have provided makes it possible to estimate the amount of oily waste produced also in other ports in Finland. In addition, according to Trafi (2014a, 11) ships that visited Port of Loviisa in 2014 didn't have an exemption from the mandatory delivery of ship-generated waste so the quantities presented in table 2 should include all oily wastes delivered to port from ships. Some other ports also provide data about the amounts of oily waste. However, these quantities represent only the volumes received to ports own reception facilities and not the volumes that are picked up by the waste management company which have a contract with ships on regular service. Therefore, most of the ports don't even know the total amount of oily waste that is delivered by ships ashore.

In transportation of oily waste from ports the volumes transported per load are smaller than, for example, volumes imported from Russia because ships don't usually leave huge amounts of oily waste to ports at once. According to Port of Loviisa (2014), usual batch size of bilge water is something between 1,1 m<sup>3</sup> and 15 m<sup>3</sup> and the weighted average from the values in table 2 is 3,9 m<sup>3</sup>. Formula for calculation of weighted average is presented next:

$$\textit{Weighted average} = w_1x_1 + w_2x_2 + \dots + w_nx_n$$

w=relative weight (%)

x=value (Finance Formulas 2016)

Next an example for calculating weighted average for amount of bilge water per ship with the quantities and numbers of deliveries from table 2 is presented:

$$\textit{Weighted average} = \frac{9}{24} * 1,1 + \frac{7}{24} * 3,6 + \frac{3}{24} * 4,5 + \frac{4}{24} * 7,5 + \frac{1}{24} * 15 = 3,9 \text{ m}^3$$

Weighted average is useful for a logistics company because it makes it easier to estimate a more realistic quantity of each load that is picked up from the port. The average amount of oily waste per ship that is calculated later in this chapter isn't a good way to estimate the amount of oily waste delivered to port at once because all ships don't deliver any waste to ports and therefore the volumes would seem to be quite small. However, average amount per ship is still a relatively good way to estimate the amount of waste delivered to port per year. For example, in case of Loviisa, it must be taken into account that there visited 305 ships in 2013 but as it can be seen from table 2 not all of them delivered waste to ports reception facilities due to some exception in mandatory delivery of ship-generated waste discussed earlier in this chapter. Port of Loviisa (2014) stated in its invitation to tender that 81 of the 305 ships delivered waste. It is approximately 27 % of the visiting ships which means that around every fourth ship delivered oily waste to port. The total amount of oily waste was 407,2+93,6+55,1=555,9 m<sup>3</sup> so on average one ship that actually delivered some waste at port delivered 6,86 m<sup>3</sup> (555,9 m<sup>3</sup>/81 ships) of it.

It can be assumed that not all the ships deliver their waste to reception facilities or directly to tank trucks of waste management companies in any Finnish port. Therefore, to be able to estimate the amounts that are delivered to other ports, the total volumes of Port of Loviisa must be divided with 305 to get the amount of oily waste produced per ship. When the total amount of bilge water is calculated from table 2, it adds up to 93,6 m<sup>3</sup>. As a result, the volume of bilge water is 93,6 m<sup>3</sup>/305 ships = 0,31 m<sup>3</sup>/ship. However, because Port of Loviisa wanted to find a waste management company that handles all the oily wastes originating from ships, it can be assumed that one company handles these types of wastes also in another ports. Therefore, it is useful to calculate the total amount of oily wastes per ship. These amounts can be calculated using the same formulas that were used in calculation of amount of bilge water. This way, the total amount of separation waste from Port of Loviisa is 407,2 m<sup>3</sup> and the total amount of used lubricating oil is 55,1 m<sup>3</sup>. When these quantities of wastes are divided with 305 which is the number of ships visiting Port of Loviisa, the quantity of separation waste is 407,2 m<sup>3</sup>/305 ships = 1,34 m<sup>3</sup>/ship and the quantity of used lubricating oil is 55,1 m<sup>3</sup>/305 ships = 0,18 m<sup>3</sup>/ship. These quantities, as well as weighted averages, are presented in table 3.

**Table 3.** Quantities of oily waste originating from port of Loviisa

Type of waste	Total amount of waste [m <sup>3</sup> ]	Amount of waste per ship [m <sup>3</sup> ]	Weighted average of the amount of waste per ship [m <sup>3</sup> ]
Separation waste	407,20	1,34	5,58
Bilge water	93,60	0,31	3,90
Used lubricating oil	55,10	0,18	2,90

The amounts of oily waste per ship in table 3 can be exploited in estimation of the quantities delivered to other ports in Finland. Finnish Port Association (2015) provides statistics in its web sites from where it is easy to calculate the total volumes of oily waste delivered to port by ships. Calculations are done by multiplying the amount of each type of oily waste generated per ship with the number of ships that visited that particular port. In table 4, there is presented the amounts of the three

separate types of oily waste with the assumption that ships visiting other ports generate as much oily waste as those stopping by at the Port of Loviisa and they deliver them to Finnish ports.

**Table 4.** An estimation of the amounts of oily waste delivered to Finnish ports by ships based on a number of ships that visited Finnish ports in 2015

Port	Total number of ships arrived to port	Amount of separation waste [m <sup>3</sup> ]	Amount of bilge water [m <sup>3</sup> ]	Amount of used lubricating oil [m <sup>3</sup> ]
Helsinki	8 413	11 232	2 582	1 520
HaminaKotka	2 548	3 402	782	460
Turku	1 844	2 462	566	333
Hanko	1 748	2 334	536	316
Naantali	1 581	2 111	485	286
Sköldvik	1 117	1 491	343	202
Rauma	1 111	1 483	341	201
Uusikaupunki	645	861	198	117
Raahe	600	801	184	108
Pori	580	774	178	105
Vaasa	580	774	178	105
Kokkola	551	736	169	100
Oulu	531	709	163	96
Lappeenranta	511	682	157	92
Kemi	494	660	152	89
Tornio	467	623	143	84
Inkoo Shipping	331	442	102	60
Kaskinen	294	393	90	53
Loviisa	212	283	65	38
Pietarsaari	194	259	60	35
Joensuu	188	251	58	34
Varkaus	144	192	44	26
Kalajoki	135	180	41	24
Kantvik	121	162	37	22
Kuopio	103	138	32	19
Eurajoki	54	72	17	10
Tolkkinen	48	64	15	9
Salo	41	55	13	7
Merikarvia	11	15	3	2
Kristiinankaupunki	1	1	0	0
Inkoo Fortum	0	0	0	0
Koverhar	0	0	0	0
Savonlinna	0	0	0	0
In total	25 198	33 641	7 733	4 552

Still, it must be stated that the quantities presented in table 4 are only estimations made by researcher. Amount of oily waste is highly dependent on the type of ship

and therefore there might be some inaccuracies because, for example, cruise ships don't call at the Port of Loviisa as they do in many other ports. As a result, the data the calculations are based on may not provide the best possible estimation for all the Finnish ports. The size of the ships has also an effect on the amount of oily waste and the biggest ships don't probably stop by in Port of Loviisa. Therefore, the amounts of oily wastes in bigger ports, such as Helsinki and HaminaKotka can be much higher than what they are in table 4. On the other hand, some of the quantities in table 4 may also be too high because ships operating in inland waters are much smaller than those operating at seas. For example, Port of Lappeenranta is visited by more than 500 ships per year but according to Finnish Port Association (2015) net weights of the ships were a lot lower in comparison to ships visiting sea ports.

The total amount of used lubricating oil is small in table 4 in comparison to what Kohonen (2016) said in an interview. Table 4 shows that total amount of used lubricating oil was 4 552 m<sup>3</sup> which equals around 3869 tonnes, when the density of lubricating oil is 850 kg/m<sup>3</sup> (Motoral 2013), but Kohonen (2016) estimated that in Finland, ships deliver approximately 10 000 tonnes of used lubricating oil to ports. However, Kohonen (2016) also said that many ships blend the separation waste with used oils which may explain the difference. After the blending, used lubricating oil is unusable for regeneration and it has to be incinerated.

According to RCR (2016), the oil content of the separation waste, also known as sludge, produced onboard is something between 30 % and 70 % and a typical mix is 70 % oil and 30 % water. However, the oil content depends on the efficiency of oil-water separator. The density of 70:30 mix of oil and water is around 900 kg/m<sup>3</sup>. In addition, according to Zuin et al. (2009, 3038), bilge water that is received to Port of Luka Koper in Slovenia, consists of 55 % of water and 45 % of oil. This can be assumed to be separated before it is delivered to reception facilities. Still, all the bilge water that is delivered to the port or to tank trucks is probably not separated which means that the density of it is quite close to 1 000 kg/m<sup>3</sup>. Therefore, it should be safe to assume that density of delivered bilge water is around 950 kg/m<sup>3</sup>. The

density of used lubricating oil is probably quite close to 850 kg/ m<sup>3</sup> (Motoral 2013). When cubic meters are converted to tonnes the total amounts of oily wastes are as they are presented in table 5.

**Table 5.** An estimation of the amounts of oily waste when cubic meters are converted to tonnes

Total number of ships arrived to port	Amount of separation waste	Amount of bilge water	Amount of used lubricating oil
25 198	30 277	7 346	3 869

Combined amount of separation waste and bilge water in table 5 seems to be realistic when it is compared to the capacity of treatment facilities in Finland. According to Ymparisto (2007), Ekokem alone has a treatment capacity of 30 000 tonnes of oily water annually in its vaporizing plant in Riihimäki and 15 000 tonnes of this is reserved for oily wastes from ports. In addition, Lassila & Tikanoja handles oily waters with the capacity of 12 000 tonnes per year but the capacity includes also other industrial oily waters. There are also some other treatment facilities in Finland. For instance, Phoenix collector, a company specialized in management of oily waste from ports, is capable of receiving 10 000 tonnes of oily water annually. (Hupponen et al. 2007) Additionally, for example Delete (2016) is also one company that receives oily wastes from ports and according to Kauppalehti (2015) Delete Group has a capacity to receive 8 000 tonnes of water-oil emulsions per year and in 2015 it had a plan to increase this capacity to 16 000 tonnes by the end of 2020. All this mentioned capacity adds up to 45 000 tonnes, excluding Delete's capacity increase. However, if it is assumed that, for example, half of the capacity of Lassila & Tikanoja is reserved for the oily waste from ports the total treatment capacity is 39 000 tonnes which is quite close to 37 624 tonnes of separation waste and bilge water combined in table 5. This increases the credibility of the estimation.

In addition, Delete handles oily wastes originating from Port of Rauma and they estimated that amount of waste that needs to be transported away from port to Delete's treatment facility in Espoo is about 2 400 tonnes per year (Mynewsdesk

2015). However, when comparing to amounts oily wastes from table 4 which add up to 2 025 cubic meters and equals 1 825 tonnes, there is a quite big difference. Still, the 2 400 tonnes per year was only an estimation made by Delete, not the real amount of collected waste so 1 825 tonnes might actually be accurate. On the other hand, there might also visit some ships in Port of Rauma that are exempted from the mandatory delivery of ship-generated waste because they have a contract with some other waste management company and they might not be included in the total amount of 2 400 tonnes estimated by Delete. Therefore, the amounts of oily wastes in table 5 might be slightly inaccurate.

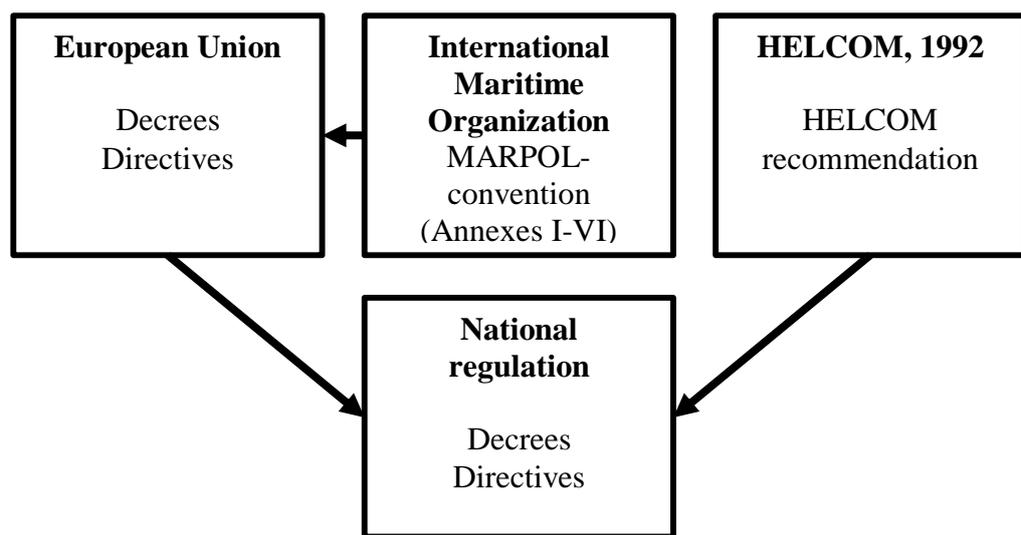
Different types of oily waste should not be mixed together since they are more easily treated separately. Therefore, for example in Port of Rauma the ships are charged less if they deliver all oily waste types separately. (Port of Rauma 2016) As a conclusion, this means that logistics company collecting these wastes must have appropriate vehicles to be able to transport oily wastes separately. This may lead to a situation where these trucks are not suitable for transportation of other substances and vice versa. And even if they were, the tanks must be washed which is quite expensive in comparison to the value of load of oily waste.

The presented amounts of oily waste can be considered quite trustworthy and they can be used to assess the attractiveness of transportation of oily waste from ports to treatment facilities. Comparison of amounts of oily waste to treatment capacity also supports the trustworthiness of estimations. Still, it must be taken into account that because of the lack of real statistics, all the amounts of oily wastes are only best guesses of the researcher. Therefore, there is a risk that in reality there is less liquid wastes to be transported and it may decrease the attractiveness of this kind of transportations for Haanpaa.

### 6.2.2 PESTLE analysis of transportation of oily wastes from ports

Political factors that have an impact on transportation of oily wastes from ports in the Baltic Sea are related to the regulations of European Union but due to

international nature of shipping, regulations are mainly global and therefore they are prepared in International Maritime Organization, IMO (Trafi 2012a). Regulations prepared in IMO are then taken into account in the preparation of legislation in European Union and on a national level. National level legislation is also affected by decisions made in HELCOM (Helsinki Commission) convention. (Trafi 2008) Policy-making system of environmental regulation of shipping is presented in figure 6.



**Figure 6.** Policy-making system of shipping regulations (Trafi 2012b)

Regulations are the reason that there is a need for waste management companies to pick up the oily wastes from ports. Without regulations most of these wastes would probably be discharged to seas which would be environmentally harmful. Anyway, delivery of wastes is a possibility to companies that are specialized in transportation of liquid substances.

There are a few economic factors that affect the collection, treatment and transportation of oily wastes from ports. Treatment of oily waters is quite expensive due to high water content of waste. Therefore, many ships wouldn't deliver the wastes to ports if it was voluntary. As a consequence, delivery of oily waste is regulated in a way that the ships are forced to pay the waste management fee no matter if they deliver waste or not. However, for ships in regular traffic it is cheaper

to make an agreement straight with waste management company and get an exemption from the dumping obligation of waste. This probably increases the average amount of waste delivered since it is cheaper for a shipping company to hand over bigger amounts of waste at once as it will decrease the logistics costs of logistics service provider and therefore also the costs of the waste management company. Shipping companies are most likely charged by the waste management companies according to the volume of waste delivered. Therefore, the ships try to keep the amount of oily waste as low as possible.

Social factors affect to the amount of oily waste delivered to the port through the environmental awareness of people. Shipping companies are using the environmental friendliness to gain a green image. For example, Viking Line (2016) delivers all its oily waste to ports even though it would be allowed to discharge the separated water overboard if it contains 15 ppm (parts per million) of oil at most.

New technology enables the separation of bilge water in oil-water separators on board but still the separated oil must be delivered ashore. This will decrease the amount of produced bilge water delivered to ports because separation decreases the water content of bilge water whereas the oil content increases. As mentioned earlier, bilge water consists of 55 % of water and 45 % of oil and this can be assumed to be separated before it is delivered to reception facilities. In addition, for example Port of Helsinki demands that bilge water must be separated before it can be delivered to its reception facilities (Port of Helsinki 2016). Additionally, Viking Line, for example, states that it delivers all its bilge waters ashore since they can be handled more efficiently there. Still, Viking Line's ships separate oil from bilge water, they just don't discharge the separated water to sea. (Viking Line 2016)

One of the technological factors affecting the amount of oily waste are the ships using liquefied natural gas (LNG) as fuel. If the LNG ships become more popular the amount of sludge will decrease because LNG does not need separation. Shipping companies are starting to use more LNG ships as emission regulations are

getting stricter and even though LNG ships are more expensive than the traditional ships they are usually cheaper in the long run.

Legal factors have a huge impact on the amount of oily waste delivered to ports because discharges of oily wastes to sea are regulated. Regulations are affected by legislations prepared by IMO and the most important IMO convention concerning pollution is MARPOL (International Convention for Prevention of Pollution from ships) (Trafi 2012a). MARPOL 73/78 includes 6 annexes of which annex I includes regulations for the prevention of pollution by oil. Annex I takes into account all aspects of the carriage of oil, either as fuel, engine room slops or cargo or dirty ballast. MARPOL regulations apply to all types of ships. Baltic Sea is one of the special areas designated in MARPOL which means that there are more restrictions on the discharges allowed from the ships. (European Commission 1997, 16-19) According to annex I, maximum oil content of discharged oily water is 15 ppm in Baltic Sea (Trafi 2014b).

Regulations also steer to use of better quality bunker fuels because the sulphur content of fuel is nowadays restricted. For example, Neste is providing low sulphur bunker fuels to ships operating in the area where sulphur emissions are regulated by EU. Baltic Sea is one of these areas. Neste's web sites state that its fuels with low sulphur content must be separated less than traditional heavy fuel oil used in ships which leads to lower production of sludge from fuel separation. Low sulphur content also lengthens the change interval of lubricating oils which will decrease the amount of used lubricating oil originating from ships. (Neste 2016) If the use of better quality bunker fuels becomes more common, the amount of oily waste picked up from ports by waste management companies will decrease and therefore also the attractiveness of oily waste transporting decreases. However, these low sulphur fuels are much more expensive than heavy fuel oil which reduces the eagerness of shipping companies to start using it. Therefore, ships rather use scrubbers to wash the sulphur compounds from exhaust gases and continue the use of heavy fuel oil. As a result, the amount of produced oily waste will remain the same assuming that the use of LNG will not become more popular for a while.

Environmental factors that have an impact on transportation of oily waste from ports are related to the pursue of environment friendliness of shipping companies. Despite of the fact that shipping companies would probably dump their oily wastes to sea without a strict legislation, some of them are also voluntarily trying to reduce the environmental impact of their ships. Many shipping companies deliver their oily wastes to waste management companies to be treated in an environmentally friendly way and they are taking advantage of it in their marketing to get a greener image. This not only reduces the amount of oily discharges to sea but also enables a business for the whole networks of oily waste management including transportation.

### **6.3 Description of the company**

Haanpaa's vision is to become the leading liquid logistics service company in its area of operation by offering services with superior customer value. Haanpaa also aims to be a reliable partner and act proactively to fulfill all the needs of its customers by delivering tailored liquid logistics services. (Haanpaa 2016) Therefore, both transportation of waste oil and oily wastes from ports fits very well to the vision of Haanpaa and also helps it to achieve its goals.

#### **6.3.1 Core competencies**

When the targeted businesses are being compared to the existing business of Haanpaa, waste oil transportation is something that Haanpaa is already doing and it's also a core business of Haanpaa. Transportation of oily wastes from ports, in turn, is completely new business area and therefore it is also more challenging to implement. However, it can be also seen as a possibility because of high total volumes of oily waste.

Import of waste oil is a core business of Haanpaa because it includes transportation of liquid bulk over long distances. Haanpaa is specialized in this type of transportation as it is transporting liquid chemicals both in domestic markets and in

whole Northern Europe and, for example, waste oil from Sweden to Finland. Waste oil importing is an additional service provided for old customer and therefore the business model would remain the same as now and business objective of import of waste oil is only to provide additional source of income.

Import of waste oil brings value to the customer through tailoring and price of service. Haanpaa is able to tailor its supply chain to best meet the specific requirements of STR Tecoil and with its current fleet it is able to provide a cost efficient transportation of waste oil to Finland. STR Tecoil appreciates low logistics prices, convenience and flexibility. Therefore, the best value can be brought to STR Tecoil by investing on flexibility and convenience while keeping the costs of operation as low as possible.

If STR Tecoil and Haanpaa are able to start the import of waste oil and it proves to be profitable and import volumes stabilize to a reasonable level, then STR Tecoil and Haanpaa could form a longer term contract, also known as vertical logistic alliance. This would help them both to improve efficiency. In case of waste oil import from Sweden this has already partially realized as formerly STR Tecoil was organizing the transportation of waste oils but now the coordination of importing has been transferred to Haanpaa which manages the pick up of waste oil straight with the waste oil collector in Sweden. This has streamlined the transportations. This kinds of agreements could also improve the import from Russia but first the volumes should rise to high enough and there should be steady flow between Russia and Finland.

In case of transportation of oily waste from ports, Haanpaa must extend its business model since this kind of transportation is not one of its core competences as sometimes it requires, for instance, transportation of small batches of waste. Additionally, Haanpaa would be working as a subcontractor of some waste management company. Transportation of oily waste from ports is also a little more challenging than waste oil importing as it is a new service that is provided to new customers. Consequently, the business objective of transportation of oily waste

from ports would be to serve new customers and extend the service offering of Haanpaa. In other words, if Haanpaa finds the transportation of oily waste from ports to be attractive enough and decides to strive for these markets, it must slightly extend its business model to match the requirements of this type of transports.

Transportation of oily waste from ports brings value to the waste management company by getting the job done from them. Waste management companies aren't usually interested in transportation by themselves because it's not their core competence and they are willing to outsource the logistics at least partially. However, there are still some value elements that they probably appreciate, such as reliable performance and flexibility of the logistics service provider.

### 6.3.2 Detailed service information

Detailed information about the import operations of waste oil is excluded from this thesis because the way that import is executed is confidential. Still, the information about the execution of transportation of oily wastes from ports is presented. First a waste management company receives information from the ship that it is about to deliver oily waste ashore and it requires a tank truck to receive it. This information comes 24 hours in advance or if the voyage is shorter than that information is received when the ship leaves the previous port, assuming that the contract between the shipping company and the waste management company is similar to the requirements of ports in these matters. After the information about the amount and the type of oily waste is received by the waste management company it forwards the information to its logistics partner unless there is a contract which states that shipping company can contact straight the logistics company. When the logistics service provider has received the information one way or another, it designates a truck to be in the port on the agreed time ready to receive the oily waste. When the truck has received all liquid oily waste from the ship it transports the waste to the treatment facility where oil and water is separated and then oil is transported to some plant to be used as fuel.

### 6.3.3 Management and personnel

Haanpaa has local presence in Russia which means that managers have experience in working in Russian markets and they have the necessary market knowledge. Business in Russia is challenging and therefore it is very valuable to have knowledge about the local practices. In addition, there is no need to hire new truck drivers because at the moment trucks are driven empty back to Finland from Russia. Therefore, waste oil can be imported with the present fleet of trucks.

Haanpaa's drivers are trained to handle hazardous materials and they have licenses so there is no need for training. In addition, truck drivers have the necessary permits for transportation of hazardous waste. The drivers are capable to do both transportation of oily waste from ports and import waste oil from Russia.

Traffic planners' work might get more complicated because the waste oil deliveries need to be anticipated and importing must be also done in a certain time frame after the authorities have been informed about the transport. If the imported volumes become high enough there might be a need to increase the number of traffic planners.

### 6.3.4 Customers and competition

In the field of waste oil transportation, the analysis of the customer is very important because there is only one regeneration company in Finland, STR Tecoil. Therefore, it is important to make sure that customer company is profitable and capable of paying enough of logistics services. STR Tecoil was formerly L&T Recoil but it bankrupted due to high costs and lack of raw materials (Kohonen 2016). Apparently, STR Tecoil is now more profitable as it is still in operation. However, according to Kohonen (2016) they still aren't using their full capacity as it is 60 000 tonnes annually and at the moment they are regenerating around 55 000 tonnes annually. Therefore, their buying motivation can be assumed to be quite high especially for the 5 000 tonnes per annum that they are missing. When they reach

the full capacity, they are able to start picking the cheapest sources of waste oil and import from Russia won't probably be one of them as Russia is charging export duties for the export of used lubricating oils. However, lower duties would probably increase the attractiveness of importing and additionally Russian law on waste incineration may also change the situation.

In the transportation of oily wastes from ports there are a few possible customers which are the waste management companies Ekokem, Lassila & Tikanoja and Delete. In order to start transportation of oily wastes, Haanpaa must conclude a contract with one of these companies. If it is not possible, Haanpaa can think of acquisition of one of the companies that are already working for one of the three waste management companies. As far as researcher know, subcontractors of waste management companies are usually smaller transportation companies that are operating locally.

Small companies pose a threat for Haanpaa in transports of oily waste from ports because it is quite difficult to compete with them. Small companies usually have just a few trucks and they are in colors of the waste management company which means that they aren't driving for anybody else whereas Haanpaa wouldn't probably be able or willing to designate trucks just for the use of waste management companies. Designation would likely decrease the utilization rate of trucks and therefore they would stand empty once in a while.

#### 6.3.5 Marketing strategy

Logistics service providers can enter the new markets through competitive tendering which is organized by a company in need of logistics services. However, acquisition is also another method of entry. Usually, marketing process of Haanpaa starts well in advance when someone responsible of sales asks the customer company if Haanpaa can take part in the competitive tendering next year. So marketing is basically personal selling in which sales representative contacts the customer and offers the services of Haanpaa. (Kares 2016)

In case of waste oil transportation sales representatives of Haanpaa have already done most of the work as customer company – STR Tecoil – is already informed about what services Haanpaa is capable of providing. If Haanpaa finds the transportation of oily wastes interesting enough, one of the sales representatives should contact the waste management companies and ask if it is possible to take part in the tendering. In other words, marketing of services of Haanpaa to waste management companies would require some effort as transportation of oily wastes from ports is a new business area for Haanpaa.

#### **6.4 SWOT analysis of waste oil transportation**

One of the biggest strengths of Haanpaa is the transportation of liquid substances to Russia and Sweden and the empty trucks returning to Finland. Haanpaa's present fleet is applicable also to transportation of waste oil so it can be exploited in import of waste oil. Present fleet of trucks also allows Haanpaa to have economies of scale in transportation which eases the planning and reduces costs. Transportation capacity also gives Haanpaa capabilities to match the changes in volumes and respond rapidly when large quantities need to be transported. The present capacity is also sufficient to match the volumes of importing for quite a long time and there is no need for procurement of new trucks. Therefore, if the waste oil transportations prove to be unprofitable for Haanpaa the expenses will be low when the operations are discontinued.

Haanpaa has also experience in working both in Russia and Sweden which gives it competitive advantage against the competitors as local presence in the area of operations is often essential in order to operate efficiently. For example, subsidiary in Russia increases the knowledge of local practices and makes it easier and cheaper for Haanpaa to start importing waste oil. Haanpaa's managers have also experience in working in Russia which increases market knowledge. Therefore, Haanpaa gains competitive advantage in comparison to other logistics service providers.

Haanpaa can also use its bargaining power when it negotiates, for example, about the transportation prices. At the moment, there are no other logistics service providers importing waste oil either from Sweden or Russia. Russian competitors' trucks are transporting chemicals across the border with low transportation costs but they are not allowed to import waste oil to Finland. Therefore, they don't compete with Haanpaa in this area. As a conclusion, one of the biggest strengths of Haanpaa is also the ability to use both Finnish and Russian trucks in the importing operations.

Weakness of Haanpaa is that it doesn't have its own fleet for collection of waste oil which forces it to trust other companies to collect waste oil and inform Haanpaa when it can be picked up from collection point. However, the lack of fleet for collection is not a big weakness. Therefore, there are no major weaknesses in the transportation of waste oil as this kind of transportation is one of core competences of Haanpaa.

The biggest opportunity for Haanpaa in the transportation of waste oil lie in the possibility to gain more turnover from Russian waste oils. The total amount of waste oil that could be imported is so big that it provides a great opportunity to Haanpaa. In addition, opportunities in importing used lubricating oils from Russia is also based on possibility to lower the percentage of driving empty and opportunity to work in cooperation with the Russian subsidiary.

As it was stated in chapter 5.2, the biggest challenges and threats experienced by Finnish companies in Russia are in the areas of customs regulation, bureaucracy, uncertainty, financial flows and logistics and transport. Some of these difficulties result from the fact that Finnish-Russian border is also the border of European Union. Still, the biggest threat for the import of waste oil is the strengthening of the ruble which will increase the costs of transportation. If Haanpaa has made a long term agreement on price of transportation, changes in the value of ruble may make waste oil importing unprofitable.

One of the threats in continuity of transboundary movements of waste oil between Russia and Finland is also high rate of duties. In the worst case scenario, they may constitute the most of the total cost of waste oil importing. According to Kohonen (2016), duty has been as high as 250 €/t but fortunately it has been lowered to around 50 €/t which is quite reasonable and it increases the profitability of import of waste oil. However, it is still not profitable enough as STR Tecoil hasn't started the deliveries yet. And when it comes to Russia, they might increase the duties any time they want back to very high level.

Nonetheless, Russia's Financial Ministry is planning to lower the oil export duties in 2017 which will have an impact on waste oil exporting from Russia as well. Originally, they had planned to lower it already in 2016 but low oil prices forced them to change their plans. Driver behind lowering of the duty is the Russian government's plan to increase oil sales abroad. (Reuters Africa 2016) If lower oil export duties realize and it becomes profitable for STR Tecoil to start importing waste oil, it has an impact on volumes transported by Haanpaa as well. However, sudden increase of duties at some point may cease the imports resulting in decreases in transportation volumes as well as in income for Haanpaa. Therefore, if Haanpaa needs to acquire more trucks to be able to transport all the waste oil from Russia, it must be certain that transportations will continue for several years. However, need for this is very improbable because of the empty flow back to Finland.

STR Tecoil's capacity poses a threat to import volumes because oversupply allow STR Tecoil to choose from which sources they procure their raw material. This may prevent the high import volumes from realizing as STR Tecoil is capable to use only the cheapest raw materials. Therefore, the highest amounts in the evaluations may not be realistic which lower the attractiveness of waste oil importing.

### **6.5 SWOT analysis oily waste from ports**

There are not many strengths that makes it possible for Haanpaa to differentiate itself and gain competitive advantage in the transportation of oily waste from ports.

Perhaps the biggest strength of Haanpaa is its personnel since experienced and trained drivers that can take care of transportations of oily waste from ports. Secondly, Haanpaa's large fleet of trucks enables the designation of trucks to pick up the oily waste.

Weakness of Haanpaa in the transportation of oily waste from ports are the batches of transported waste because they are usually quite small and therefore they are not the core competence of Haanpaa. Therefore, the transportation of oily wastes resembles a little the collection of waste oil from garages and such. Collection of waste oil isn't considered as very attractive business in Haanpaa and therefore the transportation of oily wastes from ports can be assumed to be not so attractive in the eyes of Haanpaa either.

Another weakness is the fact that Haanpaa is dependent on the waste management companies that do the treatment of oily waters. This increases the bargaining power of waste management companies. They are also able to put out a tender and choose the company that is able to provide the cheapest service. This is, of course, the case in every competitive tendering but Haanpaa doesn't have similar competitive advantages in transportation of oily waste as they have in bulk transportations. In addition, shipping has a seasonal nature as, for example, cruise ships visit in Finland only a few months a year which means that most of the year there is less waste that must be transported. Finally, deliveries are quite irregular throughout the year which makes the work of traffic planners harder.

Still, large quantities of oily waste annually provide a good opportunity for Haanpaa to gain more transportable volumes and increase its incomes. However, transportation of these wastes requires that Haanpaa wins a competitive tendering. If Haanpaa is not able to take part in the competitive tendering and win it, acquisition of a company that is already working for one of the waste management companies could be one opportunity.

First threat is that transportation of oily wastes from port is not new market as there are lots of operating companies. Therefore, it is highly competitive market and there are also smaller companies that are more agile and they have smaller fixed costs. In addition, calls for the pickup of oily water may come in short notice and Haanpaa is then required to designate a truck there at the expense of another pickup if there are no trucks available at the moment. Pickups of oily waste from ports may also be quite irregular and they are seasonal. Consequently, trucks may stand empty sometimes if they are designated only for the use of waste management company.

## **6.6 Financial data**

Total costs from import of waste oil from Russia is something between 100 000 and 2 000 000 euros depending on the volumes and income can be as much as 2 500 000 euros. However, the highest incomes from Russia are unlikely to realize due to factors that are presented later. More precise calculations are left out of this thesis due to confidential nature of cost structure of transportation.

Costs of waste oil importing were evaluated with different variables, such as exchange rate of ruble, costs per kilometer and length of the trip from Russia to Finland. The effect of each variable on costs were assessed with sensitivity analyses to get the range of costs originating from import operations. Then the highest and the lowest possible costs per tonne were calculated by changing all three variables. Highest costs were used as a pessimistic evaluation of costs and the lowest as an optimistic evaluation of costs. To get a realistic evaluation, an average costs per tonne was also calculated and used to assess the real costs of operation with different annual volumes.

There are no financial data of transportation of oily waste presented in this thesis because they are dependent on contract that is made with the waste management company. If Haanpaa finds the transportation of oily wastes from ports to be interesting enough, it can try to take part in competitive tendering of one of the waste management companies. Invitation to tender usually includes data about the

estimated amounts of transportable waste per year that are transported from ports to treatment facilities. This way Haanpaa is able to evaluate the profitability and attractiveness of transportation of oily waste more precisely and decide if it is willing to make an offer or not.

## **6.7 Supporting information**

In this chapter different kinds of risks that may affect the transportation of waste oil are identified. After the risks have been identified the severity of them is assessed to get overall picture of the impact of them. After that, the possibility to prevent the risks realizing is assessed. Additionally, some contractual aspects are discussed.

As described in theory part, there are different types of risk factors, such as environmental, service delivery and organizational and relationship risk factors. Environmental risk factor, in case of waste oil importing is, for example, decrease in transportable volumes produced in Russia. One of the service delivery factors is, for example, long waiting times on the border which can affect to transportation of other substances by delaying the deliveries. Organizational and relationship factor that can also affect to importing is the relationship of Finnish and Russian companies if Russian company suddenly needs to increase the price per kilometer for some reason. All these factors may have a negative effect on import of waste oil and therefore there is a need to take measures to avoid all of them to ensure the smooth flow of waste oil from Russia to Finland.

Environmental risk factors are quite severe because small volumes greatly decrease the attractiveness of the importing and Haanpaa is not able to affect to the volumes. Service delivery factor is also quite severe as it may lead to troubles if trucks are regularly running late because of waste oil importing. However, these risk can be effectively prevented with a careful traffic planning, for example, by choosing the border crossing point that doesn't require queuing. Organizational and relationship factors can be considered not to be very severe as long as there are clear agreements between Finnish parent company and Russian subsidiary.

One additional source of risk is pricing. If the calculations are wrong or there are some things that aren't taken into consideration, the price set for services can be too low which may lead to losses. However, as long as there are no long-term agreements on import of waste oil with certain price and cost data can be checked after the first deliveries, possible losses won't be very big.

Still, most of the risks are related to the situation where Haanpaa has made some investments on importing of waste oil and then it is ceased by some factor. For example, increasing export duties of waste oil from Russia decreases the profitability of importing for STR Tecoil and therefore it rather imports from some other country. Additionally, establishment of regeneration plant near Saint Petersburg would probably cease the importing since waste oil could be delivered more cheaply to Russian regeneration facility.

All in all, the risks in waste oil importing are quite small because it doesn't require Haanpaa to acquire new trucks and Haanpaa is already operating in Russia which means that they have knowledge about the markets. In addition, if importing proves to be unprofitable business, it is quite easy to return back to present state and cease the import of waste oil as long as Haanpaa hasn't already made any investments on importing of waste oil.

Transportation of oily waste from ports is a little riskier than waste oil importing. There are, for example, organizational and relationship related risks because subcontracting requires usually long-term commitment and if transportation of oily wastes turns out to be unprofitable it is difficult to negotiate one out of the contract. However, risks can be identified and the severity of them assessed during the competitive tendering and the decision about the offer can be made based on them. Invitation to tender usually includes also the estimation of the volumes and routes so the profitability of the operations can also be assessed before the offer is sent to the waste management company. Therefore, risks can be minimized during the competitive tendering with careful planning and pricing.

## 7 CONCLUSIONS

Both the importing of waste oils and transportation of oily wastes from ports have their own characteristics that need to be taken into account when Haanpaa decides if it is going to strive to these markets or not. Haanpaa must also take advantage of its strengths and minimize the effects of its weaknesses to operate successfully and to exploit the opportunities offered by transportation of waste. This chapter includes the most important factors that have an impact on transportation of oily wastes and provides views of researcher of the things that should be done by Haanpaa.

There are several factors that are affecting to transportation of waste oil either now or in the future. At the moment politics are steering the waste management to the direction of circular economy of which waste oil regeneration is a good example. There are legislative changes happening especially in Russia, such as law on incineration of waste oil, which provides an opportunity to parties involved in the regeneration of waste oil such as logistics service providers. Transportation of waste oil is also affected by economic downturn which has lowered the price of crude oil dramatically. Additionally, one of the economic factors affecting the transportation of waste oil is value of Russian ruble because it has a direct impact on costs of Haanpaa. Low value of ruble enables Haanpaa to transport quite profitably. However, possible increase in value of ruble must be taken into account in the pricing of services.

If legislation changes in Russia, it may increase the import potential but at the same time it means that they may establish regeneration plants in Russia which would cease the import of waste oil. Luckily, so far Russians have preferred the refining of crude oil over regeneration. In the future, technological development will have an impact on amount of waste oil as it will increase the use of electric cars. However, time span in this transition is long which ensures that there is a lot to transport for years to come.

STR Tecoil is not capable to pay very much about the waste oil transportation because of the relatively low price of its product that is closely related to the low price of crude oil. As a result, something needs to change in the total costs of waste oil importing in order to STR Tecoil to be able to start importing from Russia and especially from Moscow. Things that could increase the STR Tecoil's ability to pay are law on incineration of waste oil in Russia, increased price of base oil and lower export duties of waste oil. Shortage of raw materials is also one aspect that could increase the willingness of STR Tecoil towards import from Russia.

In case of waste oil importing from Russia it is best to wait until the effects of law on incineration of waste oil realize. Effects will show if Haanpaa's customer's ability to pay increases or not. If nothing changes in Russia, then it is necessary to think whether to keep the high prices and continue with the normal operations or assess the possibility to lower the price of import. It is, of course, necessary to evaluate the situation carefully and set the price to a level which have some buffer to respond to changes such as exchange rate of ruble. Haanpaa could lower the price of import by, for example, making a contract with its subsidiary in Russia so that they would lower the price per kilometer. Lower costs would then allow Haanpaa to make an offer that STR Tecoil is able to pay and then it would be possible to start importing and check how profitable it is in reality.

Deducing from the available capacity of STR Tecoil, the estimated potential of waste oil import from Russia is smaller than the highest total amounts presented in chapter 6.1.1. At the moment STR Tecoil is receiving around 55 000 tonnes of raw material to its regeneration facility annually and its maximum capacity is 60 000 tonnes. This means that they may be willing to pay a little more about the 5 000 tonnes that is missing from the maximum capacity. However, if there is oversupply of waste oil they will start procuring their raw material from places that they get it with the cheapest price. Consequently, the total potential for Russian imports is dependent on the price of Russian waste oil in comparison to price of the waste oil from other locations. Therefore, a lot depends on the effects of Russian law on

incineration of waste oil which may decrease the price of waste oil and increase the potential of importing.

If Russia's oil export duty is lowered, price of base oil increases and law on incineration of waste oil in Russia decreases the price paid for waste oil producers, STR Tecoil ability to pay is increased. Then the total income of Haanpaa can rise as high as 2 500 000 euros annually. However, this is highly improbable and therefore incomes are most likely a lot lower than that.

Import of waste oil is a core business of Haanpaa because it includes transportation of liquid bulk over long distances. Haanpaa is specialized in this type of transportation as it is transporting liquid substances in whole Northern Europe. Therefore, one of the biggest strengths of Haanpaa is the transportation of liquid substances to Russia and Sweden and the empty trucks returning to Finland. Haanpaa's present fleet is applicable also to transportation of waste oil so it can be exploited in import of waste oil. Additionally, the present capacity is also sufficient to match the volumes of importing for quite a long time and there is no need for procurement of new trucks.

There are also several factors that have or will have an impact in the future to transportation of oily waste from ports. For ships that are stopping by at Finnish ports it is mandatory to leave oily waste to port. However, ships in regular traffic can be exempted from this mandatory dumping of oily wastes if they have an agreement with a waste management company. For ships in regular traffic it is cheaper to make an agreement straight with waste management company and get an exemption from the dumping obligation of waste because that agreement releases them from paying the waste management fee in ports. After that they are most likely charged by the waste management company according to the costs originating from the pick up and treatment of waste.

Unfortunately, Haanpaa is not able to make a contract with ships or shipping companies since it is not a waste management company. Therefore, the first way to

start transportation of oily waste is to take part in the competitive tendering organized by a waste management company and by winning that it is possible to start operating as a subcontractor. Second chance is an acquisition of one of the companies that is already operating as a subcontractor of a waste management company.

Total amounts of oily waste from all Finnish ports is around 41 000 tonnes according to the estimation presented in this thesis. However, around 26 000 tonnes of oily waste is received in 5 biggest ports which means that these are the ports that Haanpaa should strive for assuming that Haanpaa is able to make contract with waste management company for the transportation of oily waste only from specific ports. Weighted averages for oily wastes of port of Loviisa were 5,58 m<sup>3</sup> of separation waste, 3,9 m<sup>3</sup> of bilge water and 2,9 m<sup>3</sup> of used lubricating oil. These quantities probably represent quite well the average quantities from other ports as well. Still, load sizes of oily waste from ports may vary and they are usually something between 1 m<sup>3</sup> and 15 m<sup>3</sup> and according to the statistics of Port of Loviisa on average they are 6,86 m<sup>3</sup> which means that these kinds of transportations differ from normal load sizes of Haanpaa as it is focused on bulk transportation with bigger load sizes.

However, bigger ports, such as Helsinki, HaminaKotka and Turku are visited by bigger ships and also by cruise ships and therefore the average amounts are likely to be also bigger. Additionally, average loads received from ships that have a contract straight with a waste management company are also probably bigger than those from ships with no exemption from mandatory delivery of oily waste due to costs. Ships that are not exempted must pay the waste management fee no matter if they leave the waste or not whereas ships with an exemption most likely cumulate the tanks as full as possible and leave it all at once because it requires only one pick up by the waste management company and is therefore cheaper.

There are also some factors that are affecting to the amount of oily waste from ports in the future. For example, oil-water separators are getting better which will

decrease the total volume of oily waste as its water content is decreased. Transition to better quality bunker fuels also decreases the amount of oily waste in the future since they don't need to be separated as much and they also increase the change interval of lubricating oil which decreases the amount of waste oil. However, the biggest change is going to happen if shipping companies start using more LNG ships because of the air emission regulations. It will, for instance, end the production of separation waste which is responsible for highest volumes of the three oily waste types originating from ships.

Large annual quantities of oily waste from ports provide a good opportunity for Haanpaa to gain more volumes and increase its incomes. The biggest strength of Haanpaa in this area of operations is its personnel and fleet of trucks since experienced and trained drivers that can take care of transportations of oily waste from ports with Haanpaa's existing trucks. However, these trucks must be equipped with a tank with separate compartments for different waste types so all trucks can't be used in these kinds of transportations. Additionally, after the delivery of oily waste these trucks are difficult to exploit in other transportations as oily waste is quite worthless and therefore the washing of the tanks would probably be too expensive in comparison to profits from transportation.

Financial data of transportation of oily waste from ports is left out of this thesis since more accurate data will be provided for Haanpaa if it is able to take part in the competitive tendering. Based on the invitation to tender, Haanpaa can assess the profitability of transportation of these wastes. Still, it should be possible for Haanpaa to assess the attractiveness of transportation of oily waste from ports with the information presented in this thesis and make the decision if they want to strive for these markets or not.

In case of transportation of oily waste from ports, Haanpaa must extend its business model since this kind of transportation is not one of its core competences. Sometimes it requires, for instance, transportation of small loads of waste. Additionally, Haanpaa would be working as a subcontractor of some waste

management company. Therefore, it must be carefully assessed if Haanpaa is willing to adapt its business model and start transportation of oily waste from ports for one of the waste management companies.

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