

## **Bachelor's thesis**

**Establishment of project management tool for inter-modal transportation between Russia and Central Europe.**

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<p>Description</p> <p>Project management is one of the most rapidly developing sphere, as nowadays all projects are getting more and more complicated in that case it is necessary to pay higher attention to planning and performing of all operations. Furthermore, more careful planning will lead to waste reduction and increasing of project outcomes. Logistics is also changing and evolving branch, as a consequence it is crucial to gain flexibility and options for every occasion. Moreover, for all parts of logistics is true that if you are losing your clients and route opportunities it is very hard to come back in business, as the industry already attached to an absence of certain party. To sum up, combination of these two branches will lead to flexible, stable and future orientated processing.</p> <p>The objective of the thesis was to establish a project management tool for organizing multimodal transportation projects between different law zones and countries, Russia and Central Europe in particular, by focusing on law restrictions and stress points. The base for research will be transportation of 50 thousand tons of shungit from Onega lake to Hamburg port during summer navigation period, with estimated pack size of 3 thousand tons for "Seatamar Shipping GmbH&amp;Co.KG". Research will be performed in qualitative form by using three approaches: phenomenological (interviews), which will consists of performing non-structured interviews with specialists from relevant positions of the sphere, content analysis of laws, regulations and limitations of both law zones and case studying which will be used as a vector for the whole research process. The result, will consists mostly of questions that should be answered before planning transportation project, also would be pointed out attributes, bottlenecks and characteristics which can straightly effect performing of operation.</p> <p>This research and results will help company to be more flexible in everyday changing market and business environment. Moreover, project management tool will unify the process, as a result it can be performed faster and save time for more accurate planning of particular operations.</p>		
Keywords/tags ( <a href="#">subjects</a> ) Transportation; project management; project management tool; logistics; projects; warehousing; packing; laws; regulations; limitations; Russia; Europe;		

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## Abbreviations and definitions

Shungit	Non-toxic, black carbonite mineral, which is used for different purposes
Big bag	Polypropylene bag used for packing of big fractions of ore, or other loose substances
Paper bag	Bag which is made of paper used for packing of small fractions of loose cargo
Dust index	The measure of intensity substance can produce dust
GOST	All sorts of regulations, standards starting with charting rules for design documentation ending recipes and nutrition facts
EURLEX	European set of rules and regulations
ISO	International Organization for Standardization; international set of standards from different organisations
AS	Set of Austrian standards, concerning testing and other aspects.
TEU	The twenty-foot equivalent unit, is an inexact unit of cargo used to describe the capacity of container ships.
Trans-Siberian railway (TSR)	Is the longest railway line in the world which connects Moscow with Far East of Russia

# 1 Introduction

The thesis is a study about creating a project management tool for running an inter-modal transportation project from a mixed country perspective and based on a case of transporting ore from the Lake Onega port in Russia to the German seaport of Hamburg, route plan presented on a map on Figure 1. The assignor of this research was “Seatamar Shipping GmbH&Co.KG” which is a German transportation company based in Hamburg and specialized in sea transportation.

The case company was in need of a new project for this transportation research because of several factors connected with the changing business environment as well as financial and optimization purposes. What is more, the company needed a cost evaluation to answer if the prolonging of holding this transportation option would be profitable in the future environment or if a better option would be to follow the older plan and then stop using the route completely. However, the main point of the thesis is trend in marine transportation of transporting goods on high tonnage vessels, so that smaller ships are going out of the market and thus forcing transport operators to change their ways of doing business.

The theme of creating new transportation projects and project management tools connected with transportation is quite popular between thesis writers, all kinds of statistic analysts and experts. The cumulative number of works on these two topics in JAMK is over 100 thesis works and numerous articles all over the world. It is widely known that the world is changeable and that new tendencies and trends force different branches for renovation, even if it is not necessary. Hence, the theme of the thesis is relevant.

The thesis collected and utilized information for the purpose to understand what the underwater stones of the new business environment were, which laws and regulations needed to be taken into account and what the costs of the new project would be compared with the older ones. Moreover, the purpose was to include suggestions for the implementations.

## 1.1 Client presentation

Seatamar Shipping GmbH & Co. KG was established in October 1997, and it has successfully operated on the international market till nowadays. Moreover, the company gradually has expanded its influence on the industry. The firm offers different logistics options and services mostly connected with waterway transportation to different locations all over the world. The organization is situated in Hamburg and it has its representatives and partnership companies in Russia, Canada and Germany due to their client base and previous projects.

The company's main focus area is marine and inland waterway transportation and all processes that are directly or indirectly connected with these processes. Thus, they have their influence in spheres such as fleet management and brokerage branches. In addition, they take part in the organization, consulting and guidance of the other companies in their projects. Furthermore, the company has its own fleet and rented vessels that are based in Hamburg. The organization usually operates in Europe and near European marine regions, but they also provide services through Russian and European inland waterways, the Atlantic Ocean, North Sea, the Mediterranean and the Caspian Sea.

The company has a significant client base all over the world. They have several considerable international projects, such as delivery of wood from Russia and Canada to Great Britain. They have done this in a partnership with the Portbeck Forest Products which is based in the city of Quebec. Unfortunately, it was necessary to shut this business down due to the global economic crisis in 2008. Another important project to mention, and which partly led to the implementation of this thesis, is the transportation of carbon shungite from Lake Onega to the port of Hamburg in cooperation with Salzgitter. However, due to the disappearance of the necessary vessel type and the fact that Salzgitter restructured their network, the transportation process had to be stopped in 2013. Moreover, the last project which now is alive and operating is the transportation of fertilizers with Agrobaltic. This project focuses on the Baltic Sea region and uses Rostock port as one of the main knots. There are many other projects and scenarios which have been implemented and developed by the "Seatamar

Shipping GmbH & Co. KG”, but these were mostly applicable to the thesis due to their intra-modality and international orientation.

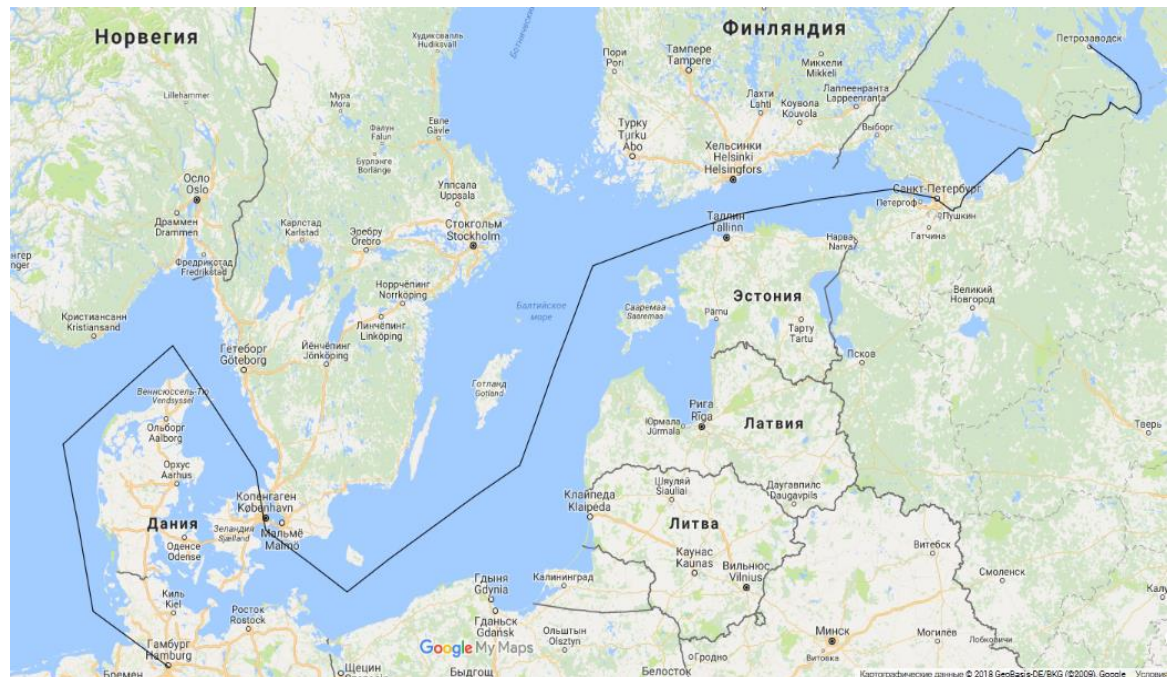


Figure 1. Route plan from Petrozavodsk to Hamburg

## 1.2 Objective of the thesis and background information

The company “Seatamar Shipping GmbH & Co. KG” is a German company which is specialized in waterway transportations mostly from the Russian Federation, and it uses the Hamburg port as its port of destination. They provide full guidance and assistance during transportation and do transportation planning at all stages. As their field of business is not restricted only by sea transportation, the changing in the vessel market will touch them directly.

The trend in marine transportation is that most of the companies and ship owners are finding it more profitable to use larger vessels during transportations and deliver goods to the port by using different modes due to the higher level of environmental friendliness that these solutions have and due to the higher profitability of the process. (How megaships are changing the shipping industry and reshaping ports 2016.) Thus, as a result, as it was told by the company coordinator, small and medium sized vessels, which are usually used for mixed-navigation between rivers and the sea, are

disappearing from the market so that every year the number of ships built is decreasing. Hence, it is quite important to react now and reorganize the existing supply chains in order to meet the new standards.

The objective of the study was to establish a project management tool for organizing multimodal transportation projects between different law zones and countries, Russia and Central Europe in particular, by focusing on law restrictions and main stress points. The base for research will be transportation of 50 thousand tons of shungit from Onega lake to Hamburg port during summer navigation period, with estimated pack size of 3 thousand tons. There are also some nationality features and characteristics that should be mentioned in order to form a complete understanding of the process and its possible drawbacks. As a consequence, establishing a uniform project management tool for running intermodal transportation processes includes sea, rail and road transportation modes between the different country zones of Eastern Europe, Russia and Central Europe.

### 1.3 Limitations

This thesis and its research covered only operations between the European Union countries, particularly Germany. Moreover, the thesis focused on the Eastern European countries which do not operate under the EU rules, regulations and legislation, in particular Russia. All other countries from the EU region were excluded from the research due to the characteristics of the actual countries' transportation policies. To these countries, only common advice and regulations based on the EU laws would be given. Moreover, countries outside the EU block, except Russia, were also excluded from the research process as they do not have general rules for transportations, and as it was necessary to make corrections according to them in all aspects. In conclusion, the project management part covers all the EU zone in general and the German market more closely and deeply. Moreover, it covers the Russian market in particular and deals with the mutual legislations of the countries which have some common rules with the Russian Federation, for instance, Kazakhstan, Ukraine, Belarus and other parts of the former Soviet Union.

The thesis was also limited to the company “Seatamar Shipping GmbH & Co. KG” and their clients. The focused only on this company and only took into account the possibilities, contracts, law regulations and transportation resources that this company used. Thus, the other companies that could possibly perform this kind of transportation were excluded. Moreover, companies that provide ore for the transportation were not covered by this research. Another aspect not covered by the thesis was logistics inside the mining company. The continuing transportation of the ore after arriving at the port of Hamburg and the warehousing processes were also not covered by the thesis. Finally, the transportation process that was not included was the way in which the supplies are delivered to the port of Lake Onega.

The port operations and all operations connected with loading, unloading, reloading and other operations excluding the actual transportation process were included in the research process and final results. All these indicators were examined in the study as the key performance indicators of the project and as factors that directly affected cost assessments. All documentations and customs processes were included in the research as necessary attributes of every project, but it was assumed that all documentations were filled in an acceptable and lawful way in a necessary time period.

The cost assessment was performed only for the transportation, warehousing, customs processes, insurance and other documentations which had to be taken into account as a consequence of volumes, period and regulations of both parties and both the countries of departure and arrival. All other costs were excluded from the research process and results. For instance, the costs to produce ore, costs for vessel’s operations like fuel costs, maintenance costs and alternative operational costs. Other costs which will be not covered by the research and will not be a part of profitability assessment are the costs that goes to category of micro expenses like possible salaries of workers and so on.

## 1.4 Research questions and problem

In order to understand the actual outcome of the thesis, it is necessary to discuss the research questions. The choice of the questions was done according to the company's purposes. The company estimated that the main points that needed to be mentioned were the cost factors that might affect the transportation process and how the inter-modality would be done as well as the rules and regulations that were involved in the whole transportation process. As a result of these points, the following research questions were formed:

- 1) What parameters have to be focused on during the planning of a transportation with several transportation modes involved?
- 2) What are the peculiar properties of planning transportations from Russia to Central Europe?
- 3) What will be the model of connection for different parameters and indicators in one project?

However, the research questions only give the main course and main outcome of the research. In addition, the thesis covered deeper problems of the planning and realization of transportation projects in the countries of interest. This was due to the fact that the real situation and processes were sometimes really different from what was written in the laws. This information was gained from the interviews. Results will be presented in separate section by using attributes and significant points. The whole model will be presented as a flowchart.

## 1.5 Research methods

There are two possibilities to handle research process during thesis writing: quantitative and qualitative. Both of these methods can be used in different situations and this choice has to be based on research specific features. Both two methods have their own pros and cons and mostly parameters are controversial one to another. Thus, below presented analyze of specifications of both researching types. (Croswell 2008, 3.)

The first one is quantitative this research method applies to significant statistic groups, focus groups and have a scope on utilizing large number of respondents so, it

will be possible to understand common patterns of participants and in the end, gives statistical valid, universal approach with wide range of outcomes. Quantitative method is widely used to evaluate common known processes or ideas. Approach gives a positive response to possible popularity reflection, what is more this way of collecting and analyzing data gives promising statistical background for the research due to high number of respondents. However, the method has cons, the first and the largest one is the necessity of performing vast data analysis according to large sample sizes of respondents, to have an opportunity of reach statistically valid results, so that it is not highly efficient for narrow focused and deep problematic. Due to difficulties in finding sufficient number of appropriate respondents that will be able to give reasoned feedback. Another important con to mention is unnecessary of understanding participant's motives and feelings to perform right and proper analysis of received results. (Creswell 2008, 10.)

The second method is quantitative research. This option usually applies to small focus groups and describe their deep motives and feelings. As an outcome qualitative methodology gives rich, deep and narrative sample description. Narrative research is usually applied to narrow focused, deep tasks that specifies for the certain industry or field of studies. There are also several pros and cons of this method, so it is obviously appropriate to take care of them. One of the main cons of qualitative research is small sample of respondents and as a result there is no possibility to apply outcomes for large groups or other projects or researches, as statistical validity cannot be reached due to small sample size. Another disadvantage of qualitative research is absent opportunity to obtain average, correlation, mean and other statistical or mathematical data due to narrative way of data interpretation and once more due to small sample size. (Snelson, & Chareen 2016, 15.) Utilized comparison of two research methods according to main characteristics can be found in Table 1.

<b>Characteristic</b>	<b>Quantitative research</b>	<b>Qualitative research</b>
<b>Type of data</b>	Numerical description of the problem	Narrative description of the problem
<b>Analysis</b>	Statistical approach	Understanding of major schemes
<b>Scope inquiry</b>	Specific question	Thematic scope
<b>Advantages</b>	Large sample, statistic specialization, population validity	Deep scope analysis, narrative way of description
<b>Disadvantages</b>	Perfunctory analyze of the respondents' motives and feelings	Small number of respondents, not valid for statistical purposes

Table 1. Research methods

In case of Seatamar shipping the research is quite narrow specified with significantly high level of required involvement to give useful feedback. What is more it is obligatory to ask people who are working in a specific industry and are aware of modern trends. As a consequence, it is necessary to use qualitative method in thesis research process.

#### 1.5.1 Research method approaches

In this part there will be discussed and presented necessary for the research process approaches and technics. Also, there will be written justification to use every of methods and guidelines to use it in nature of the following thesis. All detailed information will be presented further in a research section, for instance sample size of the interviewing group, titles of the interviewing participants and literature.

As it was already discussed in the previous part it is a promising way to use qualitative method for the following thesis. In order that there will be use only approaches from this methodological group:

- Phenomenological method or as it is also known as interviewing. This is a valid qualitative method which is based on conductive interviews and finding

appropriate connectivity between answers of different participants. Approach does not usually start with well-formed hypothesis, in controversial it is formed during process of interviewing people. There is no usual preparation for participants, the interviewer relies on their natural perspective. Usual selection size is from 5- 25 interviews. This number will lead to a building of sufficient database for future analysis. Interview can be structured, semi-structured or non-structured. Main difference between three types is the way the interview is held, more precisely to what extent interviewer prepared his questions or he will mostly rely on natural flow of conversation. For structured interview questions and themes are outlined strictly and natural flow of the conversation is ignored in order to gain highly precise and necessary information concerning certain topic. Above described approach is mostly used for narrow researches with one theme touched, if all participants should be interviewed on the same topic, as well as they should give their feedback on the one actual option. For semi-structured interview, it is true that main themes and most important questions concerning point of the interview are asked directly to reveal specific pieces of information. Non-structured interview applies mostly to researches that do not have strict vector and focus mostly on one question, as existing approach uses natural flow of the conversation and just correct the vector to theme related topics. (Sauro 2015.) In the occasion of Seatamar case phenomenological method is an appropriate due to several points. Firstly, approach gives a positive understanding of real life situation, so results can be applied in a practical way, not just in theory. Secondly, interviewed people due to narrow sample size can be taken from relevant and specified positions, so their comments and answers will be reliable and valid, as a consequence of professional orientation. The third point is data density level, one participant can give his thoughts and knowledges on all aspects of the research so that while utilizing results the picture can be explored from angles of different specialists. It is also necessary to make choice between three approaches: structured, semi-structured and non-structured. Main problem of the first option is narrow scope area of each and every interview, as it will be necessary to establish new stack of questions for every participant, as most of them will be from

different spheres of interest, so that it would be hard and unreasonable to establish personalized interview plan. Moreover, research theme is quite wide in context of obtaining sufficient data to cover all aspects of the theme. Semi-structured approach suffers from the same negative points, however, they are not so acute. As a consequence, the best approach of phenomenological method in case of given research conditions is non-structured interview, as it gives most wide and flexible possibility of handling interviewing process.

- Content studying. The following technique is widely used in qualitative research. A method can be interpreted as a sum of three different approaches: conventional, directed and summative. Each of these three types is used for text data analysis and understanding of common patterns and nature paradigms. Main difference between types content analysis is a process of interpretation and basic data of start. Direct research starts with a relevant theory or a research result and scoped content aims to confirm or refute basic concepts. Direct research usually used to check relevance of the hypothesis, or to accumulate data for the future research based on previous once. During conventional approach all themes and major points are taken straight from analyzed data. Above described type of content analysis, uses as a supportive instrument for other research methods, for instance, above mentioned phenomenological method. Due to the fact that it requires pre-determined information to narrow analysis field. Finally, in summative type the research and data collection is done by key words and content comparison. (Hsien 2015.) This method is necessary for the thesis research, because it gives an opportunity to gain and analyze previous data on the following topic, find out reliable and valid information from government resources about laws and regulations to gain a sufficient data base. It is also necessary to justify optimal approach of content analysis technic. Choice should be done according to available theories. It is understandable that in history already been performed similar project, however, in permanently changing environment it is necessary to attach previous experiences. Moreover, there should be touched specific categories: customs procedure, transportation options, packing and other parts of transportation planning. Due to above

described argumentation necessity of all three technics is sufficient option, based on different angles of view the research objective requires.

Case study method. This approach of qualitative research usually assumed as a combination of different methods and technics starting from interviews to testing and observation. Main purpose of the case study method is a deep, rich research on the exact case ignoring its representativeness of average population. (Burnham ,2013 16.) Case study method can be also used as a vector of research not just as an approach. Main feature of this kind of interpretation is context analyzing of phenomenon. It means that any topic that is studied should not be scoped without surrounding content. Case study stands on connection with data collection technics and narrative analyzing. Case study vector of researching process, helps to connect all methods with other and make a correction concerning surrounding nature of the whole process and understand particular factors that affect consolidated data from all sources. (Yin 2014, 5-6.) Case study approach is applicable for Seatamar case, due to its wide range of instruments for data collection, focus on particular occasion and context centration. It is obligatory to make an amendment on nature and surrounding factors and happening, as any project will affect processes beyond project's limitations.

### 1.5.2 Method of triangulation

Using multiple data collection methods and resources is called triangulation. This method is used both for research and validation processes. Triangulation gives an ability to be sure that research is rich, deep and complete. Main reason to use a triangulation is the fact that one method cannot evaluate and open up a phenomenon fully. (Angen 2000.) Triangulation is usually divided into four types, according to Denzin (1978, 34):

- Methods triangulation. This type is based on finding general and complete solution by using different methods of data collection. Usually it is applied for combination of quantitative and qualitative research methods. However, it is also can interpreted as different approaches inside one method.

- Triangulation of sources- consists of collecting data from different sources when performing one research method. As a rule, sources are varying, for instance, according to time, public versus private opinion and comparing different real opinions with theoretical points of view.
- Analyst triangulation- applied by using various analytic theories and approaches. Usually this method provides blind spot elimination and as a check for other technics.
- Theoretical perspective triangulation. It is a method of research, which consists of several theoretical bases, and applied to several different theories.

The choice was made to the first one due to the practical direction of the thesis research and necessity of large, diverse data base for various themes. Starting with laws and regulations ending with personal experiences of the people, who work in the industry to gain real life experience. As a result, methods which will better utilize the collection of particular piece of data will be different. Moreover, triangulation gives writer arguments to prove reliability and validity of the performed research process and its results.

### 1.5.3 Qualitative data analysis.

Qualitative data analysis is the process when researcher move from collected raw data to the form of theory, explanation, understanding and interpretation of common patterns. There are two approaches of qualitative research data analysis:

- Deductive approach. Main purposes of this approach are using research question for data categorisation and process of finding similarities and differentiations. The following approach is usually used when resources and time are limited.
- Inductive approach. This type uses arised framework for data categorisation and relation analysis.

Qualitative data analysis is usually performed according to several principles that help to utilize the process and results correctly and fully.

1. People differ in their view on reality.
2. Any phenomenon cannot be understood outside its content

3. Any qualitative research can be used only to describe phenomenon or theory based on data.
4. Exceptions lead to a new problem or inquiry.
5. Understanding of human behaviour is non-linear.

Qualitative data analysis does not have complete structure in comparison with quantitative data analysis. Whole process can only be defined into steps, however, exact process is not pre-determined or there are no strict rules or instruments, as data is mostly in narrative form, or in shape of observation. (Lewins, Taylor, & Gibbs 2005.)

Steps of process division are following: organising data, identifying borders, sorting data, using the borders for the analysis and second order analysis. For the first part, organising data, there should be performed the following procedures: data cleaning, labelling, structuring and familiarizing. After that there should be established frameworks, there are two possible ways: explanatory or exploratory. In first occasion borders will be set due to research limitations, in another option frameworks will be identified as a consequence of gained data. Next step is sorting data according to established frames, during this step borders are modified to better meet data requirements. In the fourth step descriptive analysis is performed, which include, identifying recurrent themes and range of responses in categories. In the last part the other hypothesis are established, understanding of common patterns is performed and sequence of events is built. (Lewins, Taylor, & Gibbs 2005.)

There are several possible approaches of qualitative data analysis, all of them are performed according to a scheme and step division which was presented above. However, they differ from each other by questions they want to answer and preferred analysing material:

- Content analysing. This analysing approach is based on the procedure of understanding, aggregating and categorising of non-verbal and verbal data. Method is trying to answer the following questions: What is the data? What does this data mean? (Content Analysis 2018.)
- Narrative analysis. The analysis is based on people's experience in different context, background and reflection on them. The main process in narrative

analysis is reformulation and representation of data which is covered in stories of people. (Garson 2014, 73-76.)

- Discourse analysis. Main materials for this method are written texts and spoken interactions. The point of this analysis method is not prepared and spontaneous reactions on everyday life and interpretation of this to the content of research. (Hodges 2008.)
- Framework analysis. Main material is transcribed and written data. Analysis is done by establishing of borders for collected data and understanding of common patterns, concepts and connections. (Pope 2000.)
- Ground theory. The following approach is used to formulate general statement for population. After that all other cases (data which was gained) are compared with the base case. There are two outcomes one is that it fits, then another example is taken, if not then the statement is changed to fit both or the base case is changed. The method is mostly used for theories which have narrow number of cases. (Lingard 2008.)

After data analysis is done it is necessary to prove its reliability and validity from different angles. It is commonly known that any research cannot be absolutely valid and reliable, due to human factor and imperfection way of research process and data analysis. Qualitative research and analysis is not an exception. There are several weak points of described research processes, however, it is possible to smooth out them by using different researching technics and cross checking. As it was already mentioned earlier one method of research cannot open up and explore theme from many angles. Main problems of qualitative data analysis are mentioned in Table 2 below.

Option	Problem	Possible development
Internal validity	Sufficiently true value	Triangulation, check of the participants, deviation analysis
External validity	External applicability	Reflexion, thick description
Reliability	Coherence	Dependability analysis
Objectivity	Neutrality	Reflection analysis

Table 2. Qualitative data analysis weaknesses

(Taylor, Gibbs, & Lewins 2005.)

As a result of all information and theory mentioned above, the best way to handle analysis of data for Seatamar case is combination of different analysis technics, as an objective is multidimensional, which means that it requires different types of data from different sources and moreover, multi-technical analysis will decrease the level of uncertainty according to criteria mentioned above.

## 2 Theoretical background concerning logistics and project management

In this part the scope will be made on what terminology will be used. What is already known about processes that will be described in thesis? What is needed for common understanding of the theme. Let author divide this part into three: theory will start with real life examples, so that it will be possible to have something to grip on, in the second part would be touched mostly logistics terminology and the third will focus on project management aspect. Main problem of combined projects is that despite the fact that you need to have a balance between parts, like it should be done in this thesis between project management and logistics topic, you cannot evade appearance of hierarchy of themes, so you will focus on something closely then on everything else, so this will lead to the situation when your thesis or project is no longer complex but have main theme and assistant themes. At least in this part it would be tried to evade this by focusing on both aspects closely.

The theme of the thesis is international transportation between two countries Russia and Germany, moreover it is between two law zones Russia and EU. Consequently as a result below in logistics part all necessary terminology will be briefly described, what is more all rules and regulations which might be applicable to the theme from both law zones will be added. Furthermore, warehousing possibilities rules and regulations which can be applied in this part of the transportation also will be included.

## 2.1 Real life cases

This chapter aims to give a reader possibility to understand how transportation on different modes is done nowadays. Moreover, it will give processes to grip on for future theoretical part. Examples will not be connected with transportation of one actual type of cargo, but will focus on the processes, bottlenecks and possible points of interest of every stage and operation.

### 2.1.1 “КарелВнешТорг” for “Stora Enso”

Main goal of the project was wood transportation in different forms from Karelian republic to semi-boarder territories with Finland or to Finland for “Stora Enso”. Cargo was transported in the following forms: logs, wood boards and lumber. All information about transportation project was gained from former director of “КарелВнешТорг” Nadezhda Orlova.

First point to focus on for project planning was suitable packing for each type of cargo. The choice for lumber was dictated by law, there should be used “big bags” to decrease dust emissions. For wood boards were used plastic packets to save goods from environmental effects and other damages. Another possibility is container form with seal for customs checks. Circle trees are not packed, they are fastened on every mode of transport in a specific way. (Orlova 2017.)

The second part of planning was a choice of transportation mode. There were three possibilities railroad, road or inland waterway transportation. One of criteria was a season when the transportation is planned to be performed. First occasion is mid seasons, periods from April to May and from October to November, in this case road

transportation is the worst options due to snow melting for the first period and rains for the second one in Russia established limitations on axle loads. For all cargo transportations limitation is 4 tons per axle, as a result of penalties timber carrier cannot operate with full loads without special permissions. Purchasing of permissions will result in extra spending. The other two options are applicable. For the winter period waterway is banned due to ice standing. While during summer season organizing of railroad operations is complicated, as a consequence of high load level on the railway schedule. (Orlova 2017.)

After choosing mode of transportation the next stage is loading and fastening goods. For road transportation logs are fasten on timber carrier with straps and forks of the trailer. If the choice was made to the railroad carrier then should be performed several steps. Firstly, should be rented carts of suitable size and type it can be open wagons or timber wagons, due to the fact that Russian railway company do not have carts of this type. Secondly, representative of the company should pass an exam in the Russian railway department on the subject of logs and woods fastening on cargo cart. After that, representative of logistics company control all operation connected with loading and unloading and sign certificates and waybills. For the waterway transportation requirements are rather the same as for railroad. (Orlova 2017.)

The last but not the least stage is customs processing. To arrange transportation on Russian and Finnish territories should be prepared and filled in two documents:

- Union government information system certificate of authenticity of wood
- Agreement of international cargo transportation

Both of these certificates are established to prove the origin of cargo. For all transportation modes cargo should be sealed. According to customs clearance procedure wood should be loaded in a specific way. All logs have to be the same length (+- 10cm). There should be no empty spaces between cargo and walls of the cargo carrier. (Orlova 2017.)

### 2.1.2 “Voyage” for “Northern Capital”

The case illustrates road transportation project in hard environment. Operation is about delivering confectionery products from St. Petersburg to Moscow during winter period. Process consist of the following stages: preparation of cargo including packing and certification, choosing of necessary type of truck and trailer, choosing of temperature level, loading/unloading, transportation. Main problem of this case is critically low temperature of surroundings, which harm and spoil confectionery products in a short period. During winter time temperature of the suburban areas can drop lower than 27 degrees. (Stepanov 2017.)

All problems were solved by using two changes comparing with usual transportation process. The first one concerns choosing of transportation trailer, as a rule for perishable products usually used thermo-trailers or tents, however, the second one does not provide thermo-isolation at all. The first one can only prevent goods from fast heating or freezing, which is not sufficient for almost 24 hours chain which consists of travel and loading/unloading procedures. The choice was made in favor of refrigerator trailer which has an ability to control and save temperature in cargo compartment. Another important feature which was implemented was alternative way of packing. All palletized cargo in addition to normal plastic packing were wrapped with using of foil to prevent lowering of temperature. This was done as, despite the refrigerator trailer, there are immensely strict regulations when receiving confectionary goods as violation might lead to poisoning. (Stepanov 2017.)

### 2.1.3 “Gebruder Weiss” for Rotterdam Holland.

The case is about transportation anchor chains and piercing pile from port of Bilbao Spain to port of Rotterdam Holland, receiver of goods was derrick. Exact cargo which was transported is 1250 meters of chains and one pile length 33m and weight 81 ton. The focus will be made on what decisions have company made during planning of transportation.

Main challenge is that two parts of the cargo was (chains and pile) were loaded from two different terminals. Above described occasion led to higher expenses. Company

faced two possibilities, the first one is to transport another item through ports facilities to the first terminal, however, described option appeared to be not sufficient, as a consequence of oversized cargo which should be transported. The second option was to re direct cargo vessel from one terminal to another, however, this option was also refused as shared vessel was not able to perform such kind of operation, due to delays caused by redirection. Solution was found by hiring a smaller tonnage ship “TOVE” for needs of particular operation. Despite the fact that transportation is marine and smaller tonnage is not a prior choice, solution gave higher flexibility and possibility to reduce costs on redirection of vessel from one terminal to another. Moreover, special vessel gave options to better organize loading/unloading processes to reduce delays and prevent spoiling of cargo by higher level of planning of operations organization and provide individual solutions for all cargo types. (Anchor chains and piercing pile for derrick, 2018.)

## 2.2 Road transportation

The first mode and most common for everyone is road transportation. There are various vehicles that can perform road transportation starting with agrimotor and ending with road trains. However, most common way is by using semitrailer or other vehicle combinations. This machine consist of a truck and trailer. Sometimes vehicle combinations can include more than one trailer, for exaple on Figure 2 can be seen truck for ore transportation with possiblity of operating with more than 1 trailer. Trailers can be devided into different types: semi-trailers, full trailers. The first one do not have front wheels, however, the second one does. This types are also devided by different types and groups like: refrigerators, curtain trailers, flatbed trailers and other types. What is more these types vary from country to country. All these trailers and trucks are specialized for different needs, sometimes rather narrow. As the case of thesis touches two areas of transportation network: Russia and EU with different rules and limitations. Firstly, the focus will be made on EU side of the transportation and then on Russian. The greatest challenge for comparing and connecting both of these parts are different attitude to the timetables and high level of uncontrollable occasions in Russia. This idea will be more accurately discussed in the research section of the thesis.



Figure 2. Truck and trailers for ore transportation

(Lugov 2017.)

#### 2.2.1 Laws and regulations EU part

Most of restrictions and rules can be divided in 4 groups: operational, vehicle, driver and country restrictions. The first and most common restriction is a total weight of the truck and trailer in different countries, information about load and axle load restrictions is presented in table 3 below:

Country	Weight non-drive /drive axle	Lorries 2-3 axles	Road trains 4-5 axles+	Articulated vehicles 5 axles +
Finland	10/11,5	18/26	36/40	42-48
Sweden	10/11,5	18/26	36/40-44	48/60
Germany	10/11,5	18/26	36/40	40
France	13/13	19/26	38/40	40
Denmark	10/10-11,5	18/24-26	38/42-48	42-48
Netherlands	10/11,5	21,5/33	40/50	50
Portugal	10/12	19/26	37/40	40
Estonia	10/11,5	18/26	36/40	40

Table 3. Weight restrictions

(Maximum vehicle gross weight in European countries 2014.)

Another issue which affects all transportations on road is driving rest time rules. These are the laws which regulate amount of driving time for the driver before break, amount work include driving before break, length of working day and other parameters connected with timing. In Europe, worker cannot drive more than 4,5 hours without a 45 min. break and work for more than 5,5 hours without 45 mins. break. Work is done 9 hours a day, but can be extended to 10 hours twice a week. Total number of driving hours will be 56 each week and total is 90 hours in two consecutive weeks. All of these rules are accepted by EU government in Regulation (EC) No 561/2006. Any police officer can check if this rules are applied by checking tachograph. (EURLEX 561,2006.)

Another point to go through is operational restrictions. This limitation gives an understanding of all possible regulations that transportation might face during driving time. The first one is movement restrictions they are applied in Germany to all commercial vehicles of 7.5 tones and over and also for commercial vehicles of 3.5 tones that are pulling trailers on Sundays and public holidays from 00:00 to 22:00. These restrictions are applied to the entire road network.

1. January 1<sup>st</sup>.
2. March 30<sup>th</sup>
3. April 1<sup>st</sup> ;2<sup>nd</sup>
4. May 1<sup>st</sup>; 10<sup>th</sup>; 20<sup>th</sup>; 21<sup>st</sup>; 31<sup>st</sup>
5. August 15<sup>th</sup>
6. October 3<sup>rd</sup> ; 31<sup>st</sup>
7. November 1<sup>st</sup>; 21<sup>st</sup>
8. December 25<sup>th</sup>;26<sup>th</sup>

Source: Traffic bans 2017.

There are several exceptions from these bans, but they are mostly applied to the products of first need, intermodal transportation connected with rail and inventory which are going to category: works of art. In order that, it is not connected with the case. There are also additional restrictions connected with certain highways and regions, like low emission regions(LEG) but they will not be applied to the case as most of the operations will be done in the port area or near it.

### 2.2.2 Russian road regulations

The next side of the question is Russian restrictions and regulations which can be applied to the road ore transportation. All restrictions connected to ore transportation are regulated by the Ministry of road transportation. There is a problem that ore transportation is not properly regulated by acts and rules and there are only common limitations. Most of rules for this type of transportation were stated in Soviet Union. "Regular rules for transportation by road" stated by ministry of road transportation 30.07.1971. However, they are modified by the law in 15.04.2011 №272. (Regular rules of transportation by road 15.04 2011/272.)

- Ore have to be transported by using special trailers or containers. However, truck can be regular type.
- Transportation of the ore in regular trailer without special parcel is forbidden
- It is obligatory to put a tent on the open topped trailer, if there is no tent then it is forbidden to transport ore higher than trailer's level, however in any case it obligatory to cover ore with texture etc.
- Mass and volume cannot exceed maximum restrictions for the particular car.

(Regular rules of transportation by road 15.04.2011/272.)

All of these regulations are applied to the whole road infrastructure. However, there are rules for the particular region in this case it is obligatory to take care of two regions. Karelian republic where Onega Lake is situated and St. Petersburg and Leningrad regions where the main port of the region is situated. Firstly, it is logic to go through Karelian regulations. From the start of the 2017 year the weight on one axle in Karelia is set to be 4 tonnes maximum. Furthermore, there were traffic bans established for all trucks and trailer with weight exceeding 7.5 tonnes for the spring period on most of the routes due to lower stamina of the road. The same regulations are applied to St. Petersburg and Leningradskaya oblast. (Regular rules of transportation by road 15.04.2011/275.)

Now it is possible to go through regular rules for transportations by roads in Russia. This rules have been established by Russian government 25.05.2011 №7 part 2407.

This law gave definitions to all possible processes that can be done with the transport during delivery, what is more it gives understanding of normative acts and paper documents that needed and how they should be filled in. The main point which touches thesis is weight limits, axle load limits and dimensions of the vehicle, they can be found in the table 4.

axles	2	3	4	3(train)	4(train)	5<(train)
Load(tonns)	18	25	32	28	36	40

Distance between axles (m)	More than 2	From 1,65 to 2	From 1,35 to 1,65	From 1 to 1,35	Untill 1
Axle load (KN)	100/115	90/105	80/90	70/80	60/70

Table 4. Axle load restriction Russia

(Regular rules of transportation by road 25.05.2011/7-2407.)

All trucks and trailers have to follow dimension restrictions. Stand alone vehicle and trailer cannot exceed 12 m in length 2,55 m width exception is isothermic trailers that can be 2,6 m width and 4m high. Road trains follow the same restrictions in width and height but can be up to 20m long. What is more this law regulates time limitations for loading and unloading processes. In this thesis most applicable types of vehicles are trailers and dump trucks. For these types of vehicles normal time of loading/unloading is 13mins and 3 mins for the cargo under 1 tonn. For the load more than one tonn an additional 3mins and 1min respectively for every extra tonn. (Russian road codex 25.05.2011/7-2407.)

## 2.3 Waterway transportation

The next mode of transportation to consider on is waterway. First of all let author identify an expression of this term. Waterway transportation is a transportation of people and goods by water. There are immense number of categories of ships, but thesis case concerns only cargo ships. Most of them can be divided into following groups: Bulk carriers, Container ships, Tankers, Refrigerated ships, Roll-on/roll-off

ships and coastal trading vessels. There is also categorisation according to size for every of functional categorise, for instance, Dry cargo carriers which are used to transport ore, food etc. these vessels are categorised according to the combination of several parameter: DWT (deadweight tonnaga), capacity and by dimensions. On figure 3 an example of inland bulker carrier is illustrated. (Kohli 2000, 1-3.)



Figure 3. Inland bulker vessel

(Nikonov 2012.)

Cotegarisation is done according to combination of parameters due to the fact that, some of the chanals, docks and harbours have limitations on different parameters, for example, on hight to pass under bridges. However, general categorisation looks like this:

1. Small handy size 20k-28k DWT
2. Handy Size 28k-40k DWT
3. Handymax 40k-50k DWT
4. Panamax 52k DWT loaded and 80k DWT empty
5. Neopanamax 80k DWT
6. Chinamax 380k-400k DWT

Source: Popov 2011.

In case of the thesis possible option is bulk carrier/frighter these vessels are used to transport different types of goods starting with grains to coal, ore and cement. Most of restrictions connected with marine transportation are dictated by actual port.

In the thesis case there are two possible ways of transportaion by waterways inland and sea. Inland waterway part will belong to Russian law zone and obviously sea part provides with interantional rules and regulations. (Bilault, & Jonas 2016, 280.)

### 2.3.1 Russian Rules and regulations

First of all it is necessary to go through the inland limitaions for cargo transportaion in Russia. One of the most improtant things to mention is time limits for inland water transportations. In order that the time of delivery starts when the goods are given to the shipment company and all necessary waybills and licence has been filled in, after that time borders are calculated in every occasional separately, however, there are stack of happenings when time of transportaion can be enlarged by law. (Codex of inland waterways of Russian Federation 29.12.2017/24-f3.)

These special occasions usually connected with the way the goods are packed and loaded, for instance, a delay of 2 days can be applied if the goods were accumulated in one place within small portions and have to be transported by using one consignment, also delay can be caused as a consequence of the fact that goods during transportation have to enter particular areas, for example, 12 hour delay can be occurred if goods have to be transported through Novosiberian waterworks. (Codex of inland waterways of Russian Federation 29.12.2017/24-f3.)

According to specifications of the water transportaion there is a possibilty of natural losing of cargo weight transported, so that there have been establsihed rules for this. In the case it was told that the cargo which is transported is shungit which is ore for insdustrial puproses, so according to Russian laws this type of goods goes to group 24 and this means that, it is possible to lost up to 1,6 % during transportaions, 0,48% during loading/unloading process from vessel to the train and 0,32% from vessel to vessel. One more matter which streightly affect schedule of delivery is starting and ending of the navigation on rivers, lakes and gateways. On most of the waterways summer navigation starts at the beginning of May and continues to the end of

October. Mostly dates vary due to regional features and seasonal conditions, also dates can be corrected as a consequence of not finished renovation processes on gateways etc. (Codex of inland waterways of Russian Federation 07.03.2001/24-f10.)

There is also a stack of requirements for all vessels before loading of the goods. According to the "Codex of inland waterways of Russian Federation" and regulation №24-f4 from 07.03.2001 (cor.29.12.2017). It is obligatory to clean up all surfaces which might contact goods and supplies, as it might cause harm or loss of goods. All these rules and regulations are established by the sender for each occasion. The same document legislates the way all goods should be fixed on the board. There are two possible outcomes: the first one is that the sender will use regular options which will be described below and the other one is that there would be established personally for transportation in that case all materials and devices to fix goods should be provided by sender and will be given to the receiver with goods. What is more if the second opportunity is used all fixating materials should be taken away by rules and requirements that have been mentioned by the sender. (Codex of inland waterways of Russian Federation 07.03.2001/24-f4.)

There presented special rules and regulations for the bulk goods and their transportations on sea waterways and inland waterways in Russia. Main points are the following that the chemical and other properties of the bulk cargo have to be mentioned in the special declaration by sender. Without this licence cannot be performed any manipulations with cargo. Bulk cargo have to be distributed equally till the end of the cargo compartment to provide necessary stability level. What is more it is necessary to give a vessel captain all possible information about cargo and its properties especially its conditional loading volume. This is a universal measurement unit which is expressed in  $\text{m}^3/\text{tonn}$  and uses to evaluate conditional weight of transported cargo:

- Heavy- less than  $0,56 \text{ m}^3/\text{tonn}$
- Medium- from  $0,56 \text{ m}^3/\text{tonn}$  to  $1 \text{ m}^3/\text{tonn}$
- Light- more than  $2 \text{ m}^3/\text{tonn}$

During loading and transportation cargo which goes to category heavy should be kept in hold instead tweendeck to provide necessary stability and avoid tension. (Codex of inland waterways of Russian Federation 07.03.2001/24-f2.)

As carbon shungit is an ore than according to laws before loading process there should be provided a certificate that states all properties of cargo and that there have been taken all necessary samples. Probes are taken twice one time to provide a certificate and second time before loading processes start. Samples should be taken according to the following structure for the cargo less then 15000 tonns should be taken one sample of 200 gramms for each 125 tonns, for cargo between 15000 and 60000 tonns one 200 gramm sample for each 250 tonns and for higher volumes over 60000 tonns one sample of 200 gramms for 500 tonns. After samples have been taken they will go to the laboratory for tests. Probes will be researched and inspected to provide information about following characteristics and features of the cargo: type of cargo, chemical characteristics (i.e. tempreture of burning, point of fire, possibility of spontaneous combustion etc.), some special characteristics like, moisture content and wetness of dilution. (Codex of inland waterways of Russian Federation 07.03.2001/24-f12.)

There are two standarts in Russia that stated the way samples should be taken: ISO 3081-1973 and ISO 1988-1975. The first one goes to iron ores and the second one is for anthracite and is valid for the thesis theme. There also different interantional methods that are valid in Russia for instance Austrian: AS 1141-1924 for ore probes and AS 1676-1975 for coarse-coal. (Codex of inland waterways of Russian Federation 07.03.2001/24-f5)

Loading and unloading processes are also specified by laws and regulations, standards for processing are written in Table 5. Counting of time starts from 20 o'clock if the application about ready cargo was made before 12 and from 8 o'clock if the application was made after 12. For special occasions loading/unloading time can be stopped, these exceptional reasons are: inappropriate weather conditions, strikes or absence of sufficient vehicles. Most of all they depend on type of goods. Extra tonnage can be deployed inside the ship cargo compartment with the same time limitations but applying to them coefficient 0,25. (Article 8 counting of vessel's waiting time 2017.)

	Name of goods	Time ton/day	
1	Big-bag/paper bags	1300	
2	Bulk	750/1200	Without ramming
3	Cargo in bags<51kg	300/240	
4	Palletized cargo	600	
5	Liquid cargo	1500-5000	
6	Recreations	75	
7	Oil	1500 m <sup>3</sup> /hour	

Table 5. Loading/unloading standards

(Article 8 counting of vessel waiting time 2017.)

### 2.3.2 Sea transportation EU and German part

Laws and regulations which have been described above about inland waterways and process of loading and unloading can be applied to sea transportation, what is more all necessary tests and documentations can be also applied to the part of marine transportations, due to the fact that loading process will be held definitely in Russia and because rules of marine transportation are international and can be applied to Russia the same way. Hence the point is the port of destination: Hamburg. It is necessary to consider on this part more precisely.

Port of Hamburg is one of the largest ports in Europe, the 3rd largest container port on continent and essentially largest port in Germany. Considerable number of 9000 ships enter the port every year and a vast amount of 8.9 million standard containers (TEU) are going through this port. (Port of Hamburg 2018.) Hamburg port provides services not only connected with transportation and warehousing but also with servicing of ships, no matter the size of the vessel, for instance, Queen Mary 2 held its service in port of Hamburg.

Port is situated on the river Elbe, so as a result Hamburg is a tidal port. The tidal port is a port which suffers from significant fluctuations of water level more than 3.5-6 m. Due to these changes entering the port is only possible during tides. (Isanin 1986, 73-75.) Other ports which have the same situation are for example, London port, Port of Antwerpian and Gavr. There is a schedule of the tides for port of Hamburg it varies every six hours from low to high. Average fluctuation during this period is 3.66 meters, this tidal movements cause tidal current running about 2.5 knots. As a consequence of this characteristic of displacement only ships with a maximum draft of 12.80 meters can arrive and leave the port irrespectively of tides at any time. Vessels which maximum draft is up 15.1 meters can enter port only by using tidal from North Sea. There are also possibilities of the tides from other directions, which will give an opportunity for the vessels with draft up to 13.8 m. to reach Hamburg. For now, critical depth of port reaches 14.9 meters, however, there are plans for near future deepening until the level of 15.9 meters. After this enlargement all classes of the ships will be able to enter port of Hamburg with full cargo compartment, and this also decrease the dependence from tides. The following increasing in depth is struggled due to numerous judgements with environmental activists. (The River Elbe within tides 2018.)

## 2.4 Rail road transportation

Another important way of transportation is railroad, which can be estimated as a possibility of transportation for the case. That is why it is also necessary to look deeper on it. As the volumes which are represented in the case are sufficient for this mode of transport.

Railroad transportation has several benefits among others which already been presented. The first one is the level of development of rail road system in Russia. Russian railway is the second one in the world in chart of the length, its total distance 124 thousand km. and got the leading place in the world by the parameter of electrified roads 43.4 thousand km. What is more there are major number of additional and spare routes. (Federal statistics agency of Russian federation 2009.) These two factors in sum give a vast possibility of variations and opportunities to attach the route

for the special needs and also all in all quite flexible system. The other point to mention is particularly absence of delays in the sphere. Time accuracy is achieved because of quite narrow schedule and massive number of trains, what is more cargo trains usually operates in the night time, this also have a positive effect on time tables and delay possibilities. The last but not the least advantage is the cargo transportation capacity. The possibility of transportation for one railway cart is 77 ton and there is a possibility to make a train in length more than 120 carts. As a result, it gives immense capacities. Unfortunately, there is only one possible option on a railway in connection with cart to transport bulk cargo an open wagon. Capacity of such type of wagons varies from 67 to 77 ton. Carts which can transport up to 77 tons are 4 axle wagons, and called “Innovative open wagons” (Figure 4) they have conquered market after the government directive about innovation on the rail roads and ban for old wagons to operate and ban their renovation. (Types of open-top carts 2009.)

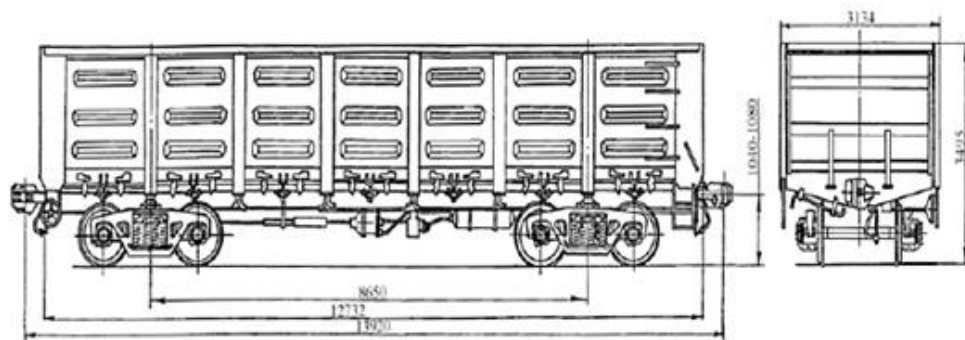


Figure 4. Innovative open wagon

(Types of open-top carts 2009.)

#### 2.4.1 Rules and regulations wagon and train

It is essential that there are regulations for bulk transportation on rail roads. These rules are formulated and regulated by “Russian Federation Codex of railroad transport” all rules and regulations inside this document were constructed and established in connection with part 3 of Federal laws from 10<sup>th</sup> of January 2003 №18-Φ3, another crucial source is “Rules of technical usage”, most of rules and regulations concerning processes of train operation are situated in this document. Previously de-

scribed documents is universal for the whole country and cannot be varied from region, as a result it is sufficient to overview only these documents, to obtain a full stack of rules, regulations and limitations.

Dimensions and other characteristics of carts and whole train are also regulated by law. Cargo train can have more than 350 axles. Axle load cannot exceed 20,5 ton per axle and cargo have to be distributed evenly between all axles. Final length of the train is set according to schedule possibilities, type of the locomotive, type of path and possibilities of spare path's length on stations that train will pass. Moreover, on electrified routes there are limitations on technical possibilities of the electric circuits. (Rules of technical usage 2014/6-37.) The theme of schedule and schedule creation will be discussed later in the chapter: operational rules and regulations. There are several types of long cargo trains: regular cargo train, joined cargo train (consist of two or more jointed locomotives) and train of the enlarged length. (Rules of technical usage 2014/23-2.)

Main points of documentation are basic transportation regulations, more specific options, as a rule discussed privately for every case. Only cargo which is included in a special list №23 of the "Russian Federation Codex of the rail road transport" can be transported in a bulk form. There are two possible options for bulk transportation of ore in closed or open topped carts. The first one should be used for type of cargo which is mentioned to have high moisture absorption factor and the second one for types of goods which not. Carts that are used to transport full cargo load of ore should be inspected beforehand to understand if their structure integrity is sufficient and that all fixation tools are in a necessary condition. There is a vast list of unacceptable faults with which it is not possible to make any movements on railway, for instance, faulty of connection mechanisms. (Rules of technical usage 2014/5-24.) Furthermore in all waybills and license in paragraph which describes number of places should be stated that cargo is transported in a bulk form.

Rules and regulations are touching not only the way the train should look and dimensions but also speed limitations. Ordinary maximum speed for the cargo train is 90 km/h, however, it can be enlarged up to 140 km/h on some parts of the route. To reach this speed there should be provided a stack of special conditions, for instance, straight path without hard corners (dimensions of maximum corner are determined

for each train specifically), necessary quality of the path, schedule possibility. (Rules of technical usage 2014/5-30.)

#### 2.4.2 Operational rules and regulations

Another important point to mention is the process of operation on Russian railways. As volumes which are described in the thesis are quite high then operation process of the train will be done not in the regular way, in which all passenger and low volume trains are operated. All operations on the railway are done according to the schedule which is established by staff for every period of the year. This schedule includes, all trains, breaks and technical windows. All these things affect transportations straightly.

There are special rules for schedule establishment, most of them connected with bureaucracy processes and cannot be taken into account, however, there are some that are connected with transportation, for instance, all timetables on all directions are established by taking into account special hierarchy of trains: first goes recovery trains, then military, international, passenger long distant trains, passenger local specialization, mail and the last ones are cargo trains. (Rules of technical usage chapter 5 part 5) Another factor which affects every action on the railway is technical window. This is a period of time when all transportation on the railway are banned, due to works to correct faults and to restore damage. This brake is stated to be between 0,7 and 1,5 hour, except special occasions. (Rules of technical usage 2014/5-40; Rules of technical usage 2014/5-41.)

All operations on the railway are connected with stations no matter of their volume and purpose. The stations can be divided into cargo stations, passenger stations, sorting stations and intermediate station. This division is done according to functional specification. However, for cargo transportation it is more important another division. The division gives stations a level according to volume of work they are doing in normal conditions. There are 5 levels of stations and unleveled stations. Most of cargo stations goes to the first level or unleveled category. The way train stations are evaluated is given in Table 6. The other aspect of this division which straightly connected with the case is that length of the train which can pass through the station is regulated by the level of the station and more accurately by the spare path which it

can enter. Spare paths are used to put on a train to give a train with higher priority a way to go through the station. Prioritization was described in the previous paragraph. As it was told most of the cargo stations are goes to the level 1 station or un-leveled, this means that they have got highest points for the work load. Most of these stations got 50 and higher points, sometimes over 100. Passenger stations usually goes to 4 category and got 0,7 to 4 points. All points are given according to special table:

№	Criteria	Units	Points per unit
1	Cargo volumes per one day on paths		
	-common use	10 carts	2,0
	-uncommon use	10 carts	2,0
2	Sorting of the carts	10 carts	2,0
3	Medicine inspections	10 carts	1,0
4	Cart turnover per day	100 carts	2,0
5	Trains turnover		
	-with changing of the train	10 trains	1,0
	-without	100 trains	0,5

Table 6. Station classification table

As it is understandable from the table and the fact that most of the cargo stations got more than 50 points as a result of this table, each cargo station can deal with trains with more than 100 carts. (Samara's government university of railway connections 2007.)

## 2.5 Warehousing and packing

The case is about intermodal transportation, as a result, there will be a necessity of warehousing space for preservation of cargo and moreover packing options due to possibility of cargo losses during transportation. Due to the fact that case subject is ore transportation, there might be no possibility to warehouse it indoor. What is

more, ore is the type of cargo which usually require special features for the warehousing and packaging to prevent damage for the environment and loss of goods.

The first and most important concept to mention is that shungit is harmless for human beings so that there few safety restrictions according to working process. Every worker who operates with the following type of ore should be provided with special clothing according to national standards. (Government test 2011/12.04.011; Government test 2011/12.04.016.) Moreover every worker should be given protection for breathing (respirators)(Government test 12.4.034 and Government test 12.4.041).

The next point is that the highest possible density of dust in the air should be no more than 2 mg/m<sup>3</sup>. (Technical conditions standard 18.04.2016/5714-00712862296-2001.)

To reach high accuracy in understanding of warehousing possibilities, restrictions and limitations, it is necessary to read chemical characteristics of this type of ore.

- High strength
- Corrosion protection
- Ability of sorption of different substances (oil, phenol etc.)
- Catalytic activity
- Eco-friendliness

What is more shungit got an ability to dust. Shungit does not cause radiation, according to national standards (Government test 30108), this ore goes to category which might be used and operated with without restrictions. (Kalinin 2006, 3-5.) Hence this is the main point why it needs special packing. Due to its main chemical features it is understandable that it did not need special temperature, moisture or isolating conditions. However, there is one possible problem, if there is heavy rain and shungit will lay under it for long period, in the end it can finally absorb moisture, but it is not possible to deal with it in long perspective.

When ore is arriving at the warehousing place it should be provided with documentations which will verify the product. In the document it is obligatory to include the following information: name of the factory, name of the product, name of the receiver, confirmation of accordance of technical conditions, technical conditions, reasons for

sending, signatures of both parties. (Technical conditions 18.04.2016/5714-00712862296-2001.)

Before accepting ore for the warehousing and during storing period, there should be done several processes to estimate incoming quality of the cargo. Every incoming shungit is controlled and tested in packages according to place of its origin and date. Every pack will be given a certificate of quality and characteristics according to the results of the testing process. All probes and samples are taken according to the Government test 23083. According to these tests the following characteristics are estimated: weight, volume weight, breaking point, density, porosity and other physical features. All standards for these dimensions are described in Government test 8269.0. (Technical conditions 18.04.2016/5714-00712862296-2007.)

There are two possible shungit's states: big fractions and small fractions or sand. There are no law regulations or prescriptions for warehousing of this type of ore. Due to absence of harm factor. However, as a consequence of persistence of dust factor and possibility of people living near the place of storage companies provide precaution measures. Which will be described below.

First there are law regulations for packing ore which cause dust. In this case it can be applied only for small fractions (sand), as a result of dangerous level of dust and possible amount of lost goods. Packing options which should be used for this type of goods is polypropylene bags for fractions greater than 20mcm and paper bags for the ones which are under 20mcm. The difference is caused by structure of polypropylene bags and their disability to handle with super small fractions. Regular size of polypropylene and paper bags is 40 kg. They usually transported in a palletized form. If the packing is made by using paper options, than it is required to isolate cargo from atmosphere moisture or underground waters. (Technical conditions 18.04.2016/5714-00712862296-2003.)

The second option is big fractions they have lower dust index. As a result they can be stored in a bulk form outdoors/indoors or in "big bags". The first opportunity fits for vast volumes, the second is used mostly for smaller lots due to higher expenses and possibility of absence of special cargo cranes. If the choice will be made to the bulk

form of storage then it is advised to use safety showers to protect surroundings from dust. An example of shungit stored in a bulk is illustrated on Figure 5.



Figure 5. Outdoor warehousing  
(Carbon-shungit 2011.)

## 2.6 Customs clearance procedures

Customs is one of the main parts of international transportation. This process is obligatory and absence of attention to it might lead to delays, penalties or even termination of operation and confiscation of the cargo, schematic illustration of the whole procedure is represented on Figure 6.

The customs processing usually consists of six stages:

1. Registration of the company, if it applies for the customs for the first time
2. Sending notification about arrival of the cargo
3. Sending a customs application
4. Performing necessary customs checks which are stated in declaration
5. Customs checks before accepting the goods
6. Accepting the goods

(Customs codex of customs union 2017/17.)

Most wide and complicated point is filling customs declaration. In the application to customs office have to be stated all information concerning cargo:

- Name, description
- Classification
- Country
- Description of packing
- Volume and mass
- Customs value
- Statistical value

Information about customs fees and invoices: customs fees, invoices and other payments, possible discounts, privileges etc., currency rates, sums of all payments. (Customs codex of customs union 2017/181.)

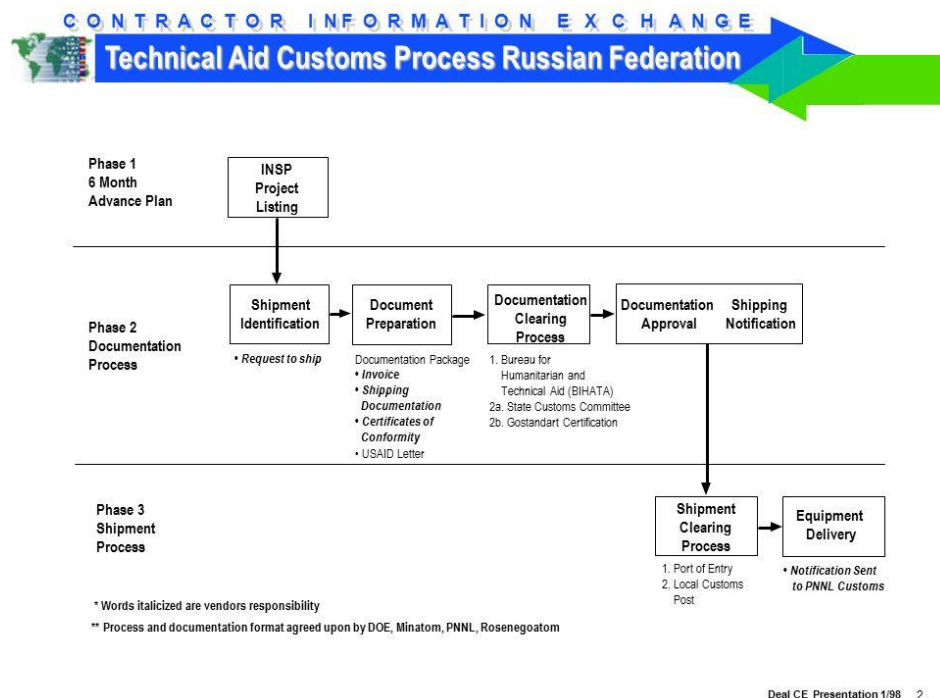


Figure 6. Customs Process

(Deal 1998.)

What is more should be stated: place, date of the declaration. The information about all restrictions, limitation, manufacturer of the cargo and data about international bargain as well as its main statements should be included. It is common practice that companies use help of trade representatives which can make the process easier and faster. (Customs codex of customs union 2017/212.)

From the moment cargo enters customs territory there should be performed special stack of procedures:

1. Checking documents and data. Consists of checking the authenticity of documents and correctness of filling.
2. Verbal interview with the owner of cargo or with the representative.
3. Description about all possible important factors that might affect customs processes in written form.
4. Customs observation-visual systematic or one-time observation about transportation of goods in controlled zone.
5. Customs inspection-visual inspection of cargo and transportation facilities without opening, to find all identification signs (seals, labels etc.) After procedure is finished special document is established.
6. Customs search- opening and inspecting all goods, packages, containers and other cargo with broken seals.
7. Checking for special markings and as a result documentation to prove legality of this cargo to be on customs.
8. Checking of areas and territories to prove that cargo is actually exists.
9. Checking systems of goods registration- established for people who got benefits from simplified customs processing.
10. Customs check- main goal of the last operation is to make sure that all laws and regulations of Customs union are followed in an appropriate way.

(Customs clearance of export: steps and payments 2016.)

All other options, payments and extra processes are done according to the type of goods and conditions which are mentioned in Customs codex of Customs union.

## 2.7 Project Management

The case of the thesis is not just to estimate costs and understand rules and regulations which affect multi-modal and multi-country transportation, but also to establish project management tool which will combine and accumulate these parameters.

In this part of the thesis will be described possible options for the project implementations, organization, development of the project and previous experiences on the following theme.

### 2.7.1 Project management philosophies

As new projects are getting more complex and complicated so that they require more careful planning every time, as a consequence higher attention is paid to project management. When people are talking about project management they imagine mostly IT sphere, due to the point that IT programs are usually modified not one time and there is no final version for any product, so it is possible to uncover potential of the project management process. There are major number of approaches and philosophies connected with project management here will be presented most popular or relevant once.

One of the most popular philosophy in project management is “4P’s principal”. This idea can be explained, as an accumulation of everything which is needed to run and develop any project. The following concept count all aspects of project management as resources which should be used to reach final goals:

1. Plan- includes all activities of the project
2. Process-Consists of all processes and their structure
3. People
4. Power- describe all policies for implementation, organigrams etc.

Most of the project management approaches take into account or straightly follow 4P’s principal. (Mesly 2017,328.)

The first approach is the most classic and widely used, it is called waterfall or phased approach. This method of management can be described as the process which will go downwards through all planned steps and chapters, with no possibility to go back and modify previous steps. This approach is widely used in heavy industry where after-the-fact changes are impossible or unacceptably expensive. Main advantages of waterfall method are: time saving, place emphasis on documentation and easy to understand and well-structured process. On the other hand, there are some cons like, possible underestimation of the problem, hard to control process of project design,

before implementation. (Winston 1970, 25-28.) Waterfall method usually consists of the following phases:

- Conception-understanding of limitations, goals, steps etc.
- Analysis- understanding of resources needed, people and other specified features
- Design
- Construction- actual processing of the project
- Deployment- implementation of the project into the working environment
- Maintenance- after implementation service of the project including error correction

(Wisocki 2013.)

Another philosophy which is widely used is lean project management. This approach focuses on delivering to the client the highest value with lowest possible time and waste. There are several types of this philosophy like: 6 sigma method, Kanban and A3 problem solving process. These all types have one same characteristic in common, they are trying to evaluate the outcoming quality and estimate possible curtailments to leave the quality level inside certain borders. It is mostly done by decreasing multitasking or task hierarchy. (Gabriel 1997, 205-209.)

The next and the most popular approach for now is iterative and incremental project management. This is a combination of two methods which are mentioned in the name of the method. Main idea of approach is to modify the process through repeated cycles each iteration. This model is suitable mostly for IT sphere due to easiness of modernization afterwards. (Leman, & Basili 2003, 47-56.) The process consists of the following phases:

1. Inception-identifying project scope, requirements and risks
2. Elaboration- deliveries a working architecture that mitigates the top risks and fulfills the non-function requirements
3. Construction- incrementally fills-in architecture with production-ready code produced by analyzes, design, implementation and testing
4. Transition-delivering the system to production environment

(Farcic 2014.)

The last but not the least important method is critical chain project management (CCPM). This approach is targeted to complete project in given time and with given resources. In this approach main point is that good enough solution is enough due to the fact that finding better solution will cause extra expenses which might not be covered by the benefits from new solution. The task should be completed no longer than planned but not less than planned to avoid quality decrease. (Leach 1999, 39-51.) Planning of this approach is usually consists of the following stages:

- Work breakdown structure (WBS) creation meaning that the whole process is worked from the end with starting each phase as late as possible.
- A duration of each phase is planned first in optimum- aggressive duration which will work in 50% occasions and then safety duration which will work with 90-95% probability
- All resources are planned in connection with aggressive plan as half of the tasks will be completed faster and half slower than planned
- It is common sense that tasks are more likely to be done in longer time than less so here are used buffers to decrease risks

(Bernard, & Icord 2014.)

There are considerable number of other approaches which can be used in particular occasion, but most of them are specific and applied mostly for IT sphere due to flexibility of this branch and high development of the sphere nowadays. Others are mostly applied to the development of the companies or projects which will have straight effect on society or company wants to show that it will, an appropriate example of such type of method is Process based method. This approach refers to vision, mission and core values of the company.



Figure 7. Project management implementation process

(Comprehensive Guide to the 5 Phases of project Management Regarding 5 Stages of Event Planning 2013.)

### 2.7.2 Project management implementation

After a suitable approach will be chosen, it is necessary to take care about implementation process, regular scheme of implementation process is presented on Figure 7. In transportation it is the main point, as the transportation is mostly a process not a target. As a consequence of the fact that, obviously the cargo will arrive to the point of destination, the question is what time will be spent and how much it will cost.

Traditionally project management consists of 4-5 management groups: Initiation, Planning and Execution, Monitoring and Controlling, Closing. These stages are fully describing implementation from start to end. To fully understand and build project management tool in valid way it is necessary to focus on all steps and their content.

Initiation is the first step in the new project construction. This process determines the scope of the future project, it also determines the nature of the project. It is crucial to perform this stage well, due to stage gives market understanding and estimates potential success of the project. This stage usually analysis the following parameters like: analysis of the business needs, reviewing current operations, financial

analysis, stake holder analysis, project analysis (ex. costs, tasks, deliverables etc.), SWOT analysis. (Nathan, & Jones 2003, 63.)

The next stage is planning of the project. This phase develops the frame of the future project and finalizing of the structure. This stage usually include such parts as: establishing the scope statement, selecting the planning group, creating work structure, understanding necessary activities to meet necessary results, evaluate resource consumption, calculation of the costs and time spending, developing of the schedule and budget, risk estimation and collecting all necessary approvals to begin execution stage of the process. (Kerzner 2003, 76-80.)

Here starts execution process. In this stage it is vastly crucial to fully understand order of the processes and their timings. During execution phase main roll is given to human resources, allocation and other resources usage, such as production powers, budgets etc. End products of phase are final benefits. The next chapter is straightly connected with the execution process, it is monitoring and controlling stage. This stage includes all action and analysis that are needed to identify all weaknesses of the project and mistakes that were made during other stages and process of their correction. Main feature of this phase is the opportunity to make detailed measurements on the performance of the project in the following business environment. The main questions that part should answer are: where are we, where we should be, how we can go on track again. Furthermore, maintenance include: error correction, project support and updates of the product.

The last but not the least important phase is closing of the project. Chapter of closing is the part where the project is fully accepted and so that ends, this might be according to numerous reasons (ex. ending of the partnership contract, changed business environment etc.). This phase usually consists of two parts: contract closure and project closure. In contract closure all contracts are completed according to the project or project phase. In the project close part: all processes that were included in the project are finished and all process groups are also formally closed. (A Guide to the project management body of knowledge 2010/27-35.)

### 2.7.3 Previous experiences on transportation project management

In this paragraph will be presented examples of the projects in logistics that can be used as an example for the case of the thesis or somehow touches the theme of the research. Main focus will be given to the examples which are connected with inter-modal transportation. What is more special attention will be on indicators and characteristics of the process which made this process unique or valuable.

#### 2.7.3.1 *Seatamar for the Salzgitter*

First example is straightly connected with presented case of the thesis. Actually, it is a previous version of scoped transportation project. The project case is following: transportation of extensive parts of shungit from Onega lake to the port of Hamburg by using mixed navigation vessels. The transportation was done in summer period by using vessels type river-sea. Cargo (shungit) was transported in big fractions.

Due to the fact that factory, where shungit is produced: “Carbon shungit” is situated on the shore of Onega lake and got their own loading facilities for ore transportation (Figure 5). During root planning there were no problems with loading process. After that vessel goes to Baltic sea by using first the river Svir and then Onega shipment channel which ends in river Vitegra. After passing Vitegra vessel enters Ladoga lake and finally by passing through St. Petersburg on Neva river enters Baltic sea (Figure 1). (Seatamar 2017.)

Problems which were faced by planners were mostly connected with warehousing possibilities and cargo safety. The first and the most important one was the weather conditions. As it was already mentioned in the warehousing part big fractions of shungit can absorb moisture, as a result quality of shungit which was mentioned in the contract also stated acceptable amount of moisture in ore. Main problem was Russian summer of the following year, due to high amount of rain and simply high moisturized air there should have been done special solutions for warehousing. Thus the “big bags” were used, to somehow prevent shungit from moisturizing and made ore suitable for indoor warehousing. Another problem was controversial for the first one, when the day was dry shungit started to produce dust. As a result, people that were living nearby complained, so the company decided to put safety showers around the area of warehousing. (Seatamar 2017.)

As a result of this case it is possible to figure out that most complicated factors to deal with are warehousing and environmental factor, which cannot be predicted at all. Another important point is rout planning to avoid outdoor warehousing and save money on on-the-go corrections and extra actions.

#### *2.7.3.2 Guangzhou province for “Reserved”*

The second example of project management in transportation is about international transportation from China to Poland. Target is to transport Chinese clothing from Guangzhou province to Poland by circle model every 1-2 months for Polish clothing company “Reserved”. Most of transported goods were clothes and other textile products.

Main challenge of this case was in meeting necessary level of quality of products at the end of all processes, due to transportation of consuming products for international company. Moreover, as transported cargo was clothes and textile there are special condition necessities and warehousing requirements to prevent cargo from spoiling. The last but not the least challenge was small time period of life of particular collection: no more than 1,5 months, small life time resulted in narrow window for transportation processes and necessity of finding stable transportation option with minimized dependency on season and weather conditions. (Shilov 2017.)

As a result of planning, resulting solution contained mainly transportation through Russian territory by using railroad transportation. The choice was made between two options: marine transportation through Indian ocean and railroad through Russia. Main arguments for the second variant were smaller lead time, stable schedule of transportation, easier customs procedures with Russian border and absence of extra moisture during processes which will lead to saving on packing and smaller opportunity of cargo spoiling or loss. Another crucial aspect which was leading to the choice of railway method is that part of the Russian railway system called Trans-Siberian railway. Railway route connects European part of Russia and Europe with Eastern centers of industry, as a result Trans-Siberian railway give possibility for fast and safe delivery. Last but not the least advantage and at the same time solution for the problem of warehousing possibilities was that Trans-Siberian Railway is mostly used for industrial needs, so areas around it have a sufficient infrastructure of transportation and warehousing facilities which would give wide choice of storage options and

lower pricing. Another part of transportation that have different option to perform is process from Moscow region to Poland. The choice was made between railroad and road transportation. Both options are possible, however, main choice was made with an idea of size of one particular operation, the higher the volume the more luckily choice will be made in favor of railroad. (Shilov 2017.)

All invented solutions resulted in the supply chain which will be described below. Cargo started its way by using Chinese railroad services until crossing with Trans-Siberian railroad. After the loading unloading procedures cargo will be transported to the Moscow region. And in the last part of transportation via international railroad or road cargo will reach receiver.

### **3 Research and analysis**

This chapter will be divided into two parts: research and analysis of results. In the research part there will be written: research plan and implementation of research process. The second part analysis will consist of analyzing of presented results, validity and reliability prove. All research results and analysis outcomes are approximate, as the situation is rapidly changing every day, however, main features and points of the research should stay the same.

#### **3.1 Research plan**

The research was performed during autumn 2017 and winter 2017-2018. During this period thesis writer was studying laws, regulations, limitations of the countries which might took part in the supply chain. Moreover, there were conducted several interviews with specialists who work in the industry on the modes of transportation which might be sufficient for the case option. As a result of content analysis and interviews it will be possible to understand and figure out KPI's for the supply chain, detect bottle necks, attributes, extremum points and other factors that have sufficient effect on the transportation process in particular case, furthermore, effect all transportation projects which will be performed by the same scheme or the same area. As a conse-

quence of the following data analysis by using deductive method the project management tool can be established on the basis of performed research. It is necessary to figure out the exact flow of each part in the research.

In the content analysis part the focus was made on two aspects of research practical and theoretical. An approach of content analysis will give a clear perspective on documentations and theoretical aspect, the method will be able to give clear frameworks for the future planning of the route and establishing other KPI's and stress points of the research. Moreover, the content will give answers to the crucial questions like: "what can be done according to law?" and "what is the border the researcher should follow?" In the theoretical part the laws, regulations and limitations were studied and utilized. In the practical part previous experiences on the following topic will be stated. Practical part of content analyzes appeared to be closely connected with interview part, as sometimes real-life situation varies dramatically from theoretical assumptions.

The interview part will study opinions and knowledges of the people who are working in the industry now or were working in the near past. According to the necessity of the research method there will be held approximately from 6 to 10 interviews. Presented number might vary depending on the received information. If the main courses and gained data will have the same vector then the number of interviewed people will be decreased, otherwise there will be more participants to gain more reliable and valid data. Main stress of the interview will be made on the actual process of transportation, new trends and possibilities. Other important points of the following part are personal characteristics and national features. Previously described part is crucial for the project management tool as well as for real life case, due to the fact that personal characteristics and national features have a major impact in all spheres especially in Russia and transportation is not an exception.

Interviews were held in non-structured manner, however, main points were stated in direct questions. The absence of straight structure of the interview was dictated by the problem that interviewed people are working in different parts and branches of the industry. Moreover, every part of the case and so the project management tool got their own features and important points to mention. In order that it is positive to establish personal approach to every interview. The main points to focus on will be:

- Timing efficiency evaluation. This is a commonly known one of the most important factors for any transportation or project.
- Human resource utilization. There might be national features of working process in the particular country, for example, siesta in Spain.
- Customs clearance processing. Crucial points of customs processing, possible under water stones.
- Safety regulations. Problems and deviations from law that can be performed and possibilities for their correction.
- Bottlenecks and difficulties during transportation process. Typical and specific occasions, problems during processing of the project, which might have straight effect on transportation timing or price for the process.

The main point of the phenomenological (interviews) method is to apply to real life occasions and collect data from the sources which provide not biased point of view. Described method will lead to a more accurate and close to real life planning and a significant number of blank points can be eliminated before running the project and suffering drawbacks.

The case study method will be implemented in the research process as an overall research strategy. As the case is straightly connected with real life and will be implemented in multicultural environment it is crucial to have in-depth research. As a result, the limitations were established to narrow down the area for the studying in other parts. Other approach to mention is context analysis, as a consequence the occasion will be scoped in connection with the environment, for instance, season schedules of the trains, port schedule that leads to more clear and easy to run project management solution.

### 3.2 Research process

The chapter research process will specify the way the information and data for the case were gained and utilized. In the following part the focus will be made not on the results of the research, but on the actions and organizational points. There will be presented two out of three research methods, as the case study option is used mostly as a research strategy. As it was also stated above whole thesis was divided

into logistics part and part of the project management. The first one was mostly connected with interviews and as a result phenomenological research method and the other one is based mostly on content analysis and systematization. However, all methods gave useful and relevant data for both parts, moreover, give an opportunity to look on the problem from different sights.

The target information of the research process can be also divided into two groups. The first one is the KPI and general information group this data consists mostly of attributes and narrative information about how the processes are done and what are possible drawbacks and bottlenecks. The second group of information include cost connected factors and possible cost evaluations of the process. These two groups are closely connected but will need different focus during data collection.

The researcher firstly took care of content analysis part, because other stages could not be done independently and will require organization, what is more they appeared to be time consuming. The content can be also divided into two categories laws and regulations according to the government and experiences of the industry connected participants about the case. The first group mostly consists of Russian and EU official legislations and laws connected with necessary safety instructions, rules of exploitation, restrictions on the weights, volumes etc. All regular information was mostly gained from Russian ministry of transport website and EUlex. Railroad connected material and data was found in Rules of technical exploitation of railways, Instruction for the trains operation, instruction for the signalization of the trains and Ministry of rail road transportation. Road transportation connected rules and regulations were gained from Road transportation ministry and Russian roads ministry. Sea and inland waterway transportation information and laws were obtained from Codex of inland and sea waterways of Russian federation and official site of Hamburg sea port. What is more have been identified delay options and prolongations for the transportation process which will not result in penalties for the carrier. Warehousing and safety instructions were mostly taken from Russian and EU standards and safety instructions for the operations with ore, for instance, Russian government standard, widely known as GOST. As a result of content analysis have been gained main rules, regulations and borders to follow.

The next part of the research process is interviewing part or, as it is called phenomenological method. The thesis writer decided to hold it in a free manner, but outline main points. The reasoning for these decisions were written in the research plan part. Interviews were held mostly using skype or other ways of long range communication. The choice for the ranged communication was an involuntary option as most of the respondents live in different cities or even countries with each other and with thesis writer personally.

In the interview participated different specialists from different spheres, who are working in the industry now, or worked in the near past. The titles of the specialists who have taken part in the interviewing process:

- Rail road logistician in “Russian railway company”
- Former customs officer and quality controller for ore and wood transportation
- Owner of road transportation company: “Trans Diesel Group”
- One of the owners of the German marine transportation company: “Seatamar”
- Train driver of the “Russian railway company”
- Technical engineer of “Baltic shipyards”
- Head quarter of Russian Customs service
- Specialist in marine transportation of forwarding company: “Module”

Most of the respondents are working on the positions connected with planning or inspection processes, however, two of the respondents are working on the execution places, as a result it is possible to gain information from both sides of the processes. As the safety restrictions, for instance, are sometimes violated during actual process, due to miss behavior or for less time consumption during operation processes. This was only one reason why it was necessary to look on a project and processes inside it from different points of view (executioner and planner).

### 3.3 Analysis process

The first part to describe results of is the content analysis part, particularly, laws and regulations studies and infrastructure analysis. The point of departure is Russia, so it

is logical to start with the points connected with the following area. Ore is produced on the Onega lake (Carbon Shungit mining), as a result it is appeared to be two possible options for the transportation the first one is to use inland waterway transport and the other one is railway transportation, as the mining company have railroad on their territory which is connected with the whole network. Preliminary point of destination Saint-Petersburg port accepts both possibilities. Consequently, the first question which appeared was: what is the best option and if it is not possible to justify then, how the choice have to be made in the particular situation? All information for data analysis and results was taken from interviews, content analysis and case study processing.

### 3.3.1 Transportation on Russian territory until connection port

This is the first stage of transportations and as well as starting point of the whole process. Further there would be analyzed and highlighted main Attributes and points of organizational process. Main focus will be made on stages, options and choices which have to be made on the particular part.

The first possible indicator of the choice of transportation mode can be assumed calculated volume of goods per one transportation. As a result there are two possibilities which might be used for medium and large volumes, this can be either railroad or inland waterway. An option to scope on firstly will be railroad mode. One innovative railway wagon according to Russian railway committee can be loaded with maximum of 77 tons of ore. However, the number of carts that can be used per train is not specified in the laws and regulations. From the interview with Russian railway representatives starts to be clear that the only mandatory point which is conducted while forming a train is the possibility to put it in the schedule. The density of the schedule varies from time to time depending on season, for cargo trains it is crucial, as they are last in the hierarchy of the transportation. The winter load possibilities give an opportunity to make trains which consists of up to 150 carts, however, for the summer period it is usually no more than 100. This deviation exists due to passenger traffic which dramatically increases during summer. In the mid-seasons load can vary, in case of economical and weather conditions. As a result, possible maximum load of the train can be from 7,7 thousand tons up to approximately 11,55

thousand tons. These borders are approximate and can be different depending on the particular year. However, above mentioned tonnages are approximate maximums for the particular season so that it is better to take as a real and stable possibility the weights from 5,5 thousand tons to 7,7 thousand tons. As this estimation will give more reliable and stable possibilities.

The second option for the transportation is dry bulk carrier. Most of the inland bulk carriers goes to mini-bulker category. This cargo vessels gave an opportunity to handle load up to 10 thousand tons. However, there is also a possibility to use handysize class which allow to transport up to 50 thousand tons of ore. The problem of using larger bulkers than handysize is navigation during inland water transportation process. Another negative aspect is the number of vessels of higher sizes on inland waterway market. Due to sanctions against Russia many shipowners are redistributing their high-volume vessels for international transportation and avoid loading in Russian ports.

As a consequence, according to volume per transportation factor the choice should be done with the following argumentation. If the weight of transported cargo is higher than 6,5 thousand tons, then it is better to use inland waterway option. Main reasoning is bounded with unstable possible number of carts per train during high season (May to August), and result of this smaller guaranteed volume. However, the train should not be excluded from choice, even during higher volumes transportation as it has other benefits which will be analyzed further.

Another important factor is transportation cost. Information was gained through content studying mostly browsing of internet offers. The cost for one 77-ton cart is approximately 21000 rubles, which is approximately 300 euros per cart depending on the currencies rate. This gives 4 euros per ton for the first part of the transportation. (Railroad pricing 2018.) As the respondents told the price is preliminary and might vary depending on actual values and volumes of particular process. The price includes only transportation and loading/unloading operations. According to the expected high volumes of the case the price will be definitely lower, but it is not possible to evaluate it preliminary, as the schedule for the periods are not placed.

Next option for the cost evaluation is inland waterway transportation. The cost for the transportation is freight and it can be decoded as ton per mil. Freight cost vary depending on volume of the goods, season, month, economic situation and necessity of special conditions. The average freight cost for inland transportation is from 6\$/ton to 15\$/ton. The exact price cannot be evaluated in a long perspective as it depends on many factors and changes weekly.

There is also one more point to mention. It is the easiness in organization of transportation. All operations connected with the railway transportation should be done according to the schedule as it was told by interviewers and proved by laws. As a result of schedule strict forwarding railroad is stable and reliable way of transporting goods. Delays might be caused only by accident situations which as the respondents told the author occur rarely. Moreover, loading and unloading is not time consuming according to the construction of wagons. However, this cause several drawbacks. The first one is the lot size bound. The point is that for the high volumes it will be hard to organize one-time transportation, as the cargo train possibly will be able to go only during night time according to its size and as a result speed. The only night time option was explained to the researcher, as an effect of the problem that train has to pass at least one station during the gap between other trains to avoid delays. In addition, high lot size will prevent the train to stop on small stations to give other trains way, as a result of length and absence of suitable spare ways. So that sometimes the train will need to pass more than one station during one break. The other one is time consumption of the whole process and absence of flexibility. If the transportation is held during high season cargo trains as a rule operates only on night time, that means, all cargo trains will move during the same period of time, which will cause heavy load on the network and as a consequence longer delivery time. Furthermore, there is absence of opportunity to attach the transportation times and dates into narrow borders, as there might be simply absence of the windows in the schedule. The last but not the least con of the railroad system and particularly schedule is impossibility of attaching the time after final arrangements. The timetable is exceedingly narrow especially during high seasons (May-August) and all transportations are planned in advance particularly high volume.

What concerns inland waterway transportation. For this part were interviewed former customs officer and quality controller for ore and wood transportation, One of the owners of the German marine transportation company: "Seatamar" and Technical engineer of "Baltic shipyards". As a rule, after planning a delivery by waterways, in case of absence of straight contract relations, vessel for the transportation is chosen after the goods arrived to the port, this is done due to several reasons. Firstly, decreasing risks of emergency situation connected with extra conditions, for instance, weight changes and extra special conditions. The following possibilities cannot occur due to law regulations, however, cultural and native aspects take their places, these factors will be described in a separate part. The second reason is higher flexibility of the fleet and harbor, as the situation is changeable. On the other hand, late vessel distribution might lead to complications. The main one is possible time delays connected with bureaucracy and mostly human factor. Another one is difficulties in planning future transportation, for instance, dock of arrival or warehouse spacing. Another problem of waterway transportation is possible delays with absence of refund. Delays of the following type are occurred when the goods are transported through special location or special period, for example, starting of navigation period or flood seasons. The list of areas and periods which can cause delays with absence of refund can be found in the catalog of ministry of inland waterway transportation. The last but not the least point is the time required and possible termination of the transportation. Termination might take place, as a result of weather conditions especially when the transportation is done not in the summer period. The opportunity exists due to the possible heavy wind or waves on large lakes, for instance, Ladoga, ice standing on the lakes or even rivers. Same reasons can lead to time delays, usual time period for this kind of transportation is 3 days.

As a result of analysis of simplicity of process and cost estimation. The following ideas can be figured out. The main pros of inland water way is stable volume of particular operation which can be used as a basis for long period planning. When train have fluctuated volume, which depends on the season and load on the path. The other advantage of waterway transportation is lower dependability on timetables and other vessels in comparison with railway. On the other hand, railroad transportation possibility does not depend on weather forecasting or seasonal environmental

condition changes (ice standings, temperature etc.). Moreover, railroad provides more stable transportation time with lower overtime possibility and absence of unpaid delays. In order that the transportation is periodic, high volume and will be hold through the known route, during summer, late spring or early autumn period, better choice is inland waterway mode. On the other hand, if transportation got changeable volume, but will not require high volumes and possibly will be performed during whole year railroad will be preferred option.

### 3.3.2 Warehousing and packing possibilities

Warehousing and packing part will show options for these processes and figure out KPI's and main points and stages. As it was told from interviews and content analysis, usually most of problems and underwater stones are acquired during warehousing process, as sometimes goods need special conditions or might be in the warehousing place for weeks or months.

The first point to consider on is the size of fractions. If it is talked about ore, simply the question will sound: is it looking more like stones or like sand? Talking about first option, in laws, big fractions are described as the ones that have diameter more than 20mcm have to be packed in "big bags", the packing machine and packing option itself can be seen on Figure 8. Big bag- a polypropylene bag which allows easier loading/unloading processes and suitable only for big fractions due to low ability to handle dust. However, the using of "big bags" require special equipment for operation, for instance, loading/ unloading cranes. For smaller fractions it is obligatory to use paper bags, possible appearance of paper bag is illustrate on Figure 9. The following rule is explained as the presence of high dust rate of small fractions of ore or other materials. Main problem of paper bags is their easiness to damage. Above described options are mostly used for small volumes of goods. For higher volumes packing is usually a simple bulk form, however, according to laws goods should be covered by a tent or some other dust and moisture prevention material. Bulk form is the cheapest one and does not require special equipment for operation with, on the other hand it needs special warehousing options as supplies are not protected from environment. Warehousing will be discussed in the next paragraph. Options for packing are usually chosen by the receiver of goods.





Figure 9. Paper bag

(Empty cement Bags Rs 7 2012.)

Warehousing is one of the most important stages in transportation process. Main aspect of choosing warehousing option is the type of goods to be stored. Understanding of type will have an effect on everything starting from place ending with conditions and extra options. In the case of the thesis, ore is the point. As a result, there are two possibilities outdoor or indoor warehousing. The second one is mostly used for small volumes or valuable goods. Advantages of indoor warehousing are: high level of control on warehousing conditions, low possible damage from the environment, low possible goods lost level and low effect from human factor or other damages. Main two cons of the following option are: high cost, approximately 0,5 euro per m<sup>2</sup>/day, of warehousing and restrictions concerning volume of possible warehousing space. The second option is open air warehousing. It has two main pros: no restrictions on volume possibilities and lower price in comparison with indoor option, approximately 0,057 euro per ton/day. Main problems of outdoor choice are environmental effect on the goods stored, possible effect on the near living society and necessity of extra protection methods to avoid spoiling the quality or even losing part of cargo. Choice of extra equipment to protect goods from environment and wise verso are usually chosen for the particular occasion and for every condition separately, for instance, in ore warehousing are widely used safety showers, special dust and moisture resistant covers or repellents.

For warehousing possibilities, the choice should be made with the same philosophy as the packing choice, also from two perspectives, however, now two parameters

will be: volume and type of cargo. In case of warehousing there is no privileged parameter, as usually special conditions for cargo are written in a contract and volume has an effect on everything. There can be 4 opportunities of warehousing process: indoor, indoor with special conditions, outdoor or outdoor with special conditions. If the goods require strict features for warehousing than the choice should be made between outdoor or indoor warehousing with special conditions, further choice between two options will be dictated by volume of the cargo and exact meaning of required circumstances. Otherwise the choice will be made between simple outdoor or indoor warehousing mostly depending on volume.

### 3.3.3 Sea transportation (St.Petersburg- Hamburg)

In the third part there will be presented analysis of the information gained through interviews and content analysis of the last part of the journey. Most of attention will be given to possible complications, bottle necks and other under water stones. The process will consist of loading in Saint -Petersburg Russia with passing the customs after that voyage over Baltic sea, example of possible vessel for described type of operation presented on Figure 10. Point of destination is port of Hamburg German. Other options of transportation are not included, due to their obvious higher cost and time consumption.

Starting point of transportation is cargo inspection which should be done before starting of any processes according to international marine regulations, regulations and the way the inspections should be done can be found in theory part in chapter "sea transportation". After inspection customs clearance procedures start. All data about customs procedures can be found in the theory part, chapter "Customs clearance procedures". Most of the interviewers and content that was studied mentioned that the only possible options to optimize and make customs process to go faster is to prepare all necessary documents in advance before goods even enter customs area and if it is applicable use support of customs representative. Accurate estimation of customs processes seems to be impossible, they can go from several hours up to several weeks. Depending on different factors including human factor.

Next stage is loading process, it will depend on the packing choice and volume of the cargo. For "big bags" as well as paper bags will be required special cranes, if will be

used bulk form then will be used regular excavators and other equipment. Loading and unloading procedures are regulated by law and specified for each type of goods. Exact limitations for time can be found in theory chapter “sea transportation” part “Russian rules and regulations”.



Figure 10. Marine dry bulker

(MI News Network 2017.)

Another point to mention is the place of vessel where cargo should be stored in order to better meet necessary quality level. For marine transportation exists two possibilities open deck and lower deck. The first option got several cons which should be stated. The first one is higher moisture level, which might affect goods which have high absorption rate. Another disadvantage is higher danger rate in case of accidents. However, placing of goods on the open deck will provide faster loading/ unloading procedures and easier performing of customs procedures. The second option have higher safety options for cargo in all occasions and moreover, can prevent goods from harming environment. Due to absence of straight contact with the surrounding.

Cost factor of marine transportation depend on economic situation and usually changes monthly. It usually straightly connected with volume, required special conditions, necessary transportation time, type of goods, currency rate, stock exchange

rate for particular goods etc. Average freight cost of transportation from St. Petersburg to Hamburg for ore is 80 euro/ton. As a rule, approximate freight cost is given when the bargain is made and indexed after transportation is done. This might lead to some small changes of price.

### 3.4 Cultural aspect

This chapter will tell about aspects and characteristics which have straight effect on transportation process. However, they cannot be described by laws or regulations and sometimes go against them. National characteristics are as important as human factor. All respondents and sources proved this. Most of the time cargo will be on Russian territory and as a result main effect will be from Russian mentality. Decision of the author was to divide all characteristics into several categories: time attitude, work attitude, corruption and safety following. All data for this part was obtained from interviews and external sources, names and links will not be mentioned due to the characteristics of data collected.

Safety instructions following. Safety instructions are one of the most important parts of working process, as they straightly connected with wellbeing of workers. However, they are forgotten quite often during working process in Russia. There are several reasons why it is done. The first one is due to time limitations and a wish to perform work faster, mostly lack of time for working process is a result of attitude towards time and work which will be discussed later. Second occasion is absence of control during working process. Another point is lack of qualification and instructions, sometimes workers are even not informed that they should use special equipment or safety gadgets during processes. The last but not the least is a simple negligence towards safety rules, it can be explained with the Russian probe, which can be translated into English as: "Maybe it will pass away of me". One of the brightest examples of insufficient safety on working places is building of Sochi Olympic village, when two workers died because they decided to use a carton to go down from bobsled track. Bad safety culture might have straight effect on time and even possibility of transportation, as accidents will definitely cause delays or even terminations.

Corruption. This factor can have an effect on any stage of the transportations or customs services. Corruption is not everywhere, however, the company might face bribable government representative or customs officer. It is not usual occasion, but it might and it will have straight effect on the smoothness of all procedures. Most of entrepreneurs, when they face corruption decide to make a donation to save time. This is not connected with their contempt of laws, but with high bureaucracy level in the country, which force people to commit described type of crime.

Attitude towards work. Another national feature is special behavior concerning working process. Main characteristic of working process in Russia can be formulated as traditional and conservative. Due to the industrial recession number of high qualified factory workers decreased. This reduction led to a confidence that the best technics were before and everything should be done as it was done before. Mostly existing phenomenon affect time and quality of work. As it is common practice that due to conservative thinking workers refuse to learn how to work on new equipment and use older ones. An example of this occasion was given by one of the interviewed persons. He was working as a quality expert on the shipping yard, he was responsible for welding process. When he for the first time checked all processes, he spotted that all welders used old machines and perform operations, as it was done years ago. He asked why they perform so, and received an answer, that this is the best way they know, as it is the way their teachers were doing. The second working feature is bounded with people and their oral agreements. The point is that in Russian business and in logistics particularly exists two laws: one is written and approved by government and another one is oral. It is approved and followed by everybody. For example, there are limitations on the time period of loading/unloading of the truck stated by laws (theory chapter road transportation), however, everyone believes that without penalties procedure can be handled up to 24 hours. This example was mentioned by one of the participants. Unwritten codex of relationships got its pros and make communication and processes between people and companies easier and smoother. However, main drawback is that international or foreign companies that are not informed about niceties of relationships might suffer losses, unexpected delays and difficulties in planning during adaptation period. It is common practice that it is rare

occasion that everything goes just as planned, but in Russia unwritten codex have a lot more power than official laws and regulations.

Behavior towards time and time tables. The last but not the least important aspect which straightly connected with all above mentioned. Russian probe can illustrate attitude towards time and timing in the best way: “We are harnessing long, but ride fast”. This also called student’s syndrome, this occasion can be described as, all tasks are performed as close to the deadline as possible, to make sure that maximum attention was paid to a certain problem. These results in poor quality and delays. Another problem is connected with timetables, most of the countries got a special regulation, that give an understanding when and for how long breaks can be done, however, in Russia there is, as a rule, no structured schedule for breaks. It leads to unstructured working process, difficulties in planning of operational deadlines and extra costs.

## **4 Results**

Here will be presented utilized and aggregated results from all parts of the thesis work starting from the theory ending with analysis of research part. There also be two ways of presenting results: narrative and by using flow chart. The second way will be added to make the structure of characteristics and other factors clearer. The other point is to make thesis research results easier applicable for real life cases and establish it as a guidance for project running. Results chapter will be divided into several parts where attributes, bottlenecks and significant points will be scoped separately.

### **4.1 Attributes**

After the research and analysis part were performed, researcher pointed out main attributes of the process:

- Type of cargo
- Total volume of the contract
- Size of fractions

- Presence or absence of special equipment in the warehouses and points of destination
- Season of transportation
- Required special conditions
- Time limits
- Volume consignment
- One time against periodical transportation

All of these factors have different effect on different parts of the transportation process. Further scope will be made with idea of equal prioritization between all criteria. However, the researcher needs to state that all factors are crucial and neither of them can be skipped from the process or under estimated. Another important notice is that car transportation is scoped less as it can be applied only to quite small volumes of cargo, or only for special operations during loading/unloading processes.

**Type of cargo.** This is commonly known as the most significant and most crucial parameter, moreover it has an effect even on other attributes like special conditions. Main effect of cargo type will be seen on all stages of transportation starting with loading/ unloading ending with customs procedures. Type of cargo will mark pack of documents needed for loading/unloading and tests that will be performed before cargo will enter vessel's or any other cargo compartment. Customs clearance process will require certificates of authenticity and origin of cargo. The last but not the least affected characteristic is cost of operations, rate of transportation indexes connecting mostly with type of cargo and actually cost of cargo on stocks exchange.

**Total volume of contract and volume of consignment.** Main impact of these factors will have on actual transportation process, particularly on choosing transportation mode, packing options and warehousing possibilities. High volumes of transportation over 5,5 thousand tons per consignment are usually performed by inland waterway transportations, medium sized are transported by railroad in innovative wagons or inland waterway, for smaller packs are used trucks, or separate carts on railroad. Packing should be also done depending on volume. High volumes are usually transported in bulk form, for medium and small sized transportations are used "big bags" or paper bags depending on fraction size. Warehousing also depend on volume, for high volumes usually used outdoor storing and for smaller indoor.

**Season of transportation.** This attribute regulates numerous aspects starting from time ending with choice of transportation mode. Inland waterways are sufficient only for summer period or early mid-seasons, due to possible ice standings. While road usually does not used for midseason transportation due to melting or rainy weather and as a result high moisturized and fluctuating ground. This leads to limitations on axle load. Railroad does not depend on weather conditions, on the other hand, it depends on seasonal load of schedule. It varies depending on tourists and celebrations. Most unlucky season is summer due to high number of people transportations to the countryside.

**Required special conditions.** Factor of special conditions combine numerous possibilities of cargo to harm itself, surroundings, society or nature. This factor includes: corrosion effects, spontaneous combustion, moisture absorption, dust coefficient etc. Choice of warehousing, transportation mode and packing depend on this factor. For instance, goods with high dust level are packed in paper bags. Usually dangerous goods require special markings and documentations for all operations and customs procedures.

**Time limits.** Factor will legislate the choice of path and mode of transportation. Train gives stable and just in time transportation, due to schedule dependability, however, schedule negatively affects flexibility and afterwards time attachments. Inland waterways are flexible and got vast number of possible vessels etc. however, it has high dependability on weather and season conditions.

**One time against periodic transportation.** It is important to understand described criteria as some modes of transportation are easier to provide stable, periodic process. Railways are stable but hierarchy of transportation will lead to possible delays or changes in the schedule as some of the trains might go unexpectedly due to government or safety necessities. Cargo vessels are usually operating on circle timetable as a result it is easy to provide periodic transportation. Cars give considerable flexibility due to their number.

**Absence or presence of special equipment** in the warehouses or points of destination. Packing possibilities depend on not only volume and required special conditions but also with what packages warehouse or another point of destination can handle.

Paper bags and “big bags” require special cranes to use. Another aspect is self-cargo requirements, for instance, warehousing space with necessary temperature to avoid spontaneous ignitions or corrosion resistant places etc.

**Size of fractions.** The last but not the least important factor of any transportation process. Above named attribute have an effect on every stage and process of transportation. Starting with packing and ending with loading/unloading procedures. For packing it is necessary to understand fraction size to avoid unplanned cargo loss and losing of quality. During warehousing process inaccurate estimation might lead to the same outcomes and moreover cause environmental dangers and effect near existing human societies. Another aspect that should be mentioned is problems with passing customs clearance procedures, due to wrong certification of cargo and wrong packing caused by wrong estimation of fraction size.

## 4.2 Bottlenecks and significant points

In the following part will be presented detected bottlenecks of the process and significant factors that might affect whole project. These characteristics include:

- Human factor
- Environmental aspects
- Corruption
- National aspects

All above mentioned features cannot be represented in rules regulations or strict borders, as all of them are mostly connected with people and their personal behavior.

**Environmental aspect.** There are two possible ways of understanding this term: first one is laws and regulations which dictate how and what should be done not to harm planet, and another one is the vision of people on what harms environment and what is not. This might straightly effect transportation on all stages but mostly during warehousing process. If warehouse situates near localities there might come complaints about cargo that corrupts surrounding areas even if all necessary safety features have been provided. In that case it is promising to implement extra solution, even if they will be useless, to give inhabitants serenity.

**Corruption.** Major factor of influence on speed and smoothness of transportation. This factor is mostly common for Russia and countries of Eastern Europe; however, it can have effect anywhere. Mostly it effects administration processes and customs clearance speed. There always two ways to use this window or to go longer way but completely in law.

**Human factor.** This is a main source of problems during any process as computer does not make mistakes but human do. In this category can be included such points as: mistakes during processes, stealing of goods, misbehavior, timetable violations and sick leaves. The way of resisting against this type of occasion is to put some percentage of goods, as a safety percentage in case of losses and time reserves to avoid delays.

**National aspects.** Feature of national aspects usually refers to the time management and attitude towards working process. In Europe there are two main directions: Russian and European. First group consists mostly of Eastern European countries like, Poland, Czech Republic, Croatia etc. and countries of that previously belong to USSR like: Russia, Ukraine, Belorussia etc. These countries are usually not strictly centered on schedule and timetable, however, easily can make process go faster than planned and as a rule usually ready to work extra hours. In contradiction to this Western European philosophy, which consists of German, France, Holland etc., appeals to more strict and organized process with following schedules and time restrictions, on the other hand, they have absence of common sense of urgent boost of process speed or extra working hours.

### 4.3 Project management planning

The following part will explain the outcomes of research process and give guidance of how to use project management tool during planning of transportation process. There also will be focus on possible bottlenecks and suggestions about avoiding them. As it was already mentioned the research was scoped on planning part of project management implementation process. As other stages will be performed according to a plan. Written below should not be understood as a complete guide for using

project management tool, but it gives understanding of what to focus on during each part and what stress points to take care of.

Whole process of project planning can be divided into several stages. The first one will focus on wide range questions like: type of goods transported, fraction size etc. The second stage will try to answer on more narrow questions, for instance, tests for cargo, possible load of transportation mode, safety options and other narrow questions. A long side with description of two stages will be pointed out bottlenecks of every stage and suggestions for their elimination. Below will be more detailed description of each stage. Furthermore, in the next part will be presented flow chart, which will show the following stages in details, with necessary questions to answer and possible bottlenecks illustration. In the flowchart first stage of planning will be indicated as main chain and the second level of planning will be the questions or important points that appear on every knot of main chain.

The first stage is wide questions solving. Main point of this stage is figuring out main characteristics of transported cargo and features of future operation, moreover, performing of first stage will give base for future stages. For instance, understanding of transportation period will regulate: bans for transportation on routes and through areas, transportation methods load, extra special conditions for cargo handling and nature factors. Main barriers of this part can be under estimation of cargo features, small time limitations on basic planning, low level of legal skills and low attention to basic information. The only way to evade problems in the future stages is to have a good base. As a result, the only possible suggestion to avoid bottlenecks connected with bad high-level planning is to find sufficient team with necessary skills and do not rush the process.

The next stage in operational planning or in other words answering narrow specified questions. During named process the scope will be made on detailed planning of future transportation, for example, necessary documentation, timings, planning of all procedure (loading/unloading, packing etc.), necessary human resources, time buffers and a lot of other factors that will have straight effect before, during or after performing of operation. The biggest challenge during this stage is necessary level of knowledge of the team about all stress points, like customs clearance processing or time limitations on sending all necessary documents and test results to pass customs.

Moreover, not sufficient level of attention on this stage will lead to time delays and extra costs, while during previous stage it was possible to minimize drawbacks of bad planning by future decisions.

Both stages have their bottlenecks during planning process. Most of them appear as a consequence of human factor, nature factors or law restrictions. The first one is absence of necessary information about law restrictions in particular country or even particular areas, this can be eliminated by more accurate team building and clear understanding of details of future transportation. Another possible bottleneck is customs processing, as this stage can cause serious delays or even cancelation of transportation. As it was already mentioned in theory part there are two options to smoothen procedure. The first one is to use customs representative services, this opportunity will eliminate possible complications concerning processing of cargo, however, it will lead to extra costs. The second option is to prepare all documents before arriving of goods to customs area. Beforehand preparation will save time and money, on the other hand it requires skills and law knowledges. Next bottleneck is route planning. This process is very complicated as it sums up all factors of nature and big number of social aspects. To minimize time and money sufferings it will be necessary to take into account such factors like: season, type of goods, environmental danger of cargo, surrounding societies, warehousing possibilities and other characteristics that will affect cargo during transportation, especially if transported supplies are dangerous or require special care. More precise places for bottlenecks and stress points will be shown in flowchart in the next part.

#### 4.4 Utilized results

The last but not the least important part of the results section will utilize all attributes and significant points in a flow chart of running transportation project. Below drawn is a way of presenting project management tool, aim of this diagram is not to give answers to certain question but to force planner to ask relevant questions. The way of presentation was chosen as it is the most illustrative way. Main idea of this implementation of results is to make them easy to use and easy to understand logic of running project. Moreover, whole diagram will help one more time point out main points and characteristics to consider on. The sequence of the process can be

changed depending on particular occasion, however, common relations will stay the same. Furthermore, attributes like periodicity of transportation will be excluded from the diagram as they effect all aspects and diagram will duplicate itself. However, their affect already have been described above. As diagram is quite large the bigger version will be presented in Appendix 1.

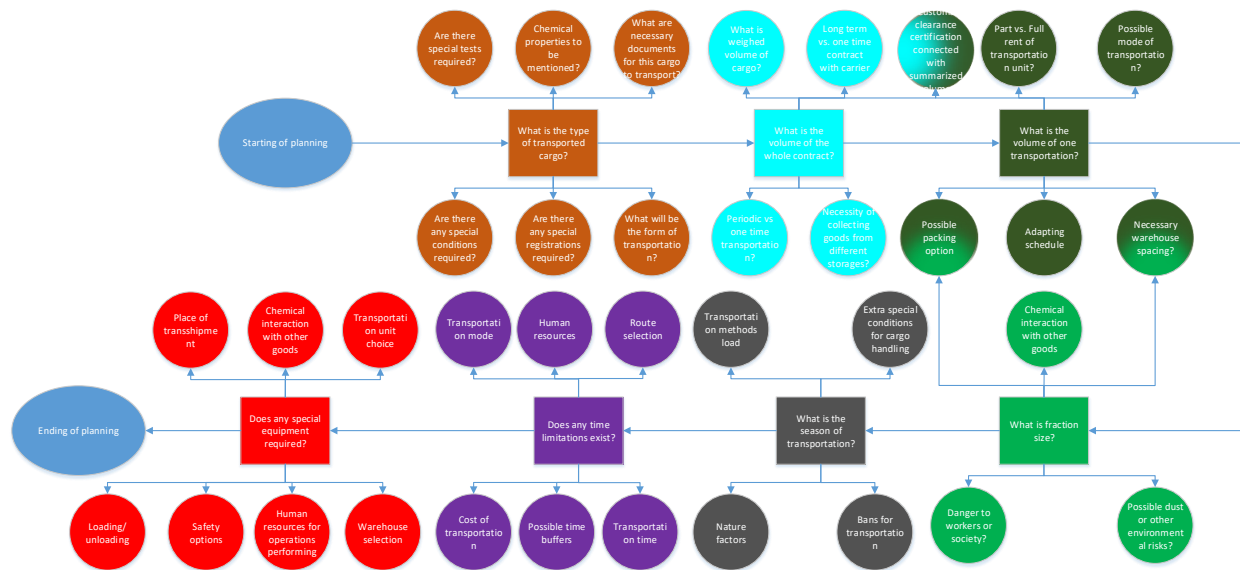


Figure 11. Process flowchart

## 4.5 Critical analysis of research results

Below presented information will critically analyze presented results of research process. Analysis will be performed according to four main criteria:

- Reliability
- Validity
- Credibility
- Transferability

Whole evaluation process will be performed in the 1 to 10 scale and presented in the table below for easier understanding. However, it is obligatory to explain meaning of each criteria for full understanding of marks and dependences.

Reliability. It is a characteristic of research results or any other measurement which indicates repeatability of results under different testing conditions and different research methods. Results count as highly reliable if they can be repeated with different research techniques. (Trochim 2006.)

Validity. This parameter can be explained as an assessment of the fact, is what is wanted to be measured really measured by the parameters which are tried to be used. In other words, do the parameters that are used really characterize what is wanted to be characterized by them. (Glossary of important assessment and measurement terms 2017.)

Credibility defines if the research and results are trustworthy and uses appropriate scientific techniques. Moreover, are they supported by these research techniques. (Alkin 2004, 134.)

Transferability characterises degree to which the research can be transferred to other contexts or settings. In other words, for qualitative research transferability means generalization of the results and research itself. (Trochim 2006.)

<b>Reliability</b>	<b>7.75</b>
Triangulation	8
Repeatability of the results	8
Quality of the research	8
Tools used	7
<b>Validity</b>	<b>8</b>
Triangulation	8
Randomized and different angled participants	9
Sufficient sample size	8
Conceptualization	7
<b>Transferability</b>	<b>7</b>
Possibility of other case implementation	6
Generalization of results	8
<b>Credibility</b>	<b>8.25</b>
Research questions	9
Methodology	8
Literature review and sources	8
Conclusions	8

Table 7. Critical results analysing

As a result of self-evaluation of results presented in table above the research and results can be assumed as credible and valid. Transferability and reliability of the research can be improved through further researches. Main problem of the reliability and transferability of the research results is presence of human factor as one of the criteria. It cannot be estimated properly due to absence of objective data for estimation and systematization of the results, moreover, number of parameters that might affect this factor is numerous and cannot be described or even taken into account during research. Another point of struggling is limitations of research. Transferability is struggled due to national centration of data and so that narrowed results transferability. In other words, amount of data to provide sufficient transferability to other law regions and nationalities is too wide for research utilization. Another crucial point that establish problems is national feature. As it was mentioned above this is

one of the most important characteristics that affect project management, however, it is hard to obtain such type of information from wide countries and societies due to absence of written reliable sources, moreover, it is hard to find sufficient number of participants for the interview who might give reliable information concerning topic. Possible improvements for further researches and for elimination of transferability and reliability problems will be described in the next part: “Suggestions for the improvement”.

## **5 Suggestions for the improvement**

Part suggestions will give some ideas and advices for future researches in the field. It would be divided into several parts which will concern different aspects of performed research. Most focus will be made on the following four aspects: Project management, cost evaluation, depth of route planning and width of the possible research implementation.

Main point concerning project management part is finding of attributes. Despite of already mentioned characteristics, which have been pointed out in the process, there obviously exist others like customs clearance process of different types of cargo, for instance, flammable goods or some others, this part is missed from thesis due to lack of reachable data about topic and necessity of re-structuration of the whole project due to special care about dangerous goods or goods with strict necessary surrounding conditions. Another feature which was missed from research is narrow timing of all operations. The problem during including timing point is that this attribute is affected by immense number of smaller parameters, that sometimes cannot be evaluated, like human factor or equipment performance. The last but not the least issue to improve is basing on larger number of real life examples. This will lead to more reliable and valid research, the barrier which was faced by researcher in thesis is problem of reaching specific projects of certain companies. An obstacle occurred as most of Russian companies refuse to give details of their solutions to third parties, as they are afraid of espionage from other companies.

Below written suggestion will touch possible improvements concerning evaluation cost of transportation and the whole process itself. In the thesis have been presented only average pricings and approximate costs of different operations. As a result, this area has wide range of possible improvements and depressions. The first one is more accurate pricing for each and every operation or check during transportation. The problem during including is that most prices of transportation companies can be obtained only by making an order for delivery or other operations, that is why data is extremely hard to reach. This cause absence of accurate and real-life data. What is more the costs can be calculated as a full summation of all possible costs and expenses. This is skipped from thesis due to the same reasons mentioned above.

Route planning can be enlarged by adding details connected with specific case. This can be, for example, specific stations of departure and arrival of goods, which will lead to more accurate timing and cost evaluations, moreover, the size of the station will give an opportunity to estimate limit of one batch. Another point is warehousing storages this will also lead to a more precise calculation and understanding of batch sizes, costs. Another aspect that will be affected by choosing of warehousing unit is packing possibilities, as it will be possible to find out absence or presence of special equipment, cranes for loading/unloading peculiar packages. The more details will be included concerning possible weather conditions, season of transportation and their effect on process, the better and more accurate will be timing and choice connected with transportation modes. In additions to weather, actual dates can be helpful. Such data will open possibility to take into account holidays and nationally specified features that can happen during transportation. All this information was away from above presented research, as described additional data mostly connected with more specific and narrow goals, while performed research concentrates more on universal tools and solutions. The last but not the least point of improvement is adding real life companies that can perform and handle described tasks. Real companies add reliability and will ease implementation of results to real life.

Width of the implementation area is a rather important part of thesis work, as well as large field for improvements. Described above research scopes mostly on Russia, or countries that have similar rules and regulations, to central Europe transporta-

tions projects, that means that it skips eastern Europe, non-EU countries and countries near Russia that have different law systems. Future researches can fix the following miss of data, main problem is finding sufficient data and reliable respondents due to absence contact network in other countries and language barrier during laws and regulations studying. Another way of enlarging implementation base is to in-depth research process not in the field of other countries but in the field of other products or raw materials, as the following research mostly focuses on high volume transportation of ore in mostly bulk form, due to the company's case specification. Other products and cargo types will enlarge not only implementation filed, but also will make laws and regulations description more wide and full. Which will give research wider and more reliable usage as well.

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## Appendices

### Appendix 1.

Bigger resolution of Flow chart which is represented on Figure 11.

