

Optimal route from Rotterdam to Murmansk

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Bachelor's thesis
May 2019
School of Technology
Degree Programme in Logistics Engineering

Author(s) Mikhailova, Anastasiia	Type of publication Bachelor's thesis	Date May 2019 Language of publication: English
	Number of pages 67	Permission for web publication: x
Title of publication Optimal route from Rotterdam to Murmansk		
Degree programme Logistics Engineering		
Supervisor(s) Ahonen, Pertti; Pesonen, Juha		
Assigned by		
Abstract <p>Globalization and current world trade are continuously expanding as well as demands for sustainable, transparent and efficient logistics processes. Some transportation routes are not yet present which is an enormous constraint in businesses. BASAMRO Shipping B.V., a Rotterdam based logistics company, has faced the same problem with deliveries to a city in the northern part of Russia called Murmansk. The goal was to find an optimal way to transport goods taking into account the main logistics priorities: money, lead-times, cargo safety and environmental impacts of the transportation.</p> <p>In order to reach the objective, it was necessary to collect data of various logistics processes and understand them. Interviews and sent quotations helped to gather information and ensure its realism, reliability, so the final result can be implemented by BASAMRO easily and efficiently enough.</p> <p>Achieved results of the study involve wide knowledge of some customs clearance procedures, existing legislations, description of different transportation modes and their influence on the environment, received quotations' answers from different transportation companies with prices and lead-times. By analysing that information, four possible routes from Rotterdam to Murmansk were chosen, discussed and the most adequate one was favoured.</p> <p>By and later, further development was suggested and completely new information was found for BASAMRO which can give an immediate business growth for the company.</p>		
Keywords/tags Logistics, Rotterdam, Murmansk, transportation, supply chain, lead time, maritime, railways, road, cargo, incoterms, customs clearance, emissions.		
Miscellaneous		

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1 Introduction

Nowadays the world's trade is gradually growing and its boundaries are almost eliminated. Such a development requires constant changes and adjustments in logistics because there is a need to reach the most difficult areas around the globe. For companies, like BASAMRO, it gives a chance to become a bigger competitor within the field. The competition in the logistic field is rising, since there are roughly 4000-6000 logistics companies in Russia already (Transrussia, 2017). People migrating, marketing campaigns integration, Internet influencers and other forces are pushing towards flexibility and adaptation of new solutions. Globalization leads companies for making a progressive search for possibilities to enter far areas in different countries, like Murmansk, Russia.

The focus of this thesis study is to create possible supply chain routes from the port of Rotterdam to Murmansk where factors like lead-times, approximate prices, environmental impacts and cargo safety are taking into account. Logistic field is at its peak of the development which requires a constant on-going analysis of the current changes, trends and customers' desires. The study process is performed in a cooperation with a Dutch company "BASAMRO Logistics Group Transport & Shipping & Aachen B.V." which headquarters are located nearby the port of Rotterdam, in Rhoon.

"BASAMRO Logistics Group Transport & Shipping & Aachen B.V." is in need of a proper analysis and research of the possibilities to ship cargo to Murmansk and acknowledge the probability of creating such a supply chain. The main company's interest is to make sure the services they offer are available in as many locations as possible which sometimes makes Russia quite a challenging target. One of them is definitely Murmansk - a port city and is considered the largest city north of the Arctic Circle.

The city is accessed quite easily from the railways and highways to Europe. Moreover, Murmansk is based only 108 km away from Norway and 182 km from Finland which makes the transportation options pretty variable and

gives space for discovering new fast, optimal, cost-efficient and environmental friendly routes.

This thesis represents four possibilities to transport goods from Rotterdam to Murmansk by help of interviews, overall calculations per one route, environmental factors, transportation modes reviews, analysis of existing problems such as custom clearance downtimes and bottlenecks, specifications to make the implementation as smooth and fast as possible.

Company presentation

“BASAMRO Logistics Group Transport & Shipping & Aachen B.V.” is a company that provides a various number of services starting from forwarding, value adding services and up to transportation and deliveries. Therefore, the company’s working areas is divided into two parts: transport and shipping. BASAMRO Shipping B.V. was created by Aart vanyder Basch in 1983 and was followed up by Pim van den Brom in 1987 who created BASAMRO Transport B.V. The locations of the company are spread around different European areas such as the Netherlands, in Rhoon and Aachen and in Belgium, in Olen. The office in Aachen was established in 2009 because of the rising coil transportation.

In order to understand the company, its future mission, values in depth and truly see the processes from the inside, there was an official visit organized in February 22nd in Rotterdam with the company’s specialist in shipping named Valentin Veresov. The interview was meant to provide all the information regarding the current situation in the company, objectives regarding the topic and possible challenges that might appear along the way. A list of main first question is shown in the appendix 8. They helped to gather the basic information for the further research.

BASAMRO Transport B.V. is directly connected with transportation demands and supply matching all over Europe. This company’s division is responsible for supply chain establishments, paperwork corresponding and providing additional services like cross-docking, customs clearance and warehousing.

However, BASAMRO does not own warehouses of any kind, but only rents the space needed.

BASAMRO Shipping B.V., on the other hand, has in spotlight networking with countries like China, India, Russia and other Far East countries. By gained throughout the years knowledge and experience, BASAMRO Shipping B.V. is capable of suggesting a well-working door-to-door service including container handling at overseas factories to final destinations.

BASAMRO Shipping B.V. is strongly focused on expending the networking in Russia and other Eastern countries as well as it was the initial ground for establishing the company's business. Forwarding was the root for the business and its later development. The current interest is reaching out to Murmansk. However, the supply chain in the area can be quite challenging and cost demanding. When interviewing the company's representative, it was clear to conclude that Murmansk area has a need for a various number of equipment transportation for local factories and industrial processes such as Novotek, food deliveries or construction materials.

The thesis is able to give a constructive perspective on how exactly to create the most efficient supply chain to achieve the most effective transportation and keep the company's reputation on the top. That makes BASAMRO's future goal: to gain a new status in the field of logistics – NVOCC which stands for Non-Vessel Operating Common Carrier.

2 Problem definition and thesis objective

BASAMRO Shipping is facing a problem with a need of transporting goods all the way to Murmansk, however, they have not experienced such a route yet. A new path would be ideal for following trends and staying within the competitive circle. Murmansk is a problematic area due to its far location as shown on the Figure 1, weather conditions and lack of understanding of the most potentially efficient supply chains there are.



Figure 1. Location of Murmansk

On the other hand, companies nowadays make a lot of effort to act as environmentally friendly as possible which makes the route planning even more tricky and challenging, since BASAMRO Shipping would like to operate dynamically, cost efficiently and keep holding the competitive position in the business area as well as keeping in mind the impacts of their activities as a part of the corporate social responsibility issues.

By and later, the questions can be stated as following: “What are the routes from Rotterdam to Murmansk that have the most adequate lead times and expenses? What are the proper level of cargo safety and routes with the least environmental impacts?”. In order to answer that, additional questions must be answered: “what are the current challenges and bottlenecks in Murmansk port area?”, “ what are the existing types of transport that BASAMRO has an access to and pros and cons of each mode?”. Also a clear understanding of the company’s desires and priorities can help comparing routes to the future goals and make a decision based on that. In this case, transportation and prices will be based on container transportation because it is quite common and gives a more realistic picture of the analysis.

Expected result of the thesis study is finding the optimal route out of four possible new routes to Murmansk that include the points mentioned above,

and recommendations for the most sufficient way for implementation. BASAMRO would be able to have a detailed analysis of the current situation, solutions and possibly use this study as basis for creating a new route to Murmansk.

Limitations

The study covers quite a broad field of logistics between several European countries as well as a big Russian territory which can result into a too wide and not efficient research. Therefore, the following limitations have been chosen in order to set boundaries and make the degree of the research extend is clear and understandable.

Air transportation is one of the way to deliver goods when it comes to an urgent or expensive type of cargo, or when the risks of expiration is the highest compared to other types of deliveries, e.g. organs, food, animals or medicine. Airways, thus, are able to provide fast and careful service, yet that capability directly influences the costs of such a transportation. In this case, this transportation mode is not taken into account since BASAMRO is only focused upon money efficiency, and there is a lack of goods that require an immediate logistics interference.

Transportation routes to Murmansk can start from a various number of ports in Europe such as Kotka (Finland), Amsterdam or Rotterdam(The Netherlands), Hamburg or Dusseldorf (Germany), Antwerp(Belgium), Marseille (France), Le Havre (France), Bremen (Germany) or Bergen (Norway). (Europeish, n.d.) However, the company's usual operating processes involve ports of Rotterdam, Hamburg and Antwerp. Other ports are not considered because the thesis study is based upon already established working process which are hard to change, therefore, would be more difficult to implement.

Russia, like Europe, provides a number of ports located across the country, though only few of them are located in the Western area and are up and working with proper container ports and cargo ground handling. These factors, when making a choice of the most suited port, result only into two ports which are Ust-Luga Multimodal Complex and Big port Saint Petersburg

excluding all other ports out of the analysis. The port of Murmansk is also mentioned in the study, despite its weak characteristics, since it is the final destination and it is crucial to see all the possibilities.

Even though the overall environmental perspective is mentioned and considered for making the final choice of the most adequate route to Murmansk, in depth analysis of all measures is excluded such as noxious odours, ground subsidence, vibrations, noise, soil pollution and water pollution. (JICA Research Institute)

Time losses during transportation means a time where the cargo was supposed to be moving, but it is postponed because of some internal or external problems. Most of them appear at the customs since the goods has to undergo customs clearance, human errors or lack of necessary documentation causing expenses per each day of the delay. In this thesis study this factor is not taken into consideration because it does not happen regularly, nor is it possible to foresee such an event. Thus, it is assumed that processes which take place during a certain transportation are not interrupted by any unfortunate events and are managed under perfect conditions.

Goods flows can be highly affected by political situation because it does not only involve the countries' desire to cooperate and make supply chains work as smooth as possible, but also it leaves impacts upon at the allowed cargo type. Current trade relationship between Russia and Europe is slightly strained because of the existing sanctions. In this way, for example, Russia created food embargo on Europe and some other counties like the USA, Australia, Canada and Norway, from 2015 with respect to Iceland, Liechtenstein, Albania and Montenegro, and with 2016 with respect to Ukraine (TASS, 2018) which has resulted into a list of goods that is not possible to be transported anymore. In this thesis study it is not reasonable to take into account because the transportation perspective is the main objective.

3 Research methods

When it comes to research methods for a certain subject, it is important to distinguish among different research methods. There are two main angles to look at the research from: qualitative and quantitative analyses. In this part each method will be presented with the methodologies, clarifications, techniques, their pros and cons as well as the reasons for choosing them. However, the detailed data for each method is not fully mentioned because it is stated in the further parts of the research.

The first research that can be applied for writing a thesis is called a quantitative research. It can be described as “ A research strategy that emphasises quantification in the collection and analysis of data...” (Bryman, 2012, p. 35) So this method means a systematic investigation of certain phenomena by obtaining data such as numbers, statistics, mathematical or computational data outcomes. The main questions of the method are “how many” or “what is the statistical pattern” leading to the numerical conclusion. It is common to apply sampling methods which can be different online polls, surveys, questionnaires etc. The difference to the qualitative method is that is used towards quite a significant group of participants which gives an evaluation of common known ideas or processes. Compared to the qualitative method, as the result it provides larger samples of data gathered, so it is easier to assume the results as general. Statistics is often seen as more reliable and trustworthy type of data. However, quantitative method has limitations as well:

- Numbers do not show common meaning of the social phenomenon (Denzin & Lincoln, 1998)
- Reasons and meanings behind the research paradigm are not seen, nor are they analysed
- Positivism of the research does not present the social reality in depth, or how the actions are interpreted by others (Blaikie, 2007)

- According to Schofield (2007), quantitative method can be compared to taking a snapshot of a phenomena : “ It measures variables at a specific moment in time, and disregards whether the photograph happened to catch one looking one’s best or looking usually disarranged.”

The second research method is called a qualitative research. A study with a qualitative research requires a research question or hypothesis, not objective. (Creswell, 2009) Data can be gathered through conversational communication or through asking open-end questions. Qualitative research involves a wide range of data collecting from people’s experiences, behaviour, organisational functioning, cultural phenomena etc. Technically, one has to obtain different unadulterated data and transform into understanding, theory or patterns interpretation to achieve meaningful inferences. In regards of logistics and transportation routes from Europe to Russia qualitative methods play a crucial role since it is directly connected with understanding “how” the processes work , “why” and “what” are the essentials for a successful supply chain. However, qualitative research has its own advantages and limitations.

Denzin (1989) states that qualitative researches are able to provide a deep description of participants’ opinions and experiences. Therefore, it gives a full and detailed picture of the current situation. Also one can include the perception of the participants based on their background which gives the opportunity for critical thinking. In the field of logistics numbers and statistics mean a lot. On the other hand, it is important to ask why are the numbers appear to be like that, and that if what the qualitative methods help with. Nevertheless, this method has its limitations. Gathered data is only understood in the appropriate context. In the meantime, the nature of the information is seen subjective and cannot be generalized or be presented as an average or mean due to small size samples (Snelson, 2016, 15.) Unreliability issues because the conclusions are generated based on the writer’s and others own thoughts and experiences which, of course, can vary.

In this thesis study the choices of data collecting for the qualitative research can be limited at some points since BASAMRO is in charge of setting goals and objectives as well as data providing is narrowed down to the minimum because of the existing competition.

Since qualitative research methods are strongly focused on the society and human behaviour, the goal is to reveal the behaviour of the targeted audience and its understanding on a specific topic. The obtained results are usually deep and descriptive which is really crucial in logistics because it is not only about transporting goods from point A to point B, but also it requires a strong communication level between parties. Thus, applying particular methods of the research will be helpful in getting familiar with what works best and how to overcome difficulties in the BASAMRO's case.

The qualitative research seems to be the most appropriate because it involves a deep understanding of the processes and can explain what makes a supply chain reliable, why there are bottlenecks at the port of Murmansk etc.

3.1 Case study method

This methodological approach is one of the most suited for this thesis because it means usage of multiple sources types for reaching a deep and reach understanding. Or, like Schramm (1971) stated that a case study focus on illuminating a decision or a set of them: why they were taken, how such decisions were implemented and what results were achieved.

Case study method suggest a wide range of recourses to use such as interviews, documents analysis, report studying, observation gathering etc. By using this method, one can easily dig into the very core of the phenomena by involving several different approaches. In case of BASAMRO, it is truly essential because, just like any other logistics problem, it concerns supply chains as a whole. Any problem that exists within logistics can be associated with cultural aspects, ability to communicate, county's limitations, equipment levels, goal and objectives of different parties involved. In order to understand the so called underwater rocks and find ways to avoid them, a case study is

the perfect choice. Moreover, any data gathered should be analysed within its context. Case study can operate also as a vector aimed at the field of research and helps recognizing the variety of underlying perspectives of the phenomena.

3.2 Interview method

The interview method - or also so called phenomenological method- carries out the idea of reviewing participants face-to-face or distantly. It can be achieved by real life interviews with one person, phone or video conversations, e-mail Internet interviewing or focus group discussions with several participants. (Creswell, 2009) Although it is more productive to conduct such a method face-to-face because it allows to read the body language and match the answers. Typical and valuable interviews are not structured and usually open-ended. This method helps gathering data in depth making it the most efficient qualitative method. The focus is put on the people who have experienced the phenomena with the efficient number from 5 to 25 participants to validate findings.

This method is full of advantages that can lead to a great scope of results. The researcher is allowed to prepare and analyse questions beforehand and adjust over the line ones along the process. Participants can not only have the up to date information, but also the historical data and experience. People tend to trust the information more when they see in person the researcher and the desire to cooperate increases respectively. In BASAMRO's case this method is truly suitable because interviewing gives an understanding of the current situation in the company, their goals and perspectives which helps, later on, to include that into the transportation analysis and choices. Moreover, the data received is indeed professional and can be trusted. Later in the research it is necessary to interview other stakeholders and parties involved into the supply chain.

On the other hand, the interviewees can share the information given from their own perspective that is filtered through their views and beliefs. And as Creswell (2009) mentions that not everyone is "articulate and perceptive".

To summarize, a prepared list of possible interview questions with an ability to be adjusted or expanded along the way can give a great result of deep and thorough data.

4 Transportation modes

4.1 Container transportation

This part of the study is involving theoretical aspects of each transportation mode, its advantages and disadvantages, including a real life example of a certain transportation type used within BASAMRO's experience. It is also important to highlight differences in regulations between Europe and Russia because they play a role in choosing the most adequate option. Company's examples give a view on how exactly transportation modes work in real life and what the realistic ways are to establish a new potential transportation route.

When transporting goods from point A to point B, it is possible in some cases to use one transport mode. However, when transporting goods over long distances, for instance, from Rotterdam to Murmansk, it might be necessary to apply the concept of multimodal transportation which means using more than one mode of transport. Furthermore, some important logistics terms will be explained and defined to create a deep understanding of all existing transportation possibilities.

The strong point of this theoretical part of the study is practicality. Theory itself within logistics field is quite various and can be often blurred because it is mostly coming from having working experience. Thus, when it is combined with practical approaches and examples, theoretical aspects become appear clear and one can see when and where exactly the knowledge should be applied.

In order to achieve the most solid and trustworthy background information, interviews were hold among logistics companies as well as the case study

method by combining qualitative and quantitative combinations also known as the mentioned above concurrent embedded method.

Container transportation can be reasonably called as the main type of cargo transportation in logistics. It is popular because of the ease to calculate prices, safety of the cargo and, most importantly, flexibility when it comes to multimodal transportation. Pretty much every hub point provides services for container handling and loading onto a different transport mode which creates that seamless supply chain that any company wishes for.

BASAMRO is considering deliveries of perishable goods and some industrial particles for transporting to Murmansk. Therefore, it makes sense to present cargo as a container delivery to make the data clear and realistic. There are two main container sizes in logistics: 20ft and 40 ft as seen on the Figure 2. They both are used for dry cargo types. However, 20ft containers are mostly used when it comes to smaller, but heavier goods, for instance, small engines. 40ft containers are suitable for goods that take up more space, lighter, or in bigger amounts. It is agreed with company's representative to take for transportation the 40ft container for further research. Nonetheless, it is important to stress that the final transportation will consist of at least 3 container per one way because fewer number is pointless and does not have anything to do with the real life cases.

Containers, on the other hand, vary a lot depending on the cargo type. For perishable goods there are refrigerator containers, open top containers (for fast loading from above), flat rack containers (for oversized cargo) and tank containers (for liquid bulk transportation).



Figure 2. Dry container (Business, n.d.)

4.2 Railway transport

In this section railway transportation is described with pros and cons, cargo types and regulations to achieve a full understanding of the mode and how it can be applied within the logistics field.

Railway mode of transportation can be indeed seen as one of the major ones because of its common usage around the world. From the old days pretty much every country has some kind of an established railway system. That factor itself makes this mode available for over 136 countries (Factbook, 2017). Russia has taken the third place in the world of the total km of railways as seen on the figure 3, having 124 thousand kilometres in total. Thus, railways appear to be one of the most accessible ways for internal transportation within Russian territory.

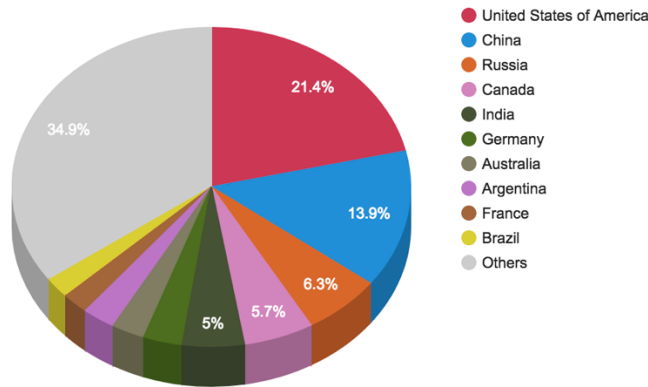


Figure 3. Total percentage of railways length in the world (Factbook, 2017)

When it comes to deliveries from Russia to the other countries, one has to recognize types of goods that are suitable for being transported via railways. Since Russia represents an origin of a various number of resources, that makes the main type of goods accordingly: petroleum products, mineral fertilizers, metals, building materials (ESTMA, 2018). Some other natural resources such as coal, grain, gravel etc. are usually transported in bulks. Bulk cargo stands for commodities that are transported unpackaged and in large sizes.

The most common type of carts for railway transportation is called a gondola cart. (Figure 4) They can be classified as a 4-axle or 8-axle carts. Gondola cart with a 4-axle can carry the capacity of 70 tons, whereas a cart with a 8-axle is capable of transporting up to 125 tons. (Advanced shipping, n.d.) Moreover, this type of carts can be divided into two types: special and universal gondola carts. The first type does not have a hatch at the bottom and it has 4 walls, except for the roof. They are designed for transporting goods that require a “closed” environment for goods. A universal type of the cart, on the other hand, has a hatch at the bottom which provides an easy unloading of bulk cargo. The universal gondola cart gives an ability to make the processes cheap and convenient meaning the least involvement of manpower.



Figure 4. Gondola cart (Altaivagon, n.d.)

Due to a different cargo requirements, railways have adopted different carts type such as boxcars, platforms, tank cars, refrigerator carts, hoppers and dumpcarts. (Advanced shipping, n.d.) Depending on the cargo, one can choose the most appropriate type of cart can be chosen.

Boxcars are used for transporting packaged or bulk cargo. If equipped with special devices, can be used for people's usage as well. Average tonnage is 60 tons. Platforms designed for oversized cargo. Cart's tonnage can vary from 60 up to 200 tons. Tank cars are meant for liquid cargo types e.g. fuel or oils with 4 or 8 axles. Capacity can be 60, 120 or 125 tons. Refrigerator cars are mostly suited for goods that must be kept in a certain temperature levels.

Dumpcarts just like some other types are commonly used for bulk cargo. However, unlike other carts, a dumpcart tilts when being unloaded, and the side walls fold for fastening the process. There are 4,6, 8 axles dumpcarts with carrying capacity of 60-65, 100-105 and 145 tons respectively. Also there are two types of unloading methods: pneumatic unloading and hydraulic unloading. Hoppers are perfect, too, for bulk transportation such as coal, ore, cement, grain, peat, ballast. A hatch at the bottom helps to self-unload the cargo due to gravity.

Container platforms allow easily and fast container uploading. Depending on the uploading type, there are two ways of handling it: with or without external lifting equipment.

4.2.1 Pros and cons of railway transportation

After acknowledging the goods types and specifications, it is possible to move on to the pros and cons of the transportation mode. Railway transportation has a major number of advantages compared to other types.

Safety is the number one priority factor because of its importance towards the cargo as well as people who operate the delivery. Transportation costs are almost 50% less expensive over long distances compared to other modes which is beneficial when speaking of international connections (TBN Logistics, n.d.). Most of the prices are created based on fixed costs. The raise in deliveries can directly represent a decrease in average costs.

Moreover, labour costs are quite low since it does not require a big number of staff to operate the transportation. (Zare, 2017) And cargo transported by railroads are usually delivered strictly on schedule and transit times.

From the sustainability point of view, railways are seen environmentally friendly producing up to 90% less of emissions compared to air cargo or road transport. (Banister, 2014) According to the European Commission 2016, railway transport has 1,6 % of the total emission production compared to other transport types.

Large capacities are a definite pro of railways transport since a lot of cargo is bulk. Cargo capacity flexibility is achieved by adding additional wagons and easy loading/unloading because of the equipped ramps on all stations.

Cargo safety research was not able to be found clear and exact, however, Eurostat claims that the number of overall railway accidents from 2010 to 2016 has decreased having approximately 1850 events per year. (Eurostat, Number of rail accidents in the EU, 2010-2016, 2019) That makes it relatively safe and stable because this statistics includes passenger and cargo trains.

Railways do though have cons despite all the positive aspects. Railways transportation cannot offer door to door service. Often railway routes belong to monopolies which can lead them to high costs and lack of competition. (Zare, 2017) Lack of all needed services at each territory; not every station is equipped with the proper value-added services for handling the cargo. Lastly, supply chain constrains complicate transportation because it cannot be adjusted according to customer's individual demands.

4.2.2 Railway regulations in Russia and Europe

The following part represents basic regulations and laws that exist in Russia and European Union regarding railways. The goal of any legislation is a creation of successful and efficient market with a competitive environment. There is no analysis made in depth because this thesis focuses mostly on the transportation modes and efficiency of different routes rather than taking into account regulation formalities. Nonetheless, the legislative part of logistics is worth mentioning for later references and showing where the information can be found and applied to.

The EU has established four legislative packages within the railways systems between 2001 and 2016 that aim for opened railways service market for competition with described appropriate conditions for framework. (The European Commission, 2019) Each package stands for some certain law type, rules or regulation e.g. from capacity allocation rules and safety requirements to train driver certification.

1. The First Railway Package. The package was created in on the 26th of February 2001 with a goal of enabling the access to the trans-European network on a non-discriminatory basis meaning cross border freight in the EU.
2. The Second Railway Package. In 2004 the second package consisted of guidelines for improved safety directives through certification, railway infrastructure capacity and the levying of charges for the

railway usage, interoperability and development, and creation of a European Railway Agency in Valenciennes (France).

3. The Third Railway Package. European Commission established the Third Package in September 2007 with measures for European railways revitalisation. The directives include certification of train drivers of locomotives and trains in the Community. The regulation in the package highlight organisation of a labour force sample survey and passengers' obligations and rights. The idea behind the Third Package was to enact international passenger services into the competitive field in the EU.
4. The Fourth Railway Package. The package can be divided into two parts: market and technical pillars. Market Pillar was adopted in 2016 with a directive of "opening of the market for domestic passenger transport services by rail and the governance of the railway infrastructure" (The European Commission, 2019) and two regulations "of the Council on common rules for the normalisation of the accounts of railway undertakings" and "opening of the market for domestic passenger services by rail"

The initial focus of the packages was to ensure Europe-wide transportation which one way or the other is connected to a regulation (EU) no 913/2010 of the European parliament and of the council adopted on the 22nd of September 2010 concerning a European rail network for competitive freight. The idea was to establish nine railway corridors , as shown on the Figure 5, in Europe making it easier to reach the final destination throughout European Union by coordinated capacity planning, infrastructure and traffic organization (Railway Gazette, 2015). Each corridor has a strictly defined route that can include an airport location, port or rail-road terminals. From international point of view, such corridors make any delivery easier, too.



Figure 5. European rail corridors (Railway Gazette, 2015)

The table 1 below shows an overview of EU countries entered in each corridor as well as the length in kilometres.

Table 1. European rail corridors (IRG Rail, n.d.)

Number	Corridor	Length in km	EU Countries
1	Baltic-Adriatic	4825	Poland, Czech Republic, Slovakia, Austria and Italy
2	North Sea- Baltic	6000	Belgium, Netherlands, Germany, Czech Republic, Poland, Latvia
3	Mediterranean	7000	Spain, France, Italy, Slovenia and Hungary, Croatia
4	Orient/East-Med	7700	Czech Republic, Austria, Hungary, Romania, Greece, Bulgaria, Slovakia
Continue on next page			

5	Scandinavian-Mediterranean	7000	Norway, Sweden, Denmark, Germany, Austria and Italy
6	Rhine-Alpine	3900	Italy, Netherlands, Belgium, Switzerland, Germany
7	Atlantic	6200	Portugal, Spain, France, Germany
8	North Sea-Mediterranean	5300	United Kingdom, Belgium, Netherlands, Switzerland, Luxemburg, France
9	Rhine-Danube	970	Czech Republic, Slovakia

Additionally, there is an International Union of Railways document called “Code of practice for the loading and securing of goods on railway wagons” that describes thoroughly loading guidelines for rail transportations in depth. (International Union of Railways (UIC), 2018)

When it comes to Russia and its regulations, one should gather the data from a document called the Transport Charter of the Russian Railways (hereafter “the Transport Charter”). It represents a set of obligations, rights and liability standards of the carrier. The very first edition goes back to 1920, however, the endured changes lead to the adopted version in 1995 and was updated on the 1st of January 2019.

This charter consists of the seven main sections : general provisions, transportation of goods, containers and carload shipments of luggage. The interaction of the infrastructure owner and carriers in the preparation and implementation of the transport of passengers, cargo and baggage cargo. Non-public railway tracks, freight traffic in direct mixed traffic, transportation of passengers, baggage, cargo as well as responsibility of carriers, owners of

infrastructures, shippers (senders), consignees (recipients), passengers, sea terminal operators. Lastly, it has acts, claims, final and transitional provisions.

The Transport Charter's aim is to ensure railway safety, rational use of vehicles, reducing transportation costs, efficient coordination of transportation and various types of it, timely cargo deliveries and its safety, financial responsibility of railways, consignors, consignees and passengers or improper performance of transportation obligations.

Moreover, the charter consist of rules of cargo rail deliveries e.g. rules for cargo receiving and issuing, rules for combining wagons and containers, rules for filling in the invoice and set of shipping documents and for the transport of bulk goods and the preparation of route shipments, norms of weighing accuracy, timing of delivery of goods, rules for the transfer and forwarding of goods etc. The document makes sure the whole transportation issues rising are covered in that set of regulations.

Lastly, the number of agreements that exist in Russia in the field of international rail transport:

- Agreement on International Carriage of Goods by Rail
- Agreements on direct railway communications with Finland, Afghanistan, Turkey, Iran, Austria, Yugoslavia (with content similar to the first agreement)
- Agreement on the creation of a single container transport system, concluded between the former CMEA countries
- Agreement on the International Railway Transit Tariff
- Russia also participates in the International Congress and Convention Association, ICCA and the Inland Transport Committee of United Nations Economic Commission for Europe (UNECE).

4.3 Road transport

Road transport is undeniably the core of any logistics processes, therefore, it is included into the thesis and presented with strong and weak points, truck most common models, cargo types and regulations as well as railway transportation above.

Road transportations are seen as the most popular once among transportation companies, both in Europe and Russia (Basamro, 2019). Whenever a transportation includes a delivery, which is more accurate in regards of the final location or transporting cargo in safe environment, trucks are commonly known for fulfilling these requirements. In this part of the study advantages and disadvantages are closely looked at, suitable cargo types, the most common vehicles in operations and existing regulations in Russia and Europe. For instance, over 75% of cargo in Europe is transported via roads. Figure 6 shows how the capacities are divided among three modes of transport according to Eurostat.

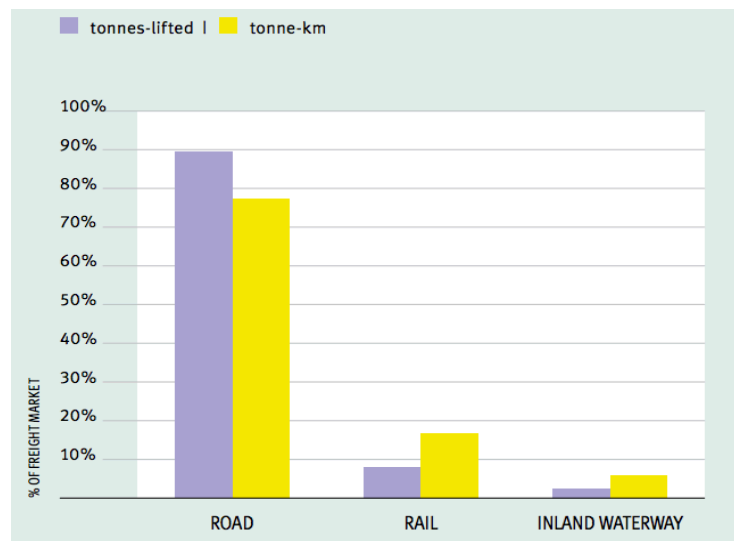


Figure 6. Freight modal split (Eurostat 2012)

According to Eurostat 2012, there are four main international road freight transportation. International loaded is the first type. Loading takes place in one country (where the vehicle is registered) and unloading is performed in a different country.

The second type is international unloaded. Unloading takes place in one country (where the vehicle is registered) and loading is performed in a different country.

Cross-trade contains loading and unloading are performed in different country with means of using a motor road vehicle registered in the third country. And cabotage means a motor vehicle performs a transportation on a national territory of a country, however, registered in another country

Goods types

The next essential goal is to get familiar with cargo categories that can be transported via road mode. Due to flexibility of this transport and its ability to be adjusted for an oversized cargo, it is hard to define one specific most common type of goods.

Perishable goods such as food from distribution centres to local stores. Any cargo that requires special storage conditions can be added to this section. Oversized or extra heavy loads cargo is usually challenging yet possible to accomplish by creating special vehicle combinations and route planning. "Live" loads stands for animals e.g. horses transportation for horse racing etc. Pallet cargo is another option for road goods type because it represents anything that can fit onto the pallets and therefore into the truck.

Dangerous goods in road transportation need a strict security measures. In addition, there are a number of rules and requirements not only directly to the transportation of such goods, but also to rolling stock, equipment of trucks carrying such goods, and the presence of a specially prepared forwarder. The list of dangerous goods is presented in the ADR agreement. (UNECE, 2019)

In order to achieve the most successful result and gain all the benefits from using road transport, one should have at least an overall knowledge of existing types of vehicles within the field.

Semi-trailer truck, as shown on the Figure 7 , is indeed can be called the most common type of trucks used in logistics (BASAMRO, 2019). The idea is that two main parts are a trailer and a truck combined together for greater efficiency. The truck's tent can be remove either from the top, or the sides for further loading/unloading. Carrying capacity can be up to 24000 kilograms. Dimensions, of course, can vary based on the manufacturer's parameters.



Figure 7. Most common type of trucks in logistics (Videoblocks, n.d.)

Tail lift truck has a name that speaks for itself- the main feature is a lift attached to the back part of the vehicle with a lifting ability – from 500 to 2000 kilograms. It does not require manual effort making it highly in use for distribution freights.

Jumbo trailer truck is similar to a semi-trailer having the capacity of 24000 kg and cargo handling method, too. However, the floor is G-shaped as shown on the Figure 8 and wheels diameter is decreased for greater speed. This truck is quite spacious which makes it suitable for high cargo up to 3 meters.



Figure 8. Jumbo trailer (Machino 2019)

Flatbed truck consist of two parts – driver’s cabin and an open-type cargo bed trailer. It is easy to operate cargo because of the lack of sides of the trailer making it suitable for bulk freight such as wood, carts, construction parts, pipes etc. (Vehicle Tracking System, 2018). This type of truck is made steady and durable which makes it able to carry weights up to 25 tonnes .

Refrigerated truck is technically a refrigerator that is capable of keep a certain temperature for transporting perishable goods. Commonly it is a semi-trailer type or a 18 wheeler truck.

Straight truck also known as box trucks, cube vans or cube trucks are relatively small compared to other heavy trucks with the capacity of approximate 44 cubic meters. Straight trucks are operated for furniture deliveries, household goods etc. They are not suited for heavy loads.

4.3.1 Pros and cons of road transportation

However, a question arises : “ What makes this transport mode so popular if the capacity is much lower compared to railways, for example?” And it is

reasonable to hesitate because trucks have weight restrictions, deliveries by size of vehicles and can be affected by weather conditions, roads quality and traffic. Besides, greenhouse gas emissions share is 73,4% compared to all other modes of transport. (European Commission, 2016) When talking about truck safety, it is important to stress that truck related accidents are accounted for 11% of all the accidents in Europe in 2014 according to the European Agency for Safety and Health at Work. Nonetheless, road transportation efficiency is stable than ever. It has the most valuable benefits for the supply chain management.

For instance, door-to-door service availability because any truck is able to provide final-leg transportation which makes it one of the more economical means of transport. Savings of special packaging compared to other modes of transport.

Flexible routing within a certain transportation because of the capability to achieve a delivering such as over border, local or rural areas, or short of long haul deliveries. (Freight Hub, n.d.) Tracking systems both for goods and trucks. Minimization of financial costs in case of short distance deliveries of goods.

4.3.2 Road regulations and laws in Russia and Europe

European Union's main legislation is strongly focus upon passenger and freight safety, fair competition in the market, environmental friendly transportation and elimination of any discrimination issues. (European Commission, 2019)

The main existing legislation of the EU of road transport consists of the following parts. Regulation (EC) No 1071/2009 of the access to the profession and to the market. This regulation is applied to vehicles over 3,5 tones. The operator has to be able to fulfil four main criteria : good reputation, financial standing (meaning capital assets available every year of at least 9000 Euro for the first vehicle and 5000 Euro for each additional vehicle (European

Commission, 2019), professional competence, effective and stable establishment.

Regulation (EC) 561/2006 sets rules of working, driving and rest period times including use of tachographs. Rules of minimum vehicle annual taxes is presented by the Directive 1999/62/EC..

Tolles rules and user charges for heavy goods vehicles are collected in the Directive 1999/62/EC . And the directive (EU) 2015/719 of maximum weights and dimensions of the road transport.

In the meantime, Russian regulations are presented in two main collections of regulations. Automated Transport Charter and Urban Ground Electric Transport. It covers everything from contracting management within road transport, delivery terms, loading and unloading rules to storage of cargo in the terminal of the carrier.

Resolution of the Government of the Russian Federation of April 15, 2011 No. 272 "On approval of the Rules for the carriage of goods by road". It represents all the rules regarding cargo handling, ,maximum permissible masses, axle loads and dimensions of vehicles, forms and procedure for filling the bill of lading and purchase order etc.

4.4 Maritime transport

Maritime transportation has had its important role in the logistics field in Europe and Russia throughout history. European market has almost 90% of external freight transported thorough sea transportation (European Commission, 2019) as well as Russia has always been a part of sea trading because of the existing kinds of activities in the country. Therefore, in this part there is a close look upon strong and weak points of this transportation mode, cargo specifications, available container types and legislation in Russia and the European Union.

Globalization is consistently forcing maritime transport to expend and find new approaches to improve services and seamless logistics solutions. Rotterdam, in this case, is the most competitive port because of its ability to

provide the most efficient services in regards of maritime logistics. According to Allard Castelein, the CEO of the Port of Rotterdam Authority, the focus of the port is strongly put on “creating added value such as employment in the port and the hinterland”. (MAREX, 2018) That dedication towards a smooth, fast and advanced service level contributed to achieving 150 million tonnes of goods in the fourth quarter of 2016 in the Netherlands. (Eurostat, Maritime freight transport in the EU, 2017) During the same period of time, Russia has become the EU biggest maritime transport partner with the total gross weight of 72 million tonnes delivered.

In the meantime, Russian central maritime operations take place in a port called Ust -Luga which is the biggest and deep water port on the Baltic, including the Baltic countries and Finland, with the overall cargo capacities was 97,6 million tonnes in 2018. (Ust-Luga Port, n.d.) The port’s location is near Saint Petersburg area, which makes it competitive and valuable because of the access to the North-South intermodal transport corridors (Baltic, Black and Caspian Seas) and East-West (Europe-Asia), the port of Ust-Luga fits well into the transport network of the North-West region and the European transport infrastructure. It operates any vessels type and ocean Ro-Ro ships. The port has a year-round operations with a really short ice period which makes it able to give services 24/7. Just like the port of Rotterdam, Ust-Luga has a highly developed hinterland transport such as road and railway connections. Terminals have services for transshipment, additional processing and storage of more than 20 categories of cargo.

Big port Saint Petersburg is used quite widely when it comes to container handling in international cooperation. The port is also constantly operating with cargo like wood, bulk, oil, scrap metal etc. The port services available can provide handling of a various cargo types. The strong point of the Big port Saint Petersburg is the connection to hinterland by roads or railways. Two districts of the port belong to the Novy Port railway station, and the third and fourth districts - Avtovo Oktyabrskaya railway station.

The growing demand for maritime shipping causes bigger environmental aspects, too. Main pollutant areas are ballast waters, dredging, oil spills and

air pollution. (Rodrigue, 2017) According to the European Commission, maritime transport had only 10,6% of the overall pollution of transport in 2014, making it the second environmentally friendly mode of transport after railways. (European Commission, 2016)

Maritime transport is efficient and popular also because of the variety of goods that can be transported by this mode. Each type of goods requires special packaging and handling. There are five defined types of goods transported overseas.

Ro-ro term stands for Roll On/Roll off type of cargo loading or discharging. This cargo type can be referred to anything that can move on its own: cars, trucks, busses, agricultural vehicles etc. Further handling is performed by highly professional drivers only.

Break bulk's general idea lies in the word "break"- cargo delivered in unitized form such as bags, boxes, pallets, crates, drums or barrels. Breakbulk can be bags of cocoa beans, paper, wood etc. Dry bulk is carried in loose form such as grain, cement, coal, sand or ores are called dry bulk. And liquid bulk can be crude oil, gas, chemicals, petrol etc. The main vessel type for liquid bulk is a tanker.

Container cargo is anything from computers, clothes, manufacturing parts to food can be transported in containers. It is safe, easy to transport due to suitability for sea vessels, trucks, inland barges and train wagons. (Antwerp, n.d.)

Cargo influences directly the packaging as well as the vessel that can transport it. Logistics experts (Basamro, 2019) define main types for goods based on its type and transportation requirements.

Container ships are meant for transporting goods carried in containers. The biggest container ship in 2019 is the OOCL Hong Kong with the capacity of 21000 TEU (Twenty Foot Equivalent Unit) (Network, 2019) Bulk vessels are made for bulk transportations in the holds inside the ship. Tonnage can reach 400000 DWT (Deadweight Tonnage) (Manaadiar, 2015)

Break bulk ships are designed to transport suitable cargo either under the deck or on the deck of the ship with the tonnage up to 40000 DWT. (Manaadiar, 2015) Ro-Ro ships are meant for wheeled cargo that can be handled via ramps connected to the ship.

4.4.1 Pros and cons of waterway transportation

Waterway transportation play a major role in may countries' international trade, so understanding when this mode is the most suitable can ensure a smooth and efficient delivery of cargo. Maritime logistics can provide quite a various number of benefits. For example, low costs per unit weight, large amounts of cargo delivered per one haul way and perfectly suited for bulky goods. Oversized cargo can be transported via vessels easily and are not restricted much in sizes.

Safety and security of container cargo deliveries are highly important. All containers are sealed after loading the goods. This helps prevent theft of goods during loading and unloading and reloading at transit points. Plus, containers protect cargo from any weather conditions and changes between transport modes. Container cargo are handled easily when switching to a next type of transport; seamless multimodal transportation.

On the other hand, maritime logistics is occupied constantly with the following risks and difficulties:

- Slow speed of cargo and risk to external unexpected risks is high.
- Weather conditions impact the lead times
- Cargo has to be reloaded to another transport type which causes time losses
- Risk of container loss in a port, or a handling mistake which leads to a wrong destination of the container. According to the World Shipping Council 2017, the 2017 survey showed that from the year of 2014 to 2016 there were on average 612 containers lost.

- Availability of regions that cannot be reached during winter seasons.
- Customer has to pay for the return of the container, too.
(gruzoperevozok, n.d.)

4.4.2 Waterway regulations in Russia and Europe

International maritime transportation is regulated by two main legal documents: International Convention for the Unification of Certain Laws Concerning Bills of Lading (The Hague Rules) which is developed in 1931 by the International Maritime Committee and UN Convention on the carriage of goods by sea, which was called the Hamburg Rules. It was developed in 1992 by the United Nations Commission (UNCITRAL). The main difference between those documents is the number of required data for transportation.

Russia, on the other hand, is mostly dependant on the Civil Code which has 41 chapters describing all regulations and forwarding. The Merchant Shipping Code of Russia (Maritime Code), the Code of Inland Water Transport of Russia, Federal Law No. 87-FZ of 30.06.2003 "On Forwarding Activities", Rules of Forwarding Activities approved 08.09.2006 N 554 by the decree of the Government of Russia are looked at when maritime transportation arises.

In foreign trade operations one should use the International Federation of Freight Forwarders (Federation Internationale Associates de Transitaires et Assimiles - FIATA) and the ICC (international non-governmental organization of private business that published the rules for interpreting international trade terms - also known as Incoterms)

Incoterms are representing international rules in the form that define sides and their responsibilities of cargo delivery. Yet they are used in a form of recommendation and only if stated in the contract. There are 11 terms in the edition of 2011, however, only 4 can be used in maritime logistics:

FAS-Free Alongside Ship- The seller has fulfilled the responsibility when the cargo is placed along the ship's side. The rest of the transportation, its safety and expenses belong to the buyer.

FOB- Free On Board- The seller has fulfilled the responsibility when the cargo is placed onto the ship. Further transportation and risks are dependent on the buyer.

CFR- Cost and Freight- The seller has to place cargo onto the ship at the port of shipment, pay all freight and costs and complete all the customs formalities. The buyer is responsible for any unexpected cargo damage or loss as well as any unforeseen expenses.

CIF- Cost, Insurance and Freight- This term is similar to the one mentioned above, however, the seller is obliged to provide an insurance for any risk of accidental loss or damage during transportation.

4.5 Customs clearance

In this section, aspects of customs clearance of goods are taken into account and described briefly to create the whole picture of supply chain from Europe to Russia. Customs clearance processes are an integral part of multimodal transportation when delivering cargo from the EU to Russia and back.

When delivering goods from the EU to Russia, there is a need for clearance of goods for exporting from Europe and the need for customs clearance of goods when importing goods to the Russian Federation. In regards to this thesis study, the lack of proper attention to customs clearance of cargo when imported into the Russian Federation may entail serious cargo downtime due to the lack of necessary permits and import certificates. Even though the downtime is not taken into account in this thesis, it is essential to keep in mind that such things can influence the lead-times.

That may entail the payment of the demurrage of the container in the port of St. Petersburg leading to significant expenses. In order to highlight the importance of the issue, below are the rates for demurrage of the container line of MAERSK. (MAERSK, 2019) Demurrage stands for penalties levied for excessive use of the container from the time it is unloaded to the terminal until the time it is taken out of the terminal. All rates are exclusive of VAT. VAT

is charged above the specified rates in cases stipulated by the legislation of the Russian Federation.

The date of commencement of calculation of the demurrage is the date of unloading the container at the port. Date of completion of the demurrage is the date of removal of the container from the port. The rates below include storage at the terminal.

Table 2. Rates of customs clearance (MAERSK, 2019)

The 1 st container terminal	20'DV (USD/day)	40'DV (USD/day)	45'HC (USD/day)
Day 1 - 5	Free period	Free period	Free period
Day 6	75	150	170
Day 7 - 8	25	50	60
Day 9 - 20	115	230	260
Day 21 - 30	165	330	370
Day 31 - 60	150	300	340
Day 61+	135		

The importer in the Russian Federation, which is a payer of customs payments, must know in advance the amounts of customs duties and taxes. For all formalities, customs clearance requires its study before the start of transportation, since goods may require, in addition to customs declaration with possible payment of customs duties and fees, the provision of permits for import or export, certificates and licenses. (ISO, 9000)

5 Research results

5.1 Quotations

In order for the research to be complete, full, reliable and realistic, a real life quotations were sent to different logistics companies in Europe and Russia. Companies like LLC “STM Company” in Saint Petersburg, “ISO 9000 Company” and “Polar Trans” were reached to gather documents for quotations specifically for a 40 feet container. Received documents were needed to reached later on other logistics companies and collect real numbers. The following documents have been received: appendix 1 shows the packing list for chipper from Michigan, appendix 2 is an invoice for a grain-dryer from Canada as well as a bill of landing in the appendix 3 , appendix 4 is a bill of landing for Chinese escalators, appendix 5 is a bill of landing for dried berries as well as a packing list in the appendix 6. The quotation has a description of goods that had to be delivered from A to B, but adjusted later on to be sent to other companies in regards of transportation from Rotterdam to Murmansk.

In the quotation it is mentioned that the prices and times are to be considered for a 40 feet HC container. Appendix 7 shows the exact way that the companies were contacted in mentioning four ways to consider and ports of loading, ports of discharge and places of delivery. It is important to mention that the cargo is requested to be transported to Saint Petersburg as the first thing since that is the usual way of cargo flows . (BASAMRO, 2019)

Some options also have a question regarding container repacking from a liner container to the container belonging to the Russian Railways (РЖД) or local truck tents. It helps to exclude unnecessary container shipping back to Saint Petersburg, which stands in need for additional expenses. The quotation was created by the help of BASAMRO Shipping and ISO 9000 Company which is a quality certification company with a brought knowledge of freight. After the quotation was ready, it was sent to the following transportation companies: LLC SINEDAN in Murmansk, RTL Group in Saint Petersburg, Russia, Main Freight in Amsterdam, the Netherlands, Red Transport and Logistics B.V. in

Rotterdam, the Netherlands, Samskip Multimodal B.V. in Rotterdam, the Netherlands, Logix Global Forwarding B.V. in Rotterdam, the Netherlands Bolloré Logistics Puteaux, France and Fins Trans, Riga, Latvia. A table below shows the prices and lead times gathered from companies like Nornickel from Tatiana Keller, LCC “STM Group” from Kirill Tikhonov, LLC Variant LTD from Olga Orlova, Red Transport and Logistics B.V. and Fins Trans from Severe Natalija. The chart below shows the process of receiving the quotations.

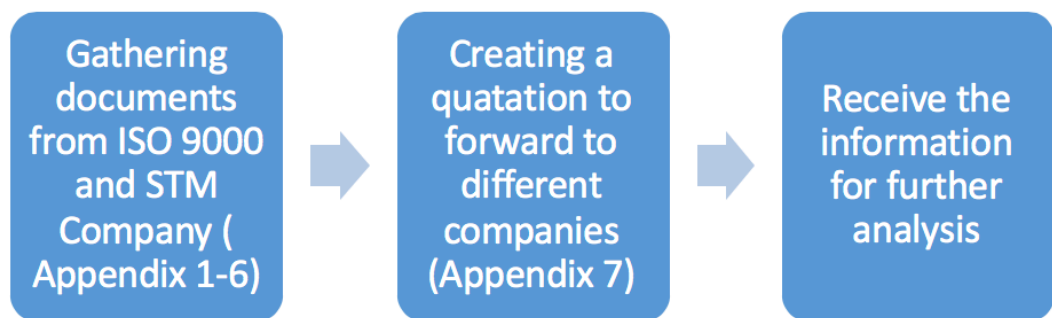


Figure 9. Quotation process

However, not every company that has been reached gave an answer. There are two reasons behind it: either the quotation was not interesting enough to work with, or the containers, shipped from the outside of the Netherlands, are usually transported via sea to Saint Petersburg directly. Therefore, calculations for the railway or road options do not make sense as well as calculating such an alternative. (LCC Variant LTD 2019)

In the routes analysis those results were be taken into consideration to achieve the optimal solution. All received answers with prices and lead times

are presented below in the table. Lead times include about three days in the ports of Saint Petersburg for customs clearance and forwarding procedures. The gathered lead times are approximate and depend a lot on the customs speed of operations.

Table 3. Prices and lead times per one 40 feet HC container

Company's name	Transportation option	Price	Lead times
Nornickel	Waterway: Rotterdam to Murmansk	827 Euro one way	5-6 days
LLC "STM Group"	Waterway and railway: Rotterdam to Saint Petersburg, Saint Petersburg to Murmansk	Freight from Rotterdam to Saint Petersburg :750 Euro. Pickup, repacking and railway fare 120 Euro+1573 Euro	14 days
LLC "Variant LTD"	Waterway and road: freight from Rotterdam to Saint Petersburg, Saint Petersburg to Murmansk	1850 euro per sea freight including repacking Road: transport 1533 Euro	11 days
Continue on next page			

Table 3. Prices and lead times per one 40 feet HC container (continued)			
Fins Trans	Waterway and road: Rotterdam to Saint Petersburg, Saint Petersburg to Murmansk	Freight: 764 Euro Container road transport: 1493 Euro	10 days
Red Transport and Logistics B.V.	Road: Rotterdam to Murmansk (in tent)	4000 Euro per tent	5 days

The Company called Nornickel operates cargo and container shipping in the port of Murmansk, therefore, Tatiana Keller has provided a clear answer of the expected possible prices. The waterway for one 40” HC container from Rotterdam to Murmansk and back would cost about 827 Euro. Moreover, she said that the company already has ships for different container deliveries, a private port that can operate the vessels and handle processes and has already experienced sending cargo to Europe. This information is new and surprising for BASAMRO since there was no knowledge of such a possibility. The research has shown that Nornickel has 110 different vessel types and some of them can be possibly involved into the transportation to Murmansk from Rotterdam. (Transport, 2019)

LCC “STM Group” company was represented by Kirill Tikhonov who has given full disclosure for the waterway and railway position in the sent quotation. For the option offered, Kirill has suggested freight from Rotterdam to Saint Petersburg for 750 Euro per one 40” HC container. Afterwards, the container is picked up, changed to another local container for approximate price of 120 Euro, and the railway tariff is 1573 Euro to Murmansk. In regards of maritime direct options, Kirill was not able to suggest any numbers since it is not the core part of the business.

Fins Trans, which is a transportation company from Riga, gave the answer for the waterway and road option that consists of quite the same freight prices of 764 Euro, road container delivery to Murmansk is 1493 Euro. If there is a need for picking up, the container change to the tent and the delivery to Murmansk are worth 1600 Euro.

Road container delivery from Rotterdam directly to Murmansk given by Red Transport and Logistics B.V. in the Netherlands and it equals about 4000 Euro, however, as the interview showed, this is not the option a provider would choose.

Olga Orlova, as a deputy director of the commercial centre of LLC "Variant LTD" has only suggested prices for freight from Rotterdam to Murmansk for 1850 Euro, container change to the local type and further road delivery to Murmansk for 1533 Euro in total.

5.2 Specific problems and bottlenecks in Murmansk

The company BASAMRO has informed of problems in the area of Murmansk that might be stopping the transportation and cause bottlenecks. The following points are the main complications that were mentioned by BASAMRO from their own knowledge: material and technical base, increased level of bureaucracy in Russia and planning problems. Thus, it is specifically relevant to include a brief description of the condition of the infrastructural system in Murmansk and the surrounding area. This will contribute to the analysis, discussion and assessment of this thesis.

Murmansk has several restrictions in the port area. There is a lack in cargo handling terminal which, indeed, complicates seamless transportation and requires special approaches and solutions. There are a commercial port that has a well working systems for coil transportation, the Fish port and a section of the port that specifically handling goods for a palladium and nickel mining and smelting company Nor Nickel. Their part of the port is capable of container operations, however, it is necessary to ensure the handling beforehand to predict any unexpected events. Lastly, this container terminal is private, which makes it indeed challenging to fully count beforehand on the

terminal's availability. In BASAMRO's experience, there is no information of any possible shipping options from Rotterdam to Murmansk.

5.3 Environment and safety

Environment plays an important role in the supply chain processes because companies around the world have come to realize the impacts they make. Corporate social responsibilities have a lot of focus upon that, therefore, an approximate analysis must be completed to see the overall results.

According to the European Commission, railways is the most environmentally friendly type of transport, followed up by maritime and road transport. However, for this research there is a need to prove that by calculating each route's impacts.

Organization "Time for Change" has a strong focus on the environment and wellbeing. They have presented a table below that shows production of emissions for each mode of transport, though air transportation is excluded because it is not needed for this thesis study. Moreover, it proves that maritime logistics is actually more environmentally friendly compared to the previously gathered information.

Table 4. Emissions amount

Transportation mode	Emissions amount per km
Modern lorry or truck	60 to 150 g (average 105 g)
Modern train	30 to 100 g (average 65 g)
Modern ship (sea freight)	10 to 40 g (average 25 g)

By using the table above and applying the numbers to each of the four options, one can see the approximate numbers and analyse what the best route is. For this case, average amounts are considered. Route one which includes railway and maritime transport has about 2294 km (Searoutes, 2019) and 1148 km by railways from Saint Petersburg to Murmansk. Route two that contains maritime and road transportation. Since the sea way is the same, which is 2294 km, road transportation can be assumed as about 1325 km. The last two options are maritime route from Rotterdam to Murmansk of 3005 km (Searoutes, 2019) and road delivery from Rotterdam to Murmansk is approximately 2960 km if going through some Scandinavian countries.

From that data it is easy to estimate the exact amounts of CO₂ emissions from each possible delivery route. The table below shows the results of the calculations.

Table 5. CO₂ emission results

Transportation mode	CO₂ emissions
Maritime and railway transport	132035 g
Maritime and road transport	196475 g
Road transport	310800 g
Maritime transport	75125 g

The results are astonishing; such a difference is proving an enormous difference between those four options. The most dangerous for the environment is the road transportation, and the most environmental friendly option is direct maritime connection between Rotterdam and Murmansk.

When it comes to safety, there is always a risk of cargo damage, especially if cargo has to be reloaded to different transport mode. From the received results of quotations it is clear to see how many times cargo has be handled

through the transportation. The table below shows each route with a safety point from risk management perspective. The gradation is from 0 to 5 where 0 is no risk at all, and 5 where it can be at the maximum.

Table 6. Safety risk score

Transportation mode	Risk
Maritime and railway transport	3 maximum
Maritime and road transport	2 moderate
Road transport	1 minimum
Maritime transport	1 minimum

Risk 1 is applied to the maritime and road transportation because these routes do not have any cargo handling in between and are able to deliver goods straight to the final destination. Nevertheless, external risks have to be considered so all the precautions are taken. Maritime and road transportation has score 2 because they have cargo handling in Saint Petersburg, yet road transportation can be the final leg mode. Whereas railways can possibly require additional handling in Murmansk, thus, this option has got a score of 3.

6 Discussion

The set objective of this thesis study was to find the optimal route from Rotterdam to Murmansk based on four main factors: lead times, prices, environmental impacts and cargo safety. The given topic was a focus of

interest of BASAMRO Shipping B.V. and it was the goal not only find the route, but make the reasoning close to real life and reliable data.

The research and quotations received have given a full picture of possible transportation paths, legislations and regulations have shown what the rules are what an important role they play in the international cooperation in logistics. Gathered route options are 100% realistic, reliable and can be implemented into the BASAMRO's working processes easily. Theoretical basis has resulted in a deep understanding of logistics processes throughout the whole supply chain: from strong and weak points of each mode, cargo types and vehicles' specifications to forwarding and freight documentation issues. The results have managed to give a transparent routes and visibility of processes that take place when cargo is being delivered from Rotterdam to Murmansk. In order to find the optimal route, it was needed to create the whole picture of each and every part.

The successful part of this study is how realistic the case is. Every gathered data and results from interviews and quotations have provided real numbers and created realistic picture of how exactly different logistic processes are managed. The analysis' impact is enormous. Now it is clear what to aim at in the coming future and what to do until the perfect supply chain is established from the port of Rotterdam to Murmansk by applying a completely new information for BASAMRO - new information was accessed regarding Nornickel and their ability to provide cargo handling at their container terminal that was considered private and closed before this study took place. Therefore, it is reasonable enough to assume that the received information might result in new deliveries to Murmansk.

Environmental aspects were calculated and they have fully supported the final choice for the thesis. Despite the fact that the routes can be different, because each company has its own ways, the route were close to being realistic. It was indeed really crucial to acknowledge the best way to transport cargo since the aim for the future to be more sustainable in supply chain. Also the results calculated have proven that the impacts can be lowered if the right modern cargo ships are used.

However, not each part can be considered fully successful. First of all, not every company replied on the sent quotations. Sometimes, new options of transportation were not answered at all since they do not exist due to the extreme money amounts needed. Thus, the data for the analyzing was narrowed down to the options that exist. That way there is no option of railway delivery from Rotterdam to Murmansk even though there is such a great corridor railway system in Europe. The lack of companies' willingness to cooperate and give answers ended up being a limitation as well.

The results can be exploit in a numerous number of ways. First, and most importantly, BASAMRO can already now consider and implement new route of delivery because of the new received information and therefore become a NVOCC which is the company's goal in the coming future. Secondly, if liner shipping option would be developed further, BASAMRO is indeed able to increase capacities and be a bigger competitor in the market.

Further development for this topic is to analyze liner shipping possibilities by recognizing and calculating possible capacities from Rotterdam to Murmansk and back, analyze adequacy for this option and the capacities amounts in order for liner shipping to be sufficient and beneficial for BASAMRO. From the environmental point of view, it would be interesting to consider exact route planning for seaborne connections to decrease any unnecessary emissions.

All the results concerning safety, environment, lead-times and prices are presented in the table below to make it easier to elaborate on the possible routes.

Table 7. Total results of the research per each route

Route	Safety score	Environment CO2 emission per km	Lead-times	Price per 40'HC container
Maritime and railways	3 maximum	132035 g	14 days	2443 Euro
Maritime and road	2 moderate	196475 g	10-11 days	2364 (Fins Trans) Euro
Road	1 minimum	310800 g	5 days	4000 Euro
Maritime	1 minimum	75125 g	5-6 days	827 Euro

7 Conclusions

7.1 Maritime and railways transport

The thesis' results are four possible routes presented based on the research from interviews, case study and supply chain knowledge. Each option has its strong and weak aspects, besides, lead times, prices, environmental impacts of the transport mode and its safety are influencing the option's rating. It is important to find the most optimal balance among those four factors, however, the final result should be chosen based on the simplicity of implementation since this thesis study is meant to be practical and as close to real life as possible.

In addition to the transportation options, the discussion part is reflecting achieved results, possible future developments, limitations' impacts and the overall success of the thesis.

The first option consists of two parts of transportation modes: maritime and railways logistics. Mostly cargo gets transported from Rotterdam to Saint Petersburg by sea and then changed to the railway system. LLC “STM Group” gave a clear understanding of pricing and lead times above, which proves that such a route must be commonly used. This route is clearly the most developed one because both, Ust Luga and Big Port Saint Petersburg, have container ports and are able to provide container handling and relocate the cargo directly onto the railways. Those ports are big logistics centres and can suggest multimodal transportation to any transportation mode to deliver goods to final destination.

Since there are a lot of providers of logistics services in Russia and Europe, there is a lot of competition in the field, which directly influences the prices by making them mostly the same. The quotation research has proved this point because the prices do not vary dramatically much from one another and the lead times are critical and exact. Plus, every route offered by forwarders are well-developed and suggest transparency of the cargo movements.

From the environmental point of view, those transportations can be considered to be one of the best options. Maritime and railway modes are the first two environmentally friendly options among all of the existing ones. This fact makes this option important for BASAMRO and the vision that the company has. Table 7 shows all the results received where it is clear to see the amount of emissions.

If the container belongs to the local railways, it does not ought to be delivered all the way back and after the unpacking, the container must be returned to the container depot. It saves a lot of money and takes less effort. These containers can be called COC- carrier owned containers. The main point lies in the fact that the consignee is not bothered by taking care of the received container.

However, the cons of the transportation cannot be neglected because they, unfortunately, involve the basics of logistics: money, lead times and cargo safety. Cargo safety is always the priority, therefore, this option might not be

able to provide the highest safety possible because of the need to repack the container to the local one and then onto the railways in one of the ports in Saint Petersburg. Such a movement increases the potential chances of cargo damage despite all the precautions taken for the container such as sealing. Later on, it is challenging to find the one who is responsible for the damage despite the existence of Incoterms because it is hard to prove which party did not prove the services on the promised level. Moreover, such transportation requires different customers clearance procedure that might result in additional expenses.

The total price of the 40 feet container delivery is about 2443 Euro, according to the received information as seen in the table 3 above, with lead times of 14 days. Thus, this option is, indeed, not the most fast one compared to the road transportation where the lead times equals 10 days.

7.2 Maritime and road transport

The second possible option is resembling the first one in the first part which is maritime logistics, however, the change is made to road transportation. First of all, the same route was suggested from Rotterdam to Murmansk – by sea towards Saint Petersburg, since it is the main logistics centre in Russia, and then a truck container delivery could be provided to the final destination. Due to the various number of trucks and container types, this option can be performed easily and efficiently.

Just like the previous route option, this one suggest market with a lot of competition and the benefits coming out of it and involvement of big logistics transportation centres. In order to avoid unnecessary repeating of benefits of those two factors, they can be found in the 7.1 Maritime and railway transport part.

Road delivery is faster compared to the railways because it takes 10-11 days including the maritime logistics. It makes this option appealing from the logistics point of view. On the top of that, when road transportation is a final leg mode, it is capable of giving a “door-to-door” service. It gives flexibility

and transparency because it is easy to track the vehicles. Thus, it ensures in a way cargo safety for customers.

On the other hand, road transportation is considered the least environmentally friendly option to deliver goods as mentioned in the table 7. The most efficient fuel usage can be achieved by having the vehicle going at the speed at least 90 km/h. However, Russian roads conditions are not always good, therefore, the speed is not maintained the same so easily. This factor directly affects cargo safety because all bumps along the way can create goods move inside the container if not secured properly enough. Yet the lead time is shorter compared to the railways deliveries which influences the risks by decreasing them due to the time spent for the transportation. And just like the previous option, cargo safety is under a bigger risk of damage if it is a multimodal transportation because of the change in the transportation mode. The container is handled at one of the ports in Saint Petersburg and must undergo customs clearance procedures. It lead to potential cargo damage as well as risks of times loses.

According to the company Fins Trans, the container will not be switched to the local Russian one after the seaborne transportation. Therefore, the container has to be returned back and create extra expenses.

In general, this option seems to be interesting because of its ability to provide great services at the final leg delivery mode if one forgets about the environmental issues.

7.3 Road transport

Road transportations are indeed one of the most common logistics solutions when it comes to deliver goods. Information, which was gathered and presented above in the table, shows that it only takes 5 days to deliver a container to Murmansk from Rotterdam. Luckily, due to a various truck and container types, containers can be operated easily. This route also avoids transshipments at the ports of Saint Petersburg and therefore decreases any potential container damages. In case of any sort of damages or delays, then

it is easy to spot the responsible party because the cargo is delivered via one transportation mode.

GPS and any other tracking systems are applied efficiently throughout the whole road transportation. It is reliable and helps companies to suggest good service level and increase transparency of the business.

However, since BASAMRO is willing to transport at least three 40 feet containers, this transportation might not be the best option. It is also important to take into account regular practices and how things are usually delivered. Thus, it does not make any sense to transport even one container considering the price per one for such a route of 4000 Euro.

Furthermore, corporate social responsibility is focused on the environment and how the impacts can possibly be decreased, preferably eliminated, so road transportation all the way from the Netherlands to Russia is the worst option. Road transportation, as mentioned in the table 7 above, can produce up to 310800 g per one way. This route is the worst one compared to all others.

Despite this option's short lead times and cargo safety, this option is not logical in any way because of the enormous prices and environmental impacts.

7.4 Maritime transportation from Rotterdam to Murmansk

This option varies a lot from any other previous ones because it involves only maritime logistics from Rotterdam directly to Murmansk. Container can be loaded onto a ship in the port of Rotterdam and then transported all the way to Murmansk. Most importantly, the containers can be handled in one of the port terminals in Murmansk which was not possible and not known to BASAMRO earlier. The container terminal of Nornickel is offering the service of handling and the exact prices for such a transportation have been provided. The pros of this transportation is clear and understandable. The price per one 40 feet container is 827 Euro and it takes from 5 to 6 days for the container to reach the final destination. In BASAMRO's case, it plays a

crucial role because of the container numbers that must be transported. Luckily, ships' capacities are great enough to contain all the cargo to Murmansk. And that fact itself might even expand other possible goods to the northern Russian area because ships are equipped for any cargo types.

Cargo safety is high because it is not replaced until arriving in Murmansk. No transport change, nor involvement of different parties almost exclude any possible cargo damage and the sealing attached to the front part of the container ensures in a way safety of the logistics processes. And even if something appears, it is easy to negotiate any outcomes.

Maritime emissions are responsible for only 10,6% of the total environmental pollution according to the European Commission. Yet the calculations have proved that it is the most sustainable way due to the availability of modern cargo ships making it the best option for increasing sustainability level.

On the other hand, there are two major challenges in the way. The first one is weather conditions and seasonality. Seasonality can affect the overall conditions of transportation. The working surrounding is tough, because of the northern location, which might results into delays. Secondly, weather conditions are a constant potential risk for any maritime logistics.

The real problem lies in the lack of liner shipping transportations. There is no such a thing, therefore, there is no scheduled shipping on the route from Rotterdam to Murmansk and back. If liner shipping existed, then the cargo flows would be able to become constant and consistent- which is exactly what BASAMRO is interested in. However, for now the opportunity offered by Nornickel seems to be good to start with.

This option seems to be the most suitable one for the container deliveries because it outstands any other options with its price, lead times, cargo safety, ease of customs clearance and environmental impacts.

This thesis study's strongest side is its realism and how it manages to show logistics from several points of view and on all stages of processes. The current problem and the goal have been well defined and analysed. As the

result, it is proved and undeniable that the container goods are best delivered by sea from Rotterdam to Murmansk. This route is perfect for the logistics with its reasonable prices and lead times, for customers- cargo safety, and for each and every one of us- the second lowest gas emissions impacts.

As the result, BASAMRO has received new detailed information about Murmansk and its container terminal possibilities which immediately provides brand-new transportation routes. And therefore increases the chances of growing improvements and bring the company closer to the future desired goal.

Exploring Arctic sea ways, development of the Northeast Passage, constantly expanding international trade and commodity circulation pushed forward the need of creating liner shipping. However, for now BASAMRO can cooperate with Nor Nickel, use their container terminal at the port of Murmansk and their various types of ships as mentioned above in the part 5 Research results. Liner shipping analysis is the next step for a successful connection between Rotterdam and Murmansk.

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9 Appendices

9.1 Appendix 1. Chipper packing list



PACKING LIST

December 26, 2018

BOOKING NUMBER: AYU0136894
 CONTAINER NUMBER: TCNU3240295
 VESSEL NAME / VOYAGE: NAVI BALTIC / OLEOPN1PL
 SEAL NUMBER: 117283

Contract No. 5 dd 09-28-2018

Q-ty	Description, weight	
1	Model 18XP Bandit Chipper, 2018 Serial Number: 4FMUS1816KR508526 Disassembled	Length: 5* mm Width: 2*.05mm Height: 2.43*.15 mm Net/Gross weight 4100 kg
1 Box	Art 900-9902-27 Chipper knife for Bandit 18XP - 4 pcs net weight = 14.06 kg	Length: 356 mm Width: 254 mm Height: 127 mm Gross weight 14.51 kg

Total gross weight: 4114.51kg

Susan Hulliberger

Susan Hulliberger
International Sales Assistant

Bandit Industries, Inc.
6750 Millbrook Road
Remus, Michigan 49340

Chris Walters
MTPLEASANTCHAMBER OF COMMERCE
200 E. BROADWAY ST.
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6750 MILLBROOK ROAD • REMUS, MI 49340 • PHONE: (800)952-0178 • (989) 561-2270 • FAX (989) 561-2273

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 • 6750 MILLBROOK ROAD, REMUS, MI 49340 • TEL: (800) 952-0178 OR (989) 561-2270 • FAX: (989) 561-2273
 • E-MAIL: SALES@BANDITCHIPPERS.COM • HTTP://WWW.BANDITCHIPPERS.COM

9.2 Appendix 2. Invoice for grain-dryer

Semson International

5301-2191 Yonge St. Toronto, Ontario, M4S 3H8, Canada; andriysemenovych@gmail.com

**COMMERCIAL
INVOICE**

Инвойс №	0423-01	Дата	23.04.2018		
Продавец	«SEMSON INTERNATIONAL»				
Адрес	5301-2191 Yonge St. Toronto, Ontario, M4S 3H8, Canada				
Покупатель	ООО «СЕМЕТРА»				
Адрес	400080, Россия, г. Волгоград, ул. Митрофановская, 2-50				
Контракт	№ 04/25 от 23 апреля 2018 года				
Условия поставки	CFR Россия, Санкт-Петербург <i>MURMANSK</i>				
Страна происхождения товара – США Country of origin – USA					
Описание	№ п/п	Наименование	Количество	Стоимость за единицу дол.США	Общая стоимость, дол.США
	1	Зерносушилка SUKUP TC 2471 новая, разобранная	1	64975,00	64975,00
Итого:					\$ 64975,00
Beneficiary name	SEMSON INTERNATIONAL				
Beneficiary Bank	BANK OF MONTREAL				
Beneficiary Bank address	1 PROMENADE CIRCLE THORNHILL, ONTARIO, L4J4P8, CANADA				
SWIFT number	BOFMCAM2				
Transit number	3920				
Correspondent Bank SWIFT number	4604-727				
Correspondent Bank SWIFT number	Wells Fargo Bank (FKA Wachovia Bank)				
	PNBPUS 3 NNYC				
	026 005 092				

President




SEMENOVYCH ANDRIY

9.3 Appendix 3. Bill of landing for grain-dryer

Зерно сушилка

OOCL ORIENT OVERSEAS CONTAINER LINE		COPY NON NEGOTIABLE		SEA WAYBILL (Not Negotiable)	
SHIPPER/PORTER (COMPLETE NAME AND ADDRESS) A- LOGISTICS, INC 420 EAST 79TH STREET #12D NEW YORK, NY - 10075 UNITED STATES		BOOKING NO. 2605094060	SEA WAYBILL NO. (WAYBILL) OOLU2605094060		
CONSIGNEE (COMPLETE NAME AND ADDRESS) XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX		MORMANSK PORT AND COUNTRY OF ORIGIN OF GOODS #RUSSIA			
NOTIFY PARTY (COMPLETE NAME AND ADDRESS) (The consignee or consignee's agent or a third party to be notified by the carrier) SAME AS CONSIGNEE		ALSO NOTIFY PARTY ROUTING & INSTRUCTIONS #RUSSIA			
PRE-DETERMINE BY VESSEL/PORT/AGENCY OOCL EUROPE 146K PORT OF DISCHARGE SAINT PETERSBURG, #		PLACE OF RECEIPT MINNEAPOLIS (MN) POINT OF LOADING NORFOLK, VA PLACE OF DELIVERY SAINT-PETERSBURG	LOCALS PER TONNAGE NEW YORK TYPE OF PACKAGING (IF VARIOUS, USE DESCRIPTION OF PACKAGES AND GOODS FIELD) FCL / FCL	MEASUREMENTS TO BE RELEASED AT NEW YORK CY/CY	
PARTICULARS DECLARED BY SHIPPER BUT NOT ACKNOWLEDGED BY THE CARRIER					
QUANTITY 17 PCS	DESCRIPTION OF GOODS 1 X 40' HC CONTAINER GRAIN HANDLING EQUIPMENT B SCHEDULE CODE: 8419.31	GROSS WEIGHT 7321KGS	MEASUREMENT		
OCEAN FREIGHT PREPAID TOTAL NO. OF CONTAINERS/PACKAGES RECEIVED & ACKNOWLEDGED BY CARRIER FOR THE PURPOSE OF CALCULATION OF PACKAGE LIMITATION (IF APPLICABLE): 1 CONTAINER(S)/PACKAGE(S) DESTINATION CHARGES COLLECT PER LINE TARIFF, AND TO BE COLLECTED FROM THE PARTY WHO LAWFULLY DEMANDS DELIVERY OF THE CARGO. SHIPPER LOAD AND COUNT, CONTAINER(S) SEALED BY SHIPPER THESE COMMODITIES, TECHNOLOGY OR SOFTWARE WERE EXPORTED FROM THE UNITED STATES IN ACCORDANCE WITH THE EXPORT ADMINISTRATION REGULATIONS. DIVERSION CONTRARY TO U.S. LAW PROHIBITED. ADDITIONAL B/L CLAUSE 31. PERSONAL DATA PROTECTION THE PARTIES AGREE TO FULLY COMPLY WITH GENERAL DATA PROTECTION REGULATION 2016/679 ** TO BE CONTINUED ON ATTACHED LIST **					
NOTICE 1: The carriage is to be made under the Charter Party conditions of the Carrier and subject to the Carrier's liability for a maximum of 2.5 USD per package or container load unit (CLU) or its equivalent of the U.S. Dollar or Dollar for Sea Air (OOCSA) unless the Merchant advises in writing that it is to be made under the Carrier's conditions of carriage. If the Merchant desires to insure the cargo, it must contact the Carrier's insurance broker.					
NOTICE 2: See Clause 20 of the Charter Party for details of the Carrier's liability for cargo claims.					
NOTICE 3: If the Merchant is not a resident of the United States, the Merchant agrees to indemnify the Carrier for all claims and expenses incurred by the Carrier in connection with the carriage of the cargo.					
Declared Cargo Value US\$ _____ If Merchant enters a value, Carrier's limitation of liability shall not apply and the ad valorem rate will be charged. FREIGHT & CHARGES PAYABLE BY:					
BOOKING CONTRACT NO. AEL174020		DOC FORM NO.	COMMODITY CODE		
CODE	TARIFF ITEM	FREIGHT AS	RATE	PREPAID	COLLECT
The printed terms and conditions appearing on the front and reverse side of this Bill of Lading are available at www.oocl.com, or OOCL's published US terms, and in paragraph form.					
* STRIKE OUT FOR ON BOARD VESSEL BILL OF LADING * SET CLAUSE 1 ON REVERSE SIDE * SET CLAUSE 2 ON REVERSE SIDE GRUO HQD 0101				00000 OOCL (USA); INC BY: _____, as agent for ORIENT OVERSEAS CONTAINER LINE, AS CARRIER	

9.4 Appendix 4. Bill of landing for escalators

Fesco Ocean Management Limited SHIPPER (Name and Full Address) SJEC CORPORATION 28 WEIKIN ROAD SIP 215122 SUZHOU CHINA		BILL OF LADING  FSC1394LTCCLR3KAG			
CONSIGNEE (Non-Negotiable Unless Consigned to Order) [REDACTED] INN905040070 Russian Federation, 614066 PERM SH, KOSMONAVTOV D 215 DF 8 [REDACTED]		BILL OF LADING No. FBL114550 FESCO OCEAN MANAGEMENT LIMITED COPY NON - NEGOTIABLE			
NOTIFY PARTY (Name and Full Address) SAME AS CONSIGNEE		ALSO NOTIFY (Name and Full Address/ DOMESTIC ROUTING) EXPORT INSTRUCTIONS/TERMINAL/ONFORWARD ROUTING FROM POINT OF DESTINATION			
INITIAL CARRIAGE (Mode)*	ON-CARRIAGE VOYAGE <i>MURMANSK</i>	SERVICE NAME	FESCO BALT ORIENT LINE		
PLACE OF RECEIPT*	PLACE OF DELIVERY SPETERSBURG(SFP)	BOOKING No.	BNCCBE0FL092		
EXPORT CARRIER (Vessel & Flag)	VOYAGE APL TEMASEK	QUOTE No.	Quot.Tarif[TAR-00800295FBO]		
PORT OF LOADING Shanghai	PORT OF DISCHARGE Rotterdam (RWG)	NUMBER OF ORIGINAL BILLS OF LADING			
BELOW PARTICULARS OF THE GOODS FURNISHED BY THE SHIPPER					
MARKS AND NUMBERS	NUMBER OF PACKAGES	DESCRIPTION OF PACKAGES AND GOODS	WEIGHT (KGS)		MEASUREMENT (CBM)
			N.W.	G.W.	
N/M		ESCALATOR			
	3 Packages	40DC/COC/FESU 4034173 Seals: F6376322		5,605.0000	39.0000
	3 Packages	40DC/COC/FESU 4043654 Seals: F6376329		5,305.0000	36.0000
	3 Packages	40DC/COC/FESU 4044455 Seals: F6376328		5,805.0000	39.0000
	3 Packages	40DC/COC/FESU 4058149 Seals: F6376330		5,305.0000	36.0000
	3 Packages	40DC/COC/FESU 4038651 Seals: F6376324		5,305.0000	39.0000
	4 Packages	40DC/COC/FESU 4038657 Seals: F6376326		5,985.0000	40.0000
AS PER ATTACHED RIDER					
FCL/FCL CY/CY		CARGO WEIGHT DECLARED WITHOUT ISO CONTAINER (TARE) WEIGHT SHIPPER LOAD, COUNT, STOW & SEAL			
FREIGHT - CHARGES		PREPAID	COLLECT	The undersigned Ocean Carrier hereby acknowledges receipt on board of the sealed container or packages or other shipping units as to contain the Goods described above in apparent external good order and condition unless otherwise stated. All particulars (weight, measure, marks, numbers, quantity, contents, value, etc) stated being as stated by the Merchant but unknown to the Ocean Carrier. In accepting this Bill of Lading the Merchant accepts and agrees that the receipt, custody, carriage and delivery of the goods is subject to all the terms and conditions set forth and incorporated by reference on the side and reverse hereof, whether written, stamped or printed. The Ocean Carrier has signed the above mentioned number of originals of this Bill of Lading all of the same tenor and date, one of which being accomplished the others to be void. Signed as Carrier by:	
FREIGHT COLLECT					
TOTAL					
PLACE OF ISSUE: Shanghai		Fesco Ocean Management Limited			
DATE OF ISSUE: 22.12.2018					

*APPLICABLE ONLY WHEN USED AS A MULTIMODAL BILL OF LADING

9.5 Appendix 5. Bill of lading for dried berries

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BILL OF LADING
When Negotiable Unless Stipulated to Other

SHIPPER/PORTER (COMPLETE NAME AND ADDRESS) NANTONG BRIGHT-RANCH FOODS/STUFFS CO., LTD. KINLIN, YANGKOU TOWN, RUDONG COUNTY, JIANGSU PROVINCE, 226461 P ^A		BOOKING NO. OOLU2105797750																															
SHIPPER'S COMPLETE NAME AND ADDRESS OOLU2105797750 115515 NANTONG OVERSEAS FEDERATION KANGRUCKY BLVD. 57, BUILDING 6, FLOOR 2, BUSTE 1, **		EXPORT REFERENCE RATE FOLDER 00047138																															
NOTIFY PARTY (COMPLETE NAME AND ADDRESS) (It is agreed that responsibility of bills rendered to the carrier is subject to the terms of the contract) OOLU2105797750 115515 NANTONG OVERSEAS FEDERATION KANGRUCKY BLVD. 57, BUILDING 6, FLOOR 2, BUSTE 1, ***		FORMAL AGENT REFERENCES FMC NO.																															
VESSEL/CONTAINER CHANG HONG 11 2 HAO/9017E		POINT AND COUNTRY OF ORIGIN OF GOODS NANTONG																															
PORT OF DISCHARGE HAMBURG		ALSO NOTIFY PARTY (COUNTRY & INSTRUCTIONS) *R. CHINA **ROOM 28 ***ROOM 28																															
PLACE OF RECEIPT NANTONG		TYPE OF MOVEMENT IF M.V. (USE DESCRIPTION OF PACKAGES AND GOODS FIELD) FCL / FCL CY/CY																															
PARTICULARS DECLARED BY SHIPPER BUT NOT ACKNOWLEDGED BY THE CARRIER																																	
CONTRACT NO. / MARK & NUMBERS OOLU8721084 / FGU2685	SECURITY FOR CERTAIN CIRCUMSTANCES M	DESCRIPTION OF GOODS 563 CARTONS / FCL / PCL	GROSS WEIGHT /40HQ/ 5690.900KGS																														
N/M	563 CARTONS	1) PREMIUM STRAWBERRY PIECES 2) PREMIUM STRAWBERRY PIECES 3) PREMIUM RASPBERRY POWDER 4) PREMIUM PEACH PIECES 6X6X6 5) PREMIUM ORANGE POWDER FREEZE 6) PREMIUM BANANA PIECES 2-8 MM	69.700CBM																														
** TO BE CONTINUED ON ATTACHED LIST **																																	
<p>NOTICE 1: For carriage to or from the United States of America, if Carriage is not by water, the Carrier's liability for loss of or damage to the goods is limited to the actual value of the goods at the time of loss or damage, but not to exceed the actual value of the goods at the time of loss or damage, as determined by the U.S. Customs and Border Protection.</p> <p>NOTICE 2: For carriage to or from the United States of America, if Carriage is by water, the Carrier's liability for loss of or damage to the goods is limited to the actual value of the goods at the time of loss or damage, but not to exceed the actual value of the goods at the time of loss or damage, as determined by the U.S. Customs and Border Protection.</p> <p>NOTICE 3: For carriage to or from the United States of America, if Carriage is by water, the Carrier's liability for loss of or damage to the goods is limited to the actual value of the goods at the time of loss or damage, but not to exceed the actual value of the goods at the time of loss or damage, as determined by the U.S. Customs and Border Protection.</p>																																	
Declared Cargo Value US\$		Merchant enters a value. Carrier's limitation of liability shall not apply and the ad valorem rate will be charged.																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CODE</th> <th>TARIFF ITEM</th> <th>FREIGHTED AS</th> <th>RATE</th> <th>PREPAID</th> <th>COLLECT</th> </tr> </thead> <tbody> <tr> <td>DCD</td> <td>I/B DCC FEE</td> <td>1/40HQ</td> <td>80.00</td> <td>USD</td> <td>80.00</td> </tr> <tr> <td>SEC</td> <td>SECURITY SURCH</td> <td>1/40HQ</td> <td>20.00</td> <td>USD</td> <td>20.00</td> </tr> <tr> <td>THD</td> <td>DEST TRLM HAND</td> <td>1/40HQ</td> <td>405.00</td> <td>USD</td> <td>405.00</td> </tr> <tr> <td colspan="3" style="text-align: right;">TOTAL</td> <td></td> <td>USD</td> <td>505.00</td> </tr> </tbody> </table>				CODE	TARIFF ITEM	FREIGHTED AS	RATE	PREPAID	COLLECT	DCD	I/B DCC FEE	1/40HQ	80.00	USD	80.00	SEC	SECURITY SURCH	1/40HQ	20.00	USD	20.00	THD	DEST TRLM HAND	1/40HQ	405.00	USD	405.00	TOTAL				USD	505.00
CODE	TARIFF ITEM	FREIGHTED AS	RATE	PREPAID	COLLECT																												
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TOTAL				USD	505.00																												
<p>The printed terms and conditions appearing on the back and reverse side of this Bill of Lading are hereby incorporated by reference into this Bill of Lading, and it is hereby agreed that the Bill of Lading shall be subject to the terms and conditions of the Bill of Lading, and it is hereby agreed that the Bill of Lading shall be subject to the terms and conditions of the Bill of Lading, and it is hereby agreed that the Bill of Lading shall be subject to the terms and conditions of the Bill of Lading.</p> <p style="text-align: right;">TOTAL EQUIVALENT</p>																																	

COPY NON NEGOTIABLE



9.6 Appendix 6. Packing list for dried berries

南通群禾食品有限公司

NANTONG BRIGHT-RANCH FOODSTUFFS CO.,LTD.
 Add: XINLIN YANGKOU TOWN, RUDONG COUNTY, JIANGSU PROVINCE, 226461, CHINA
 Tel: 86-513-34888018 Fax: 86-513-34889158

PACKING LIST

Invoice #	19ECO-003
Date	18-Feb-2019

Invoice To
 南通群禾食品有限公司
 NANTONG BRIGHT-RANCH FOODSTUFFS CO.,LTD.
 Add: XINLIN YANGKOU TOWN, RUDONG COUNTY, JIANGSU PROVINCE, 226461, CHINA
 Tel: 86-513-34888018 Fax: 86-513-34889158

Ship To (Consignee)
 南通群禾食品有限公司
 NANTONG BRIGHT-RANCH FOODSTUFFS CO.,LTD.
 Add: XINLIN YANGKOU TOWN, RUDONG COUNTY, JIANGSU PROVINCE, 226461, CHINA
 Tel: 86-513-34888018 Fax: 86-513-34889158

Scheduled Shipment: Feb. 26, 2019 ETD Nantong Via OOCL
Delivery Condition: CIF SI, Reimburing-Raisin
Carrier: OOCL *MYKMAN 86*
Container Number: OOLU8721084 (1x40'FCU)
Seal Number: FGU2685

No.	Descriptions of Goods	Quantity (Cartons)	Net Weight (Kgs)		Gross Weight (Kgs)		Measurement (CBM)	
			Unit	Amount	Unit	Amount	Unit	Amount
1	PREMIUM Strawberry Pieces 2.6 mm Freeze Dried	389	7.00	2,583.00	9.00	3321.00		
2	PREMIUM Strawberry Pieces 1-4 mm Freeze Dried	28	7.00	203.00	9.00	261.00		
3	PREMIUM Raspberry powder Freeze Dried	14	15.00	210.00	16.30	228.20		
4	PREMIUM Peach Pieces 6x6x6 mm Freeze Dried	64	7.50	490.00	9.50	608.00		
5	PREMIUM Orange Powder Freeze Dried	24	15.00	390.00	16.30	391.20		
6	PREMIUM Banana Pieces 2-8 mm Freeze Dried	10	15.00	150.00	16.50	165.00		
7	PREMIUM Berries Forest pieces 2-5 mm Freeze Dried (Black currant 35%/ Blackberry 30%/Blackberry 20%/ Raspberry 15%)	23	13.50	310.50	15.50	356.50		
8	PREMIUM Blueberry pieces 2-5 mm Freeze Dried	30	10.00	300.00	12.00	360.00		
Total:		553		4596.50		5690.90		69.70

群禾食品
 Nantong Bright-Ranch Foodstuffs Co., Ltd.
 南通群禾食品有限公司
Jade Way
 International Department

9.7 Appendix 7. E-mail sent quotations for companies

1x40HC CONTAINER:
1 MODEL 18XP BANDIT CHIPPER, 2018
SERIAL NUMBER: 4FMUS1816KR508526
4 PCS CHIPPER KNIFE FOR BANDIT 18XP
HTS CODE: 8427.20.000
gross weight 4114.510

1.
POL - Rotterdam/RTM, the Netherlands
POD – St.Petersburg, Russia
PLD – FOR Murmansk, Russia (oncarriage by rail)
The possibility to reload fm LOC into RZDU cntr at the rail terminal in St. Petersburg.

2.
POL - Rotterdam/RTM, the Netherlands
POD – St. Petersburg, Russia
PLD – FOT Murmansk, Russia (oncarriage by truck)
The possibility to arrange reloading fm LOC into truck
The rate for a round trip STP – Murmansk – STP with mty cntr return.

3.
POL - Rotterdam/RTM, the Netherlands
POD – Murmansk, Russia (by sea)

4.
FOT Rotterdam/RTM, the Netherlands – FOT Murmansk, Russia (road haulage)

9.8 Appendix 8. Interview questions

1. What was the start of the company? What was the base for creating the business?
2. Is the company's business experiencing financial growth recently?
3. What kind of transportation is the most frequent one?
4. What are the cargo types mostly transported?
5. What kind of cargo would be transported to Murmansk?
6. Are there any warehouses in the company's possession?
7. What are the container types?
8. Who are the main company's partners?
9. What is currently making working process complicated?
10. What are the future goals?
11. Possible new future location?
12. What kind of an impact can the thesis achieve?
13. Why is Murmansk area interesting for the business expansion?
14. What are the capacities for the future deliveries?