

## Case Study: The Shtokman Project.

### The Socio-Economic Capacity of the Murmansk Region in the Framework of the Development of the Shtokman Project.

*Daria Kovalevskaya*

*Olga Mikhaylova*



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*Daria Kovalevskaya*

*Olga Mikhaylova*

**Supervisor:** Hans Andersson, Swedish University of Agricultural Sciences, Department of Economics

**Assistant supervisor:** Aileen Espiritu, Barents Institute, Kirkenes, Norway

**Examiner:** Karin Hakelius, Swedish University of Agricultural Sciences, Department of Economics

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Swedish University of Agricultural Sciences  
Faculty of Natural Resources and Agricultural Sciences  
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# **Abstract**

This research is conducted on one of the world's largest deposits - Shtokman gas and condensate field located in the Barents Sea. The development of the field is operated by the Special Purpose Company Shtokman Development AG - the international consortium of Total, Statoil and Gazprom.

This research is aimed to analyze the value chain of the Shtokman project and to study the socio-economic capacity of the Murmansk region in order to examine the perspective fields of work for local companies, as well as the socio-economic potential of the region related to the gas industry that can be applied to the realization of the Shtokman project.

The research is based on qualitative and quantitative data collection that involves the results of 24 semi structured interviews conducted in the Murmansk region, including the interviews with representatives of the Shtokman Development AG and the industrial committee of the Murmansk region government.

The results of this study illustrate the importance of the value chain of the Shtokman project and the economic potential of the Murmansk region due to the gas cluster formation in the framework of the Shtokman project development. Additionally, the study includes the comparison with some similar offshore projects such as Snøhvit and Sakhalin-2.

# Sammanfattning

Forskningen bedrivs på en av världens största fält - Shtokman gas och kondensat fält som ligger i Barents hav. Utvecklingen av fältet drivs av ett separat företag Shtokman Development AG - ett internationellt konsortium bestående av Total, Statoil och Gazprom.

Forskningen syftar till att analysera värdekedjan i Shtokman-projektet och i syfte att studera den socio-ekonomiska kapaciteten i Murmansk regionen. Dessutom analyseras utifrån ett företagsekonomiskt perspektiv potentiella arbetsområden för lokala företag samt den socio-ekonomiska potentialen i regionen i samband med att gasindustrin utvecklas vid genomförandet av Shtokman-projektet.

Forskningen är baserad på kvalitativ och kvantitativ datainsamling som omfattar resultatet av 24 semistrukturerade intervjuer i Murmansk regionen som inbegriper intervjuer med företrädare för Shtokman Development AG och den industriella kommittén i Murmanskregionens regering.

Resultaten av undersökningen visar på betydelsen av värdekedjan för Shtokman-projektet och den ekonomiska potentialen i Murmansk regionen av projektet p.g.a klusterbildning inom ramen för Shtokman projektutveckling. Dessutom innehåller studien en jämförelse med liknande offshore projekt såsom Snövit och Sakhalin-2.

# Abbreviations

AAPG – American Association of Petroleum Geologists  
AMIGE – Arctic Marine Engineering Geological Expeditions  
CSR – corporate social responsibility  
EIA – environmental impact assessment  
GCF – gas and condensate field  
HSE – health and safety policy  
KSC – Kola Science Centre  
LNG – liquified natural gas  
MAGE – Marine Arctic Geological Expedition  
MCSP - Murmansk Commercial Sea Port  
MSTU – Murmansk State Technical University  
NCC – Northern Chamber of Commerce  
NGL – natural gas liquids  
NRCC – Norwegian – Russian Chamber of Commerce  
PSA – Production Sharing Agreement  
RAS – Russian Academy of Sciences  
R&D – research and development  
ShDAG – Shtokman Development AG  
SME – small and medium enterprises  
TLC – transport-logistic complex  
USCRF – United Shipbuilding Corporation of the Russian Federation

## Units

cu - cubic  
km – kilotemets  
m – meters  
mln - million  
tons – tonnes  
tn - trillion  
% - percent

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# 1 Introduction

In this thesis the authors discuss the value chain of the Shtokman project and the potential of the Murmansk region for the development of the gas cluster. By the Shtokman project the authors mean the development of the Shtokman gas and condensate field (GCF) that is located in the Barents Sea far in the Russian Arctic. The reason for choosing the topic of gas cluster formation in the Murmansk region in the framework of the Shtokman project is the particular interest of the regional authorities and the local companies evoked by all the expectations associated with the beginning of the gas production. The local companies consider participation in the project as a good prospect for their economic development. Meanwhile, the authorities of the Murmansk region work on the project of the gas cluster formation and prepare the legislation for the Shtokman project (Borisenko, personal message, 2011).

This research topic is important since the Shtokman project is a part of the Russian government's strategy for the development of the Russian Arctic (Kalinnikov, 2009). It is connected with the fact that the economically viable oil and gas fields deplete, therefore exploration and discovery head to the further ends of the earth, such as the Arctic that holds valuable mineral deposits (California Energy Commission, 2011). Moreover, the development of the Murmansk region is included into the Russian national strategy (Ministry of Economic Development of the Murmansk region, 2010c). Mentioned strategies are connected and interdependent, since the development of the Shtokman project and the Murmansk region can influence each other. Therefore, it is interesting to analyze the economic capacity of the Murmansk region in order to examine how the region can contribute to the development of the Shtokman project.

The Norwegian project Snøhvit and the Russian project Sakhalin-2 are similar to the Shtokman project due to the remote offshore location of the fields and the liquefied natural gas (LNG) production. Figure 1 represents the geographical location of the offshore fields for Shtokman, Snøhvit and Sakhalin-2 projects.

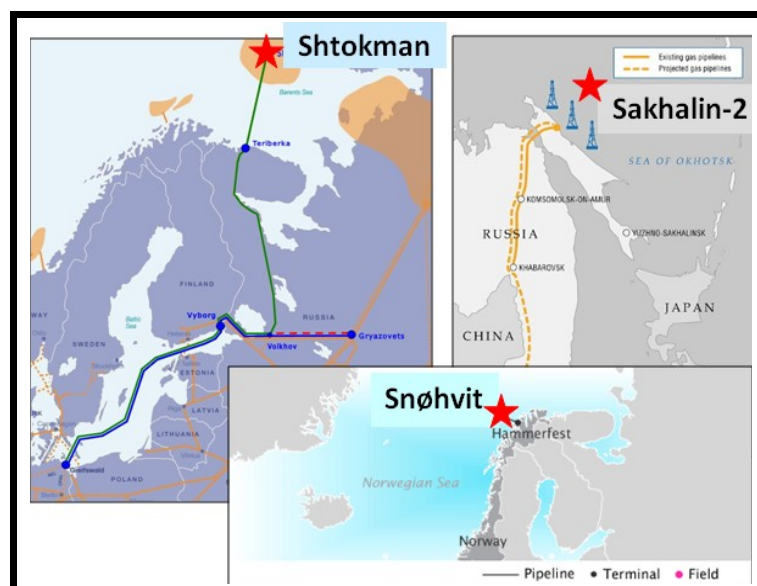


Figure 1. Geographical location of the Shtokman, Snøhvit and Sakhalin-2 fields (Gazprom, 2011e; Gazprom, 2011f; Statoil, 2011b).

Snøhvit and Sakhalin-2 are projects that have been already developed. Hence, the comparison with those two projects is done in the discussion part of the thesis.

## 1.1 Problem background

The Shtokman GCF was discovered by the Soviets in 1988 and named after the famous scientist Shtokman. The field is situated in the icy waters of the Barents Sea at an average depth of 320-350 m. Located some 550 km northeast from the port of Murmansk on the Kola Peninsula, this field was estimated to contain reserves of approximately 3,9 tn cu m in addition to around 53,3 mln tons of gas condensate. The data about the volume of the field deposits is still changing due to the ongoing process of exploration (Selin, Tsukerman and Vinogradov, 2008; Kalinnikov, 2009). Now, many years after the discovery of the Shtokman GCF, its development is one of the most attractive and broadly discussed topics in the oil and gas industry. On February 21, 2008 Gazprom, Total and StatoilHydro signed the Agreement of Shareholders for the Foundation of the Shtokman Development AG (ShDAG) - Special Purpose Company for operating the Shtokman field during Phase 1 of the project. The company will own the infrastructure of Phase 1 of the project for the 25 years from the start of field production. Gazprom owns 51% of the capital of ShDAG, Total - 25%, and StatoilHydro – 24%. ShDAG plans to produce 23,7 mln cu m of natural gas per year during Phase 1 of the Shtokman project. It is stated on the official internet page of ShDAG that the Shtokman field production is scheduled to begin in 2016 and the LNG plant is scheduled to be put into operation in 2017 (ShDAG, 2011a).

The development of Shtokman, one of the world's largest GCF, is of great importance not only for the further development of the international energy markets, but also it is of strategic importance for Russia. For comparison, it is interesting to mention that the gas production from the Shtokman field is almost equal to the Norway's total output (Szymczak, 2010). This project involves the fulfilment of such essential tasks as guaranteed gas supplies to Russian regions over the next 40-50 years and it supports Russia's obligations to supply gas to Europe (JSC Giprospeftgaz, 2011). The gas and gas condensate from the Barents Sea will contribute to a great demand, due to the fact that the gas from the Shtokman GCF is one of the resources for filling the Nord Stream pipeline that will secure gas supply in Europe (Nord Stream AG, 2011a). The gas from Shtokman GCF is planned to be supplied to the Nord Stream pipeline through the Murmansk-Volkhov pipeline (Figure 2).



Figure 2. Murmansk-Volkhov and Nord Stream gas pipelines (Gazprom, 2011e).

It is illustrated in Figure 2 that gas will be distributed through the pipelines and on the LNG vessels. The demand on LNG is increasing, due to decrease of its production costs and the increase of the consumption of gas as the most environmentally friendly fuel. During the last years the technology for production and for marine transportation of LNG has been improved. This allows the reviewing of many gas projects that previously were considered to be unprofitable. Therefore, Gazprom initiated the development of the Shtokman GCF that includes not only the supply of gas through the pipeline but also the construction of an LNG plant in Teriberka with the purpose of LNG supply to the new energy markets. Marine transportation of LNG creates favourable conditions for the supply of Russian gas to the new markets. (JSC Giprospeftgaz, 2011)

According to the World Factbook comparison by the 1<sup>st</sup> of January 2010 of the world proved gas reserves, Russia is ranked on the first place with the most proven gas reserves that amount up to 47,6 tn cu m (CIA, 2011). However, Gazprom is the major gas producer in Russia with proved reserves of 33,1 tn cu m (Gazprom, 2010). Figure 3 illustrates the relation between the global and the Gazprom reserves, and respectively the Shtokman GCF and the Gazprom reserves.

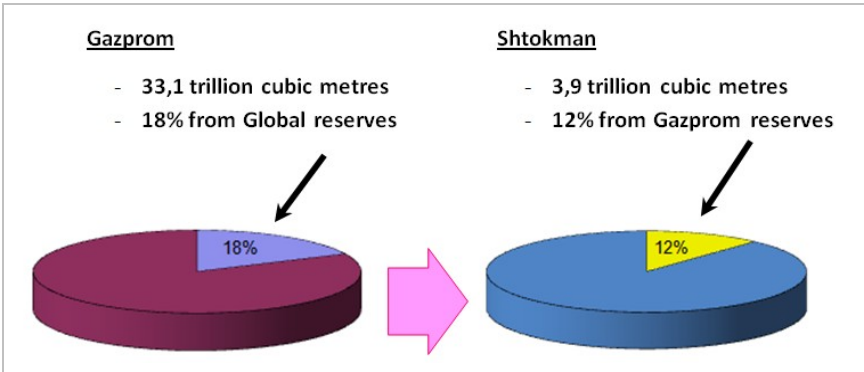


Figure 3. Global, Gazprom and Shtokman proved gas reserves (Gazprom, 2010).

According to Figure 3, it is possible to calculate that the share of Shtokman reserves is approximately 2% of the global reserves. The contribution of the Shtokman GCF into the global reserves is significant; therefore, the development of the Shtokman project is important for the creation of a new long-term resource base.

## 1.2 Problem

The climate and geographical features of the Murmansk region and the remoteness of the gas field from the shore has restrained the development of the Shtokman GCF for many years. The Shtokman project is very complex; hence, it requires a special approach with the use of new technologies, innovation, and a lot of resources including highly-skilled specialists. The involvement of such companies as Statoil and Total that have experience in the offshore gas production has enabled Gazprom to initiate the Shtokman project. The Murmansk region will serve as a base for the project development. Nevertheless, the requirements for the project and the rivalry from out-of-the-region companies are high, the region has a potential for offering conditions for managing the gas production from the Shtokman GCF. Therefore, the economic and social aspects of the Murmansk region need close attention.

### 1.3 Aim and delimitations

The aim of the thesis is to analyze the value chain of the Shtokman GCF and to study the socio-economic capacity of the Murmansk region in order to answer the question:

- *How can the Murmansk region contribute to the development of the Shtokman project?*

This research is going to explore the economic, social and legal aspects of the Murmansk region to understand to what extension the region can be involved into the Shtokman project with the purpose of benefitting from its development. Therefore it is necessary to work on the following objectives:

- *to make analysis of the value chain of the Shtokman project,*
- *to make analysis of the potential resources of the Murmansk region for the development of the gas cluster in the framework of the Shtokman project.*

The authors give an answer to the main question of the study in the analysis and the conclusion parts of the thesis.

The study is delimited upon the different aspects of the problem that the authors are not able to discuss due to limited time and resources. Shtokman project is operated by the international consortium Shtokman Development AG which consists of Gazprom, Statoil and Total. The authors could look upon the problem from the perspective of Gazprom and Murmansk region in Russia. Moreover, the local government works on creation of the oil and gas cluster in the Murmansk region, due to the fact that oil fields are also being developed in the Russian Arctic. Therefore, the study is delimited since the authors have concentrated on the gas industry. Additionally, the subjectivity of the obtained information such as the results of the interviews and the errors in statistical data should be taken into account.

## 1.4 Outline

The outline of the thesis, illustrated in Figure 4, is intended to give the reader a picture of the structure of the study.

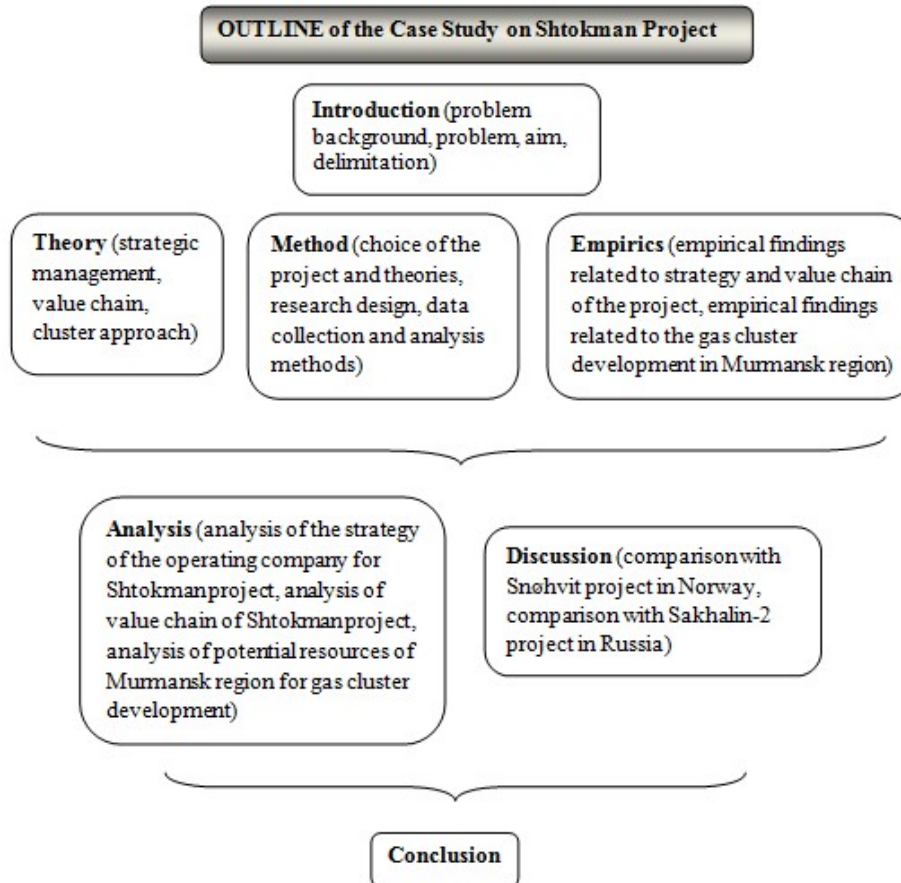


Figure 4. Illustration of the outline of the study.

This thesis is organized as follows: Chapter 1 represents the introduction, the problem and the aim of the thesis. Chapter 2 describes the theoretical perspective, such as strategic management, the value chain and the cluster approach. Chapter 3 introduces the method used, the choice of the project and the theories, the research design, the data collection and the analysis methods. The empirical study that covers the implications for the value chain of the Shtokman project and the gas cluster formation in Murmansk region is presented in Chapter 4. Chapter 5 offers the analysis as a combination of the theoretical perspective and the empirical findings. Chapter 6 presents the discussion and a comparison with similar offshore projects, such as Snøhvit and Sakhalin-2. Finally, Chapter 7 provides the reader with the conclusions.

# 2 Theoretical perspective and literature review

The theoretical base for the project is described in this chapter. Three levels of strategy, such as corporate, business, and operational, and strategic management aimed at creating the value of goods and services. Hence, the authors have chosen the value chain management theory for the analysis of the value chain of the Shtokman project. The Murmansk region is the centre for the development of the Shtokman project. The local companies can contribute to the development of the project and it is important to evaluate the potential of the Murmansk region. Therefore, the cluster approach is also described in this chapter.

The outline, illustrated in Figure 5, is aimed to help the reader to capture the whole picture of the theory used in the thesis.

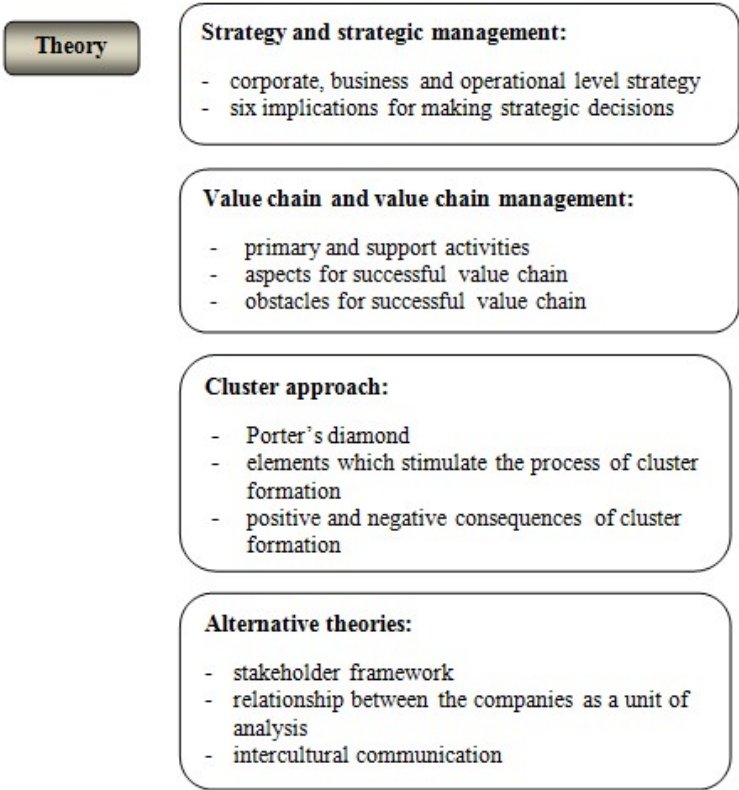


Figure 5. Illustration of the outline of the theoretical part of the thesis.

## 2.1 Strategy and strategic management.

Strategy is “the direction and scope of an organization over the long term which achieves advantage in a changing environment through its configuration of resources and competences with the aim of fulfilling stakeholder expectation” (Johnson, Scholes and Whittington, 2008, p.3). A match between an organization’s environment and its strategy, structure, and processes has positive effects on the organization’s performance (Hill and Jones, 2010). Therefore, it is important for the project development to formulate the strategy that leads to the growth of profit and increase of shareholders and owners’ value.



It is worth mentioning that strategy formulation takes place on corporate, business and operational levels. *Corporate-level strategy* describes a company's overall direction in terms of its general attitude toward growth and the management of its various businesses and product lines (Johnson, Scholes and Whittington, 2008). *Business-level strategy* usually occurs at the business unit or product level, and it emphasizes improvement of the competitive position of a corporation's products or services in the specific industry or market segment served by that business unit (Johnson, Scholes and Whittington, 2008). *Operational strategy* is the approach taken by an operational area, such as marketing or research and development, to achieve corporate and business unit objectives by maximizing resource productivity (Johnson, Scholes and Whittington, 2008). Decision making process on each level influences the development of the project.

Johnson, Scholes and Whittington (2008) highlight 6 implications for making strategic decisions. The first implication is the *complexity* of the strategy, since the scope of factors influencing the strategy is wide, especially in the multinational company. The second implication is *uncertainty*, due to the fact that the consequences, extent, or [magnitude](#) of circumstances, [conditions](#), or [events](#) are unpredictable. The next important implication is the *operational decision*, since the operational activities determine the path of the strategic development. The decision-making involves considering interests and priorities of different parties, therefore, the *integrated approach* should be applied. Another implication that is important for making strategic decisions is *establishing relationships and networks outside the company* that helps to build crucial links with stakeholders for the further operation. Managers involved in decision-making process should be ready for unexpected internal or external change. For that reason the last implication, *change considering*, should be reckoned strongly in the decision-making process.

Complying with the mentioned above implications for making strategic decisions can serve as a guarantee for the achievement of the superior performance and a competitive advantage (Hill and Jones, 2010). A competitive advantage is the specific strength of the company that allows creating more economic value than competitors, where economic value is a difference between the benefits received by the customer of certain goods or services and the full economic cost of the same goods and services (Barney and Hesterly, 2007). Making the right choices concerning value creation is important for sustaining a competitive advantage. Drawing the value chain of a company enables managers to see the full scope of activities involved. It is important to consider that all the functions of a company may take part in lowering the cost and increasing the value of the good or service (Hill and Jones, 2010).

## 2.2 Value chain and value chain management.

A value chain is a chain of activities for a firm operating in a specific industry that gives managers a clear view of activities within the company. Thorough analysis can help managers to find sources which add value to the product or it helps to understand how each of the activities of the company affects its financial, physical, individual, and organizational resources (Barney and Hesterly, 2007). The business unit can serve as an appropriate level for the construction of a value chain. It is important to differentiate the price and the value of the product, because value is connected with performance, design, quality, and point-of-sale (Mentzer, Myers and Stank, 2007).

Porter (1985) introduced the concept of the value chain that evaluates the extent to which the company is able to diversify on a particular market with a certain product position. The value chain is illustrated in Figure 6.

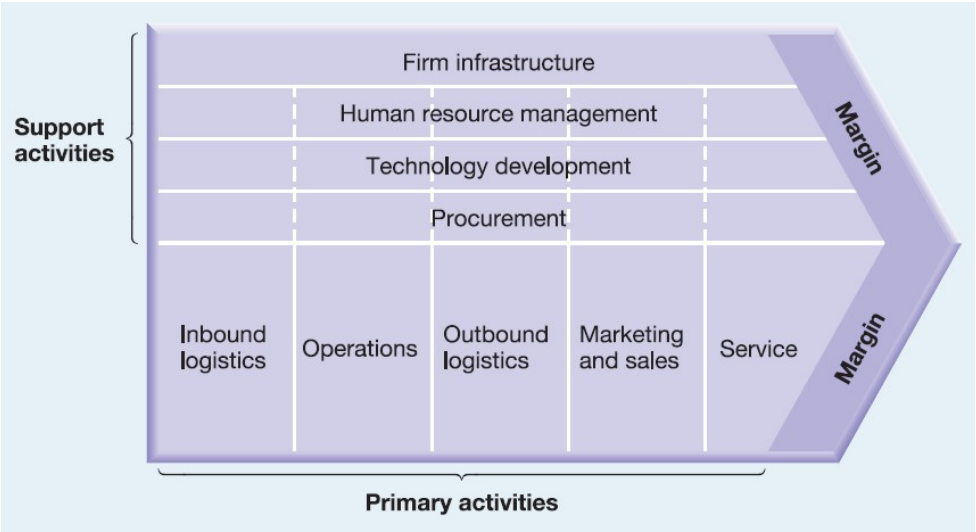


Figure 6. Michael Porter’s value chain (Ferguson, Ferguson and Rothschild, 1993, p.232).

As it is shown in Figure 6, the company’s target is to achieve a margin of revenue over the costs in each activity what contribute to the production and sale of the product. According to Michael Porter’s value chain, activities of the company are divided into primary and support (Porter, 1985). Primary activities are connected with the physical creation of the product, while support activities facilitate primary activities. The list of activities can be drawn according to the stages of production. The examples of the primary and support activities of the values chain are given in Table 1.

Table 1. Primary and support activities (Johnson, Scholes and Whittington, 2008)

<b>Primary activities</b>	
Inbound logistics	Materials handling, warehousing, stock control, returns on suppliers, transport
Operations	Physical conversion of inputs into the final product, including machining, packaging, assembly, testing
Outbound logistics	Distribution to customers, including warehousing, material handling and distribution of the product to the customers
Marketing and sales	Sales administration, advertising and sales
Service	Installation, maintenance, repair, training, spares
<b>Support activities</b>	
Firm infrastructure	Planning, finance, quality control systems, information management, organization’s culture
Human resource management	Recruiting, managing, training, developing, and rewarding people within the organization
Technology development	Electronic and information systems, R&D, product design, process development, raw materials improvement, “know-how”
Procurement	Acquiring the various resource inputs into the primary activities

The value chain is created in order to evaluate the possibilities to attain additional value on particular field of activities. Therefore, it is necessary to look through all the functions of the company.

Potential sources of advantage can be identified in the configuration of the value network. However, the managers should not only concentrate on cutting the costs as it can cause the decrease of quality what may increase expenses further along the production process (Ferguson, Ferguson and Rothschild, 1993).

As soon as all the activities are evaluated it is easier to understand the possible resource of additional value creation. Firstly, the managers are able to recognize the most centrally important activities that give the competitive advantage to the company. To compete on the market it is necessary to have a low price, hence, it is important to find profit pools within the activities of the company by using superior technologies or having special contracts with suppliers. It is quite rare that one organization is able to provide all the ongoing services. For this reason it is important to evaluate potential fields of outsourcing. Another way of dealing with outside companies is partnering which is important to consider in activities that are not appropriately developed within the company (Johnson, Scholes and Whittington, 2008).

Proper management of the value chain gives an opportunity to oversee the entire sequence of integrated activities and information about incoming and outgoing flows of products and services in order to create the highest value to stakeholders. Finding the balance between meeting and exceeding the unique needs of customers and overriding rivals in terms of price and quality is one of the main goals of value chain management. (Robbins and Coulter, 2003)

Dynamic competitive environment forces companies to find outstanding solutions for managing the value chain. In Table 2 the main aspects of a successful value chain management are described in detail.

Table 2. Aspects of a successful value chain management (Robbins and Coulter, 2003)

Coordination and collaboration	Sharing information and being flexible among chain members, building interrelationships, open communication
Technology investment	Additional attention for information technology that facilitates the data flow to the end users
Organizational process	Managing organization's main skills, capabilities, and resources, scrutinizing of every process in the company, that can even extend to sharing with other value chain partners
Leadership	Strong motivation and serious commitment of staff from top to lower levels, exceeding expectations in pursuing the strategy, clarified roles in value chain
Employees and human resources	Flexibility in job design and flexibility of employees, that can be assigned to work teams, focusing on collaborative relationships, ability to learn and adapt, continual and ongoing staff training
Organizational culture and attitudes	Sharing, collaborating, openness, flexibility, mutual respect, trust and other features that can support pursuing the common goal among internal and external partners on the value chain

As it is presented in Table 2, the value chain management requires a lot of energy, time and recourses. However, as a reward, a company can achieve profit in different ways. Among them are increased sales, reduced costs, extended market share, reductions in inventory,

accelerated delivery time, improvement in customer service and quality, and developed logistics (Robbins and Coulter, 2003).

Besides the positive aspects, the value chain management can build up several obstacles that can interrupt the process of successful value chain management (Robbins and Coulter, 2003). Currently, companies experience additional obstacles that appear in condition of tremendous pressure on the competitive market. Continuous technology development and quality initiatives are among those extra features that a company should take into account while managing the value chain (Robbins and Coulter, 2003).

Having necessary requirements for a successful value chain management and preventing the emergence of problems enables the company to pursue the common goal of performance improvement and achievement of sustainable competitive advantage. Therefore, the different skills, recourses and costs can be systematically exploited in order to locate each element of the value chain in the region or even in another country where it can be conducted most effectively and efficiently (Johnson, Scholes and Whittington, 2008).

Choosing between going global or developing locally is another task for managers analyzing the value chain. The location of activities is one of the essential sources that give potential advantage for a company to outperform the competitors, especially considering the fact that the world economy is a single market unimpeded by national boundaries (Belussi and Sammarra, 2010). In global industries different activities of the same commodity chain are increasingly spread across national boundaries, requiring international integration and coordination. Moreover, fragmentation and integration are particularly important considering multinational companies (Belussi and Sammarra, 2010). Despite globalization and internationalization, a lot of attention is paid to the process of the incorporation of the district companies into the value chain as it affects the level of local development.

## 2.3 Cluster approach

Johnson, Scholes and Whittington (2008) determine two principal opportunities available for the allocation of company's activities. The first one is to exploit the certain national advantages that are regularly situated in the company's home country. The second one is to search advantages overseas through an international value network. It is worth mentioning that the concentration of activities within one country or region may have an important bearing on the competitive position of that company on the global market.

In order to understand how national factors can affect a competitive advantage a company needs to identify the location of the most significant competitors, and where the company might want to allocate certain productive activities.

Porter (1985) embodies four determinants of a national or country specific environment that help to analyze national competitive advantage. These four determinants together make up a diamond-shaped figure; hence, the framework is called Porter's diamond and is presented in Figure 7.

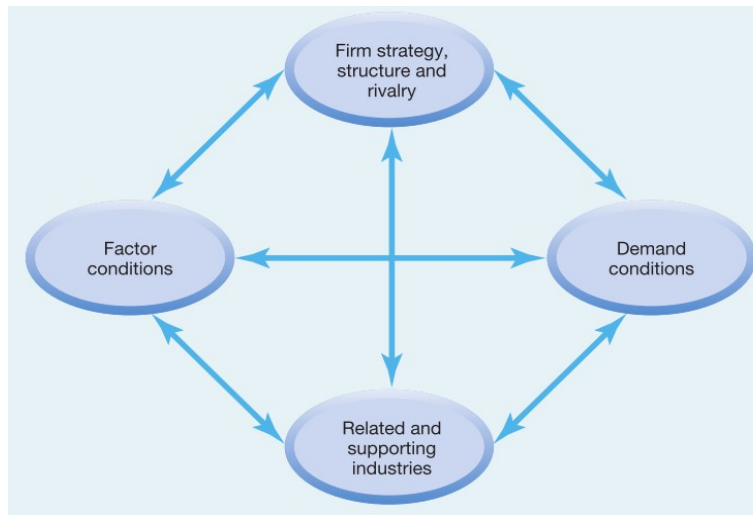


Figure 7. Porter's diamond (Johnson, Scholes and Whittington, 2008, p.301).

The examples of four determinants that constitute the Porter's diamond are presented in Table 3.

Table 3. Four determinants that constitute the Porter's diamond (Johnson, Scholes and Whittington, 2008)

Factor conditions	Raw materials, land, labour
Home demand conditions	The nature of a domestic customer
Related and supporting industries	Already existing cluster of industries
Firm strategy, industry structure and rivalry	Raising safety and environmental standards

The analysis of the mentioned above determinants helps managers to decide how to allocate the activities of the company. The process of allocation and fragmentation of the activities of the multinational company is directly connected with the birth and development of a cluster (Belussi and Sammarra, 2010).

Porter (1998) defines a cluster as "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities" (p. 199). In other words, cluster formation is a market instrument for the quality development of the local economical systems, which is based on the fact that certain economical activities tend to concentrate on the definite territories, where the factors for the development of the industry are most favourable (Alexeeva and Bogachev, 2009).

It is important to remember that in most cases, cluster involves partnership of the mutually interested companies and organizations. Therefore, cluster is the base for identification of the optimal combination of the interests of the region and separate companies (Alexeeva and Bogachev, 2009). The most important advantage of the cluster's structure is that all the members of the cluster are partners but not subordinates.

There are different types of clusters. However, the geographical and the megacluster are the most relevant for this study. Geographical (regional) cluster corresponds to the concentration of organizations on the territorial principle, while megacluster is a cluster generated by the network of smaller clusters related to different kinds and characterized by a high degree of concentration (Alexeeva and Bogachev, 2009).

It is worth mentioning, that the most important goal of a cluster is the development of rivalry within the particular region and of the country as well (Alexeeva and Bogachev, 2009). According to Porter (1998), one or several companies that have achieved competitiveness on the international market spread the influence on the nearest environment: suppliers, customers, and competitors. In its turn, the successful business environment has a positive impact on the further increase of the competitiveness of the company. Eventually, the network of companies within tightly related industries is created, where the members mutually encourage their competitiveness (Porter, 1998).

The presence of stabilized legal, political and social institutes in the region, in other words the *national industrial policy*, as well as stabilized macro-environmental policy can serve as a good base for the clusters development. As for the developing countries, it is important to mention that one of the effective instruments to compete on the market is the establishment of the cluster supported by the government centre. (Alexeeva and Bogachev, 2009)

Additionally, a localized cluster can reach an adequate competitive strength, benefitting from a vast array of *external economies*. Belussi and Sammarra (2010) highlight six important elements of *external economies* that stimulate the process of cluster formation:

1. a skilled human resource on the local labour market,
2. the existence of related industries and infrastructure,
3. specialized machinery and equipment according to the company's activities,
4. cooperation and collaboration between local companies,
5. transparency in terms of rivalry,
6. an innovative attitude and an adoption of new methods and technologies.

According to Alexeeva and Bogachev (2009), the positive outcomes of the cluster formation are the raise of the quality of products and its competitiveness on the local market. The authors also highlight the creation of the new competitive advantages for the local companies. The cluster helps to improve the quality of the human, financial, material and intellectual resources of the region. The cluster formation is a process that involves a lot of members, such as the local companies, authorities and scientific centres; therefore, the successful cluster formation implies a socio-economical development of the whole region. Moreover, the cluster formation contributes to the development of scientific, R&D and innovation activities.

Along with these positive consequences, it is important to acknowledge the existence of negative factors in the cluster approach. Instead of strengthening competitiveness the weakening rivalry can emerge due to the fact that localized groups of firms can decline if they do not adapt to the changing external circumstances (McJee, 2003). Another problem is that proactive strategies are not available to all district firms, since only the major local companies, endowed with sufficient recourses, are able to invest significantly in a functioning upgrading (Belussi and Sammarra, 2010). Possible limitations should be taken into account while the cluster approach is implemented. For example, the problem of power extension by the leading companies over the other participants of the chain appears in the framework of many cluster cases (Belussi and Sammarra, 2010). Dependency is connected with the level of development of the local companies and the scale of activities the company is involved in. Another significant negative factor arising as an outcome of the cluster formation is the high requirements dictated by the external international companies, such as the quality process standards and the prohibition of child labor (Belussi and Sammarra, 2010).

Nevertheless, in several successful experiences of district upgrading, the reshaping of the local value chain has been driven by the strategic behaviour of the local leading firms which were able to change the traditional business model of typical district firms. The entry of knowledgeable actors such as multinational enterprises in industrial districts can give rise to a significant process of technological transfer of MNE subsidiaries and local firms (Belussi and Sammarra, 2010). MNE can generate different kinds of knowledge spillovers, which gives an advantage to local companies in the form of access to assets, skills and routines that may usefully compliment the location and bound knowledge of cluster companies (Belussi and Sammarra, 2010).

## 2.4 Alternative theories

There are several theories that have been considered inappropriate by the authors due to several reasons that are described in this part.

Firstly, the stakeholder framework based on the management of a company's relationship with its stakeholders is a possible theory for this research (Freeman, 1984). The influence of the level of social responsibility on the performance of the company is an important issue in every company. This issue has particular significance for MNEs where different international enterprises are represented, due to the fact that the image of all the shareholders can be influenced by the activities of the MNE. The realization of the Shtokman project is on the initial phase at the moment since the final investment decision is not taken yet. It is important to mention that the company has already issued several policies concerning the high social responsibility towards the different groups of stakeholders. However, it is subjective to judge the company on pursuing its strategy of being socially and environmentally responsible before the operation of the project starts. Therefore the stakeholder framework is not used for this study, although it can be an interesting topic for further research.

The relationship between companies in an industrial market is another possible theoretical base for the thesis. This concept implies the relationship as a unit of analysis and covers such issues as companies' interaction, network paradoxes, the ways of approaching different companies and evaluating the capabilities of the company for establishing relationship (Håkansson et al., 2009). The development of the Shtokman GCF assumes active companies' interaction with an opportunity of a business network creation. However, it is difficult to predict how the companies will collaborate or interact in the future as the operation of the field has not begun yet (Gazprom, 2011d).

The intercultural communication competence is another theory that can be implemented in this project. It combines the evaluation of the three main components, such as knowledge, motivation and skills. This theory can be used for analysis of the behaviour and interaction of the international personnel within the company (Gudykunst, 2003). The issue of cross-cultural communication in a multinational company is frequently raised in cases when the personnel from different countries are represented. However, the topic will be of more value when the works for the Shtokman project which will involve specialists from different countries start.

### 3 Method

A research paradigm implies a research methodology. The qualitative research is used in this thesis in order to illustrate the entire research process within the boundaries of *validity*, *credibility*, *dependability* and *confirmability* (Pickard, 2007). The methodology part of the thesis maps out all the essential components of a qualitative research design that are outlined in the following way in Figure 8.

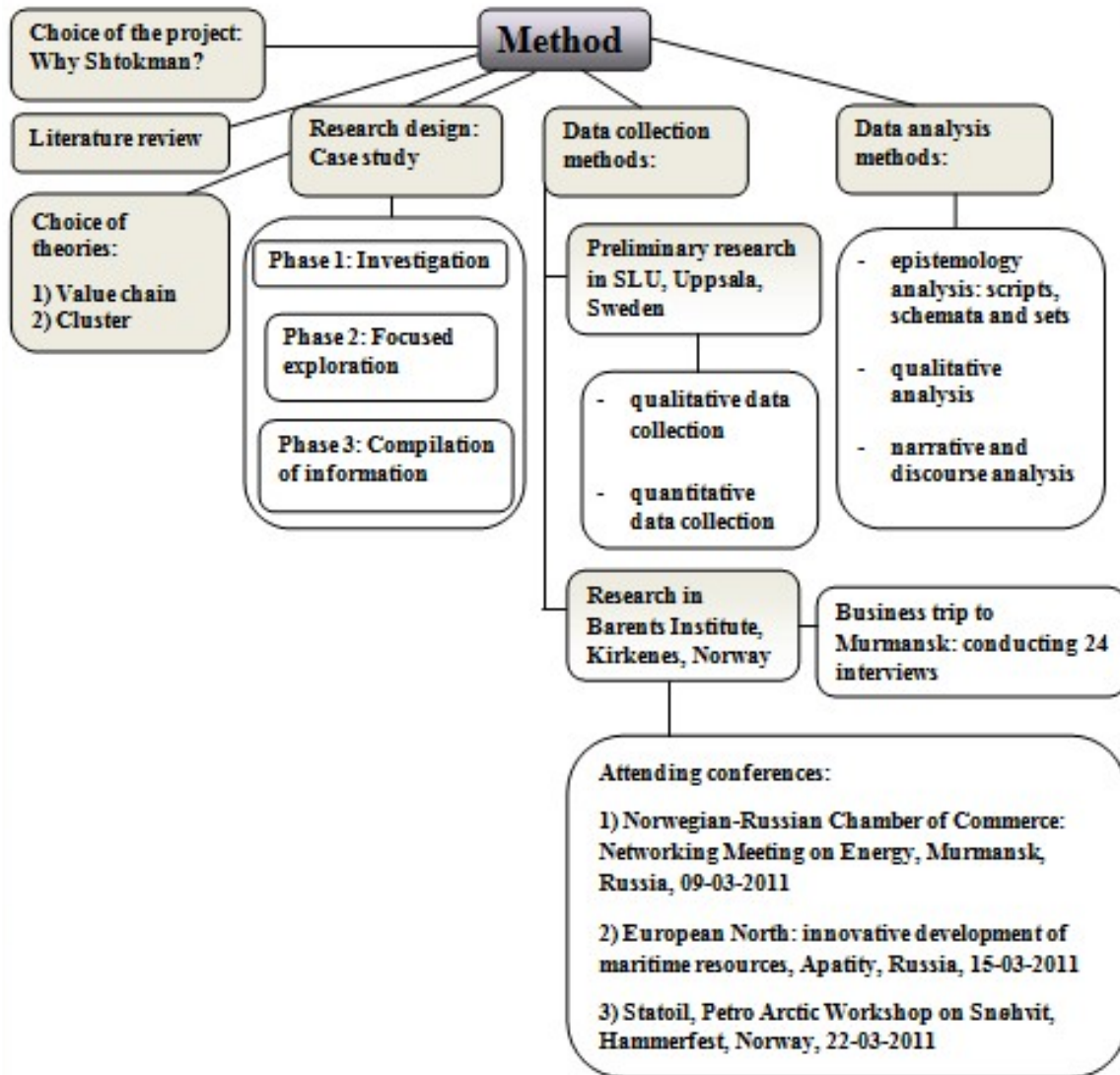


Figure 8. Illustration of the outline of the method of the study.

#### 3.1 Choice of the project

The choice for the Shtokman project as a topic of research is explained in this chapter. The Russian territories of the North and the Arctic have always been an interesting topic for the business world due to the rich reserves of natural resources. Experts estimate that the guarantee of Russia’s presence in the North and in the Arctic can be achieved by the



sustainable territorial development and the development of the offshore oil and gas reserves (Scientific Council of the RAS, 2010).

The Shtokman GCF is located in the Russian Arctic, in the centre of the Russian sector of the Barents Sea. It is estimated to be one of the world's largest natural gas deposits with reserves of about 3,9 mln cu metres of natural gas and about 56 mln tons of gas condensate. The Shtokman project is officially included in the strategy of the socio-economic development of the Murmansk region until 2025 as the largest investment project in the region (Ministry of Economic Development of the Murmansk region, 2010c). The experts on economic development of the Murmansk region associate the development of the Shtokman field with the economic development of the region and the formation of gas cluster due to the participation in the project of local contractors and the development of the Murmansk transport hub. The region is looking forward for a final investment decision for the Shtokman project that has not been taken yet.

The research is focused on the scrutinized study of the value chain of the Shtokman project. Hence, the cluster theory has attracted the attention of the authors as well in order to study the potential of the Murmansk region for the gas cluster formation in the framework of the Shtokman project.

The research topic has been offered to the authors by the Barents Institute, the research centre in Kirkenes, Norway. Hence, the authors were able to conduct a research in the Barents Institute for three months from February till April 2011. Murmansk is close to the Norwegian border and the city of Kirkenes. Therefore, the authors had an opportunity to travel to Murmansk in Russia, the epicentre of the Shtokman project, for obtaining interviews.

## 3.2 Literature review

While conducting the interview with the researcher Mr. Kotomin from the Institute of Economic Problems named after G. P. Luzin of Kola Science Centre in Murmansk, several books that are valuable for this study were presented to the authors. The value of these literature sources for this research is significant, since the information about the Shtokman project, the Murmansk region, the Russian Arctic and the evaluation of the hydrocarbon deposits of Russia is difficult to access. Therefore, the authors have made an in-depth study of these literature sources and found a lot of useful implications that helped to form the theoretical and empirical base for this thesis.

Nikolaeva and Selin (2009) define the economic trends in exploration and development of the hydrocarbon deposits of the Arctic shelf. Both theoretical aspects and practical examples of special economic zones of port type and clusters in the Murmansk region are widely discussed by the authors. Scientific Council of the Russian Academy of Sciences (2010) deeply covers all the aspects of the socio-economic situation in the regions of the North of Russia and the Arctic. The application of the cluster approach for the North regions of Russia with a lot of natural resources and a high socio-economic potential for the regional development and formation of industrial clusters is discussed. Selin, Tsukerman and Vinogradov (2008) define the problems and perspectives of the exploration and development of the new strategic oil and gas province of Russia - the shelf of the Russian Arctic. Kalinnikov (2009) presents the analysis of the official regional socio-economic statistics and discusses the investment projects of the Murmansk region, including the Shtokman project. Alexeeva and Bogachev (2009) discuss methodological problems of cluster approach implementation for foundation of

regional innovation economy. The authors explain the strategic role of regions in the development of the clustered social-economic system.

The mentioned above information from various literature sources has an impact on the choice of the theory from the empirical perspective. The authors of the thesis gain valuable knowledge in the field of the hydrocarbon deposits of the Arctic, in particular the wide scope of analytical data concerning the development of the Shtokman GCF, the socio-economic aspects of the Murmansk region and the cluster theory in the application.

### 3.3 The choice of the theories

Two main theories were used in this research: the value chain management and the cluster approach. The reasons for choosing these two theories are explained in this chapter.

#### 3.3.1 Value chain management

The value chain management theory is chosen as the main method of detailed study of the Shtokman project, since it is the most detailed and descriptive method of studying all phases of the project. The value chain is a concept from business management that was first described and popularized by Porter (1985). The value chain management method is used in the project since it is a powerful analysis tool that describes a chain of value-adding primary and support activities for ShDAG operating the Shtokman field.

#### 3.3.2 Cluster approach

The cluster approach was used in this research since the Government of the Murmansk region together with ShDAG and the association of oil and gas suppliers Murmanskshelf is working on the project of oil and gas cluster formation in the Murmansk region. The formation of several geographical clusters such as the mining cluster and the oil and gas cluster is discussed by Selin, Tsukerman and Vinogradov (2008). The authors focused on the cluster approach, since it helps to fully analyze the capacities and potential of the Murmansk region to form gas cluster in the framework of the Shtokman project (Selin, Tsukerman and Vinogradov, 2008).

### 3.4 Research design: Case study

The choice of the thesis writing format was in favour of the case study design. According to Bromley (1986), a case study can be conducted in different fields such as administration, business, history, social work, etc. The most commonly applied definition of case study research is provided by Yin who defines it as: “an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (Yin, 2002, p.23). In this research the *contemporary phenomenon* is Shtokman GCF, which exists in the *real-life context*, such as Barents Sea in the Russian Arctic with the closest onshore territory - Murmansk region. *The multiple sources of evidence* are the phases of the Shtokman project and the Murmansk region’s economic capacity.

A case study can be rather qualitative or quantitative depending on what the authors investigate and how the knowledge of the case is acquired. Case study research is a method

designed to study the particular within context and has a very specific purpose (Pickard, 2007).

The purpose of a case study is to provide a holistic account of the case and in-depth knowledge of the specific through rich descriptions situated in context. Triangulation within a case study can be achieved by using both multiple data collection techniques and multiple sources of evidence for “complementing” each other (Miles and Huberman, 1994, p.276; Pickard, 2007).

The design of a qualitative case study is an iterative process. A post-fieldwork plan in a qualitative case study research allows for discovery and exploration (Pickard, 2007). In case of the Shtokman project the post-fieldwork plan is presented in Table 4.

Table 4. Case study

<b>Phase 1:</b> Investigation	Establishing research focus and broad aim, designing on boundaries of the Shtokman project case study. Deciding on the unit of analysis: the Shtokman project value chain and the Murmansk region economic capacity for a gas cluster. Determining data collection techniques such as interviews and observations, and which approaches to use when selecting companies for interviews. Comprehensively and systematically collecting multiple sources of evidence (Pickard, 2007).
<b>Phase 2:</b> Focused exploration	In-depth literature study. Checking the appropriateness of the data collection techniques to the research question and the feasibility of the techniques in the context. Considering practical issues: sending letters requesting the time for the interviews, checking availability of people, preparing the interviews schedule and semi-structured questions for interviews. Preparing for the conferences. Transcribing the interviews and making the observation notes from conferences (Pickard, 2007).
<b>Phase 3:</b> Compilation of information	Compilation of information obtained from literature study, interview results and conference observation notes (Pickard, 2007).

The introduction part about methodology is stating that the research process is conducted within the boundaries of *validity*, *credibility*, *dependability* and *confirmability*, which are considered to be the criteria for judging value in qualitative research (Pickard, 2007). Case studies are not intended to produce generalizations, but to allow for *transferability* of findings based on contextual applicability (Pickard, 2007). The findings of this thesis are transferred into practical information for everybody who is interested in the Shtokman project and they were presented at the conference in the Barents Institute in Kirkenes, Norway.

### 3.5 Data collection methods

Two types of data collection are used in this research - quantitative and qualitative. The explanation of how the data for the research was collected is presented in this chapter. Several techniques were used for the data collection such as data mining of published works, interviewing companies’ representatives, etc.

### 3.5.1 Preliminary research in SLU

During the preliminary research in SLU, Uppsala, the authors made the review of the available literature such as books, journals, articles and on-line publications that are related to the qualitative data collection approach. The researchers decided to integrate the qualitative approach into the thesis writing process due to its significant advantages (Polgar and Thomas, 1995). The main advantages of the qualitative approach are the possibility to make constant changes and refinement of research ideas during the progress of the study. In addition, the qualitative approach allows the authors to present the phenomenon being investigated, the Shtokman project, in a more holistic view (Saunders, Lewis and Thornhill, 2007).

The quantitative approach is used as well in the research as in the writing process. The main quantitative tools that were used in this research are the numerical data and statistics. The main advantage of the quantitative approach is that it helps to prevent gathering biased research data and on the contrary helps to create the objective forms of measurement. The purpose of the quantitative approach is to avoid subjectivity by means of collecting and exploring information which describes the experience being studied, such as the official statistics of the socio-economic development of the Murmansk region. (Robson, 2002)

### 3.5.2 Research in Barents Institute

The research has been conducted for three months from February till April 2011 in the Barents Institute, Kirkenes, Norway. During this time the authors made an in-depth literature study, organized 24 interviews in companies and organizations of Murmansk region, attended three conferences concerning the research topic in Russia and Norway, collected the rare monographs, books and journals available only in the Kola Science Centre and reviewed the mentioned sources of information.

#### *Business trip to Murmansk, Russia*

Interviewing the representatives of 24 companies and organizations has been done. The authors have sent out 112 official letters of requests for interviews to the organizations from which 24 positive answers has been received. It is important to mention the way of contacting the companies for making the appointment for the interview. There are some differences in the business culture and the business communication between the Russian and the European companies. In Russia it is important to write an official letter of request preferably signed and stamped. All the letters were written on the official letter-blank of the Barents Institute, signed and stamped and finally sent by fax, scanned and doubled by e-mails (Appendix 1).

The organizations to where the authors sent the interview requests were selected according to the following criteria:

- membership in the association of oil and gas suppliers Murmanshelf (Murmanshelf, 2011b),
- registration in the Murmansk region,
- listed on INTSOK , the organization that represents the partnership between Russian and Norwegian oil and gas industries (Intsok, 2011b).

The list of the companies where the interviews were conducted with the information of their field of work, size and turnover and the questions that were asked during the interviews is represented in Appendix 2.

Conducting 24 interviews for the qualitative research for the case study about the Shtokman project is valuable, since it provides *the multiple sources of evidence*. The main characteristics of the interviews are *interactivity*, *real-time* and being obtained *in natural language* (Rugg and Petre, 2007).

There are several interview techniques: structured, semi-structured and unstructured. In structured interviews the interviewers decide on a structure for the interview beforehand. This structure may be a list of topics or a list of questions tightly scripted. Unstructured interview implies spontaneous questioning. Semi-structured interview technique is used in this research. The questions for the interviews are derived from the preliminary research. There were some predetermined questions; however, some space was left for following-up interesting questions. If the questions would have been structured around the literature from the preliminary research, then the obtained results would be framed within the same structure, which may or may not correspond to reality (Rugg and Petre, 2007).

The “soft-wired” structure of the interviews, when the researchers decide on the overall structure, but do not specify the follow-up questions and topics, has been used. For example, it is shown in the Appendix 2 that the researchers asked the companies from different fields of activities common questions, such as:

- Is your company interested in participating in the Shtokman project?
- How will the development of the Shtokman project influence the economic development of the Murmansk region?
- What problems does your enterprise face?
- What are the pros and cons of the membership in Murmanshelf for your company?
- If we consider the value chain of the Shtokman project, in which node of the value chain can your company participate?

The answers of the companies to the same questions varied; therefore, there was an opportunity to phrase spontaneously the follow-up questions (Rugg and Petre, 2007). It was a difficult task to formulate *clear*, *unambiguous* and *meaningful* to the respondents questions, since the companies varied in their field of activities, which required very thorough preparation for each interview. The interviewing schedule was very tight, because the business trip from Kirkenes to Murmansk was limited in time and lasted two weeks. After the interviews have been transcribed and analyzed, they have been returned to the interviewees for verification (Pickard, 2007).

### *Attending conferences*

The following conferences have been attended by the authors of the thesis during the research period in Barents Institute, Kirkenes, Norway:

#### *1. Norwegian-Russian Chamber of Commerce: Networking Meeting on Energy, Murmansk, Russia, 09-03-2011 (Appendix 3)*

The most important issues of the Murmansk region development were raised by the speakers of the conference. The most important topics for the current research that were highlighted at the conference are:

- formation of a free economic zone of port type in Murmansk,
- a legislation base for the investments projects,
- energy efficiency within the Barents region.

### 2. *European North: innovative development of maritime resources, Apatity, Russia, 15-03-2011*

The issues of geophysical companies in the region were described; the questions about the development of the Russian Arctic were covered.

### 3. *Statoil, Petro Arctic Workshop on Snøhvit, Hammerfest, Norway, 22-03-2011*

The conference was dedicated to the problems of the involvement of the local contractors of the Finnmark County into the development of the Snøhvit project. The received information served as a solid ground for the discussion chapter of this thesis, where the comparison of Snøhvit and Shtokman project is made.

To sum up, attendance of the conferences broadened the researchers' knowledge on the topic and enabled them to look upon the issue from different perspectives.

## 3.6 Data analysis methods

In order to analyze the data thoroughly and systematically several data analyses methods are applied in the thesis, such as epistemology, qualitative, and narrative and discourse analysis. Even though, the questions were given in a clear way in the interviews, still the authors faced the problem of analyzing the number of possible interpretations of unclear, incomplete and inconsistent data. This chapter describes how the authors analyzed this type of data for the research question (Rugg and Petre, 2007).

Putting knowledge together has been done by various disciplines, under various names such as “epistemology” or “knowledge representation”. The knowledge is not a single homogeneous thing. There are different types of knowledge, different ways of describing, classifying and representing that knowledge (Rugg and Petre, 2007).

Knowledge with both theoretical and practical implications can be analyzed through the *scripts*, *schemata* and *sets*. In this thesis the *scripts* are the various tables in an empirical part, *schemata* are the graphically presented schemes of the value chain and cluster in the analysis, and *sets* are presented in this thesis by compiled and structured information about the potential contractors within the Murmansk region and the statistical data about the machinery in the Murmansk region (Rugg and Petre, 2007).

The statistical method of analysis is used in the thesis for analyzing the quantitative data about machinery in the Murmansk region. Statistics comes into two types, namely descriptive statistics and inferential statistics. In this thesis the descriptive statistics is used for describing the findings such as the highest and the lowest values of Murmansk commercial port transshipment capacity. The statistical data is presented by the graphs, for example, the number of potential contractors of Murmansk region in various industries (Rugg and Petre, 2007).

As for the qualitative analysis, the authors mean analysis of any type of research that produces findings not arrived at by statistical procedures or other means of quantification (Strauss and Corbin, 1998; Pickard, 2007).

The major concern with the discourse and narrative analysis is to understand how individuals represent experiences in a shared form. That analysis has been applied while compiling the information received from the conducted interviews (Pickard, 2007).

# 4 The empirical study

This chapter covers the empirical findings related to the strategy of ShDAG, the first phase operator of the Shtokman project, and provides the description of the value chain of the project. The development of the Shtokman GCF is a strategic project for the Murmansk region; therefore it is interesting to study how the region can contribute to the development of the Shtokman project. Therefore, the empirical findings related to the development of the gas cluster in Murmansk region are also described in this chapter. In Figure 9 the outline of the empirics used in this thesis is presented.

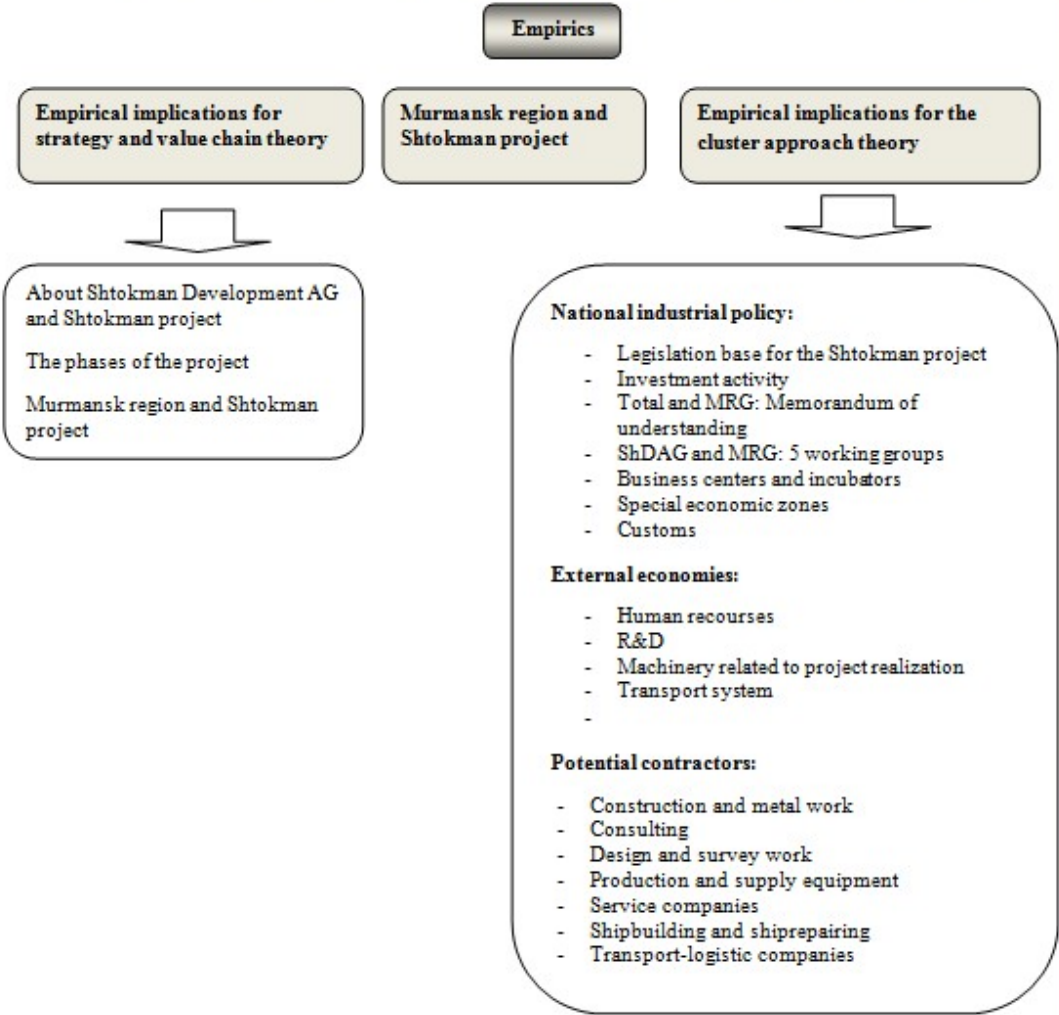


Figure 9. Illustration of the outline of the empirical study.

## 4.1 Implications for strategic and value chain management

The special purpose company ShDAG was established to operate the first phase of the Shtokman project. In order to have a full scope of the Shtokman project it is important to study the strategy of ShDAG which is directly connected with the strategy of Gazprom. This connection is direct, since Gazprom owns 51% of ShDAG. In order to draw the value chain of the Shtokman project, the description of the project’s facilities is provided further in the text.



#### 4.1.1 About ShDAG

According to the “Russia’s energy strategy for the period up to 2020” announced by the Government of the Russian Federation on August 28, 2003, exploration of the gas reserves in the Barents Sea is one of the priority directions for Gazprom in long-term perspective. The state owns a 50,002 % controlling stake in Gazprom (Gazprom, 2011c). The corporate strategy of Gazprom is to become a leader among the global energy companies with the help of the development of new markets, diversification of activities and providing reliable supplies (Gazprom, 2011g). The Shtokman GCF development project has a strategic importance for the company due to the fact that the field will serve as a base for the formation of a new gas-production region on the Arctic shelf of Russia (Gazprom, 2011d). The formation of new oil and gas centres is supposed to improve the socio-economic situation of the Murmansk region and other regions that can participate in the different field developments (Lesikhina et al., 2007).

Taking into account the difficulties caused by the severe climate conditions and the remoteness from the shore, Gazprom has decided to involve financial and engineering abilities of the biggest international corporations. For this reason, for the first phase of the project the company ShDAG was founded on February 21, 2008 with the headquarters in Zug, Switzerland. The shareholders of ShDAG are Gazprom 51%, Total SA 25% and Statoil ASA 24% (ShDAG, 2011j). Among other reasons for partnering with Total and Statoil, ShDAG highlights the fact that these companies have already experience in developing offshore fields, which can be helpful for the future development of the Shtokman GCF (Berezhnoj, personal message, 2011).

It is important to mention that ShDAG is responsible for design, finance, construction and operation of the facilities and will be operating the field during 25 years (ShDAG, 2011b). According to the plan of the first phase of the Shtokman field development, 23,7 milliard cu m of natural gas will be produced annually (ShDAG, 2011a). While operating, ShDAG claims to promote and implement the best practices. The company states its commitment to the highest international health, safety and environmental standards (ShDAG, 2009b). As a multinational consortium of three well-known international companies, ShDAG elaborates the sustainable social development policy that claims that the project will contribute to the developing of the areas of operation. The key elements of the corporate social responsibility are the compliance with Ethic Norms and Rules, transparency, regulatory compliance, risk management and sustainable development. (ShDAG, 2011l)

The contracts and procurement policy of ShDAG claims that the implementation of the tender pre-selection for different kind of works will be auditable and in full transparency. In other words, no preference will be given to Russian or local contractors. However, in case when two or several companies put in tenders for the same contract have “all conditions being equal, Russian contractors from Murmansk and Arkhangelsk will be given the priority” according to the “Local Content Policy” (ShDAG, 2009a). ShDAG sets up certain requirements for the participants of the tenders. Besides cost and time frame, all the companies should meet the high international quality standards, have a good reputation, experience in similar works and comply with the project technical specification. It is also appreciated when competing for the tender the company has high management skills and English-speaking staff (ShDAG, 2011l). The tenders are publicly announced and posted on the web-site of ShDAG. The publicity of tenders relates to the policy of the company to be

transparent. The other proofs of the company's commitment to the CSR policy are the supporting programs for different stakeholders influenced by the project development. Among them are the northern indigenous minorities, fisheries, the population of the village Teriberka, where the LNG-plant will be constructed. Dealing with the mentioned above aspects can contribute to the creation of the favourable conditions for other phases of the Shtokman field development.

ShDAG pursues a sustainable social policy and contributes to the development of the local suppliers. For this reason, the company participates in a range of non-profit industry organizations and associations; among them the most important for the organizations of the Murmansk region is the Association of suppliers for oil and gas industry Murmanshelf (ShDAG, 2011c).

#### *Association Murmanshelf*

The association of suppliers for oil and gas industry Murmanshelf was established on May 12, 2006 according to Memorandum of Understanding in Technical and Economic cooperation between the Government of the Murmansk region and the Statoil ASA Company (Murmanshelf, 2011b). The aim of the association is to develop an industrial cluster of companies in order to perform work and to provide services for the implementation of the Shtokman GCF and oil and gas projects in the Arctic shelf (Murmanshelf, 2011b). The list of members of the association is constantly changing. The association includes the largest companies of the North-West of Russia as well as foreign companies. The members of the association are divided into several categories and published in a catalogue: consulting, service, transport-logistic, design and survey work, construction and metal work, shipbuilding and shiprepairing, and production and supply of equipment companies (Murmanshelf, 2011a). There is also a niche for educational, scientific and research organizations of the region as well as geological organizations (Murmanshelf, 2011b). The most significant for this study are the companies that are registered on the territory of the Murmansk region.

Membership in Murmanshelf is aimed at supporting companies in adopting modern international oil and gas industry technologies, working on international contracts, meeting international standards (ShDAG, 2011). Murmanshelf together with ShDAG informs the potential contractors about the upcoming projects and the requirements for tenders in order to be able to upgrade and improve their technologies, equipment, resource base and managerial skills, and as a result to be competitive and to broadly participate in the Shtokman project. Looking from the regional perspective at the work of the association, the main activities of the association with a local perspective are working with local and other potential contractors in order to increase the competence, consulting about different business projects held by the members of the Association, organizing joint meetings for the potential contractors and project operators in order to exchange information. (Murmanshelf, 2011b) The aspect of social responsibility of association implies two main characteristics - the security and safety (Stratij, personal message, 2011). The value of the association for the local companies can be followed by its activities. For example, the association organizes joint seminars, provides its members with contact information on different organizations, connects the companies, gives words for participants, and publishes industry oriented articles in the magazine Murmanshelf (Stratij, personal message, 2011).

Besides the catalogue of the potential suppliers for oil and gas industry produced by Murmanshelf, ShDAG has the database of potential contractors that have been evaluated by

the company. There are 40 companies from the Murmansk region in this section at the moment. Among them are mainly old shipbuilding factories and shiprepairing plants which facilities may be used in the Shtokman project (Berezhnoj, personal message, 2011). In order to see the full scope of the potential field of works for the local companies, it is important to see the whole process of the Shtokman GCF development project.

#### 4.1.2 About the Shtokman project

The development of the Shtokman GCF can be divided into three main parts: offshore facilities, onshore facilities, and logistics.

##### *Offshore*

The engineering concept of the project was introduced by a subsidiary of Gazprom JSC Giprospeftgaz (JSC Giprospeftgaz, 2011). According to this concept, offshore facilities include subsea field infrastructure, ice-resistant processing platforms, and subsea pipeline systems that carry gas to the onshore facilities (Piotrovskiy, 2008). The value chain of the gas production faces the great threat of icebergs. The existence of icebergs in the field with the weight up to 4 mln tons has made it necessary to use the “extracting vessel” instead of platform (Masloboev, personal message, 2011; Shtokman, 2011k). Figure 10 illustrates the offshore facilities.

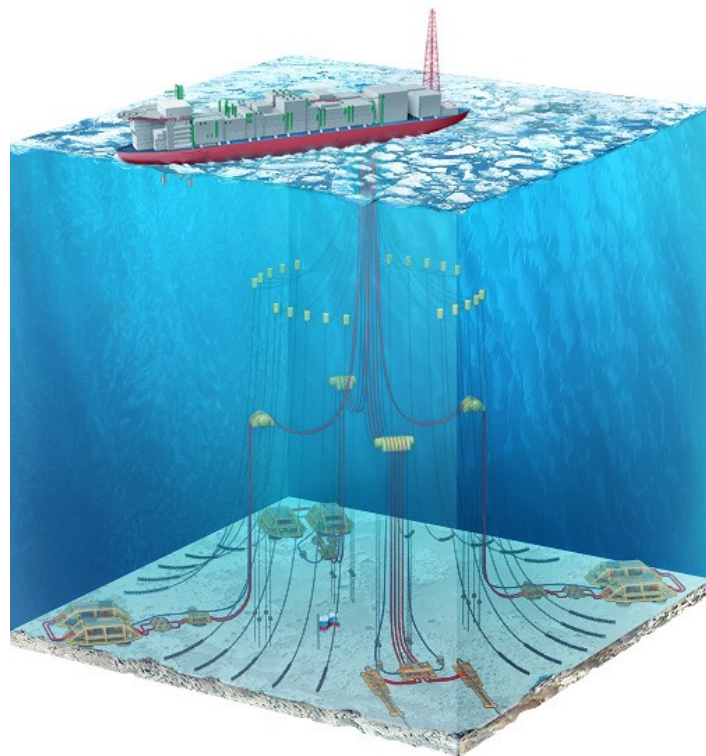


Figure 10. Offshore facilities of the Shtokman project (Shtokman, Offshore, 2011).

Utilizing unique technology, gas will be produced from the process-oriented floater and transported to the shore via 550 km long pipelines. It is important to take into account the environmentally sensitive ecosystem and the severe Arctic conditions for the technical development of the offshore facilities. Additional difficulties are caused by the remote location of the field. Therefore, the technical concept of the project should be complied with high design capacities (ShDAG, 2011f). It is worth mentioning that the process of extracting

gas offshore in such a remote location and under the extreme conditions is unique not only for Russia but for the global community as well. Moreover, the effectiveness of the extraction in Russia is nowadays about 20-25%, which is worse than, for example, in Norway, where the effectiveness is about 50%, so the development of the Shtokman field needs new technologies not even developed in other countries (Masloboev, personal message, 2011).

### *Onshore*

The onshore transport and production complex will consist of an LNG plant with a production capacity of 7.5 mln tons per year, gas treatment facilities, special purpose sea port, as well as auxiliary facilities including a power plant, housing area, support vessels and tugs, helicopter pad, etc (ShDAG, 2011g). LNG plant construction is an energy and resource consuming process that involves a lot of new technologies. It is important to mention that LNG plant has been built in Sakhalin as a part of Sakhalin-2 project in the Far East of Russia (Sakhalin Energy, 2011c). Therefore, Russian companies can participate in the construction of the LNG plant in Teriberka for the Shtokman project. However, due to the complexity of the project the experience of international companies will be required for the realization of this part of the project as well. Moreover, the evaluation of the profitability of the LNG-plant is still in the process (Bereznoj, personal message, 2011).

### *Logistics*

The ShDAG Logistics & Marine Division is created for operating the logistics part of the Shtokman GCF development. The division is responsible for the air and sea support of the project during subsea operations, drilling, construction, and production. Complying with the tight delivery schedules of the different sorts of equipment on the long distances in harsh conditions is one of the main challenges for the division (ShDAG, 2011d). The natural gas and LNG production is followed by its distribution through the different channels. As soon as the decision on the LNG plant construction is not made the distribution channels are still under negotiation (Bereznoj, personal message, 2011). Nevertheless, the distribution and selling process depends on the level of the prices on the global market. However, there are three channels of delivery to the final consumer that are highly discussed at the moment:

#### *1. Transportation of the gas through the Nord Stream to the European gas market.*

Nord Stream is one of the longest offshore pipelines in the world, with the length of 1,224 km. The first channel of delivery implies the transportation of the gas through the Nord Stream pipeline, which is a natural gas pipeline through the Baltic Sea operated by the Nord Stream AG. The shareholders of the company are OAO Gazprom (51%), Wintershall Holding GmbH (15,5%), E.ON Ruhrgas AG (15,5%), N.V.Nederlandse Gasunie (9%) and GDF SUEZ S.A. (9%). In late 2011, Line 1 of the twin pipeline system will begin contributing to the energy security of the European Union, helping it to meet its greenhouse gas reduction goals. When fully operational in late 2012, the two lines will supply 55 mln cu m (bcm) of Russian gas a year to the EU for at least 50 years (Nord Stream, 2011b). The Nord Stream route starts from the offshore pipeline from Portovaya Bay near Vyborg, Russia to the coast of Germany near Greifswald, Mecklenburg-Western Pomerania (Figure 11).



Figure 11. Nord Stream gas pipeline. (Gazprom, 2011f).

The gas supplies for Nord Stream are Yuzhno-Russkoye oil and gas reserve, Yamal Peninsula, Ob-Taz bay and Shtokman fields (Nord Stream, 2011a). The Baltic Sea route is the most direct way to transport gas from the planned Shtokman field in the Barents Sea to Western Europe, where additional gas is needed due to a growing demand and decreasing reserves in the North Sea. A shorter route means less environmental impact and lower costs for construction and operation. (Nord Stream, 2011c)

2. *Transportation of the LNG on the LNG vessels to the LNG receiving terminals (California Energy Commission, 2011).*

Another channel of delivery of the gas from the Shtokman field to the final consumer is transportation of the LNG. The production of LNG requires the construction of the LNG plant. Gazprom and the Government of the Murmansk region signed a cooperation agreement for 2010-2015, that includes the construction of an LNG factory and the creation of the port infrastructure in the village of Teriberka for the LNG transportation. The construction of an LNG factory in Teriberka is at the design stage. The beginning of the construction depends on the investment decision for the whole Shtokman project that has not been taken yet. The planned completion date is the year 2014. The plant will be one of the largest in the world. The design capacity is about 7,5 mln tons of liquefied natural gas per year, it would require 11 mln cu m of natural gas. Strictly speaking, it is planned to build in Teriberka a harbour transport and processing facility to produce liquefied natural gas from the Shtokman field. It will include a dedicated port and a gas condensate factory. (Ministry of Economic Development of the Murmansk region, 2010c; Energy Delta Institute, 2011)

It is important to take into account that the number of importers of LNG is limited, as well as the number of buyers (Masloboev, personal message, 2011). The list of potential consumers of the LNG is limited due to the fact that worldwide there are only 18 countries locating regasification terminals. Europe and the USA are the most likely destinations (Berezhnoj, personal message, 2011). Moreover, there is a thread for Shtokman LNG in a lot of alternative gas solutions such as shale gas or the development of the Jamal gas field (Kotomin, personal

message, 2011). However, the shale gas production is extremely harmful and any predictions towards the subject of shale gas being the competitor for Shtokman gas are very subjective (Masloboev, personal message, 2011).

Constantly increasing demand for the LNG (for the last 10 years demand growth constituted 2,5% per year) due to decrease of its production costs and the consumption growth of gas as the most environmentally friendly fuel. The main advantage of LNG is that during liquefaction the gas volume decreases by 600 times. In the production process of LNG the gas temperature reaches the mark of minus 162° C and under atmospheric pressure gas becomes liquid and more compact, what allows to a large degree to increase the efficiency of its storage and transportation. (JSC Giprospeftgaz, 2011)

3. *Delivering gas to the domestic market through a pipeline that will provide gas to the Murmansk region, the Republic of Karelia and the Leningrad region (Lesikhina, 2007)*

The third channel of delivery implies the transportation of the gas through The Murmansk-Volkhov gas pipeline that will ensure gas supplies from the Shtokman field to consumers in North-Western Russia and gas exports via Nord Stream. In particular, the gas pipeline construction will allow implementing the socially significant gasification program in the Murmansk Region and Karelia, thus stimulating the industrial development of the region (Gazprom, 2011b). Gasification of the Murmansk region has economic as well as environmental aspect, since fuel oil energy source will be substituted with the gas which is less polluting (Glushkov, personal message, 2011). Figure 12 presents the route of the Murmansk-Volkhov pipeline that will be connected to the Nord Stream to enable the gas supply from the Shtokman field to Europe.



Figure 12. Murmansk-Volkhov gas pipeline (Gazprom, 2011e).

The length of the Murmansk-Volkhov gas pipeline is 1,365 km, the projected annual capacity of the pipeline is planned to be up to 50 mln cu m of gas depending on the Shtokman



field output. It is planned to construct ten compressor stations. The current status of the project is that the initial data acquisition has been carried out. The engineering survey is underway and the project documentation is being prepared. (Gazprom, 2011b)

Summarizing, it is important to mention that the Murmansk-Volkhov gas pipeline, which will be connected to the Unified Gas Supply System of Russia, will supply gas through the Nord Stream gas pipeline to Europe. This will be a fundamentally new route for Russian gas exports to Europe. The target markets for gas supplies via Nord Stream are Germany, the UK, the Netherlands, France, Denmark and others. There are no transit countries for Nord Stream. This reduces Russian gas transmission costs and eliminates any possible political risks. Nord Stream will provide the most reliable gas deliveries to customers in Western Europe. (Gazprom, 2011a)

## 4.2 Murmansk region and Shtokman project

Besides the gasification, which plays both an economic and an environmental meaning, the region can benefit from the development of the project in various directions. The experience of Sakhalin-2 can serve as a good example of how the Sakhalin region benefited from the offshore field development (Berg, personal message, 2011). The development of the offshore Shtokman field, in its turn, will provide the Murmansk region with the taxes to the federal budget received from the rent of land, taxes from the LNG-plant production, taxes from the salaries of specialists working in the Shtokman-related industries, new working places and the most important the gasification of the region and especially the village of Teriberka (Kotomin, personal message, 2011).

Moreover, the Shtokman project will influence the social development of the region, since the construction of the buildings for social purposes such as kindergartens, schools, and hospitals is planned in the village Teriberka where the LNG plant will be located (Buch, personal message, 2011). It is planned that the plant personnel in Teriberka will be administrative, technical and support, all together about 350 – 400 workers. The operation of a specialized port will provide about 600 jobs in administration, coastal service, and maintenance service, bunkering base, crews, customs, border guards, sanitary control, and immigration and trucking service. In the service sector of the plant and the port it is planned to attract about 200 people from Teriberka. They can count on the post of technical personnel, as well as to work in the dining room, hotel, laundry services and other (Murmanshelf, 2011c). It is also planned to build 29 four-stored residential buildings of 48 apartments each, two kindergartens for 370 children, three schools (for full 11 years of studies), in addition fitness centre, a club for 300 visitors, a supermarket with a total area of 1500 square m, dining cafe for 200 sitting places, a mini-processing plant of seafood, modern boilers, hospital with 150 beds and outpatients' clinic (Murmanshelf, 2011c). Additionally, the project will enable the development of the related industries (Buch, personal message, 2011).

Above and beyond the positive impact on the economy and the social system of the Murmansk region, the development of the Shtokman GCF has a geopolitical and macroeconomic significance for the region. The meaning of the North and especially the Arctic to the modern Russia is determined by the fact that this vast territory of the country has the specific socio-economic development, the unique potentiality of natural resources and the advantageous geopolitical position. The natural resources of the Arctic provide the Murmansk region with strategically important types of raw materials and fuel (Scientific Council of the Russian Academy of Sciences, 2010). Figure 13 shows the location of the region.



Figure 13. Geographical location of the Murmansk region (BBC News, 2011).

As it is illustrated on the Figure 13, the Murmansk region has borders with the industrially developed European countries such as Finland, Norway and Sweden. The advantage of the region is the ice-free port with the access to the Atlantic Ocean and to the Pacific Ocean through the Northern Sea Route (Kalinnikov, 2009). The infrastructure of the Murmansk region is developed including the transport system, the energy supply system, gas and oil pipelines and telecommunication. The region is the base of the Northern Navy of Russia (Kalinnikov, 2009). A specification of the region is that a lot of employees live here temporarily due to severe climate conditions, so it is necessary to create favourable conditions to attract people to stay for a constant residence in the Murmansk region (Scientific Council of the Russian Academy of Sciences, 2010).

The development of the Murmansk region is directly connected with the development of the Shtokman project. Unfortunately, a significant problem of the region is its technological unpreparedness for the development of the offshore field (Kotomin, personal message, 2011). The advantage of the region for the Shtokman project is the developed transport hub, but the other problem is the so-called ZATO – the closed military territories, due to the location of the Northern Fleet in the Murmansk region (Berg, personal message, 2011). Forbidden territories are located along the Kola bay and create obstacles in the accessibility of the shore territories. Nevertheless, the region is waiting for the final investment decision and the beginning of the field development (Berezhnoj, personal message, 2011). The volume of natural and biological resources in the Murmansk region is significant and at the same time the exploration of the Arctic requires a lot of new technology.

Therefore, the development of better foreign economic relations is unavoidable and the Shtokman project will be the base in the Murmansk region for the international cooperation (Scientific Council of the Russian Academy of Sciences, 2010). The project also will stimulate the development of such industries as mechanical engineering, construction and metal work, shipbuilding and shiprepairing, logistic and transport system. The direct influence of the project on the Murmansk region is the creation of new working places within the ShDAG and in related industries, hence the increase of the employment, income and taxes in



the region (Kalinnikov, 2009). The development of the seaport in the village of Teriberka is unavoidable (Berezhnoj, personal message, 2011).

The Shtokman project requires skilled, trained and experienced personnel (Alexeeva and Bogachev, 2009). The high competition for various works for the Shtokman project among the potential suppliers of the Murmansk region will motivate the companies to improve the quality of human resources. The improvement of the quality of infrastructure of the Murmansk region is the necessity for a successful development of the project (Selin, Tsukerman and Vinogradov, 2008). Therefore the cooperation between the government and the companies is important (Nikolaeva and Selin, 2009). Additionally, the development of the Shtokman project will require additional research which will lead to the extension of the opportunities for R&D centres in the Murmansk region.

For the successful development of the Shtokman project it is important to take into account the existing problems of the Murmansk region. The government of the Murmansk region provides the publicly accessible document where all the regional problems are listed (Ministry of Economic Development of the Murmansk region, 2010c). Among them are the complex demographic situation, the difficult access to and the low quality of the range of social services, the poor environmental situation – the region is in the state of an ecological emergency, slow innovation activity of the companies and low effectiveness of the natural resources potential (Ministry of Economic Development of the Murmansk region, 2010c).

The Government of the Murmansk region does not only actively work on the solution of the mentioned above problems, but also on the creation of the favourable socio-economic conditions for the successful development of the Shtokman project. Therefore, the government implements a new tool for the regional development such as the cluster approach. The cluster approach is a quite new instrument in Russia for stating the national and regional production policy in condition of the market integration. The government’s strategy of the cluster formation serves as a base for the regional development, concentrated on the quality of the local competitive advantages (Alexeeva and Bogachev, 2009). The government of the Murmansk region together with the association Murmanshelf works on the project of the oil and gas cluster formation in the Murmansk region. As an outcome of this project the main sectors of the oil and gas cluster in Murmansk region were distinguished and are presented in Figure 14.

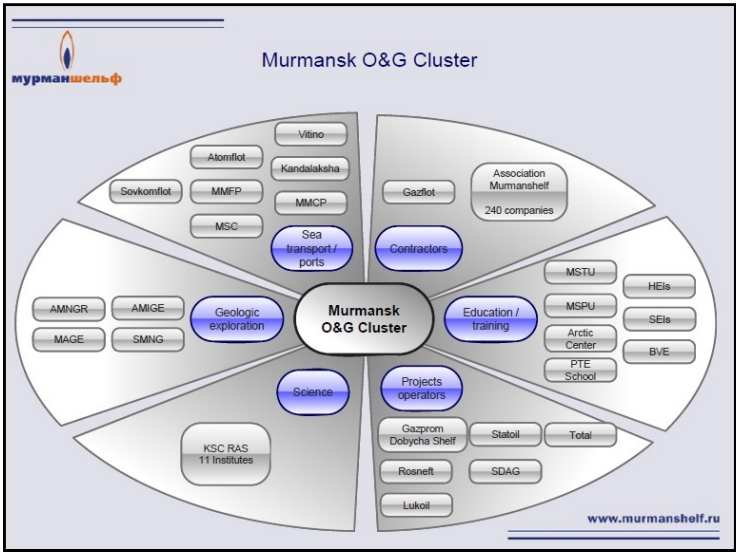


Figure 14. Murmansk oil and gas cluster (Intsok, 2011a).

The cluster presented in the Figure 14 covers all the important sectors of the oil and gas industry of the Murmansk region. Since this study concentrates on the Shtokman GCF project the sectors that relate to the formation of the oil industry are omitted in the research. However, all the sectors that refer to the gas industry are taken into account and broadly described in this study.

### 4.3 Implications for the cluster approach theory

Several aspects should be discussed in order to get the full scope of the capacities of the Murmansk region for the creation of the gas cluster in the framework of the Shtokman project development. Many aspects influence the formation of the cluster including its participants and external environment, from which the political aspect is very important (Kotomin, personal message, 2011). The national industrial policy of the country plays a significant role for the development of the national economy. The Russian government includes the formation of industrial clusters into the national industrial policy of the Russian Federation. This policy includes such aspects as an investment activity and legislation base which influence the formation of clusters (Federation Council, 2008). Moreover, the external economies which create the “cluster environment” should also be discussed. The labour sources, the related machinery, R&D, transport system and other aspects create the favourable environment for the cluster formation.

#### 4.3.1 National industrial policy

Industrial policy is a system of measures aimed at developing the national economy, new technologies and products with a high degree of processing, advanced information and human resources. The national concept of cluster policy in the Russian Federation has been already developed and approved in 2007 (Kalinnikov, 2009). In its turn the government of the Murmansk region develops a project of gas and oil cluster formation in the region, which is a part of the Russian “Cluster policy in the North” (Federation Council, 2008). The creation and the development of industrial geographical clusters is one of the key areas of the economic development of the North under market conditions. The value of cluster and cluster policy for the Murmansk region lies in the ability to impart its knowledge-intensive nature to the traditional resource development of the territory (Kalinnikov, 2009). In the Russian Federation the cluster policy is carried out by the municipal and state authorities in order to create and support cluster development in certain areas. This support includes the development of the measures for ensuring a legal base, investments, financial mechanisms and information support. (Federation Council, 2008)

#### ***Legislation base for the Shtokman project in the Murmansk region***

The success of any project depends on the position of the government (Glushkov, personal message, 2011). Laws and regulations are created on the regional, state and national levels. In the Murmansk region, it is possible to get acquainted with the legislation activities in the Northern Chamber of Commerce. This local body monitors the activities of the Russian government on the local, state and national levels and their impact on the economic environment.

Shtokman is the strategic project for the Murmansk region and its influence on the development of the region is very significant. This is the reason why no other project has

gotten as much attention from the government of the Murmansk region as the Shtokman GCF development (Borisenko, personal message, 2011). The initiative of the government of Murmansk region is to prepare the local contractors for the realization of the project; however, it is necessary to prepare favourable conditions, especially legal for the local companies and the development of the Shtokman project (Borisenko, personal message, 2011).

### *Grants*

The Government of the Murmansk region supports local small and medium enterprises and start-up entrepreneurs. For example, the program “Step by step” is initiated in order to provide training and royalty-free financial support for start-up entrepreneurs. After the training-course the entrepreneurs compete in the contest of business plans for the start-up grants. In 2009, 20 start-up grants of 200000 rubles each were given to the winners. In 2010 the size of grant was increased up to 300000 rubles. (Ministry of Economic Development of the Murmansk region, 2010a)

### *Subsidies*

Another state program aimed at supporting the local companies is a long-term target program called "The development of SME in the Murmansk region for 2009-2011". This program provides different subsidies to small and medium-sized companies. Non-repayable monetary funds, subsidizes, are transferred for reimbursement of various costs of entrepreneurs, such as the payment of the interest on loans, the costs of the development of the business plan, patenting, obtaining guarantees, extending the premises. (Ministry of Economic Development of the Murmansk region, 2010a)

### *Soft micro-loans*

Additionally, the state financial support in the form of soft micro-loans for the start-up entrepreneurs is provided by the non-profit organization “Fund for the development of SME of the Murmansk region”. Moreover, the entrepreneurs operating for more than 1 year can obtain the guarantee from the Guarantee Fund of the Murmansk region for a loan in certain banks of the Murmansk region. (Ministry of Economic Development of the Murmansk region, 2010a)

These SME supporting programs are a part of the existing mechanism of support for entrepreneurs (Borisenko, personal message, 2011). The development of the Shtokman GCF stimulates the intellectual potential of the region for the creation of new business ideas in order to participate in the Shtokman project. Mentioned above programs, in its turn, are a real opportunity for the entrepreneurs in the Murmansk region to realize these ideas, to establish and to develop a company.

### ***Investment activity in the Murmansk region***

The Murmansk region is one of the most attractive regions for investors in Russia. The investors are interested in the region due to its enormous industrial potential, the variety of the natural resources of the Kola Peninsula and the perspectives for development of hydrocarbon resource fields in the Arctic Shelf (Informational Agency, 2010).

The government of the Murmansk region is creating favourable conditions for the work and the development of the companies in the framework of the Shtokman project, therefore, two conceptual laws have been adopted (Borisenko, personal message, 2011).

The law of the Murmansk region by 11.05.2005 № 626-01-ZMO "On state regulation of investment activity in the Murmansk region" is already working for the 6th year. The importance of this law is in the stipulation and regulation of the investment activity of the national and foreign investors coming to the region in the framework of the Shtokman project (Government of the Murmansk region, 2010a).

One of the main official investment projects of the Murmansk region is "The integrated development of the Shtokman GCF, including an LNG plant and a port transport-technological complex for the LNG shipment". The description of the project is presented in Table 5.

Table 5. Shtokman Investment project (Ministry of Economic Development of the Murmansk region, 2011a)

<b>The volume of the investments</b>	44 bn US dollars, including 17 bn US dollars on the territory of the region
<b>The initiator of the project</b>	JSC "Gazprom"
<b>Designed project volume of production, services</b>	the production of 71.1 bn m <sup>3</sup> of gas, and the production of 27, 2 mln tons in LNG plant
<b>Number of employees</b>	1500 people
<b>The timeline for the implementation</b>	2008-2021

The mass media broadly discuss the topic of the possible tax relief for the Shtokman project, since it is very difficult to get a return on investment in such a complex project like Shtokman (Kotomin, personal message, 2011). The government of the Murmansk region works on a draft amending the law "On income tax and the law on property tax in organizations" (Borisenko, personal message, 2011). However, there is no clear picture about the fiscal conditions for the Shtokman project and it will be necessary to follow the updates of the government of the Murmansk region (BarentsObserver, 2009; BarentsObserver, 2011; BarentsNova, 2011).

The implementation of the investment project "The integrated development of the Murmansk transport hub" is planned to be carried out in practice observing the law of the Murmansk region "The participation of the Murmansk region in the public-private partnerships" (Borisenko, personal message, 2011). There are concerns of the economists and analytics that authorities pay too much attention to the Shtokman project, and as a result such other important for the Murmansk region projects like the development of the mining industry or the transport hub get insufficient attention, support and development (Kotomin, personal message, 2011).

The federal program "The development of the transport system of Russia (2010-2015)" provided 117.3 mln rubles, where 50.9 mln rubles come from the federal budget and 66.4 mln rubles come from private investments. This program is aimed at the integrated development of the infrastructure of the Murmansk transport hub. The Murmansk transport hub can be developed earlier than the Shtokman project (Buch, personal message, 2011). Among the priority activities to ensure the development of the transport system of the North-West Federal District of Russia is the investment project of reconstruction of the runway of the

Murmansk airport (Informational Agency, 2010). The beginning of the development of the Shtokman field is associated with the flow of new specialists to the Murmansk region from all over the world; hence the reconstruction of the airport of Murmansk is very important since it is the only airport that operates international flights.

The Murmansk commercial sea port will be used for certain works of Shtokman. One of the main official investment projects of the Murmansk region is “A container terminal in the Murmansk Commercial Seaport”. The description of the project is presented in Table 6.

Table 6. A container terminal investment project (Ministry of Economic Development of the Murmansk region, 2011a)

<b>The volume of the investments</b>	800 mln US dollars
<b>The initiator of the project</b>	Federal Government Agency “Rostransmodernizatsiya”
<b>Designed project volume of production, services</b>	1 mln TEU
<b>Number of employees</b>	No information
<b>The timeline for the implementation</b>	2008-2013

Another main official investment project of Murmansk region that has direct relation to Shtokman is “The port transshipment complex for coal and general cargo”. This investment project will create extended transshipment capacities of the port which will be used for the production and supply of goods and equipment for the Shtokman project. The description of the project is presented in Table 7.

Table 7. The port transshipment complex investment project (Ministry of Economic Development of the Murmansk region, 2011a)

<b>The volume of the investments</b>	500 mln US dollars
<b>The initiator of the project</b>	Ltd “Sea commercial port “Lavna”
<b>Designed project volume of production, services</b>	Capacity is 20 mln tons
<b>Number of employees</b>	530
<b>The timeline for the implementation</b>	2009-2015

### ***Total and the Government of Murmansk region: Memorandum of understanding***

In July 2007 the concern "Total" became the first foreign partner of Gazprom in the project of the Shtokman GCF development. The company owns 25 % of the stake in the Special Purpose Company ShDAG that was established in 2008 for the purpose of implementation of the first phase of the Shtokman project. "Total" attaches great importance to establishing partnerships with the administration of the Murmansk region and the public areas connected to Shtokman gas condensate field development. In 2008 "Total" opened its representative office in Murmansk that has since significantly expanded and strengthened the company's connection with the regional authorities and local organizations. In May 2008, “Total” and the Government of the Murmansk region signed a “Memorandum of understanding on the cooperation of the parties in the following areas: education, health, culture and sport”. Since spring 2008, "Total" cooperates with the Murmansk State Technical University in the training of future specialists in the oil and gas field. The practice of giving the lectures in the oil and gas field to the students of the Murmansk region has been developed by The Association of Teachers of the concern "Total". (Ministry of Economic Development of the Murmansk region, 2011b)

### ***ShDAG and the Government of the Murmansk region: 5 working groups.***

ShDAG in the framework of realization of the Shtokman project signed an agreement with the Government of the Murmansk region about the creation of 5 working groups:

1. a working group on the involvement in the project of enterprises of the Murmansk region,
2. a working group on the organization of training and retraining of specialists of the Murmansk region for ensuring the staffing needs of the project,
3. a working group on transport and logistics of the Murmansk region,
4. a working group on the use of an energy supply system for the Murmansk region,
5. a working group on land management and environmental protection (Shtokman, 2010).

The organization of working groups is one of the most effective tools of modern organizational development that is used for solving problems that require coordinated actions of workers of various fields. In case of the Shtokman project, the working groups are valuable tools for organization, coordination and the control of local participation. Practically, the local companies that express interest in becoming the contractors for Shtokman works can obtain the information about the main principles, requirements, opportunities, types of contracts, the EU contracting standards, tenders' procedures and tenders' requirements, the control and quality requirements of ShDAG and in general the logistics strategy of ShDAG. (Government of the Murmansk region, 2010b)

### ***Business centres and incubators***

Business centres and incubators are included into the Russian "Cluster Policy in the North" as an effective tool for SME development in the region (Federation Council, 2008). This tool is applied by the government of the Murmansk region and as a result several business incubators are working in the region and the Northern Chamber of Commerce is working on a project of creating of the International Business Centre "Murman" (NCCI, 2011).

The company JSC "The International Business Centre "Murman" was registered on the 31st of August 2007 by the Northern Chamber of Commerce of RF and Barents Invest AS. The objectives of the company are to meet the needs of Russian and foreign entrepreneurs in the services that facilitate international trade, economic and scientific-technical cooperation between the Russian Federation with foreign countries, the expansion and strengthening of business ties between the Russian and foreign companies, enterprises and organizations, as well as profit from all activities of the company. (Northern Chamber of Commerce, 2011)

In Figure 15 the plan of the future International Business Centre Murman that will provide the region with new business facilities, conference rooms, congress rooms, etc is presented. (Buch, 2009)



Figure 15. Project of the International Business Centre Murman (Buch, 2009).

The company “The International Business Centre “Murman” bought an unfinished building on the Kolskij prospekt in Murmansk. 12 % of the shares are owned by the Northern Chamber of Commerce of RF and 88% Norwegian company Barents Invest AG. The company rents the land, since it is still unprofitable to acquire the ownership, although there are certain advantages to be an owner of the land, because it leads to the capitalization of the object. The costs of the project are estimated to be around 3 bln rubles. The final investment decision is not taken yet (Buch, 2009). Since the region is interested in new Russian and foreign companies, the business incubating activity is well-organized in the region with the help of the Government of Murmansk region; therefore, several successful business incubators are represented in the region. (Borisenko, personal message, 2011)

A business incubator is an organization that creates the most favourable conditions for starting the development of small enterprises by providing an enterprise with comprehensive services and resources, workplace on favourable terms, communications facilities, necessary equipment, staff training, consulting and other important facilities. The range and complexity of services provided by a business incubator varies from secretarial, accounting, legal, and educational to consulting.

*The Murmansk Regional Agency for Small and Medium Enterprises (in Murmansk)*

A professional consulting organization was founded in 1995 with the assistance of the Russian Agency for Small and Medium Enterprises, the Government of Murmansk region and the city administration of Murmansk and the leading consulting organizations in the city of Murmansk. This incubator offers seminars, educational programs, trainings and consultations for start-up entrepreneurs in the Murmansk region. Early describe state program “Step by step” is implemented by the incubator by providing help to the start-up entrepreneurs in order to teach them how to apply for grants and subsidies within the program. (Murmansk regional agency for SME, 2011)

*Public Regional Institution of the Murmansk Regional Innovative Business Incubator (in Apatity)*

The incubator was founded on the initiative of the Government of the Murmansk region with the support of the Ministry of Economic Development of the Russian Federation. The mission is to promote the establishment and support the development of small and medium enterprises

engaged in activities aimed at the development, implementation and dissemination of new or improved products, new or improved technology, innovation, research and development activities. The incubator offers the training program “Start-up entrepreneur” of 50 hours of theoretical course and 10 hours of individual consultations that guides the participants through all the steps of starting the company in the Murmansk region from writing a business plan till participating in the funding state program “Step by Step”. (Murmansk regional innovative business incubator, 2011)

#### *The Norwegian-Russian business incubator Polar Star (in Murmansk)*

This is the first Russian-Norwegian business incubator in the Murmansk region. The mission of the incubator is constant development of the cooperation between Norway and Russia. The incubator offers modern physical infrastructure, necessary equipment, support services, professional network and safe working environment. The goal is to render the best support services to Norwegian and Russian companies and entrepreneurs who intend to start up business in the North-West Russia. The organization has already incubated 8 companies, among which is the company Barents Ecology established in Murmansk that specializes on environmental protection offshore and onshore, waste handling and works on the establishing of a test centre for oil spill products. (Polar Star, 2011)

#### *The special economic zone*

Implementation of the project of the oil and gas cluster formation in the Murmansk region at full scale requires certain decisions at the federal level, in particular on the allotment of the Murmansk seaport status of a special port area, as well as on the mechanisms of formation of the so-called Pomeranian zone in the Barents region (Federation Council, 2008). Special economic zone is the instrument for the development of important industries of the region, since the implementation of that tool in ports provides significant tax preferences for the enterprises that operate within that zone (Glushkov, personal message, 2011). The special economic zone is defined by the Russian Government of the Russian Federation as a special mode of doing business. The special economic zone complements the effects of industrial sites, sites and areas of special institutional conditions of operation (reduction of tax, customs, administrative and other costs) (Federation Council, 2008). However, one of the problems for Murmansk is the high competitiveness of the Norwegian sea ports that offer better services and already for many years have the status of a special economic zone of the port type, for example the port of Kirkenes is free since 1987 (Glushkov, personal message, 2011). The creation of special economic zones of the port type demands investments and government guaranties, since the main problem in Russia is bureaucracy (Kotomin, personal message, 2011)

The special economic zone of the port type is a limited area with a special legal status in relation to the rest of the territory and favourable economic conditions for national and/or foreign entrepreneurs of the following character: customs, currency, tax, and visa. For example such favourable conditions can be represented in the free banking zone, offshore, favourable economic zone, free trade zones, technology parks, etc.). A clear legal regime for special economic zones in Russia does not exist because the law on special economic zones has not been adopted yet. Special economic zone, except of the tourist-recreation type, can be established only on state-owned land. (Academic, 2011)



The government of the Russian Federation adopted a resolution on the 12<sup>th</sup> of October 2010 N 800 “On the creation of the special economic zone of the port type in Murmansk region” (Ministry of Economic Development of the Murmansk region, 2010b).

Depending on the type of the special economic zone, its residents enjoy a number of benefits that can be divided into four main groups:

- foreign trade benefits that impose special customs - the tariff regime and simplified order of foreign trade operations;
- fiscal incentives that provide tax incentives for certain types of activities; financial incentives, including various kinds of subsidies (reduction of rates of payment of utility bills and rent, preferential use of government loans);
- administrative privileges that involve simplifying work-related institutional arrangements.

In the Murmansk region the law about the special economic zone of the port type can be applied for JSC “Murmansk Commercial Sea Port” (the eastern shore of the Kola Bay), JSC “Murmansk Sea Fishing Port” (the eastern shore of Kola Bay), and port transshipment complexes (the free western shore of Kola Bay) (Kalinnikov, 2009).

Among the main investment project of the Murmansk region mentioned above are the construction of a container terminal in the Murmansk Commercial Seaport and the construction of the port transshipment complex for coal and general cargo which are aimed at enlarging the port capacity (Ministry of Economic Development of the Murmansk region, 2011a). On the territory of the special economic zone of the port type it will be possible to build a container terminal and to upgrade existing and construct new port facilities for receiving, handling and loading of bulk and liquid bulk cargoes. The investors of the Murmansk special economic zone of the port type will receive tax and custom privileges (Kalinnikov, 2009).

To summarize, it is important to mention again the significance of the Murmansk port due to its unique geographical location. It is one of the most perspective ports of Russia, since it is a deep-water ice-free port, protected from disturbances, such as high waves, the defined area of water of Kola Bay (Kalinnikov, 2009). The formation of the special economic zone of the port type will allow to provide the improvement of legislative and legal environment of the port structures, especially in antimonopoly regulation, omitting of the administration and economic barriers for the companies operating in the port, support of the *bona fide* competition, to reduce the scope of tariff regulation, establishing procedures for the management of land and the lease in the area (Kalinnikov, 2009).

### ***Customs legislative regulations in the Murmansk region***

The customs regulations are among the most significant aspects that influence the formation of industrial clusters and any cross-border trade, shipment and other business relations. There are 10 departments of customs clearance and control in the Murmansk region: Airport Murmansk, two-way automobile checkpoint in Borisoglebsk, Kandalaksha, Kirov, Kovdor, automobile checkpoint Lotta, automobile checkpoint Salla, Monchegorsk, the Seaport of Murmansk and the custom department in the city of Murmansk (Customs, 2011). The laws on customs is constantly changing in Russia what makes it difficult to follow and to apply; stable

regulations for customs services are very important for the development of the local businesses in the Murmansk region (Tsurkan, personal message, 2011).

According to the long-term strategy of the economic development of the Murmansk region, particularly the development of Murmansk transport hub, the structure of the warehouse and distribution area of the container terminal on the eastern shore of the Kola Bay is planned. The warehouse and distribution zones will include closed and open storage areas with the storage mechanization, manufacturing facilities, spur tracks, office facilities and hotel, and the new office of custom clearance (Citytowers, 2011). In case of using the Teriberka port and the eastern and western coasts of the Murmansk port, a new customs department will be needed in order to be able to provide the service for suppliers, declare the supply of goods and equipment.

#### 4.3.2 External economies

External economies are of a great importance for the creation of a cluster. A localized cluster composed of a bunch of small and medium-sized companies can reach an adequate competitive strength, benefiting from a vast array of external economies (Belussi and Sammarra, 2010). Human resources, R&D, the use of highly specialized machinery related to the ShDAG specialization, and transportation system of the Murmansk region are identified by the authors of the thesis as the most important elements which are involved in the formation of localized external economies. The regional resources are presented in this part of the thesis with the purpose of identifying the external economies for Shtokman.

##### *Human resources*

In business world the "manpower decides everything", so a special place in the preparation for the Shtokman project takes the training of specialists. Nowadays, it is possible to count on one hand all the regions of the Russian Federation where the specialists for the oil and gas industry are prepared. (Perspective, 2011) However, there is no doubt that the development of the Shtokman field will influence the development of the educational institutions in the Murmansk region, especially in the direction of oil and gas education programs and supporting programs as well (Skiotis, personal message, 2011). As it was already mentioned before that the ShDAG together with the Government of the Murmansk region has initiated a working group on the development of the training programs for the Shtokman project. ShDAG is interested in young, promising and ambitious specialists/professionals. Cooperation of the company with the universities of the region is the priority in the policy formation of human resources for the implementation of large-scale project in the Russian Arctic - the Shtokman field. Implementation of the project requires a large number of highly qualified specialists in various fields for offshore, onshore and logistic works for the project, as well as for the ancillary works. For that reason the management of ShDAG holds a series of meetings with representatives of major educational institutions of the region, concerning the questions of the peopleware of the Shtokman project. (EnergyLand, 2011)

In order to understand the human resource potential for the Shtokman project, especially what the Murmansk region can offer in terms of professionals, it is necessary to look into the demographic situation of the Murmansk region. As well as in the whole of Russia, the demographic problem exists in the Murmansk region. The population of the North has dramatically decreased from 1990 till 2009 from 9807 to 8204 thousand people, around 1,6

mln people. Another problem is that the population is getting older (Buch, personal message, 2011). In Figure 16 the demographic situation of the region from 2001 till 2010 is represented. (Murmansk statistics, 2011b)

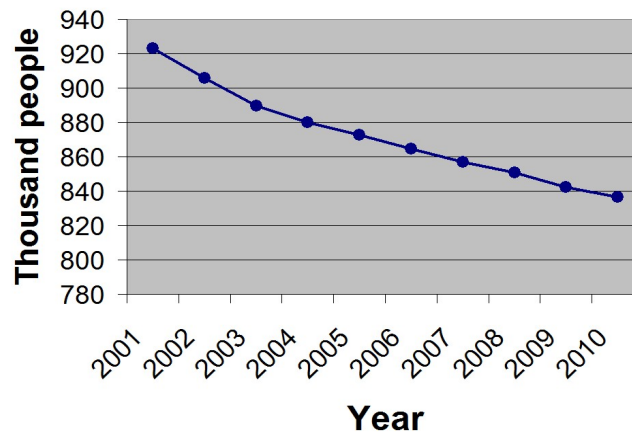


Figure 16. Population of the Murmansk region (Murmansk statistics, 2011b).

The main reasons for such dramatic decrease of the population are the migration from the North and the natural loss of population (Scientific Council of the Russian Academy of Sciences, 2010). The constant migration from the North can be explained by the program of Russian Federation for the resettlement from the North (Borisenko, personal message, 2011). However, the main aim of the government of the Murmansk region is not to increase the number of people, but to improve the level of living in the region (Borisenko, personal message, 2011). Nevertheless, the demographic situation has positive dynamic in some indicators. For the last 5 years starting from 2006 the positive dynamics of several demographic indicators can be noted in the Murmansk region:

- fertility rate increased by 13% (9303 children were born in 2010, what is 787 children more than in 2005),
- mortality rates decreased by 15% (9527 people died in 2010, what is 2,145 people less than in 2005),
- infant mortality decreased by 2 times (Murmansk region, 2011).

However, there is the threat of an increase of the level of death due to health problems with the cardiovascular system and external influence like poisoning, accidents, suicide, crime, etc (Scientific Council of the Russian Academy of Sciences, 2010).

The demographic statistics of the population of the Murmansk region shows in Figure X that 67% of the population has the working age, while 17% is already over the working age. This statistics shows the positive situation in the region since more than 50% of people can be considered as a real labour source.

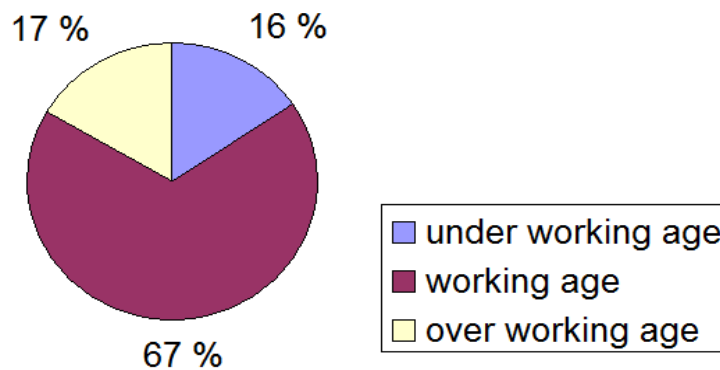


Figure 17. The population of Murmansk region: age groups, 2010 (Folk encyclopaedia My City, 2011).

It is important to mention that in spite of the 67% of people able to work in the region, the rate of employment is very high. The unemployment rate is very dependent on the specialty of the region, since many cities are military. That means that many workers come from other Russian regions to have a contract work for the military fleet. Military closed areas are officially called ZATO in the Russian language, what means closed administrative-territorial entities. There are seven cities that are located in these closed territories in the Murmansk region: Vidyaevo, Zaozersk, Ostrovnoy, Poliarny, Severomorsk, Skalisty and Shezhnogorsk. It is important to have an overview about the military situation in the region, since the fleet and ZATO are located on the shore of the Kola bay not far from the Murmansk commercial and fish ports. (Kalinnikov, 2009)

The recruiting companies of the region are mainly specialized in crewing for fishing industry. The region has a strong maritime specialization of labour sources. For example, the recruitment agency New Century Plus in Murmansk provides complex services in crewing, recruiting and consulting (New Century Plus, 2011). The agency is certified according to the international standards and obtains the certificate ISO 9001, therefore the international companies entering the regional market in the framework of the Shtokman project can rely on its services (Ruban, personal message, 2011). However, there is a weak organization for the retraining of the maritime specialists and a lack of highly qualified specialists on the regional labour market (Ruban, personal message, 2011). It will be necessary to attract specialists from other regions for the realization of all the works of the Shtokman project since the region can offer specialists mainly in the following areas: fishery, military, economics, ecology, geology, mine, layers and service assistance (Ruban, personal message, 2011). However the specialists in geology are very important for the regional geologic exploration of the oil and gas reserves. The Murmansk region has a potential of intellectual resources and of sufficiently educated specialists in that field (Loktev, personal message, 2011).

The Murmansk region is relying on the Shtokman project, waiting for the development of various businesses, especially the increase of the business activity in construction, oil and gas and related to them industries (Ruban, personal message, 2011). There is a lack of human resources for oil and gas industry in the region. So it is necessary to attract employees from other regions and countries. In general human resources are expensive in the North comparing to other Russian regions, due to a lot of social privileges (Borisenko, personal message, 2011). However, the Shtokman project requires highly educated and experienced professionals that eventually the Russian specialists from the North itself are cheaper for ShDAG than the foreign specialists (Berezhnoj, personal message, 2011). According to ShDAG estimation, around 1600 workers will be involved at the peak of the offshore

construction. Approximately ten times more workers will be required for the construction of the LNG plant. (ShDAG, 2011e)

Therefore, the oil and gas specialists will be in demand. For that reason, the special training programs are already under process of development in the region. There are in total 19 universities in the Murmansk region and eleven specialized educational institutions (Murmansk statistics, 2011a). In Table 8 the reader can get acquainted with the educational and training programs which exist in the Murmansk region for preparing specialists for the oil and gas industry.

Table 8. Educational and training programs related to oil and gas industry in the Murmansk region

<b>Educational institution</b>	<b>Program</b>
Murmansk State Technical University (MSTU), Department of continuum mechanics and offshore oil and gas business	Bachelor program in Oil and Gas Business: Operation and maintenance of oil and gas sector of the Arctic shelf (MSTU, 2011a)
	Master program in Geology and Mineral Exploration (MSTU, 2011c)
	Master program in Physical Processes of Oil and Gas Production (MSTU, 2011c)
	Master program in Industrial and Civil Construction, including hydraulic engineering buildings and structures (MSTU, 2011c)
Arctic Centre for Preparing Specialists for Oil and Gas field	Logistics training program Other programs are under development The centre is not supporting graduates with further employment (Buch, personal message, 2011)

The specialists for the Shtokman project are not fully prepared in the local universities, even in the biggest university MSTU most of the full-scholarship places are provided for fisheries specializations (Buch, personal message, 2011). In Figure 18 the graduates of public institutions of higher education by groups of areas of training and specialty groups are graphically presented.

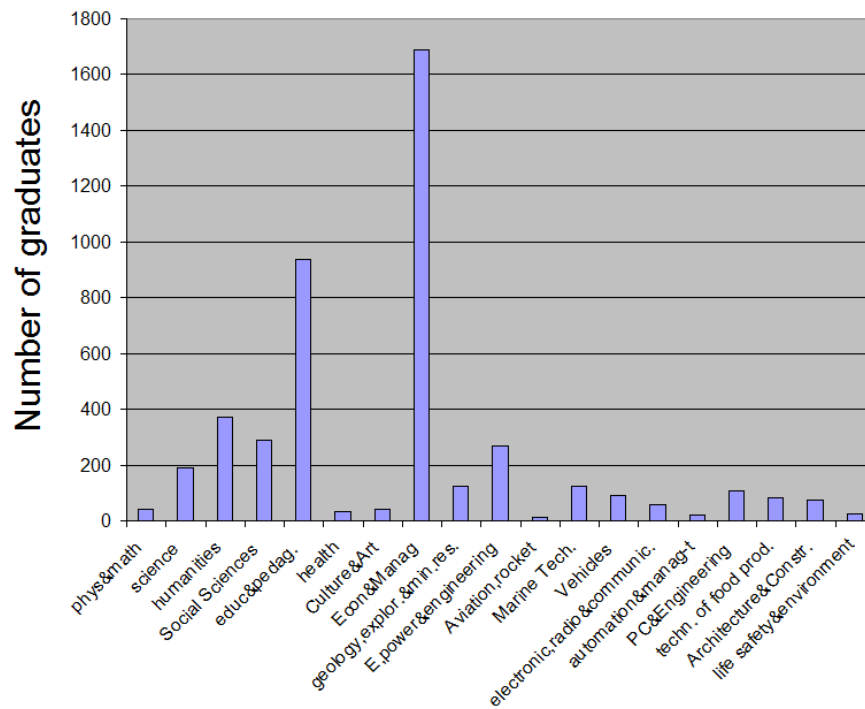


Figure 18. Graduates, 2010 (Murmansk statistics, 2011a).

From Figure X it is possible to understand that there are around 1000 graduates in education and pedagogic area and around 1700 graduates in economics and management area, however in all of the technical specializations the number of graduates is less than 200 people, except e-power and engineering where there are around 300 graduates. There is a lack of specialists in mathematics and physics – the areas of study that are extremely valuable for offshore and onshore works for Shtokman project (Berg, personal message, 2011). As for the new specialists, local educational situations are not able to provide 100% of human resources demand for the project (Buch, personal message, 2011). There is a lack of such specialists in the region as welders, carpenters, fitters and riggers, as well as a lack of specialists for the works with high technologies that will be also required for Shtokman works and more likely these specialists will be attracted from other regions and countries (Buch, personal message, 2011).

It is also important to pay attention to the fact that shift method of work will be the most common in the Shtokman project (Berezhnoj, personal message, 2011). Hence, there will be another problem that will appear when the project will be developed - the works from all over the world together with the employees from the Murmansk region will face the features of intercultural communication (Skotis, personal message, 2011). The Murmansk Humanities Institute offers such educational programs that are aimed to teach future workers how to work in an international environment and survive between the cultural differences at work, how to solve psychological problems at work in remote locations, etc (Skotis, personal message, 2011). All these educational directions are important for future Shtokman employees who will work in remote offshore field or in restricted area of LNG plant and live in the temporary village for workers in Teriberka (Berezhnoj, personal message, 2011).

### *The shift method of work*

As it was already mentioned above, the shift method will be mainly used in the Shtokman project (Berezhnoj, personal message, 2011). The shift method has both advantages and disadvantages, which are presented in Table 9.

Table 9. Advantages of the shift method of work (Armstrong, 1976)

Earnings	Work in the shifts for Shtokman is located in the remote areas of the Far North. The cost of living comes to minimum for the workers, especially in the very remote places, when the housing, for example the temporary village for the workers in Teriberka, is provided by the enterprise and there is almost no possibility of shopping.
Unique professional experience	In-depth study of a special topic, possibility to be directly present at the difficult and unique technical works, an opportunity to study in details the equipment, ask the experts all questions, insight into the methods and principles of various types of work, etc.
New language	Work in international group allows learning new foreign languages. In case of the Shtokman field development the most demanded languages will be the most common international language English, as well as Russian, Norwegian and French, since the main operating companies of the field are Russian Gazprom, Norwegian Statoil and French Total.
Invaluable personal experience	Opportunity to establish strong personal and professional relationship working in difficult field conditions with representatives of various regions, countries, professions, backgrounds and cultures.

Summarizing, the high salaries together with the obtained professional experience for life, new language knowledge together with new personal and professional contacts bring the main value to the shift work for Shtokman in the Arctic. However, it is difficult to find experienced specialists who would be willing to move to the high north of Russia for some temporary works on the offshore field (Armstrong, 1976). Working shifts in remote locations, the workers feel a lot of pressure; they need to learn the intercultural communication in order to work in an international team (Stratij, personal message, 2011). Therefore, it is important to understand the full scope of the features of the shift method of work including the disadvantages that are presented in Table 10.

Table 10. Disadvantages of the shift method of work (Armstrong, 1976)

Remoteness	Distanced location from the family, absence of communicational technical capabilities (in some very remote locations mobiles do not work).
Lack of personal space	Constant environment of the same people at the work place and at the living place. It is almost impossible to be alone: depending on the type of accommodation workers can live in shared rooms.
Working day exceeds standard 8 hours	The amount of free days between the shifts can depend on the specific project and the duration of the shifts.
Low comfort level	Possible low level of domestic comfort to its complete absence. Sharing shower, kitchen, etc. Is very common in Russia to have shortages of hot water on the land, hence in offshore conditions of work the hot water question may arise. The trip to the workplace may take up to 10 hours and consist of several flights and transfers

	with not always comfortable means of transportation, for example noisy helicopters or off-road cars.
Homesickness and family destruction	Most of the time will be spent without the family. This can lead to homesickness or to the destruction of the latter one. Consolation could be the creation of a new family on the working place.

This table explains many disadvantages of the shift working method that cannot be overlapped by the high salary that makes it difficult to find the combination of excellent specialists ready to travel to remote uncomfortable places of work. The temporary village for workers of the LNG plant will be built in Teriberka. The technical staff like cooks, electricians and carpenters can be prepared in the Murmansk region (Berezhnoj, personal message, 2011). ShDAG is planning to involve the citizens of the village Teriberka in the age below 35 years (Berezhnoj, personal message, 2011). However the other professionals may come from out-of-the-region places for working in shifts (Berezhnoj, personal message, 2011).

#### *Hotels and conferences capacities*

Due to the Shtokman GCF development the region will face the flow of the entrepreneurs mainly to the capital of the region – the city of Murmansk. In that case it is relevant to analyze the hotel market of the region, in particular in the city of Murmansk, including the congress and conference facilities. There is a shortage of high quality conference halls in Murmansk (Milokhin, personal message, 2011). Nevertheless, there are 12 hotels and hostels in Murmansk, in which there are three 3-star hotels such as Poliarnie Zori, Meridian and Ogni Murmanska that are described further in the text. There is also one hotel Arktika located right in the heart of the city, unfortunately it is under a renovation process already for many years and the year when it will be put back to work is not decided yet. The crises has negatively influenced on the development of this business sector (Berezhnoj, personal message, 2011).

#### *Hotel Poliarnie Zori*

This is a 3-star hotel which was built in 1973 and reconstructed in 1997. In 2000 the hotel won the award "Best service of the Murmansk region". The hotel is situated in the city centre and has a wonderful view over the Kola Bay. Near the hotel is a drama theatre, the main offices of many banks, science institutes, two stadiums, the Ice palace, marine, art and local museums and the city exhibition centre. There are 262 rooms, restaurants, high-speed internet, a business centre with conference capacities, parking, sauna, remoteness from the city centre is 1 km, remoteness from the airport is 30 km, remoteness from the railway station is 1,5 km (Hotel Poliarnie Zori, 2011). There is a project of enlarging the hotel's facilities, however due to the crises the investment is postponing (Milokhin, personal message, 2011).

#### *Meridian*

Meridian is a 3-star hotel located in the centre of the Murmansk city. There are 135 rooms in the hotel, from which 1 VIP, 7 two-room suits, 15 one-room suits, 3 twin-rooms, 85 business rooms and 24 economy rooms. There is also an entertaining complex "M-club" which includes restaurant, bar, nightclub, bowling and billiards. The business centre of the hotel is represented by the two large halls with a capacity of max 80 and 120 people, two small halls



with the capacity of max 30 people, business round lounge for 10 people. (Hotel Meridian, 2011)

### *Ogni Murmanska*

This is a 3-star hotel, located 6 km from Murmansk downtown, 20 km from the airport, 6 km to the railway station. There are 37 apartments from which 1VIP Royal, 1 VIP, 3 Lux, 2 Lux with sauna, 4 Junior suites, 23 Business rooms and 3 standard rooms. The hotel offers cable TV, parking, wireless internet, aqua park and ski-centre attendance free of charge for its guests. There is restaurant with two halls for max 100 and 40 people and conference room for max 45 people, two bars, mountain-sky centre, swimming bath, barbeque wooden cottages and Extreme Park. (Ogni Murmanska, 2011)

### *Arktika*

This is an 18-stores hotel located in the city centre of Murmansk that is able to accommodate max 1030 people. Since 2009 the hotel is not functioning due to the reconstruction. Although the hotel has the potential to be the business card of the city since it is the highest building located beyond the polar circle. There are a business centre, conference facilities, a restaurant, two cafes, beauty salon, billiards, shops, bars and other entertaining facilities for clients. The hotel is included into the Azimut hotel chain and will be renovated by this company. (Azimut hotels, 2011)

Summarizing, it is important to mention that the hotel Poliarnie Zori is an example of how foreign investments work for the region, since it was purchased by Norwegians and included into the Park Inn chain of hotels. Being a 3-star standard and one of the most luxurious and popular hotel of the city and the region, the hotel is still lacking the conference facilities. However, it is possible to organize conferences for 150 people maximum (Milokhin, personal message, 2011). When the investment decision for Shtokman project will be taken, then for example it will be needed to organize a congress for 300 people than the city already cannot do it (Milokhin, personal message, 2011).

### **R&D**

The government of the Murmansk region issued a resolution on the 24.02.2005 № 56-PI/2 about the strategy for the development of science, technology and innovation in the Murmansk region until 2011 (CNTI, 2005). Among several strategic goals of the resolution are the development of new industrial sectors such as oil and gas, including hydrocarbon production, transportation and recycling (more than 100 mln tons per year). For example, the construction of the offshore and onshore parts of the pipeline in the Shtokman project requires a lot of research. The offshore pipeline raises a lot of questions, especially from the fishermen of the Murmansk region, since there is a thread of accidentally hitching up and damaging the pipe with the trawl from the fishing vessel (Demjanenko, personal message, 2011).

Threat in exploring the Shtokman field is in the large scale fumes that can go into the atmosphere in case of the pipeline damage and cause explosion (Loktev, personal message, 2011). This can lead to the catastrophe when the gas leaking from the pipeline will spread in the water and lower its density, due to this the extracting vessel operating on the Shtokman field will have a thread of sinking, moreover all living organisms in the area of accident will die (Loktev, personal message, 2011). In this respect, before science faces the challenge of

developing measures to prevent or mitigate the potential social conflicts in the zone of pipelines crossing areas dominated by traditional land and aqua use, it is necessary to conduct necessary scientific research and develop options for different solutions for contentious issues (CNTI, 2005).

In connection with the development of the gas fields in the European North of Russia and the Barents Sea shelf, as well as the emergence of new routes for the transportation of oil and gas there are qualitatively new challenges to ensure environmental safety. For the Barents and White seas it is necessary to evaluate the impact of offshore production units, subsea pipelines, tanker traffic and oil terminals in the fishery ecosystem, and state protected species. The environmental impact assessment (EIA) of selected major projects, such as a complex of gas production at the Shtokman field should be performed. It is also necessary to continue improving the methodology and procedures for EIA offshore oil and gas deposits, which are currently largely based on empirical experience of EIA development for the Shtokman gas condensate field in the Barents Sea and the search and appraisal work for oil in the Pechora Sea. (CNTI, 2005)

In a broader setting, the aim of the scientific strategy of the Murmansk region is to conduct a strategic environmental assessment in the Barents Sea (in the longer term - the Barents-Kara region) for the harmonization of the leading sectors of maritime economy such as fishing industry, oil and gas industry, maritime defence – the Northern fleet, maritime transportation and activities aimed at environmental protection. (CNTI, 2005)

There are several organizations in the Murmansk region undertaking the scientific research work. Three main regional leaders in science and innovation are described below.

#### *MSTU*

MSTU is the Murmansk State Technical University that was already mentioned as the only one educational institution of the Murmansk that offers full-time bachelor and master programs in oil and gas field. The international centre for the transfer of innovation and development of applied research is established on the basis of the MSTU. The research work undertaken in that centre relates to the innovative solutions for urgent economic problems of the Murmansk region such as fishing and fish processing, navigation safety, housing reform about energy saving, oil and gas business, ecology, information and telecommunications systems. (MSTU, 2011b)

#### *MAGE*

MAGE is the Marine Arctic Geological Expedition that was established in Murmansk in 1972 and became the first marine geological organization of the Kola Peninsula (MAGE, 2011). MAGE has experience in complex geological and geophysical studies in the seas of the Arctic and Antarctic on the continental shelf of the Spitsbergen archipelago in the Atlantic and Pacific oceans (MAGE, 2011). The expedition has its own production facilities, including a laboratory building in Murmansk, marinas, shops and warehouses on the shore of the Kola Bay, three research vessels “Geolog Dmitriy Nalivkin”, “Professor Kurentsov”, “Geofizik” and the pilot boat “Yantar” and the shore computer centre. The main activities of MAGE are integrated geophysical surveys for oil and gas in the Arctic Seas and seismic exploration for oil and gas offshore the Atlantic Ocean and its seas under contracts with foreign companies. (CNTI, 2005; MAGE, 2011)

## KSC

KSC is the Kola Science Centre of the Russian Academy of Sciences (formerly the Kola Branch of the USSR Academy of Sciences), named after S. M. Kirov. KSC is the union of scientific institutions of RAS located in Apatity on the Kola Peninsula (KSC, 2011). The structure of the scientific institutions of Kola Scientific Centre includes the following research departments:

1. Geological Institute,
2. Mining Institute,
3. Institute of Chemistry Technology of Rare Elements and Mineral Raw Materials,
4. Murmansk Marine Biological Institute,
5. Polar-Alpine Botanical Garden-Institute,
6. Institute of North Industrial Ecology Problems,
7. Polar Geophysical Institute,
8. Institute of Informatics and Mathematical Modelling of Technological Processes,
9. Institute of Physical and Technological Problems of Energetics in Northern Areas,
10. Kola Regional Seismological Centre,
11. Institute of Economic Problems (KSC, 2011).

The institutions are located in the centre of the city of Apatity and in other towns of the Murmansk region. KSC staff in total amount of 1547 people, from which there are 99 doctors of science, conducts valuable researches for the Murmansk region, for example the researchers study the geological structure of the Kola Peninsula, the natural geochemical processes and patterns of distribution of minerals, the development of effective technologies of production and mineral processing, scientific principles and methods of complex processing, investigation of biological productivity in the Barents Sea, and ways to improve it, economic valuation of natural resources. (Kalinnikov, 2009)

Summarizing, it is necessary to mention the ongoing target program of the Murmansk region “Science and scientific provision of Strategy of economic development of the Murmansk region for the period until 2015”. However, the regional law “About innovation and innovation activity” that would be valuable for regulating the research and development together with the innovation activity in the Murmansk region, does not exist (Kalinnikov, 2009). Moreover, the association Murmanshelf coordinates theoretical and practical project "Formation of a cluster of oil and gas industry in the Murmansk region – the potential and problems of its realization" (Fertoft and Voskoboynikov, 2010). This scientific program is developed in the framework of the Shtokman GCF development in the Murmansk region.

### *Geologic exploration*

It is not surprising that exploration of the continental shelf of Western Arctic is one of strategic tasks of the government of the Murmansk region. The role of the government is essential – it is the owner of all the land and aqua territory in Russia (Loktev, personal message, 2011). The first steps are described in the Energy strategy of Russia that states that by 2020 the extraction will reach 30 billiards cu m of gas. (Scientific Council of the Russian Academy of Sciences, 2010)

The Arctic shelf including Okhotsk Sea estimated by the experts to be one of the most promising in terms of extracting hydrocarbons and will be able to support 30 per cent of the annual volume of Russia by 2025 (Kotomin, personal message, 2011). Moreover, the most gas resources are located in the Barents Sea and the Kara Sea – up to 70 mln cu m.

Distribution of hydrocarbon resources within the area of water of Russia is quite uneven: 86 % of northern seas resources are located in the western Arctic (Barents, Kara, Pechora Sea). Exploration of the region of western Arctic the highest in Arctic, as in this region is already done 90% of prospecting seismology of category 2D, 100% of 3D exploration, drilled 100% holes of the shelf and islands. Because of expansion of activities of SevMorNefteGazRazvedka from 1979 till 1990 the volume of seismology exploration has increased from 9500 to 38307 linear km. Unfortunately, the exploration was decreased after and even equal to 0 in 1994 due to shortening of the financial support from the budget (Kotomin, personal message, 2011).

The share of promising resources and explored reserves is slender. Due to this fact it is important to precede regional and searching works in order to prepare geological works for licensing. The materials of the exploration made with application of new equipment and technologies are available to the state authorities of bowels management, so that it is possible to evaluate the volume of the field and pursue the strategic planning. (Scientific Council of the Russian Academy of Sciences, 2010)

The current state of oil and gas development in Russia is characterized by a reduction in exploration, and low rates of regeneration. The volumes of geological survey work do not ensure regeneration of the mineral raw materials base within the oil and gas industry. The most profitable parts of the fields and deposits are being developed, not the more challenging ones. (Lesikhina et al., 2007)

From Figure 19 it is possible to see the distribution of oil and gas reserves between the various seas on Russia's Continental shelf as estimated in 2005.

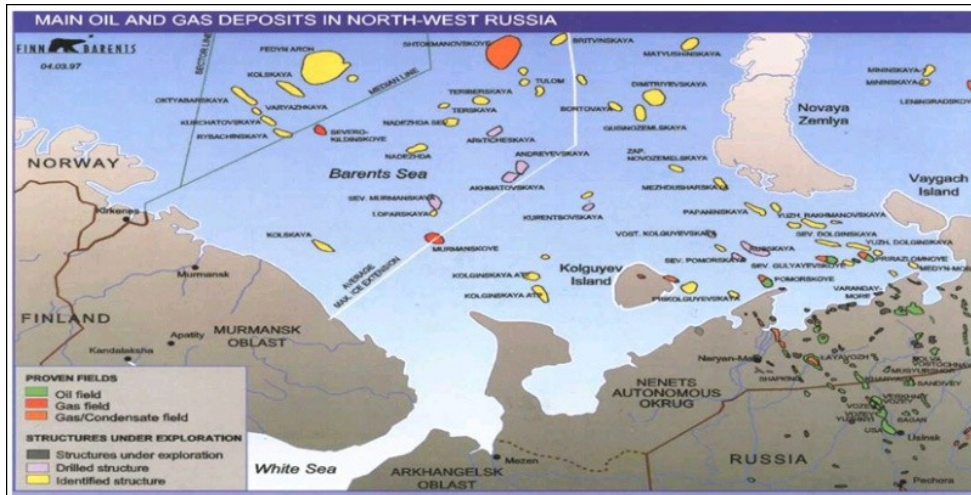


Figure 19. Distribution of oil and gas field in the North-West Russia (Bellona, 2011).

In Russia there are 2 deep-water vessels that conduct seismology exploration 3D with four 6000m long braids. The potential of the geophysical fleet of Russia can explore up to 80000-100000 linear km of regional, searching, detailed exploring of the category 2D annually, what can result in a qualitative exploration of the shelf in 3-5 years for the further exploration of 3D-4D category and drilling. However, Figure 20 shows the distribution of capital investments for the development of the typical oil and gas field in 2008.

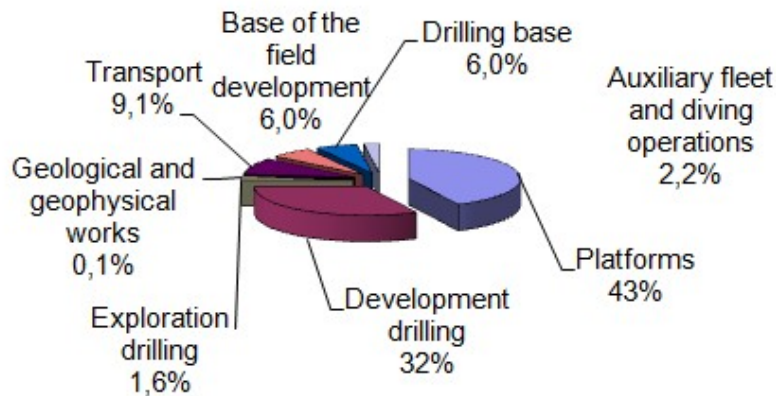


Figure 20. Distribution of capital investments, 2008 (Kotomin, 2011).

From Figure 20 it is clear that only 0,1% of the budget goes to the geological and geophysical works. It should be mentioned that geophysical works are expensive and it takes high technology for the data processing. (Kotomin, personal message, 2011)

One of the problems in geology in the Murmansk region is the lack of investment (Loktev, personal message, 2011). However, there is a long-term program until 2020 of exploration of bowels and reproduction of the material resources of Russia based on the balance of consumption and reproduction of mineral resources. According to this program, 15 mln dollar is planned to invest in a geological survey of the shelf with partial participation of the government (10%). However, it is not enough for the increasing of the resources up to the planned level – 10 tn cu m. (Scientific Council of the Russian Academy of Sciences, 2010)

Private investors do not get move on the investment before the primary calculation. It is connected with the fact that severe climate conditions and lack of technologies decrease the

profitability of projects for extracting of natural resources from the shelf. As soon as there is no experience in remote offshore field development there will be no calculations of investments profitability.

It is necessary to mention that there is another field in Jamal of 10 tn cu m of gas which is not as remote as the Shtokman field. Therefore, there is a threat of postponing of the Shtokman project development. There are some difficulties with the Jamal field exploration due to the fact that there is significant share of helium that cannot be wasted. Helium is a substance of the future. Therefore, additional storage capacities should be constructed for the helium storage that will bring additional expenses. (Kotomin, personal message, 2011)

Summarizing, the government of Russia has no clear and valid perspective for the oil and gas industry. The governmental programs and strategies are not corresponding with each other, especially on the part about the increasing of the geological survey on the Arctic shelf. Current technological and technical level should be taken into account while claiming the diversity of hydrocarbon resources exploration. (Scientific Council of the Russian Academy of Sciences, 2010)

### ***Machinery related to project realization***

Another element of the external economy of the Murmansk region from which ShDAG could possibly benefit is the machinery related to the company's specialization. The amount of the machinery in-use is important for the development of the oil and gas industry of the region. Shtokman project requires the machinery of various types, from excavators for the sand when building the road in the village Teriberka to the heavy-duty trailers for transporting the pipes. From the official statistics office the information about the major construction machinery that is represented in the region is collected in the Table 11. Table 11 shows the statistics of the major construction machinery in organizations engaged in construction activities in Murmansk region from 2003 until 2010, so it is possible to follow the dynamics of the decreasing/increasing amount of machinery in the region.

Table 11. Machinery statistics 2003-2010 (Murmansk statistics, 2010a)

<b>Type of machinery/Year</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Excavator (with one shovel)	150	155	129	207	221	206	228	218
Crawler-mounted (including backhoe) cranes	32	34	29	34	39	28	25	19
Grader (auto-grader)	30	30	27	70	65	70	71	82
Bulldozer (on continuous tracks)	111	119	92	178	195	185	218	216
Cranes on pneumatic-run (including cranes on special chassis)	18	17	12	13	11	15	19	12
Tower cranes	39	28	22	24	24	14	11	5
Truck cranes	106	111	92	126	128	125	152	131
Hydraulic lifts	33	29	21	42	46	42	52	45
Shovel loader	43	51	43	98	113	173	152	129
Tractor	37	48	29	67	97	80	130	122
Drilling machines based on a tractor and a car	17	15	4	8	4	3	5	2
Self-propelled road roller	46	52	49	69	67	58	56	55
Inventory and mobile concrete-solution-mixing plant	25	22	15	6	26	32	18	11

Heavy-duty trailer	37	42	29	50	51	39	55	76
Pile diesel-hammer	16	16	15	12	5	6	6	1
Construction and finishing machines	59	134	153	238	160	140	252	263
Hydraulic breaker	15	19	20	32	28	30	32	27

Summarizing, it is necessary to say that there is lack of machinery in the region; this field can be attractive as a potential investment activity. From Table 11 it is possible to notice that there is lack of crawler-mounted cranes, cranes on pneumatic-run and on special chassis and tower cranes in the Murmansk region. All types of cranes are very important machines used for lifting, generally equipped with a hoist (device) or winder (also called a wire rope drum), wire ropes or chains and sheaves that can be used both to lift and lower materials and to move them horizontally. Cranes are widely used in the oil and gas industry; hence the investment into this type of machinery will be needed in the future. Such decreasing in the amount machinery like the inventory and mobile concrete-solution-mixing plant and diesel pile hammer are valuable in construction and might be used for the construction of the LNG plant in Teriberka. Hydraulic breaker has also been decreasing in amount, although it is very useful type of machinery especially in the Murmansk region that can be used for the destruction of rocky soil, concrete and reinforced concrete, destruction of the frozen ground, etc. All above mentioned machinery can be used for onshore operations of the Shtokman project. However, the industry in the Murmansk region has insufficient equipment and machinery (Berezhnoj, personal message, 2011).

### ***Transport system***

The transport system of the Murmansk region constitutes a significant part of the external economies for the development of the Shtokman GCF. The authors captured the seaport, railways, roads and airport as the main components of the transport system of the Murmansk region.

#### ***The Seaport of Murmansk***

The port of Murmansk is the world's largest port located behind polar circle. It is situated on the Kola Peninsula at the coast of the Barents Sea. Murmansk is the most Northern non-freezing port in Russia. Only in very severe winters Kola bay's port area entirely becomes covered with ice. In these cases vessel's pilotage is carried out by ice-breakers and port tugs. Depths on fairway and roads, which length is 22 miles, are quite deep that provides availability to work with any type of vessels. (Belfreight, 2011)

The port of Murmansk is located in the zone of the dense urban area of the city of Murmansk that does not allow its further expansion and connected to it development. To expand and develop the port, the increment, growth of its territory is needed, for example by land filling 20,000 square m of its territory. The internal connection of economy of the Murmansk region with the other Northern economic regions like Republic of Karelia, Arkhangelsk region and Nenets Autonomous District and the Northwest Economic Regions such as St.-Petersburg, Kaliningrad, Leningrad, Pskov and Novgorod is very weak, due to poor transport infrastructure and the lack of significant mutual economic ties. (United Russia, 2008)

JSC "Murmansk Commercial Seaport" is one of the biggest enterprises of the Murmansk region. The uniqueness of the Murmansk Commercial Seaport is in its all year round ice-free location. The freight turnover of the port in January-March 2011 has increased by 2% over the

same period of 2010 and amounted to 3,394 tons. In particular, the volume of transshipment of the export cargo amounted to 3 203.3 thousand tons, import - 72,6 thousand tons, cabotage - 118.1 thousand tons. (Murmansk Commercial Seaport, 2011)

The main part of the freight turnover was coal export, transshipment of which during the reporting period reached 2 684.5 thousand tons (79% of the total turnover of Murmansk Commercial Port). In addition, in the first quarter of 2011 processing of iron ore concentrate increased to 121.5 thousand tons (88% compared to the same period in 2010); transshipment of pellets (by 40%) to 26,6 thousand tons, transshipment of manganese ore (increase by 2 times) up to 68,7 thousand tons, transshipment of cabotage freight (55%). (Murmansk Commercial Seaport, 2011)

In the first quarter of 2011 Murmansk Commercial Seaport handled 47 160 wagons and 123 vessels. In early April 2011 were announced preliminary financial results of the JSC "Murmansk Commercial Seaport" for the 1st quarter of 2011 and the expected revenue is 720 mln rubles. The port started to work on major repairs of moorage of cargo area, for these works to the end of 2011 it is planned to spend about 200 mln rubles. (Murmansk Commercial Seaport, 2011)

It is necessary to increase the capacity of the port, in particularly increase the storage capacity, to double the freight turnover of the port. It is important to be able to store reserves. In fact, this will allow increasing the carrying capacity of the road and transshipment capacity of the port. The new coal terminal project was sent to the JSC "Russian railways". Murmansk port is the base port for Northern Sea Route and the base for the nuclear icebreakers. (Velenj, 2004)

As a growth point for the Murmansk Commercial Port can be considered the promising project of the Shtokman GCF development, which is now at an early stage. The contract for handling 300 thousand tons of macadam is in the signing stage. But it should be noted that the Murmansk Commercial Port today is capable of receiving all goods for the development of the Shtokman project. Past few years the Murmansk Sea Commercial Port actively increases its production capacity, now it is possible to overload up to 20 mln tons of export-import and cabotage freight. (Marine news, 2011)

The construction of the container terminal on the eastern coast of the Kola Bay is planned. The construction of modern container transshipment complex will allow using the potential of the Murmansk Transport Hub as a container port in terms of growth of the container freight turnover (Citytowers, 2011). The container terminal supposes the following content: marine freight front, container storage facilities, rail or and auto freight front, internal port container transport for moving containers between the freight fronts and storage facilities, storage facilities for packaging and unpacking arrangement with rail or auto access and construction of border checkpoints across the state border including the inspectoral customs complex (Citytowers, 2011).

The Figure 21 represents where the container terminal is planned to be constructed. ([Citytowers, 2011](#))





Figure 21. Plan of the reconstruction of Murmansk Commercial Seaport ([Citytowers, 2011](#)).

Murmansk Commercial Sea Port tranships pipes for the Shtokman gas condensate field. The current capacity of the port allows storage of some 6.000 pipes. The Port Authority is considering solutions to increase the throughput of the port. The port will be ready to use for handling Shtokman pipes at berth N1 after its completion. The Shtokman field project requires a lot of pipes and the administration has been looking for additional sites for storage of the cargo. The Port Authority is considering using handling facilities outside the port at the nearby seaports. (Russian Transport Daily Report, 2010)

Due to the fact that some technical works are not implemented in Russia, the involvement of the sea ports of Norway will be considered (Berezhnoj, personal message, 2011).

#### *Railways and roads of the Murmansk region*

Today the Murmansk branch of the Russian October Railways has 1068 km of ways, from them 495 km are electrified, more than 20 enterprises, more than 50 stations, about 8 thousand working (Hibiny, 2011). In 2002 the general departure of cargoes on branch has made 24944270 tons, and a passenger turnover - 757902 mln km (Hibiny, 2011). Below Figure 22 represents the railways web of the Murmansk region, the part of Russian October Railways.



Figure 22. Railways network of the Murmansk region (Travelling by train, 2011).

Murmansk branch of October Railway is one of six offices of the Russian October Railway. The length of the roads today is 1,068 km, of which 491 km is electrified. There are 55 stations in the department. The total length of motor roads in the region is just 4,400 km, railways – 891 km (Ministry of Foreign Affairs of the Netherlands, 2011). Below Figure 23 represents the web of main roads of the Murmansk region.

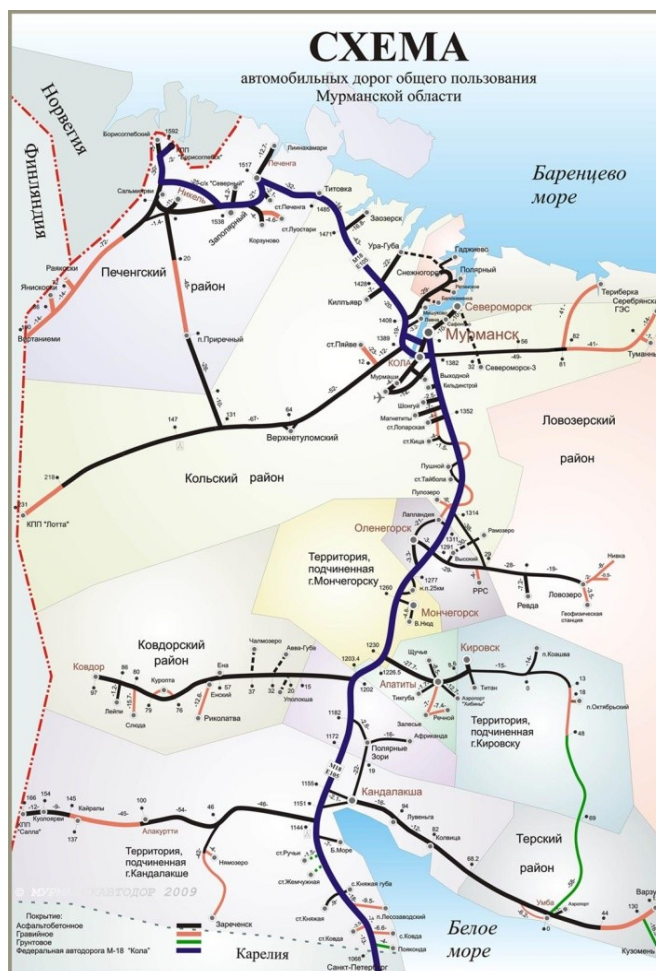


Figure 23. Roads network of the Murmansk region (MurmanskAutoDor, 2011).

Summarizing, it is possible to say that the condition of the roads of the Murmansk region is fair, moreover the reconstruction of roads leading to the Russian-Finnish custom departments Salla and Lotta is frozen (Zaitsev, 2009). Nevertheless the railways and roads infrastructure in the region is reasonably developed and gives the opportunity for future investment. Moreover, ShDAG has already built 8 km of new road in Teriberka (Borisenko, personal message, 2011).

### *Airports*

The development of the Murmansk airport is included in the plan of development of the Murmansk region until 2015. There are two major airports in the Murmansk region - Airport Murmansk and the airport Khibiny. The airport Khibiny is located in the administrative district of the city of Apatity at a distance of 32 km from the town of Kirovsk. Geographically, the airport Khibiny occupies a very important position, since it is located in the heart of the Kola Peninsula. However the airport Murmansk is the only airport that is open for international flights. It provides ground handling of aircraft and passengers, baggage

handling, cargo and mail. Figure 24 represents the structure of the Murmansk airport. (B-port, 2008)

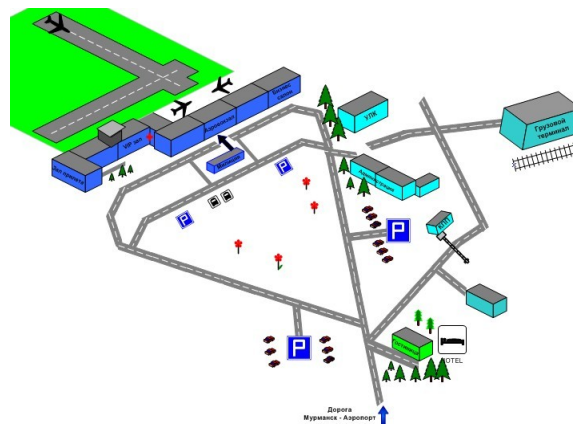


Figure 24. The scheme of the Murmansk airport (Murmansk Airport, 2011).

The Murmansk airport has a number of international lines, including regular flights to Finland, Sweden and Norway. Airport Murmansk annually serves more than 140,000 passengers, and is usually used in emergency situations for research of the ice conditions, rescue operations, delivery of urgent cargo. The reconstruction of the airport runway of the airport Murmansk is presently held (B-port, 2011).

Finally, it is necessary to mention, that despite of two airports in the Murmansk region that both can be used for national and international flights, cargo and mail, the polygon Novaya Zemlja will be used for the Shtokman project as well (Berezhnoj, personal message, 2011).

Taking into account both economic and security reasons the ShDAG has considered the archipelago of Novaya Zemlya to be the place for the supply base for the Shtokman CGF (Novaya Zemlya, 2009). Novaya Zemlya is an archipelago in the Arctic Ocean in the north of Russia and the extreme northeast of Europe at Cape Zhelaniya that is administrated by the Archangelsk region. The military airport Rogachevo on Novaya Zemlya can be used for the Shtokman project as one of the best solutions. The archipelago of Novaya Zemlya has fairly developed infrastructure and it is located 360 km closer to the Shtokman field, than the coast of the Kola Peninsula. In the area of Belushya bay (Figure 25) are 5 marine berths capable of handling virtually all types of marine vessels and a small thickness of the ice cover allows using the minimum of ice-breaking support vessels for various purposes.

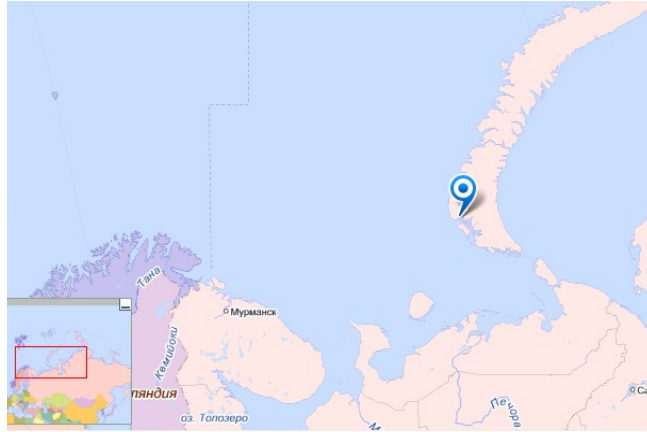


Figure 25. Novaya Zemlya, Belushya Bay (Yandex Map, 2011).

In addition, the flying time for the aircraft from Novaya Zemlya to the Shtokman field is significantly less than from the airport Murmansk or Khibiny in the Kola Peninsula. Moreover the climatic conditions for the staff are practically identical. Hotel, homes for specialists, school, kindergarten, and sports complex that are necessary for normal life in the Arctic for staff working in shifts exist in Novaya Zemlya in Archangels region versus the village Teriberka in the Murmansk region (Novaya Zemlya, 2009). However, due to the military status of the airport Rogachevo on Novaya Zemlya, the questions for using it for the Shtokman base should be settled with the Russian Ministry of Defence.

#### 4.3.3 Potential contractors for the Shtokman project

The potential contractors of Shtokman project can be all interested companies that meet certain criteria of the tender system implemented by ShDAG operating company for the first 25 years of the project (Berezhnoj, personal message, 2011). ShDAG has the following requirements for the contractors:

- guaranteed high HSEQ standards,
- equipment compliance with project technical specifications,
- similar work experience, high reliability of equipment or services provided,
- quality control and quality assurance of equipment/services,
- financial stability,
- qualified personnel,
- cost and completion times (ShDAG, 2011h).

The companies will be involved into the project according to their level of quality what in practice means that the company should be certified according to the international standards certificate ISO (Stratij, personal message, 2011). Potential contractors and suppliers must be able to offer Shtokman Development AG favourable terms regarding the price, quality, reliability, and ease of operation and maintenance of their products. Great importance is attached to compliance with international codes and standards in the realm of health, safety,

and environmental protection (ShDAG, 2011i). The Russian supplier or contractor putting in tender for Shtokman and being equal with the foreign contractor will be given a preference with regard to experience and qualification, quality of work or services that meet the specifications and other reasonable requirements of the parties or the project, cost and timing, guaranties, and responsibilities (ShDAG, 2011i).

Association of potential suppliers for oil and gas industry Murmanshelf listed all its member companies in the catalogue of the potential suppliers for oil and gas industry in the Murmansk region. However this catalogue includes the companies from all over Russia and foreign counties as well, mainly Norway, Finland and France. Therefore the authors made the selection of the potential suppliers registered in the Murmansk region from this catalogue. The members of the association Murmanshelf have no priorities among other companies when putting in tenders for the Shtokman works, since the association does not lobby anyone's interests, but only provides the companies with the informational support, finding partners, building a strategy and consulting on how to be competitive on the new market for the Murmansk region (Stratij, personal message, 2011).

Robust approach and cooperation is the work of the international consortium like ShDAG is important, therefore the tender system of choosing contractors is implemented in the company vice the framework agreements (Berezhnoj, personal message, 2011). The tender system implies the transparency. Moreover it provides the company with safety: in case if something happens with the first tender winner, then there is no need to look for another contractor again, but it is possible to invite the contractor who was the second in the tender (Berezhnoj, personal message, 2011). Another non-written rule concerns the company's registration in the Murmansk or Arkhangelsk region (Berezhnoj, personal message, 2011). This non-written rule will mainly be applied to the contractors of contractors, meaning that the priority will be given to the companies of the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and other levels of contract agreements with ShDAG that have registered in tax authorities in Murmansk or Arkhangelsk region (Berezhnoj, personal message, 2011).

ShDAG evaluates that the Murmansk region can offer its services for the Shtokman project in the following fields:

1. former plant supporting military industry with appropriate equipment and experience,
2. Norwegian companies registered on the territory of the Murmansk region,
  1. small construction works,
  2. mining works,
3. arrangement of the field development, cladding pipes, transshipment points (Berezhnoj, personal message, 2011).

Despite this evaluation of ShDAG of the Murmansk region capacities for the Shtokman project, the authors have calculated total 161 companies dividing them into 7 different categories that are members of Murmanshelf and registered in the Murmansk region (Murmanshelf, 2011a). Figure 26 represents the potential contractors of the Murmansk region for the Shtokman project.

Figure 26. Potential contractors of Murmansk region (Murmanshelf, 2011a).

Below Table 12 represents the number of the companies in every field and in particular the companies that were interviewed among the potential contractors of the Murmansk region.

Table 12. Fields of work of contractors.

Field of work/ Total № of companies in the field	Interviewed company from the field/ Web-site of the company
Construction and metal work/27 (Appendix 4)	Nerpa, Shipyard, FSUE <a href="http://www.srznerpa.ru">www.srznerpa.ru</a>
Consulting/18 (Appendix 5)	ANO "Arctic Centre for preparing oil and gas specialists" "New Century Plan" OOO <a href="http://www.nep15.ru">www.nep15.ru</a> "Ramboll Barents" OOO <a href="http://www.ramboll-barents.com">www.ramboll-barents.com</a>
Design and survey work/12 (Appendix 6)	Sevgipprorybflot, Ltd <a href="http://www.sgrf-mur.com">www.sgrf-mur.com</a>
Production and supply equipment/25 (Appendix 7)	MAXIMA management company, Ltd <a href="http://www.maxima51.ru">www.maxima51.ru</a> Moretron Terfito, Ltd <a href="http://www.moretron.ru">www.moretron.ru</a>
Service companies/49 (Appendix 8)	OAO, Arctic Marine Engineering and Geological Expedition (AMIGE) <a href="http://www.amige.ru">www.amige.ru</a> EcoCentre, JSC <a href="http://www.eco-centre.org">www.eco-centre.org</a> Expert-Technology, Ltd <a href="http://www.texnol.ru">www.texnol.ru</a> MAXIMA management company, Ltd <a href="http://www.maxima51.ru">www.maxima51.ru</a> Murmansk Centre for Standardization, Metrology and Certification <a href="http://www.mesm.ru">www.mesm.ru</a> Ramboll Barents, Ltd <a href="http://www.ramboll-barents.com">www.ramboll-barents.com</a> SpetsTekMurmansk, Ltd <a href="http://www.trim.ru">www.trim.ru</a> <a href="http://www.itm.spb.ru">www.itm.spb.ru</a>

Potential contractors

14%

4%

31%



Shipbuilding and shiprepairing/7 (Appendix 9)	MAXIMA management company, Ltd <a href="http://www.maxima51.ru">www.maxima51.ru</a> Nerpa, Shipyard, FSUE <a href="http://www.srznerpa.ru">www.srznerpa.ru</a> Sevgipprorybflot, Ltd <a href="http://www.sgrf-mur.com">www.sgrf-mur.com</a>
Transport-logistic companies/23 (Appendix 10)	MAXIMA management company, Ltd <a href="http://www.maxima51.ru">www.maxima51.ru</a>

### ***Construction and metal work***

Construction and metal work in the Murmansk region consists mainly of repairing naval vessels, fishing and marine fleets, equipment manufacture and repair of technical equipment of mining, logging, woodworking processing, fish and food industry (Murmansk region, 2004). Former plants supporting military industry with appropriate equipment and experience were mentioned by ShDAG to be potential contractors for Shtokman in that field of work.

In Attachment 1 the whole list of potential suppliers of the Murmansk region that are the members of “Murmanshelf” and registered on the territory of Murmansk region are listed. Among them is the leading shipbuilding and shiprepairing enterprise of the Murmansk region Nerpa located 30 km to the northwest from large seaport and railway station of Murmansk in the closed military area in the city of Snezhnogorsk-2 (Ship-Repairing Yard Nerpa, 2011).

The plant Nerpa is specialized in shiprepairing, modernization and conversion of ships, vessels, boats and floating structures of different purposes. Moreover the enterprise is specialized in manufacturing of gas-fair equipment NORD: gas-cutters, gas-burners, petrol-cutters, redactors; and manufacturing of metal constructions and metal frames of different application and other works and services (Ship-Repairing Yard Nerpa, 2011).

The enterprise has an exit to the Northern Sea Route and also an opportunity of an all-the-year sea exit to the Atlantic Ocean. Except the sea-connections, the factory is connected by automobile ways to all industrial centres of the Murmansk region and has an exit to the international highways, connecting the Murmansk region to the countries of Scandinavia. The network of automobile ways allows cargo transportation. (Ship-Repairing Yard Nerpa, 2011)

The enterprise is considered to be the potential contractor for the Shtokman works; however there are several significant problems that the enterprise associates with doing works for the international consortium, putting in tenders for the Shtokman works and dealing with the foreign languages (Dolotov, personal message, 2011).

One of the problems for the enterprise is that the list of general contractors is unknown; as a result it is impossible to conduct preparation for the tenders. Moreover tender documentation with all the description of works and requirements constitutes sometimes up to 900 pages and is provided to the Russian contractors in the English language. Therefore the documentation for tenders should be translated from the Russian into the English language, but at the same time the translation of the tender documentation in outside/outsource companies is forbidden by the condition of the confidentiality. It is very difficult to translate many pages of technical tender documentation for the random engineer in Nerpa plant, what requires the employment of a professional full-time translator. (Dolotov, personal message, 2011)



Even if the plant wins the tender, it is difficult to cooperate, due to harmonization of standards between Russian and foreign enterprises involved into the construction and metal work. For example, there are no tables of interchangeability of the metal and other materials that makes it difficult to understand the tender documentation. There is no possibility to attract new specialist to work for the plant, since it is necessary to provide them with the appropriate living conditions. The old specialists are getting lost and the new ones are not enough qualified. (Dolotov, personal message, 2011)

It is important to mention, that continuity of delivery and timeliness of works play an important role in the complex projects. Nerpa plant has a certificate ISO 9001; however there is an insufficient investment into modernization at the plant Nerpa. For the Shtokman project works the company is considered to be a subcontractor of the second level. The company doesn't provide the lowest price level but the quality is appropriate. Moreover the company is a member of the association Murmanshelf and follows all the updates in the oil and gas industry in the Murmansk region. At the moment there is no investment decision for the Shtokman project respectively no real contracts between ShDAG and Nerpa. (Dolotov, personal message, 2011)

Not only the shipbuilding and other naval construction is relevant for the Shtokman project, but also it is important to mention the housing construction in the region. When Shtokman project will start working the new flow of specialists will come into the region. They will face the problem of accommodation. As the hotel sector of the region was described above to be insufficient neither for hosting large flows of new people in the region, nor for organizing the congresses and conferences for over 300 participants. Hence it is important to look at the housing construction sector in the Murmansk region.

The dynamics of the decrease of the housing construction in the region shows us that for example in 2007 the volume of housing construction in the region was only 2% from the volume in 1990. Deterioration of the material and technical base of construction in the region is reflected by the increasing level of depreciation of fixed assets of construction companies (Kalinnikov, 2009). The volume of production of most important types of products in the construction field from 2000 till 2009 is represented in Table 13.

Table 13. Construction and metal work: production volume of major products (Murmansk statistics, 2009b)

<b>Product/Year</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Industrial wood, thousand m3	39,7	31,5	18,9	18,7	16,6	16,7	15,6	19,1	23,4	17,5
Wall materials (without wall ferroconcrete panels), mln bricks	7,5	6,2	5,4	7,7	5,5	4,5	4,5	5	8	2,8
Design and details of precast ferroconcrete, thousand m3	18,4	15,2	16,8	16,2	17,4	18	12,7	14,2	17,7	5,4

Construction non-metallic materials, thousand m3	2839	3129	2797	2668	2928	2890	3211	3169	3021	1530
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It is clear from Table 13 that the decrease of the production of the construction bricks is the most significant. The volume of the construction and metal works of the region depends on the plans of the realization of large-scale investment projects such as Shtokman GCF, development of Murmansk transport hub, reconstruction of working enterprises and construction of new industrial enterprises. The development of such huge projects will require the strengthening of production capacity in construction and metal work industrial field of the Murmansk region. Moreover nowadays this field of work already faces the lack of the specialists. The development of mega-projects will also lead to the increase of engineer and technical professionals for construction and metal work field. (Kalinnikov, 2009)

In Table 14 below the dynamics of prices from 2005 until 2009 for the certain types of products purchased by the construction companies is represented. Average prices in rubles currency for certain typed of products purchased by the construction companies of the Murmansk region are represented in Table 14.

Table 14. Construction and metal work: price dynamics (Murmansk statistics, 2009a)

<b>Product/Year</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Concrete ready for filling, m3	3629	5128	6884	6584	6385
Construction mortars/solutions, m3	4452	5739	6390	8257	7595
Construction non-refractory ceramic brick, thousands items/bricks	1037 7	8300	8540	11530	11193
Silicate bricks, thousands items/bricks	7238	5036	6179	8379	8883
Crushed stone, m3	378	412	516	699	591
Other natural sands, m3	180	185	255	345	324
Rolled metal varietal and shaped hot-rolled, hot-drawn, extruded and forged from plain carbon steel, tons	2296 6	23988	2733 1	35151	30466
Armature of the periodic profile of class A III, tons	1861 6	29144	2349 1	28549	31954
Common lumber (not included in other groups), m3	4540	3988	5570	6877	6510
Mixtures and products from insulating materials (not included in other groups), m3	1761	2203	2222	2246	3078
Ceramic glazed tiles for internal wall lining, m2	292	301	311	no data	no data
Ruberoid (roofing felt), m2	21,2	18	no data	26,4	no data
Linoleum, m2	293	319	278	371	383
Leaf moulded glass and rolled profiled glass, m2	143	211	230	no data	no data
Cement, tons	2419	2471	5311	4221	2597
Road concrete mix, tons	1755	no data	2133	2399	2804
Bitumen, tons	7731	8321	8172	13296	13044
Paints, tons	5544 6	55640	6774 2	71180	85581

Water-gas steel pipes, tons	2543 0	29689	3141 5	40893	32305
Steel electro-welded pipes, tons	2500 6	31435	3519 9	40061	45874
Seamless pipes for oil and gas pipelines of ferrous metals (except cast iron), tons	3181 0	34684	3695 2	50249	46515
Gasoline A-76, AI-80, etc., tons	2010 3	21493	2295 7	28384	25912
Diesel fuel, tons	1908 3	21143	2255 4	30348	21726

Summarizing, it is possible to say that in general the construction and metal work potential of the Murmansk region is significantly weakened for the present moment (Kalinnikov, 2009). The positive indicator in the construction field is that the price for cement went down significantly from 4221 rubles/ton in 2008 till 2597 rubles/ton in 2009; together with the price for the water-gas steel pipes that also decreased from 40893 rubles/ton in 2008 till 32305 rubles/ton in 2009. However one of the factors of the decrease in price of these construction materials and the decline of the construction material production volume of the main products in the region is the almost complete termination of the large-scale housing construction in the Murmansk region (Kalinnikov, 2009). Moreover the low rate of the investments into the capital assets of the construction industry is another reason for the decline of the construction in the region. Therefore the construction industry of the Murmansk region does not have the necessary labour and technical recourses for the realization of the Shtokman project with regional existing capacities yet (Kalinnikov, 2009).

### ***Consulting***

In the Murmansk region, there are several dozen consulting companies that specialize in different activities. The consulting companies play an important role for the development of the Shtokman project, since the business consulting, business training, education and staff recruitment in oil and gas industry is a new business area for the region, and the specialized companies will be in demand. Ramboll Barents, the Russian branch of Norwegian company, is in the consulting sector according to the potential suppliers for oil and gas industry in the Murmansk region of the association Murmanshelf. The company helps in building the strategy and provides business support on the market, by playing as an intermediary between Russian and Norwegian companies (Makoveeva, personal comment, 2011). As it was stated by ShDAG the Norwegian companies in the Murmansk region might be the potential contractors for the Shtokman works. However the Norwegian companies coming to the Russian market face certain problems and have to struggle with the following challenges:

- lack of information,
- lack of proper HR (technical specialist with knowledge of foreign language),
- element of bureaucracy,
- intercultural communication,
- corruption (Makoveeva, personal message, 2011).

Again, the investment decision is not made what postpones the inviting of tenders to the consulting companies of the Murmansk region (Pers. Com., Makoveeva, 2011).

### ***Design and survey work***

Design and survey work has the purpose to obtain information about the natural conditions of the construction, which should serve as an important part of the initial data for the project. Design and survey works are usually carried out by specialized organizations with appropriate licenses. In some cases, performers can be individual structural units of design organizations (departments and survey), which must also be licensed. Design and survey work is preceded by the receipt of various approvals and permits for their conduct, including the permission of local executive authorities on the preliminary choice of location, or granting land contract for the use of land for exploration, signed with the developer (owner, landowner, landholder or lessee), registration (permit) of production engineering research. Registration manufacturing survey issued by the customer or on behalf of the executor of engineering surveys with payment related services. (Kalinnikov, 2009)

Design and survey work is presented in the Murmansk region widely from ecology to construction. For example the Russian branch of the Norwegian company Sevqiprorybflot is specializing in designing and modernization of vessels of all types by the usage of modern engineering technologies including virtual three-dimensional modelling. The company is considered to be the potential contractor for the Shtokman works. The company has highly qualified engineers with the great experience in designing. (Sevgiprorybflot, 2011)

### ***Production and supply of equipment***

Among different companies of production and supply of equipment in the Murmansk region, the research is focused on the companies specialized in the maritime equipment. One of them is Maxima – a group of the companies that offers a range of services to customers, including operating delivery of technical supply and spare parts to a board of a vessel. Additionally, the company has own manufacturing departments and warehouse areas on the territory of the Fish port in Murmansk and carries out a full complex of works on manufacturing of details and products such as manufacturing casts, manufacturing forged pieces or punching and machining (Maxima, 2011).

Moretron Service, Ltd is specializing in delivery of communication facilities, radio navigation, radar, electronic scales, fish-finding and scientific sonar equipment (Moretron, Service, 2011). The company is willing to participate in the Shtokman project and can contribute to its development by providing service after the construction. Moretron Service distributes, installs and maintains the equipment of the international companies such as Cathelco, Consilium Marine, McMurdo and others (Moretron Service, 2011). As soon as the company cooperates with international partners, the language barrier does not exist for the staff. Even though, the personnel of the company consist of qualified engineers, the company still shows the concern about the rivalry from the companies in Saint-Petersburg and Moscow. As an advantage, Moretron Service highlights the knowledge of the specificity of the regional business (Barkov, personal message, 2011).

### ***Service companies***

Although the Murmansk economy is dominated by the industrial sector, accounting for 90 % of the region's revenues, still the various service companies hold their specific niche in providing services for the region's major industries such as mining and metallurgy, fishing

and power generation and in the near future also the oil and gas industry. The service companies of the various fields of work are represented in the Murmansk region, for example: geological, ecological, industrial, recruiting, metrological, standardizing, technological fields of work.

For example, the Department of Hydrometeorology and Environmental Monitoring is a state organization located in Murmansk that provided technical data for the EIA for the Shtokman project (Siekkinen, personal message, 2011). The EIA itself using mentioned above data was conducted by the Moscow Company Frecom (Frecom, 2011a). The Murmansk Department of Hydrometeorology and Environmental Monitoring has rich base for making the EIA and monitoring of the coastal, littoral and maritime zones of the Kola Peninsula, however the organization has the lack of financial support from the government (Siekkinen, personal message, 2011).

Another Murmansk organization representing the potential contractors for the Shtokman project from the service companies is the Federal State Institution Murmansk Centre for Standardization, Metrology and Certification. The organization is ready to cooperate in different directions, as well as conduct various type of research (Dedkov, personal message, 2011). The organization is specializing in the Russian standards and norms, moreover it works on standards harmonization, since the differences between Russian and international standards are significant, similarity at the moment is around 60%. (Dedkov, personal message, 2011)

The Federal State Institution Murmansk Centre for Standardization, Metrology and Certification offers services on metrology, different kinds of tests, provides environmental review. The main problem that the organization faces is the lack of the federal funding that is not enough for a lot of interesting projects. (Dedkov, personal message, 2011)

The harmonization of the standards is necessary for the successful operation of the Shtokman project and future other oil and gas offshore international joint projects (Berg, personal message, 2011).

Another service company, the potential contractor of ShDAG is the EcoCenter, the organization that conducts research projects aimed at protection of the territory of the Murmansk region from oil and petrochemicals products (Glazov, personal message, 2011).

According to the recruitment company New Century Plus, the international certificate such as ISO is very important in any company's activities. It helps to structure and build the strategy, set up goals and aim of the company. As for the tender system, the company supposes fair competition putting in tenders for Shtokman works, but mentions tender system to be not so clear in Russia. The problem is that companies in order to win the tender lower the price therefore it is important to check the history and reputation of the company. Often, the contractors are chosen only by the price offer. The company's experience is the difficulties with translation documentation into English language for tenders. It takes a lot of resources to participate in the tenders. However, participation in the tenders is a good motivation to develop. (Ruban, personal message, 2011)

Another service company SpetsTech that specializes in the ISO standards consults the Russian companies in the Murmansk region about international standards. For example,

Norwegian companies can serve as an example for Russian companies concerning the level of quality, safety and environmental responsibility. (Lykova, personal message, 2011)

### Shipbuilding and shiprepairing

The United Shipbuilding Corporation of Russian Federation unites 80 % of all shipbuilding projects in Russia. USC brings together the best shipbuilding, shiprepairing companies and design bureaus. The strategy of the corporation aims at the development of shipbuilding industry niches with high profitability. In civil shipbuilding the corporation unites enterprises which are specialized in drilling and the production of platforms, offshore engineering, building of specialized ice-class vessels for the Arctic, and vessels for work on inland waterways (United Shipbuilding Corporation, 2010a). The Figure 27 represents all the major shipbuilding and shiprepairing enterprises of the Russian Federation.



Figure 27. Shipbuilding and shiprepairing enterprises in Russia (United Shipbuilding Corporation, 2011b).

In the Murmansk region, the enterprise Nerpa in Snezhnogorsk-2 and the 35th Shiprepairing Factory in Murmansk are members of the United Shipbuilding Corporation (United Shipbuilding Corporation, 2011b). The production capacities of the regional companies specializing in shiprepairing, shipbuilding and manufacturing of steel structures for offshore oil and gas projects were discussed by the participants of the meeting, organized by the Committee of Industrial Development, Environment and Natural Resources of the Murmansk region on the 28th of April, 2011. The meeting was attended by representatives of the Moscow company "Design Technology", the head of the branch JSC "Nerpa shipyard" in Snezhnogorsk-2, Norwegian company representative "Reinertsen" in Murmansk. The specialists have exchanged information on their business activities on the territory of Murmansk region and views on possible areas of cooperation. At the end of the meeting the specialists concluded that the production capacity of these enterprises may be called for implementation of the shipbuilding or shiprepairing projects initiated due to Shtokman project development, as they have the necessary resources and technologies (Government of the Murmansk region, 2011).

### Transport-logistic companies

Transport and logistics complex is currently developing in the Murmansk region. Recently the association "Murmanshelf" signed the agreement for creating of consortium "Murmanshelf Logistics" in Murmansk. This consortium will include the association member companies such as "Murmansk Shipping Company", "Barents Logistics", "Wilson Murmansk", "International customs terminal", and "Ramboll Storvik". The Consortium will participate in the procurement of equipment by all modes of transport for the Shtokman project, a project of modernization of the Murmansk transport hub, the creation of independent regional system for collection and analysis of information on the development of transport and logistics of the Murmansk region, to develop an ideology of development and translate it into practice. Precisely, the company signed the agreement that will provide consulting and analytical services in the transport sector, training, seminars, roundtables and other educational events, organize the interaction of businesses with administrative agencies and regulatory bodies in the sphere of transport, promote the interests of companies participating in the consortium and attract foreign investment in the development of transport - logistic complex (TLC) of the Murmansk region. (Virtual customs, 2009)

Summarizing all the potential contractors of the Murmansk region, it is necessary to say that in each working field the region has certain capacities that can be offered for the development of the Shtokman GCF. It is possible to say that the capacities of the region are not sufficient to develop the Shtokman project: the contractors of only the second and third circle are presented in the region (Borisenko, personal message, 2011). Unfortunately the quality of works of regional companies doesn't match the required quality. Not all the companies have a certificate of international standard ISO, since it is very time and recourse consuming to obtain and implement this certificate and standards. Decrease of the temp of GDP growth. In spite of the fact of having the local content policy supporting the participation in the project the Murmansk region companies, ShDAG is forced to appeal service of out-of-the-region companies, since the companies of the region are subcontractors of the second level (Berezhnoj, personal message, 2011). In case of the emergency situations concerning the Shtokman project ShDAG will address the problem to the Murmansk Basin Emergency and Rescue Management organization that is specializing in emergency rescue, under-water technical, diving and other rescue works on the water.

Additional resources will be involved from the Arkhangelsk region. ShDAG appreciates the international cooperation in different fields like infrastructure, educational programs, technological exchange and other. Therefore alliances between Russian and Norwegian companies are appreciated. (Borisenko, personal message, 2011)

## 5 Analysis

The analysis part of the study reflects the aim of the thesis. The empirical findings imposed on the theoretical base of the study enable to give the answer to the main question of the study: *How can the Murmansk region contribute to the development of the Shtokman project?* This chapter begins with an overview of the strategic management of ShDAG. Then the analysis of the value chain of Shtokman project is presented, followed by the analysis of the potential resources of the Murmansk region for the development of the gas cluster in the framework of the Shtokman project.

### 5.1 Strategic management of Shtokman Development AG

ShDAG can be considered as a business unit of Gazprom, since Gazprom owns 51% of shares. Thereafter, the corporate-level strategy of Gazprom is to become a leader on the energy market, while business-level strategy of ShDAG is to create favourable environment for the field development on early stages. The activities of the latter will contribute to the successful realization of Phase 2 and Phase 3 of the Shtokman project as well as to the Russian government's long-term direction of formation of the oil and gas Arctic centre in the Murmansk region. However, numerous issues interfere with the full-speed development of the Shtokman project. The fact that shareholders of ShDAG have not yet agreed on the final investment decision is essential as Gazprom does not have enough capabilities to pursue the business-level strategy for the development of the Shtokman project. Meeting the various stakeholders' expectations while making the strategic decisions are time and resource consuming and challenge ShDAG in the process of strategy pursuing. Some of the implications that influence the decision making process are presented below.

#### *Complexity*

The *complexity* is one of the essential issues for the international consortium Shtokman AG due to the fact that the project involves participation of the wide range of companies from different industries. Even though, the selection process is organized so that the companies put in tenders for works announced by ShDAG, still the management of ShDAG has to verify the credibility of the future contractors while choosing the tender. Moreover, it is important that various economic, social, political and ecological aspects are taken into account. For example, such political issues as the unstable situation in the Arctic and constantly changing Russian national and regional legislation challenge the development of the Shtokman project. It is important to mention that ShDAG has claimed high company's social and environmental responsibility as well as willingness to contributing to the development of the Murmansk region by ensuring the participation of the local companies. It is important for the future successful creation of the oil and gas centre in the Arctic that ShDAG pursue the claimed policy of the company. ShDAG should also provide the ecological safety within and beyond the operating area of the Shtokman project. Ecological assessment and constant monitoring is a necessity for ShDAG in order to avoid the explosion of the pipeline and as a consequence the gas-disaster.



## *Uncertainty*

The *uncertainty* can be an obstacle for the decision-making of the company. In 2007 the beginning of the gas distribution through the Volkhov-Murmansk pipeline was planned for 2013 (Mazneva et al., 2007). However, the investment decision has been postponed several times and, according to the updates announced by ShDAG in March 2011, the investment decision will be taken at the end of 2011 and the extracting is planned for 2016 (ShDAG, 2011a). The experts explain such a postponement by instability on the energy markets, where the level of the gas prices is a variable value, that influences all the gas producers/suppliers and consumers.

The prospect of the shale gas production is another implication of *uncertainty* that has recently arisen from the energy market (Hoyos, 2010). Even though, the assessment of profitability and scale of the environmental impact associated with the harmful production process should be further conducted, still shale gas is considered to be a competitor for the natural gas on the energy market (Masloboev, personal message, 2011).

Additionally, an implication of approach of European leaders to the climate and energy policy “20-20-20 targets” can cause the decrease of the energy consumption and transition to renewable energy resources (European Commission, 2010). As a consequence of the successful implementation of this European approach the demand on the gas can reduce. *Uncertainty* induced by the introduction of this energy program can be viewed as an obstacle for the long-term decision-making process of ShDAG.

## *Operational decisions*

The real strategic advantage can be achieved on operational level. Therefore, the engineering solution is adjusted in accordance with the changes in business and technological environment. However, the *operational decisions* will play an important role after the final investment decision, when the development of the project will be in full speed.

## *Integration*

The interests of all ShDAG’s shareholders - Gasprom, Total, and Statoil, as well as other stakeholders of the Shtokman project should be taken into account. This constitutes the basis for *integration* in the decision-making process. For example, the new standards were introduced by international shareholders of ShDAG for the operation of the Shtokman project (Berg, personal message, 2011). Harmonization of standards has enabled companies to come to the mutual agreement on the issue of applying high standards. Another implication for the *integration* issue in the decision-making process is the transparency of ShDAG. Transparency is an important principle for the multinational company; therefore, the tenders are used for choosing contractors. The tender committee involves at least one representative from Total, Gazprom and Statoil. The purpose of applying the tender system for Shtokman project is that all the participants have equal conditions while putting in tenders (Berezhnoj, personal message, 2011).

Total and Statoil have an experience in offshore field development, so their knowledge and technologies will be highly used during the project realization (Berezhnoj, personal message, 2011). Sharing experience in operating a unique offshore field is the significant feature of an *integration* of ShDAG’s shareholders.

### *Relationships and networks*

As a multinational company with high responsibility ShDAG is building links with different stakeholders. Among them are the local fishermen, the indigenous people of the Murmansk region and the inhabitants of the village Teriberka. In order to develop national economics and economics of the surrounding regions, ShDAG is participating in activities of non-profit industry organizations and associations. For more extended involvement of the Murmansk region into the Shtokman project, ShDAG is participating in the meeting of the potential contractors. Introduction of high requirements and explaining the principle of choosing contractors for tenders can motivate local companies to improve the quality of the products and services with the perspective of further participation in the Shtokman project.

### *Change considering*

Special attention should be paid for unexpected internal or external change while pursuing the strategy. The project is unique, so flexibility and innovativeness of managers is essential. Profitability of the project is still doubtful for the shareholders. It is necessary to evaluate all the elements of the project in order to define the profit pools that will enable the company to have competitive advantage. The complexity of the project and high investments will make it impossible to change dramatically the production scheme as soon as the facilities are constructed.

Considering all the mentioned above implications for the decision-making process, it is possible to underline the importance of managers with regard to strategy pursuing. Even though, ShDAG will be an operator responsible for the infrastructure creation along the period of 20-25 years, the activities of the company are essential for the creation of additional value and further development of the Shtokman field. The development of Shtokman GCF has a strategic significance for the Russian government and considered to be the first step in extended Arctic exploration. However, the hard access to the field, new technologies requirement, commitment to risk-taking demand scrutinized evaluation of all the stages of the Shtokman project and in its turn postpone the development of the GCF. Therefore, the value chain management is another aspect that can influence the decision-making of ShDAG. It helps managers to evaluate each of the activities of the company and their impact on the use of financial, physical, individual, and organizational resources.

## **5.2 The value chain analysis of the Shtokman project.**

The process of Shtokman GCF development is unique and complex. Companies and organizations from different spheres of activities will be involved into realization of the project. ShDAG's policy for choosing contractors does not suppose using framework agreements. Hence, companies from different regions of Russia and other countries are able to put their tenders in for different kind of works. The value chain will include companies with different geographical location so that it is possible to call the value chain "global". For this research, it is important to highlight the areas where the local companies can contribute to the successful global value chain management.

According to Porter's value chain, the primary activities of the value chain of the Shtokman project, illustrated in Figure 28, are directly connected to the production of natural and liquefied gas.

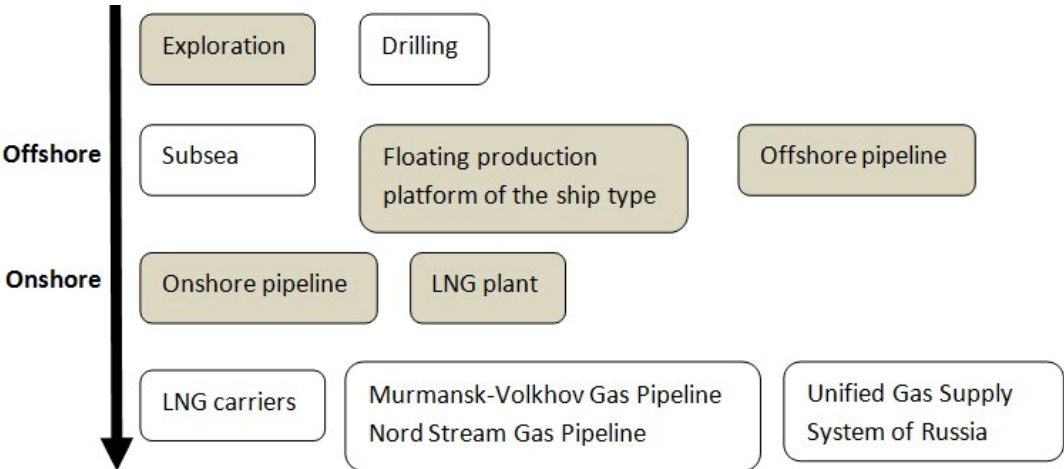


Figure 28. Value chain: primary activities.

According to Porter's value chain, the inbound logistics will include transport and logistics of all the required materials and machinery necessary for the production stage. It is worth mentioning that the Murmansk region companies in the construction industry and logistics can contribute to the Shtokman project development on the early stages where the works are material and labour consuming.

The operations are divided into onshore and offshore. Particular attention is paid for the construction and maintenance of the floating production platform of the ship type and LNG-plant. Success on these stages of the project can serve as a good incentive for exploration of other gas and oil fields in Arctic with the similar level of remoteness and complexity. However, the offshore gas extraction as well as liquefied gas production is a new industry for Russia and the Murmansk region in particular. It implies that the experience of international companies will be highly used for the realization of the operational activities of the value chain.

Finally the outbound logistics covers the distribution of natural and liquefied gas to the final customer. Due to the fact that the channels of distribution have not been decided yet, the research is not covering the marketing and sales activities.

The activities marked in grey colour in Figure 28 distinguish nodes of the value chain where the companies of the Murmansk region can participate in the realization of the project. It is most likely that the Murmansk region has only resources and competence to participate in activities as the suppliers or contractors of the second and third level (Berezhnoj, personal message, 2011). However, geophysics is one of the developed industries in the region, so further exploration of the field can be partly held by the local contractors.

Concerning the early stages of the Shtokman project, a lot of constructional works will be held on the place; therefore, it is important to develop the constructional industry of the

region. Offshore activities can provide work for shipbuilding and shiprepairing plants of the Murmansk region that are already considered to be potential contractors by ShDAG (Berezhnoj, personal message, 2011; Dolotov, personal message, 2011).

The level of development and the quality of the products and services of the local contractors is not sufficient for the full participation in the Shtokman project (Berezhnoj, personal message, 2011). Furthermore, the costs of resources such as labour and materials are relatively high comparing to the southern regions of Russia. The government of the Murmansk region is interested in foreign investments and in the registration of new companies which will bring new resources for the economic development of the region (Borisenko, personal comment, 2011). Partnering with out-of-the-region companies can give local companies a good opportunity to participate in the project. However, partnering is not common for the Russian companies operating in the same industry. Therefore, the local companies express concerns about high rivalry from out-of-the-region companies that can decrease the level of local companies' involvement into the Shtokman project.

Managing the primary activities of the value chain, ShDAG will have difficulties to find general contractors in the Murmansk region for the activities requiring high technologies and experience in the gas production. Therefore, outsourcing can serve as a key for the successful management of the Shtokman project. Support activities are presented in Figure 29.

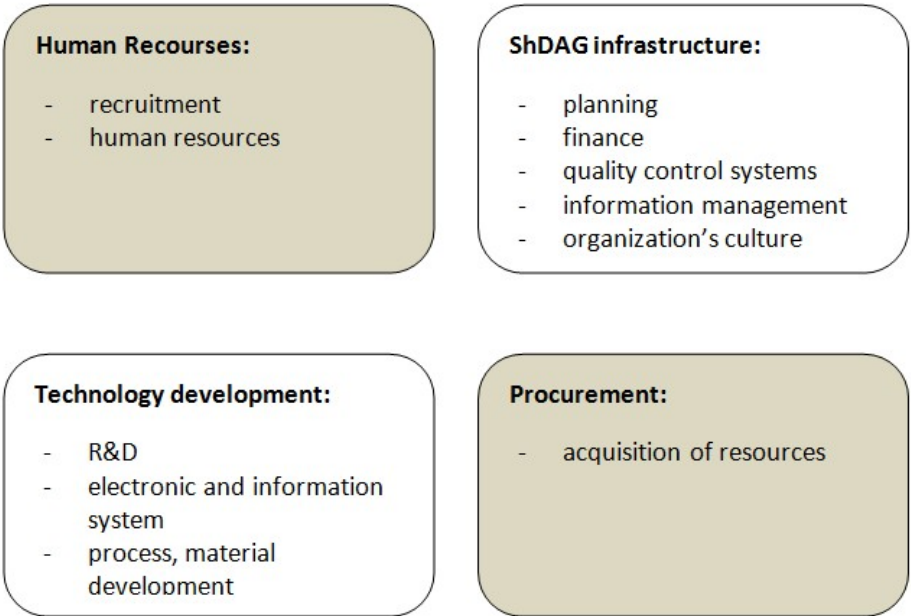


Figure 29. Value chain: support activities.

Infrastructure of ShDAG that includes planning, finance, quality control systems, etc. will be organized by the company. It is worth mentioning that the management of ShDAG consists of specialist from Gazprom, Total and Statoil; it gives an opportunity to take into account the interests of all the shareholders of ShDAG. According to the fact that the project has no analogue, the experience of shareholders in managing offshore activities will be more valuable. Due to the previously mentioned fact that the gas industry is new for the Murmansk

region, the technology development of the Shtokman project will be mostly held by out-of-region or international companies.

The human resources and procurement are the fields where the participation of the Murmansk region is expected. The region is rich with natural resources what will positively influence on the creation of additional value. ShDAG is planning to maximize the involvement of the citizens of the village Teriberka into activities of the plant in case the decision for the LNG-plant construction is positive. The maintenance the LNG plant will require not only specialists dealing with highly technological equipment, but also electricians, carpenters, social workers will be on demand; there is a range of activities where local citizens can be fully involved. There are a lot of educational institutions in the Murmansk region that are able to prepare specialist for different kind of activities.

To sum up, the Murmansk region can only partly participate in the value chain of the Shtokman project. Nevertheless, the activities of the company will be concentrated in the Murmansk region where two offices of ShDAG are registered. Additionally, ShDAG is interested in the economic development of the region. There are several aspects that can create advantages and obstacles in the processes of the value chain management that should be considered by the management of ShDAG in order to fully evaluate the resources and competences of the Murmansk region. They are presented in Table 15.

Table 15. Aspects of the value chain management

<p>Coordination and collaboration</p>	<p>ShDAG participates in the association Murmanshelf that organize meetings with the Shtokman project operators in order to inform local contractors on the conditions of tenders and special requirement for certain works. However, the companies have to pay fee to become a member of the association. The meetings have informative style, but not aimed at discussion problems of the local companies in the framework of the Shtokman project.</p> <p>Using the tender system prevent company from operating within the framework agreements, however, it creates fair competitiveness.</p>
<p>Technology investment</p>	<p>The level of quality of products and services in the region does not meet the requirement of the ShDAG in most of the cases, so further development of the local companies is impossible without investment into technologies. Technological development is the responsibility of each particular company willing to participate in the project. According to several local companies the requirements for the participation in the Shtokman are high; as a result, additional certification is necessary. Operation on the local and Russian markets doesn't need international standardization and it is not reasonable for the local companies to certify before the final investment decision for the Shtokman project is made. It is preferable that government has special financial programs that will enable companies to have additional resources for the purpose of technological upgrade.</p> <p>Additionally, uncommon for the companies in the Murmansk region,</p>

	ShDAG openly present information about the company on the official site of the company what gives an opportunity to publicly access certain kind of information.
Organizational process	It is important for the successful value chain management to properly allocate the resources of the company. The material consuming and bulky works that do not require additional investment into technologies can be performed by the companies of the Murmansk region. It is also important to understand how to use resources of the Murmansk region most effectively. For example, the port facilities can be insufficient for the transportation of the equipment and spare parts necessary for the Shtokman project realization, therefore the ports of Norway can be used for this purpose, but it will involve customs procedures. Therefore, it is necessary to compare the different options before making the decision.
Leadership	Strong motivation of ShDAG management to contribute the development of the Murmansk region and concern about the potential influence of company's activities on the village Teriberka is a positive sign showing serious intention of further creation of the oil and gas centre in Arctic. The local companies are willing to participate in the Shtokman project and the development of the project is expected to create favourable conditions for the business development.
Employees and human resources	The participation of experienced and highly skilled staff is necessary for the successful realization of the project. Therefore, creation of proper human resource base in the region for the further development can serve as an additional pool for using local resources. Shift method has an extreme pressure on the personnel, thereafter it is important to create favourable social and economic conditions for the staff in order to motivate them to settle down in the Murmansk region instead of hiring specialists for a limited period of time.
Organizational culture and attitudes	The intercultural issues will emerge during the process of Shtokman project development, as the business culture and approach in each country is different. The task of the company is to prevent the emergence of such issues. Special training or team building programs should be organized for the multinational staff. The language barrier is another obstacle. Specialists in non-linguistic fields are rarely fluent with foreign languages (Skotis, personal message, 2011). However, small private companies and those companies that have already cooperated with international companies have no difficulties with foreign languages.

The data presented in Table 15 shows that integration of the Murmansk region into the global value chain can create both positive aspects and obstacles in the process of the Shtokman field development. However, multinational companies coming into the region with a long-term perspective tend to be interested in the local economic development. According to ShDAG policy, the development of the Murmansk region is one of the priorities of the company.

Additionally, the government of the Murmansk region is particularly interested in the development of the project that can create favourable business conditions in the region. The joint interest in the development of the Murmansk region of ShDAG and the government can be very beneficial for the local companies. The oil and gas cluster formation will give an

opportunity for the local companies to extend the level of participation in Shtokman project and for ShDAG to avoid obstacles in the process of operating in the region and create favourable conditions for the further exploring of the Arctic.

### 5.3 The gas cluster analysis

The analysis of the global value chain of Shtokman project has shown the activities of ShDAG that can be located in the Murmansk region; however, the regional content in the project at the moment is not so broad. Therefore, the development of the industrial network of the Murmansk region in the framework of gas cluster formation can positively influence the local companies in order to support the Shtokman project and further creation of the oil and gas centre in the Arctic (ShDAG, 2009a).

The increase of competitiveness of the Murmansk region companies can give an opportunity to extend the participation of the region in the global value chain of the Shtokman project. In order to determine the extension of the influence of regional resources on creation of the competitive advantage for ShDAG, it is important to examine where the most significant competitors for the local companies can come from. In case of Shtokman project, the local companies express their concern about high rivalry from the companies from the Moscow region. For example, the assessment of the environmental impact of the different activities of ShDAG was held by the Moscow Company Frecom that has experience in this field (Frecom, 2011b). ShDAG has commented that the quality of the service provided by Frecom has no analogue in the Murmansk region what explains the choice of the company.

According to ShDAG policy, it is not obligatory for the company providing goods or services for ShDAG to register in the Murmansk region. However, in terms of local economy development it is preferable to host new companies that have experience and are able to stimulate regional companies to increase the level of quality of products and services. Foreign companies are particularly interested in the project. Norwegian companies are extensively represented in the region; Finnish companies are the next in the list (Stratij, personal message, 2011). However, international companies represented in the region are not the competitors. Contrarily, international companies operating in the Murmansk region has a positive impact on local economy development by providing jobs, paying taxes to the government. Thus, when companies with good reputation on the international market open branches in the Murmansk region, it can positively influence the development of the local economy.

It is important to examine the resources of the Murmansk region that can play for allocation of the ShDAG activities in the region. The aspects for evaluation of the recourse potential of the Murmansk region are described in Table 16 according to Porter’s diamond.

Table 16. Porter’s Diamond for the Murmansk region

Factor conditions	The region is rich with natural recourses. Firstly, the region has significant gas and oil fields. Moreover, the potential of the Kara sea is not fully explored. A range of raw material such as wood, iron, sand, land are represented in the region, which can be useful for the construction works and production of bulky equipment (Kalinnikov, 2009). Special attention should be given to the human resources. The region has several educational institutions that can partly provide specialists in different fields for the project.
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Home demand conditions	Gas is a potential replacement for the fuel oil that is used in the Murmansk region at the moment for the energy production. The region is looking forwards to gasification since it will decrease the electricity expenses and environmental impact as gas is more environmentally friendly comparing to the fuel oil.
Related and supporting industries	It is important to mention that the Murmansk region has already a created transport system, including ice-free developed sea port with access to the Atlantic ocean and railways that connect the region with other parts of Russia. Existing infrastructure can positively influence the cluster formation in the region. Moreover, the intention of the government to form mining cluster and the existence of historically dominating shipbuilding and ship repairing industry creates an additional advantage for the successful operating of ShDAG in the Murmansk region.
Firm strategy, industry structure and rivalry	Even though, ShDAG is highly motivated to develop the Murmansk region and create new opportunities for the local companies and organizations, the structure of the local industries is not ready to fully participate in the project as well as the quality of the provided products and services is insufficient for some works that require experience in oil and gas industry.

Analyzing aspects from Table 16 that can contribute to the development of gas industry in the Murmansk region, it is worth noticing that factor condition is a dominant as the Murmansk region is the closest region to the Shtokman GSF. Therefore, in order to cut the expenses it is reasonable to create the oil and gas centre in the Murmansk region (Stratij, personal message, 2011). It will be easier to comply with the tight delivery schedules if the ShDAG facilities are situated in the Murmansk region. Additionally, the existence of relative industries and infrastructure can contribute to the development of the Shtokman project, especially concerning the material and energy consuming works. The prospect of gasification of the Murmansk region serves as an incentive for the local government to switch the resource of energy production from fuel oil to natural gas.

The expected duration of the Shtokman GCF development is 70 years. The positive consequences of the project for the Murmansk region in a form of gasification, taxes, investments, new jobs, infrastructure development are significant for the development of the local economy; therefore, the government intensively supports the development of the Shtokman project and has initiated the clustering of the oil and gas industry in the Murmansk region. The intention of the government is to create the regional cluster that involves the companies participating in the Shtokman GCF development. However, the long term strategy of the Murmansk region government is to form a megacluster consisting of a network of smaller industrial clusters.

The national industrial policy serves as a base for the cluster. Establishment of the cluster supported by the government is an effective instrument to compete on the market. The Russian government has announced the “Cluster policy in the North”; however, continuously changing laws and norms and unprepared law base for the development of the strategic project is one of the main obstacles for the successful clustering in the framework of the Shtokman project development. Legislative instability forces companies to concentrate on the short-term profit what has become a feature of the Russian economy. Local companies lack resources to invest into new technologies and quality certification.



As a positive aspect, the government of the Murmansk region works on three directions in the framework of the Shtokman project: firstly, creating favourable conditions for the investment activities listing Shtokman project as the most essential investment project in the region; secondly, the development of the Murmansk transport hub together with creation of the special economic zone of the port type as an essential part of the clustering process; finally, the development of the private public partnership in the Murmansk region. The programs are on the initial stage at the moment; however, their development can facilitate the development of the Shtokman GSF as well as the process of clustering in the Murmansk region. Figure 30 illustrates the gas cluster in the Murmansk.

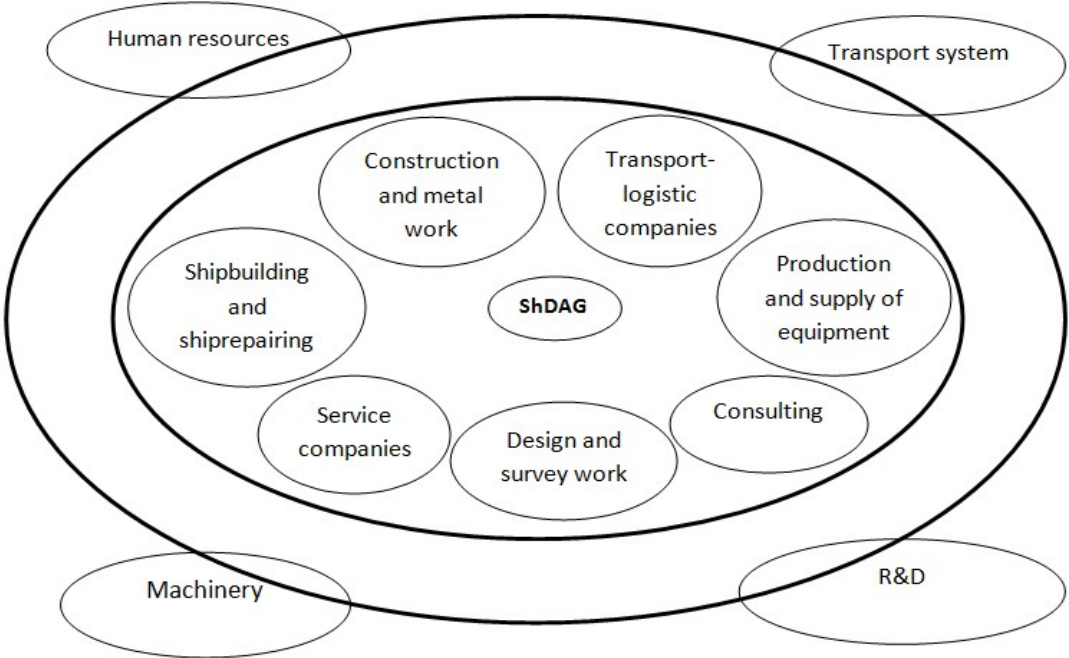


Figure 30. Gas cluster in the Murmansk region.

Figure 30 is based on the Murmansk oil and gas cluster created in the project of the Murmansk regional government and the association Murmanshelf. Numerous circles represent different sectors in the region that can contribute to the development of the gas industry. It is important to build links between the members of the cluster in order to operate in accordance with the common goal.

As for the outer circle including HR, transport system, machinery and R&D, they present the external economies that can contribute to creating resource base for the companies of the cluster. The potential contractors related to different industries in the Murmansk region are located in the middle circle. Some of them have already worked with ShDAG, but most are only willing to participate in the Shtokman project. The global value chain of the Shtokman project that is earlier described in the research mark out several nodes where local companies can participate in the project. Finally, the circle in the centre is the operating company ShDAG. Company’s high requirements can serve as a motivation for the potential contractors to increase the quality of the products or services in order to be involved into the global value chain of Shtokman project. It explains the central location of ShDAG in the cluster.

According to the data provided in empirical part of the study it is possible to make an analysis of the external economies of gas cluster of the Murmansk region presented in Table 17.

Table 17. Gas cluster analysis: positive and negative sides

	<b>Positive sides</b>	<b>Negative sides</b>
HR	Experience sharing: Total cooperates with the Murmansk State Technical University in the training of future specialists in the oil and gas field; demand for the specialist in other fields besides gas industry where Murmansk region citizens can contribute. For example, the construction of the LNG-plant will require a lot of HR; starting training program in logistics: specialists in logistics will be on demand on the initial stages of the Shtokman project	Lack of specialists in the oil and gas industry as well as in mathematics and physics; graduates from the MSTU lack the experience in oil and gas industry; strong maritime specialization of the labour resource in the region decline of population, trend of resettling to other regions of Russia due to extreme climate conditions; shift methods put a lot of pressure on workers, the cost of labour is high;
Transport system as a part of infrastructure	Murmansk hub has a developed infrastructure; ice-free sea port with access to the Atlantic ocean; the project of Murmansk-Volkhov gas pipeline that will connect the Murmansk region with the Nord Stream	Necessity to build road junctions and to strengthen bridges and roads due to transportation of heavy equipment to Teriberka; some parts of railways have only one track
R&D	Scientific accompaniment: Kola Scientific Centre of Russian Academy of Science; Arcticmorneftegasrazvedka (AMNGR) - one of the largest geological exploration company; the Arctic is one of the most promising regions for extracting hydrocarbons	Lack of investment; some programs don't meet the requirement of the industry; tendency of reduction in exploration in Russia and low rates of regeneration; severe climate conditions and lack of technologies decrease the profitability of projects for extracting of natural resources from the shelf
Machinery	Existence of certain types of machinery in the Murmansk region	Weakened machinery potential; the number of machinery registered in the region is decreasing, while the level of the depreciation is constantly growing; lack of resources for equipment upgrade

It is important to add that the cluster members can also benefit from other external economies. The transparency of rivalry, which ShDAG has intended to achieve by using tenders for work distribution, can be one of them. Besides fair competition, tender system has some negative aspects for the local companies. For example, the documentation for the tenders is presented

in English language and is not allowed to be translated with the help of third companies. The requirement of experience in the gas industry, which is new for the Murmansk region, automatically crosses out a lot of local companies. Innovation and new methods of technology can give an advantage for the companies in the Murmansk region in the framework of clustering.

Another external economy is the cooperation between local companies. The association Murmanshelf was established with the purpose of joining the potential contractors of ShDAG and providing information about the requirements and goals of ShDAG. Membership in Murmanshelf gives an opportunity for the local companies to build strong business relationship, however, several companies has mentioned that the membership is not as effective for their company as they expected. As soon as the contractors of the second and third level are presented in the Murmansk region, it is possible to assume that local contractors can be involved into the project after the contract are distributed among the general contractors. The companies should also keep in mind that the final investment decision is not made yet what delays the work distribution. Nevertheless, many local companies consider Shtokman project as an impetus for the development of the economy of the Murmansk region.

The attention of authorities and companies is concentrated on the Shtokman project, what distracts the government from the creation of an alternative project that can also influence the development of the region (Masloboev, personal message, 2011).

Cluster formation being a national task plays an important role for the economy of the Murmansk region. It is important to emphasize that in Russia cluster approach is quite new instrument for establishing the national and regional production policy in condition of market integration. The gas cluster formation is on the initial stage at the moment; however, there are a lot of positive aspects in the region that are mentioned above that can stimulate its further development. The cluster can contribute to the growth of level of local companies' economy what will give them an opportunity to fully participate in the global value chain of the Shtokman project. The negative aspects should be also taken into account in order to avoid them in the future. The local companies can decline in case they are not able to adapt the required standards.

## 6 Discussion

The Shtokman project is unique and complex. It is difficult to predict the outcomes of the field development as soon as the final investment decision is not made yet. However, it is possible to learn from similar projects. Snøhvit and Sakhalin-2 are similar offshore projects that involve LNG production. The comparison with these projects is presented in this chapter.

### 6.1 Snøhvit project in Hammerfest, Norway

The latest project Snøhvit in the neighbouring country Norway is compared with Shtokman GCF by experts in gas industry in many informational sources. The Snøhvit LNG project, which is situated in Hammerfest, was constructed for the development of three gas fields in the Barents Sea: Snøhvit, Albatross and Askeladd. The project was started in 2003. The distance to the shore is 140km, and it is several times less than the distance to the shore from Shtokman GCF. The reserves of the field are estimated of 193 mln cu m of LNG and 17.9 mln cu m of condensate and 5.1 mln tones of natural gas liquids (NGL) (Hydrocarbon-technology, 2011). The further geologic exploration is important for ensuring gas supply for the further operation of the LNG-plant. However, the reserves of Shtokman GCF will supply gas for LNG-plant for 70 year according to Shtokman project.

The international consortium that consists of Statoil (33.53%), Petoro (30%), TotalFinalElf (18.4%), Gaz de France (12%), Amerada Hess (3.26%) and RWE-DEA (2.81%) is interested in the development of the local economy. StatoilHydro together with Hammerfest and Finnmark county authorities initiated the project of direct and indirect influence of the project on the local community (Hydrocarbon-technology, 2011). According to ShDAG policy, the development of the region is also one of the company's priorities.

In order to determine the potential field of works for the local contractors of the Murmansk region it is possible to compare Shtokman project with Snøhvit. It is important to mention that local contractors' assistance in the pre-construction phase of Snøhvit project was significant. The Snøhvit business association PetroArctic assisted the local companies to be able to meet the high requirements of the project operators. PetroArctic has become a model for the association of the potential contractors Murmanshelf (PetroArctic, 2011). Therefore, the preconstruction phase as it is stated earlier in the research can be a vast field for involvement of contractors of the Murmansk region into the global value chain of the Shtokman project.

The operation of the Snøhvit project has created a lot of job positions for the local community. Among the essential characteristics that were improved after the beginning of the project development are the attractiveness and the level of living in municipality. Mentioned above facts are expected to take place in the Murmansk region as well.

Additionally, the tax base has been changed in the frame of the Snøhvit project. As a result, the plant generates about NOK 150 mln per year in property taxes for the local government (Statoil, 2011a). Unfortunately, similar change in the Russian taxation system is unlikely to happen. However, the government of the Murmansk region can consider the change of the tax system for the successful development of the gas industry in the region.

The local contractors are not fully participating in the realization of the Snøhvit project. For the discussion of the level of involvement and problems of the local companies, the first workshop with local contractors was conducted by the Snøhvit business association PetroArctic on March 21-22, 2011 in Hammerfest.

The main obstacles for the local companies that can be common for the companies of the Murmansk region in the future are distinguished below:

- lack of experience and knowledge in the gas industry due as the project is new for the municipality as well as for the Murmansk region;
- High rivalry from the out-of-region companies that are operating in the gas industry for more than 40 years;
- Scope of contracts that are able to cover the local companies is small. This causes inconvenience for the general contractors as the control of smaller operations is complicated and requires more resources;
- Framework agreements of the general contractors with particular companies simplify the implication of the certain works, but it eliminates the participation of the local companies;
- The corporate strategy of StatoilHydro and operational strategy are not in balance. Talking about the local contractors, it is hard to find the combination of the lowest price and high quality;
- According to the program Achilles, where potential contractors are ranked in the list, the local companies are regularly situated at the end of the list.

The important similarity of the Murmansk region and Finnmark County is that only contractors of the second and third ring are represented on the local market. In order to help the local companies to intensively participate in the project the Shtokman and Snøhvit project operators should have a special concept for motivation of the general contractors to use local companies as sub-contractors. Another approach that can increase the level of involvement of the local companies is the formation of cluster of gas industry in the region. Communication and collaboration with local potential contractors can help to increase rivalry among local companies, and as a result, improve the quality of provided goods and services.

The example of Snøhvit is located in Norway, therefore, the difference in legislative and taxation system makes it less likely to have high similarity of the outcomes of the gas field development for the local companies. However, the case of Snøhvit can serve as an example for the development of the potential contractors of the Shtokman project in the Murmansk region.

## 6.2 Sakhalin-2 project in Far East, Russia

Sakhalin-2 differs from Shtokman project in climate conditions, however, both are located in Russia, therefore, the taxation and legislative systems are similar. Due to this fact, it is interesting to see how the realization of the project impacts the economy of the Sakhalin region.

The company Sakhalin Energy was created in 1994 for the development of the Piltun-Ostokhskoye oil field and Lunskeye natural gas field in the Okhotsk Sea. At the moment the company has the following shareholders: Gazprom holds 50% plus 1 share, Shell 27.5%,

Mitsui 12.5% and Mitsubishi 10%. It is important to mention that the Sakhalin Energy as well as ShDAG claims high social and environmental responsibility and shows high interest in the development of the economy of the Sakhalin region (Sakhalin Energy, 2011a).

Within the framework of the Sakhalin-2 project the Russian Government began the negotiations of the specific circumstances for the oil and gas fields' development. As a result, the Sakhalin II Production Sharing Agreement (PSA) has been signed. It requires that Sakhalin Energy maximizes the Russian content in each year in order to achieve the level of 70% involvement of labour, materials, and equipment and contract services from the Russian side over the life of the entire project (Sakhalin Energy, 2011a). According to the agreement Sakhalin Energy should be focused on the development of the Russian business opportunities. As a result, the share of the Russian material and equipment is 91% of the total amount. The total value of contracts with Russian companies at the beginning of 2008 was 10,9 mln US dollars (Sakhalin Energy, 2011b). In case of the Shtokman field development the statement about the necessary level of involvement of the Russian companies has not been made yet.

As for the influence of the Sakhalin-2 project on the region, over 11000 specialists in different spheres from Sakhalin region are involved into the project realization. It is estimated that the Shtokman project will create from 4000 to 5000 vacancies. According to statistical assessments, each working place in the oil and gas industry stimulates the establishment of 7-10 working places in related industries. Besides providing jobs, analytical experts claim the positive influence of the Sakhalin-2 project on the related industries of the Sakhalin region, such as construction, transport, commerce, education, etc. The main part of incomes into the budget of the region (more than 2,3 mln US dollars) consists of the tax payments from contractors and suppliers of the project (Bocharikov, 2008). Figure 31 illustrates the number of companies registered in the Sakhalin region.

Figure 31. Number of companies registered in the Sakhalin region (Sakhalin statistics, 2006).

It is clear from Figure 31 that the number of the companies has significantly increased after the creation of the Sakhalin Energy company in 1994. The beginning of the Sakhalin-2 project has served as a strong push for the development of the economy of the Sakhalin region. The development of the Sakhalin-2 project has made the Sakhalin region attractive for investor, what is presented in Figure 32.

Figure 32. The volume of investment in the Sakhalin region (Sakhalin statistics, 2006).

According to Figure 32, in 2003 there was an increase of investment that can be explained by the beginning of the second phase of the Sakhalin-2 project that includes the construction of the Russia's first LNG plant (Sakhalin Energy, 2003). The government of the Murmansk region considers Shtokman as the main investment project that can contribute to the development of the region.

Similarly to the influence of Snøhvit project on the local community, the development of the Sakhalin-2 project increase the level of life of the Sakhalin region inhabitants. As for the quality of the goods and services, the requirement of the multinational consortium forced the local companies to meet the international standards in order to participate in the project (AAPG, 2006).

Even though, the costs of both Snøhvit and Sakhalin-2 projects turned out to be substantially underestimated, still the positive influence of the projects development on the local economy is essential.

## 7 Conclusion

This study has now reached the answering of the question:

*How can the Murmansk region contribute to the development of the Shtokman project?*

For this reason the authors has made the analysis of the value chain of the Shtokman project and of the potential resources of the Murmansk region for the development of the gas cluster.

This study is focused on the Shtokman project as a part of the Russian government strategy to develop the Arctic. The development of the Shtokman GCF will serve as a base for the formation of the oil and gas centre in the Murmansk region. However, the shareholders of ShDAG have not agreed on the final investment decision yet. The strategic decisions depend on the range of factors from gas price on the energy market till integration of the interests of stakeholders of the Shtokman project.

The project is complex and unique due to the extreme climate conditions and the remoteness from the shore. The technologies that will be used for the Shtokman GCF development have no analogue in the Murmansk region as well as in Russia. Therefore, the experience in offshore gas production of Total and Statoil will be widely used in the project. Analyzing primary and support activities of the value chain of the Shtokman project, it is possible to conclude that companies of the Murmansk region can participate in the Shtokman project as subcontractors of the second and third level. The local companies are expected to be involved in the construction works.

It is important to develop the gas industry in the Murmansk region in order to raise the level of regional content in the Shtokman project. According to the announced Cluster policy in the North, the government of the Murmansk region together with the association Murmanshelf has initiated the project of the oil and gas cluster formation in the Murmansk region. Cluster formation will give an opportunity for the Murmansk region to add scientific base for the traditional developing of the raw material extracting. The research has concentrated on the cluster of the gas industry.

The national industrial policy serves as a base for the gas cluster. The government of the Murmansk region works on the investment activities, the transport hub development and public private partnerships. However, the legislation base is one of the obstacles for the successful development of the Shtokman project and the gas cluster formation. The external economies that can be beneficial for the members of the cluster have both positive and negative aspects. The potential contractors of the Murmansk region are willing to participate in the Shtokman project, even though, it will be necessary to increase the level of quality of the products and services in order to meet the high requirements of ShDAG.

The comparison with the similar projects Snøhvit and Sakhalin-2 has illustrated that the local contractors face a lot of obstacles while trying to increase the local content in the projects development. The local companies have to meet the high requirements of the multinational companies in order to participate in the project. However, the positive influence on the local economy and the increase of the level of life is significant.



### *Suggestions for further research*

The clustering can have both positive and negative influence on the members of the clusters; therefore, it is a good topic for the further research to evaluate the influence of the clustering on the local contractors, as well as the impact of the clustering on the development of the Murmansk region. The value chain management has a lot of aspects to elaborate on. It is possible to evaluate the effectiveness of the Russian content in the development of the project. As soon as the Shtokman project will include a lot of international companies, the issue of intercultural communication can be also developed in the further research.

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### **Personal message**

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Berg, E. Company representative in Murmansk, Total's Exploration and Production Division in Russia. Interviewed on March 3<sup>rd</sup>, 2011.

Borisenko, O.K. Vice-chairman, Committee of Industrial Development, Environment and Natural Resources of the Murmansk region. Interviewed on March 4<sup>th</sup>, 2011.

Buch, O.V. Director General, Arctic centre of preparing specialists. Interviewed on March 3<sup>rd</sup>, 2011.

Dedkov, N.P. Director, Federal State Institution: Murmansk Centre for Standardization, Metrology and Certification. Interviewed on March 4<sup>th</sup>, 2011.

Demjanenko, N.D. Head of Navy Department, The Union of the Fishermen of the North. Interviewed on March 5<sup>th</sup>, 2011.

Dolotov, I.V. Security Service Engineer, Parent branch of Shipyard Nerpa in JSC Zvezdochka. Interviewed on March 14<sup>th</sup>, 2011.

Glazov, A.L. Head of Group of Companies EcoCentre. Interviewed on March 9<sup>th</sup>, 2011.

Glushkov, A.M. President, Northern Chamber of Commerce. Interviewed on March 12<sup>th</sup>, 2011.

Kotomin, A.B. Researcher, Institute of Economic Problems named after G.P. Luzin of Kola Science Centre. Interviewed on March 10<sup>th</sup>, 2011.

Loktev, A.S. Chief Geologist, AMIGE. Interviewed on March 9<sup>th</sup>, 2011.

Lykova, T.V. Director General, SpetsTech Murmansk. Interviewed on March 5<sup>th</sup>, 2011.

Makoveeva, S.E. Director General, Ramboll Barents. Interviewed on March 5<sup>th</sup>, 2011.

Maslobojev, V.A. Director, Institute for Industrial Ecology Problems in the North. Interviewed on March 10<sup>th</sup>, 2011.

Milokhin, A.N. Deputy Director, Hotel Park Inn Poliarnie Zori. Interviewed on March 9<sup>th</sup>, 2011.

Ruban, E.V. Director, New Century Plus. Interviewed on March 14<sup>th</sup>, 2011.

Siekkinen, E. Director, State Institution: Murmansk Administration for Hydrometeorology and Environmental Monitoring. Interviewed on March 3<sup>rd</sup>, 2011.

Skotis, E.I. Head of International Relations Office, Murmansk Humanities Institute. Interviewed on March 11<sup>th</sup>, 2011.

Stratij, G.I. Director General, Association of suppliers for oil and gas industry Murmanshelf. Interviewed on March 4<sup>th</sup>, 2011.

Tsurkan, J.M. Director General, International customs terminal. Interviewed on March 4<sup>th</sup>, 2011.

## **Conferences**

Kotomin, A.B., 2011. Problems and innovative approaches to seismic exploration of hydrocarbons in the Russian shelf of the Arctic Seas. In: *European North: innovative development of maritime resources*. Apatity, Russia 15 March 2011. Apatity: Kola Science centre.



# Appendix 1

An example of letter



## Appendix 2

Interviews data: company, field of work, questions.

№	Company/organization name	Field of work	Questions
1	Institute of Economic Problems named after G. P. Luzin of the Kola Science Centre	Research scientific institution	<p>How the development of the Shtokman project will influence the economic development of the Murmansk region?</p> <p>How the pipelining will influence the fisheries?</p> <p>What are the pros and cons of a free economic zone for the regional economy?</p>
2	International customs terminal	Customs broker	<p><i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i></p>
3	Management company “MAXIMA”, Ltd. “MTP Union”	Ship repair and complex servicing	<p>Will the territory of the fish port be a free economic zone?</p> <p>Who are your competitors in the market?</p> <p>Is your company interested in participating in the Shtokman project?</p> <p>Returning to the issue of the free economic zones, how will it affect the activity of your company?</p>



			<p>What is your experience in participating in the tender contest (tender system)?</p> <p>What are the pros and cons of the certification of quality according to the ISO standards?</p> <p>How do you find out about the selection criteria for the tender contests?</p>
4	Parent branch of shipyard “Nerpa” in JSC “Zvezdochka”	Shipbuilding, ship repairing	<p>What features of your enterprise allow keeping the competitive advantage on the market?</p> <p>Is your company interested in participating in the Shtokman project?</p> <p>What problems does your enterprise face?</p>
5	Ltd. “New Century Plus”	Service company, recruiting , crewing, consulting	<p>Is your company interested in participating in the Shtokman project?</p> <p>What kind of manpower is well presented in the region?</p> <p>What is the situation in the region with maritime specialists?</p> <p>What is your experience in participating in the tender contest?</p>

			What are the pros and cons of the certification of quality according to the ISO standards?
6	Ltd. “Ramboll Barents”	International consulting engineering company	<i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i>
7	Ltd. “Sevgiprorybflot”	Design, modernization, technical maintenance and repair of vessels	How do you assess the readiness of the region for the Shtokman project in the framework of the activity of your company?
8	The Union of the Fishermen of the North	Union, non-profit organization	<i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i>
9	Ltd. “SpetsTech Murmansk”	Consulting services on ISO certification, budget planning, maintenance and repairs of technology	Is your company interested in participating in the Shtokman project?
10	Branch of JSC “Shtokman Development AG”	Shtokman project operating company for the first 25 years	Which industries, represented in the Murmansk region, are potential participants for the Shtokman project?  Why is the tender system chosen for selecting suppliers?  Will the company's registration in Murmansk or Arkhangelsk region be one of the necessary criteria for participation in the project?

		<p>Will the ISO certificate be necessary criteria for participation in the project?</p> <p>Has Gazprom stated that the participation of the Russian companies in the Shtokman project implementation will prevail?</p> <p>What is the situation with the preparation of specialists for oil and gas industry for the Shtokman project?</p> <p>What are the problems in the Murmansk region facing your company at the early stages of the Shtokman project?</p> <p>Do you think that the creation of special economic zones will be the solution of customs regulation problems?</p> <p>Please, comment on the program of transport node development as a part of the project of creation of free economic zones.</p> <p>Does your company pay attention to environmental issues?</p> <p>How the development of the Shtokman project will influence the development of the Murmansk</p>
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			<p>region?</p> <p>What are the pros and cons of using the shift working method in the Shtokman project?</p> <p>What is the situation with the hotel sector in the Murmansk region?</p> <p>How will the development of the oil and gas industry in the Murmansk region influence the fishing industry?</p> <p>How will the development of the oil and gas industry in the Murmansk region influence the military industry?</p> <p>Does your company plan to supply gas to Asia or to the Far East?</p>
11	Ltd. "Expert Technology"	Industrial safety, construction and installation work	<p>Is your company interested in participating in the Shtokman project?</p> <p>The work with international companies requires an ISO certification. How would you deal with this issue?</p>
12	JSC "AMIGE"	Marine Engineering Geological Expeditions	<p>Are the exploration works on the Shtokman field still in progress? The Norwegian project Snøhvit is called a model for the Shtokman project. How can you comment on this?</p> <p>If we consider the value chain of the</p>

			<p>project, in which node of the value chain does your enterprise participate?</p> <p>Which has a greater negative impact on the environment - a breakthrough of a pipe and a leakage of gas or an oil spill?</p> <p>Will your company take part in the construction of an LNG plant in Teriberka?</p> <p>There is an opinion that there is not enough qualified staff in the region therefore experts from other regions and other countries will be involved into the project development. How would you comment on this?</p> <p>Does the danger of damaging the pipeline with trawl of the fish-vessels exist?</p>
13	Arctic centre of preparing specialists	Training, consulting	<i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i>
14	Institute for Industrial Ecology Problems in the North	Engineering and environmental surveys, environmental impact assessment	There is an opinion that Russia has entered too many contracts for the supply of gas, and that the development of the Shtokman field becomes a necessity. How would you comment on this?
15	Murmansk Humanities Institute	Educational institution, scientific	Do you participate in the social and educational part of the Shtokman

		research	project?
16	Moretron Service	Engineering and repair company, delivery and maintenance of marine navigation, alteration of vessels	<i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i>
17	State Institution “Murmansk Administration for Hydrometeorology and Environmental Monitoring”	Federal Service for Hydrometeorology and Environmental Monitoring	<i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i>
18	JSC “Murmansk commercial port”	Port, one of the largest enterprises of Murmansk region, transshipment services, storage capacities	Murmansk Regional Government is developing a project to create free economic zones of the port type. Will the Murmansk Commercial Seaport be a resident of this area?  If the final investment decision will be made in March 2011, and the Shtokman project will start developing actively, will the Murmansk transport hub, especially the Murmansk Commercial Seaport be ready for the project?
19	Federal State Institution “Murmansk Centre for Standardization, Metrology and Certification”	Technical regulation of the Ministry of Industry and Trade	<i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i>
20	Association of oil and gas suppliers “Murmanshelf”	Association, non-profit organization	What companies the tax preferences will be applied for?  What are the criteria for evaluating

	<p>Committee of Industrial Development, Environment and Natural Resources of the Murmansk region</p>	<p>Representatives of the government of Murmansk region</p>	<p>the activity of the company to be a part of the strategic project?</p> <p>You said that Shtokman is a strategic project. How will this project influence the dominant industries in the Murmansk region such as mining and fishing?</p> <p>What are the financial sources from the government for the development of the Murmansk region?</p> <p>What are the new development programs?</p> <p>Is the environmental monitoring and environmental impact assessment of the Shtokman project held?</p> <p>Are there means to mitigate the consequences in case of an accident?</p> <p>What are the areas for cooperation of the Russian and the international companies?</p> <p>The population of the city of Murmansk and the Murmansk region has dramatically decreased during the last years. Are there any programs to motivate the specialists who come for contract, shift work in the Murmansk region to remain in the</p>
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			<p>region?</p> <p>What are the programs that support the development of small and medium enterprises?</p> <p>Please, comment on the project of the development of the Murmansk transport hub?</p> <p>Is the region interested in attracting the firms from Moscow and other big cities?</p> <p>What are the requirements for the companies who wish to enter the association “Murmanshelf”?</p>
21	Hotel “Park Inn Poliarnie Zori”	Hotel, conference and congress services, restaurant and entertainment services	<p>What is the situation with the hotel market in the Murmansk region?</p> <p>If the Shtokman project will start to develop in the region, after the final investment decision, will there be enough places to accommodate all the people coming to the Murmansk region?</p> <p>Does the hotel plan to extend the facilities, construct new living facilities?</p> <p>What are the competitive advantages of the hotel Park Inn Poliarnie Zori?</p>



			Do you get any support from the government of the Murmansk region?
22	Northern chamber of commerce	Non-profit state organization, consulting, services of arbitral tribunal	Please, comment on the agreement on the delimitation of the maritime zone signed by Norway and Russia?
23	Representative office of “Total, Exploration, Development” in Murmansk	Oil and gas production, technology, onshore and offshore experience Fields of activities in Murmansk region: culture, sport, education, health	<i>The company representative has made power point presentation; therefore no exact questions are listed in the table.</i>
24	Ltd. Environmental Centre, Group of companies “EcoCentre”	Environmental projects	Where do you get the funding for the environmental projects?  Are you interested in participating in the Shtokman project?  Do you have environmental projects related to Shtokman gas field?  What are the pros and cons of membership in the association Murmanshelf?



# Appendix 3

The program of the NRCC conference



## NRCC Networking Meeting in Murmansk

### 2011

**Date and time:** March 9, 2011, 15hrs00 – 19hrs00  
**Place:** Hotel Park Inn Poliarne Zori,  
 Knipovicha St. 17, Murmansk, Russia

PROGRAM	
<p>15.00 <b>Welcome</b> By Project Manager of the NRCC, Mr. Jørn Tverseth</p> <p>15.05 <b>Improvement of Business and Investment Climate in the Murmansk Region</b> By Chairman of the Murmansk Regional Duma, Mr. Evgeniy Nikora <i>Questions &amp; Answers</i></p> <p>15.25 <b>Current Market Situation – Possibilities and Challenges for the Norwegian Industry in Murmansk</b> By Consul Commercial Affairs, Mr. Knut Mugaas, the Consulate General of Norway in Murmansk <i>Questions &amp; Answers</i></p> <p>15.45 <b>Business Barometer for 2011</b> By General Manager, Mr. Geir Reiersen, SIVA International Management <i>Questions &amp; Answers</i></p>	<p>15.55 <b>Energy Efficiency in the Barents Region – Project Status</b> By Managing Director of ESAVE, Mr. Kjell Krüger, and Project Manager of the NRCC, Mr. Jørn Tverseth <i>Questions &amp; Answers</i></p> <p>16.10 <b>Business Train and Business Safety</b> By International Project Manager, Ms. Bente Sofie Bye, SIVA International Management <i>Questions &amp; Answers</i></p> <p>16.20 <b>Investment Projects in the Murmansk Region</b> By President of the North Chamber of Commerce and Industry, Mr. Anatoly Glushkov <i>Questions &amp; Answers</i></p> <p>16.40 <b>Report from the Bilateral Economic Commission and NRBC II in Moscow</b> By Managing Director of the NRCC, Mr. Jarle Forbord</p> <p>17.00 <b>Networking and refreshments</b></p>

**The NRCC Networking Arena North is financed by:**



Ministry of Foreign Affairs of Norway



The NRCC Reserve Fund



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## Appendix 4

### Contractors

#### Construction and metalwork

1.	ASM, Construction firm (Agrostroyontazh), Ltd <a href="http://www.asm-murman.ru">www.asm-murman.ru</a>	Murmansk
2.	Apatitstroy, JSC	Apatity
3.	Arktikekologia, Ltd	Poliarnie Zori
4.	DiaMANT, Ltd <a href="http://www.diamant-rfm.com">www.diamant-rfm.com</a>	Murmansk
5.	Druzhba PKP, Ltd <a href="http://www.mz-druzhba.ru">www.mz-druzhba.ru</a>	Murmansk
6.	EACEC (Euro – Arctic Commercial and Economic Company), JSC	Murmansk
7.	Energomontazh, JSC	Murmansk
8.	Energospetsmontazh, Installing - construction administration N 10, JSC	Poliarnie Zori
9.	Farn, Ltd	Apatity
10	Kolatomenergoremont, JSC <a href="http://www.aer-rea.ru">www.aer-rea.ru</a>	Poliarnie Zori
11	Kolskiy Proekt, Ltd	Kola
12	Metallurgprokatmontazh, Production Union, Ltd <a href="http://www.pompm.ru">www.pompm.ru</a>	Apatity
13	Murmanoblgas, JSC	Murmansk
14	Murmanskmorstroy trust, JSC <a href="http://www.murmanskmorstroy.ru">www.murmanskmorstroy.ru</a>	Murmansk
15	Murmanskpromstroy, JSC <a href="http://www.mpp.ru">www.mpp.ru</a>	Murmansk
16	Nerpa, Shipyard, FSUE <b>(Interviewed)</b> <a href="http://www.srznerpa.ru">www.srznerpa.ru</a>	Snezhnogorsk
17	Nordenergmontazh, JSC <a href="http://www.zaonem.ru">www.zaonem.ru</a>	Murmashi
18	Reinertsen NVR, Ltd <a href="http://www.reinertsen.no">www.reinertsen.no</a>	Murmansk

19	Stroiteljnye tehnologii, Ltd	Murmansk
20	ScanSroy, JSC Scanstroy.livejournal.com	Murmansk
21	SevZapStalKonstruktsiya, JSC <a href="http://www.stalco.narod.ru">www.stalco.narod.ru</a>	Monchegorsk
22	Severpromstroy, Ltd <a href="http://www.severpromstroj.narod.ru">www.severpromstroj.narod.ru</a>	Kandalaksha
23	Severtransstroy, JSC <a href="http://www.sevtransst.ru">www.sevtransst.ru</a>	Kandalaksha
24	Skarus, Ltd	Murmansk
25	Stroystandart, Ltd	Murmansk
26	UNG <a href="http://www.acco-apatity.narod.ru">http://www.acco-apatity.narod.ru</a>	Apatity
27	Kandalaksha experimental machine-building plant <a href="http://www.oaokomz.com">http://www.oaokomz.com</a>	Kandalaksha

## Appendix 5

Contractors

Consulting companies

1.	OOO «Andreev and partners» <a href="http://www.andreev.net.ru">www.andreev.net.ru</a>	Murmansk
2.	ANO "Arctic Center for preparing oil&gas specialists" <b>(Interviewed)</b>	Murmansk
3.	"State fund of sme development in Murmansk region (FORMAP)" NKO <a href="http://www.formap.ru">www.formap.ru</a>	Murmansk
4.	"Kola Centre of Evaluation and Consulting" OOO	Murmansk
5.	"Murmansk regional agency for supporting sme" OOO <a href="http://www.murbiz.ru">www.murbiz.ru</a>	Murmansk
6.	"New Century Plus" OOO <b>(Interviewed)</b> <a href="http://www.ncplus.ru">www.ncplus.ru</a>	Murmansk
7.	"Polar innovations" OOO	Murmansk
8.	"Ramboll Barents" OOO <b>(Interviewed)</b> <a href="http://www.ramboll-barents.com">www.ramboll-barents.com</a>	Murmansk

9.	“Recourse centre” OOO <a href="http://www.rc51.ru">www.rc51.ru</a>	Murmansk
10	“Red Star Consulting Nord” OOO <a href="http://www.redstar-consulting.com">www.redstar-consulting.com</a>	Murmansk
11	“Swift Technical (Russia) Limited” (Great Britain) Branch of private company <a href="http://www.swiftoilandgas.com">www.swiftoilandgas.com</a>	Murmansk
12	“Socium+” Educational, innovational, research and development” Non-commercial partnership <a href="http://splus.murman.ru">http://splus.murman.ru</a>	Murmansk
13	“Union of fishermen in the North” NO <a href="http://www.srps.ru">www.srps.ru</a>	Murmansk
14	“Technopart-Apatity” NP	Apatity
15	“Technopark-NOR” OOO <a href="http://www.technoparknor.no">www.technoparknor.no</a> <a href="http://www.barentsnove.com">www.barentsnove.com</a>	Murmansk
16	“Center of informatics (company NETSL)” ZAO <a href="http://www.netsl.ru">www.netsl.ru</a> <a href="http://www.consulting.netsl.ru">www.consulting.netsl.ru</a>	Murmansk
17	“Centre of consulting projects” OOO <a href="http://www.it-murman.ru">www.it-murman.ru</a>	Murmansk
18	VBS Consulting, LTD <a href="http://www.VBS-consult.com">www.VBS-consult.com</a>	Murmansk

## Appendix 6

### Contractors

#### Design and survey work

1.	Artel +, Architecturally-design workshop, Ltd <a href="http://www.art-l.info">www.art-l.info</a>	Murmansk
2.	Ekosroyproekt, Ltd	Murmansk
3.	Energomontazh, JSC	Murmansk
4.	Engineering centre of ecological safety, scientific and production organization, Ltd	Murmansk
5.	Kola’s geological information-laboratory centre (KGILC), JSC <a href="http://www.kgilc.ru">www.kgilc.ru</a>	Apatity
6.	Murmanoblgas, JSC	Murmansk
7.	Murmansk trust of construction engineering research, JSC <a href="http://www.murmansk-tisiz.ru">www.murmansk-tisiz.ru</a>	Murmansk

8.	Murmanskpromproekt, JSC <a href="http://www.mpp.ru">www.mpp.ru</a>	Murmsnsk
9.	Nordenergmontazh, JSC <a href="http://www.zaonem.ru">www.zaonem.ru</a>	Murmashi
10.	Ramboll engineering, Ltd <a href="http://www.ramboll-barents.com">www.ramboll-barents.com</a>	Murmansk
11.	Reinertsen NVR, Ltd <a href="http://www.reinertsen.no">www.reinertsen.no</a>	Murmansk
12.	Sevgiprorybflot, Ltd ( <b>Interviewed</b> ) <a href="http://www.sgrf-mur.com">www.sgrf-mur.com</a>	Murmansk

## Appendix 7

### Contractors

#### Production and supply of equipment

1.	Arktikekologia, Ltd	Poliarnie Zori
2.	Dostavka Morskogo Snabzheniya, Ltd	Murmansk
3.	Druzhba PKP, Ltd <a href="http://www.mz-druzhba.ru">www.mz-druzhba.ru</a>	Murmansk
4.	Dukos, Ltd <a href="http://www.dukos.com">www.dukos.com</a>	Murmansk
5.	EliTeks, Manufacturing-Commercial Firm, Ltd <a href="http://www.specodezda.narod.ru">www.specodezda.narod.ru</a>	Murmansk
6.	Energomontazh, JSC	Murmansk
7.	Industrial complex Stroykonstruktsiya, JSC <a href="http://www.ksk.mels.ru">www.ksk.mels.ru</a>	Murmansk
8.	Information science centre (Net SL Company), CJSC	Murmansk

	<a href="http://www.netsl.ru">www.netsl.ru</a> <a href="http://www.consulting.netsl.ru">www.consulting.netsl.ru</a>	
9.	MAXIMA management company, Ltd <b>(Interviewed)</b> <a href="http://www.maxima51.ru">www.maxima51.ru</a>	Murmansk
10.	Labour protection, Ltd <a href="http://www.prof-kom.ru">www.prof-kom.ru</a>	Murmansk
11.	Moretron Service, Ltd <b>(Interviewed)</b> <a href="http://www.moretron.ru">www.moretron.ru</a>	Murmansk
12.	Olen Betong, AS <a href="http://www.olenbetong.no">www.olenbetong.no</a>	Murmansk
13.	Reinertsen NVR, Ltd <a href="http://www.reinertsen.no">www.reinertsen.no</a>	Murmansk
14.	Stroitelnye Tehnologii, Ltd	Murmansk
15.	Severnaja Metallobaza, Ltd <a href="http://www.metallbaza.com">www.metallbaza.com</a>	Murmansk
16.	Sevkabel – Murman, Ltd <a href="http://www.sevcable.ru">www.sevcable.ru</a>	Murmansk
17.	Sevzapkanat – Murmansk, Ltd <a href="http://www.sevzapkanat.ru">www.sevzapkanat.ru</a>	Murmansk
18.	ShelKO, Ltd <a href="http://www.shelko.ru">www.shelko.ru</a>	Murmansk
19.	Skarus, Ltd	Murmansk
20.	Souzenergo Concern, Ltd	Apatity
21.	TechnoGlobalSnab, Ltd <a href="http://www.tehnoglobal.ru">www.tehnoglobal.ru</a>	Murmansk
22.	Technoavia – Murmansk, Ltd <a href="http://www.tehnoavia.ru">www.tehnoavia.ru</a>	Murmansk
23.	Teploenergmontazh, Ltd	Murmansk
24.	Trade Company Sudovie tehnologii, Ltd	Murmansk
25.	Wilson Murmansk, Ltd <a href="http://www.wilsonship.no">www.wilsonship.no</a>	Murmansk

## Appendix 8

Contractors

Service companies

1.	Arktikdesign, Ltd <a href="http://www.arctikdesign.ru">www.arctikdesign.ru</a>	Murmansk
2.	Armada <a href="http://www.armada-murmansk.ru">www.armada-murmansk.ru</a>	Murmansk
3.	AST-Murmansk, Ltd <a href="http://www.astavia.com">www.astavia.com</a>	Murmansk
4.	AgroholdingMurmanskiy, CJSC	Murmansk
5.	April, Ltd <a href="http://www.aprilcom.ru">www.aprilcom.ru</a>	Murmansk
6.	OAo, Arctic Marine Engineering and Geological Expedition (AMIGE) <b>(Interviewed)</b>	Murmansk



	<a href="http://www.amige.ru">www.amige.ru</a>	
7.	Arktikmorneftegasrazvedka (AMNGR) <a href="http://www.amngr.ru">www.amngr.ru</a>	Murmansk
8.	Sevmorneftegeofizika <a href="http://www.smnggeophysics.com">http://www.smnggeophysics.com</a>	Murmansk
9.	Briz-Marine <a href="http://www.briz-marine.ru">www.briz-marine.ru</a>	Murmansk
10.	Centre clean production, ANO	Murmansk
11.	Centre of consulting projects, Ltd <a href="http://www.it-murman.ru">www.it-murman.ru</a>	Murmansk
12.	Ekvant, Ltd <a href="http://www.orange-business.ru">www.orange-business.ru</a>	Murmansk
13.	Energomontazh, JSC	Murmansk
14.	Ecocentre, JSC <b>(Interviewed)</b> <a href="http://www.eco-centre.org">www.eco-centre.org</a>	Murmansk
15.	Expert-Technology, Ltd <b>(Interviewed)</b> <a href="http://www.texnol.ru">www.texnol.ru</a>	Murmansk
16.	Fleet Maintenance base	Murmansk
17.	Flait, Ltd <a href="http://www.norge.russland.ru">www.norge.russland.ru</a>	Murmansk
18.	Information science centre (Net SL Company), CJSC <a href="http://www.netsl.ru">www.netsl.ru</a> <a href="http://www.consulting.netsl.ru">www.consulting.netsl.ru</a>	Murmansk
19.	Kola's geological information-laboratory centre (KGILC), JSC <a href="http://www.kgilc.ru">www.kgilc.ru</a>	Apatity
20.	Kolatomenergoremont, JSC <a href="http://www.aer-rea.ru">www.aer-rea.ru</a>	Poliarnie Zori
21.	Konsultant Service Plus, Ltd <a href="http://www.ksplus.ru">www.ksplus.ru</a>	Murmansk
22.	Marine arctic geological expedition (MAGE) <a href="http://www.mage.ru">www.mage.ru</a>	Murmansk
23.	MAXIMA management company, Ltd <b>(Interviewed)</b> <a href="http://www.maxima51.ru">www.maxima51.ru</a>	Murmansk
24.	Murmanoblgas, JSC	Murmansk
25.	Murmansk ship repair company <a href="http://www.mskm.ru">www.mskm.ru</a>	Murmansk
26.	Murmansk regional publishing company, Ltd	Murmansk
27.	Murmansk shipping company, JSC <a href="http://www.msco.ru">www.msco.ru</a>	Murmansk
28.	Murmansk – Termo, Ltd <a href="http://www.termosteps.ru">www.termosteps.ru</a>	Murmansk
29.	Murmansk marine biological institute <a href="http://www.mmbi.info">www.mmbi.info</a>	Murmansk
30.	Murmansk rescue and salvage department (MBASU)	Murmansk
31.	Murmansk Centre for Standartization, Metrology and Certification <a href="http://www.mcsm.ru">www.mcsm.ru</a> <b>(Interviewed)</b>	Murmansk
32.	Navigator-Marine	Murmansk
33.	Polar Mar Service <a href="http://www.polarmar.ru">www.polarmar.ru</a>	Murmansk

34.	Polar Fishery Institute (FSUE PINRO) <a href="http://www.pinro.ru">www.pinro.ru</a>	Murmansk
35.	Poliarnie Innovatsii, Ltd	Murmansk
36.	Plazagroup, JSC <a href="http://www.plazagroup.ru">www.plazagroup.ru</a>	Murmansk
37.	Ramboll Barents, Ltd ( <b>Interviewed</b> ) <a href="http://www.ramboll-barents.com">www.ramboll-barents.com</a>	Murmansk
38.	Recourse Centre, Ltd <a href="http://www.rc51.ru">www.rc51.ru</a>	Murmansk
39.	Russian Marine Shipping register, Murmansk branch office, FSI <a href="http://www.rs-murmansk.ru">www.rs-murmansk.ru</a>	Murmansk
40.	Construction technologies, Ltd	Murmansk
41.	SheLKO, Ltd <a href="http://www.shelko.ru">www.shelko.ru</a>	Murmansk
42.	SpetsTekMurmansk, Ltd ( <b>Interviewed</b> ) <a href="http://www.trim.ru">www.trim.ru</a> <a href="http://www.itm.spb.ru">www.itm.spb.ru</a>	Murmansk
43.	Swift Technical (Russia), Ltd <a href="http://www.swiftoilandgas.com">www.swiftoilandgas.com</a>	Murmansk
44.	TEKKO, Ltd	Apatity
45.	TMK – Premium Service, Ltd <a href="http://www.tmk-premium.ru">www.tmk-premium.ru</a>	Murmansk
46.	TechnoGlobalSnab, Ltd <a href="http://www.tehnoglobal.ru">www.tehnoglobal.ru</a>	Murmansk
47.	TerraMedia, Ltd <a href="http://www.000.dj">www.000.dj</a>	Murmansk
48.	Trade company sudovie tehnologii, Ltd	Murmansk
49.	Vitino sea port <a href="http://www.vitino.ru">www.vitino.ru</a>	Kandalaksha

## Appendix 9

Contractors

Shipbuilding and shiprepairing

1.	Alek, Ltd <a href="http://www.ooo-alek.ru">www.ooo-alek.ru</a>	Murmansk
2.	DiaMANT, Ltd <a href="http://www.diamant/rfm.com">www.diamant/rfm.com</a>	Murmansk
3.	MAXIMA management company, Ltd ( <b>Interviewed</b> ) <a href="http://www.maxima51.ru">www.maxima51.ru</a>	Murmansk
4.	Nerpa, Shipyard, FSUE ( <b>Interviewed</b> ) <a href="http://www.srznerpa.ru">www.srznerpa.ru</a>	Snezhnogorsk
5.	SRZ 10 MO RF, FGUE	Poljarny
6.	Sevgiprorybflot, Ltd ( <b>Interviewed</b> ) <a href="http://www.sgrf-mur.com">www.sgrf-mur.com</a>	Murmansk

7.	35 SRZ Branch, repair centre JSC, Ship Zvezdochka	Murmansk
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## Appendix 10

Contractors  
Transport-logistic companies

1.	Barents Logistics, Ltd <a href="http://www.barentslogistics.ru">www.barentslogistics.ru</a>	Murmansk
2.	Barents-transit, Ltd	Murmansk
3.	Belfreight - Murmansk branch, JSC <a href="http://www.belfreight.ru">www.belfreight.ru</a>	Murmansk
4.	Belomortrans, JSC <a href="http://www.belomortrans.ru">www.belomortrans.ru</a>	Murmansk
5.	Briz RS, Ltd	Murmansk

6.	Cape of hope, Ltd <a href="http://www.shipagency.ru">www.shipagency.ru</a>	Murmansk
7.	Commercial sea port of Kandalaksha, Ltd <a href="http://www.portofkandalaksha.ru">www.portofkandalaksha.ru</a>	Kandalaksha
8.	Dostavka morskogo snabjenija, Ltd	Murmansk
9.	Intrans, Ltd <a href="http://www.shipagent.ru">www.shipagent.ru</a>	Murmansk
10	Kolanefteprodukt, JSC	Murmansk
11	LUMAX, Ltd	Murmansk
12	MAXIMA management company, Ltd <b>(Interviewed)</b> <a href="http://www.maxima51.ru">www.maxima51.ru</a>	Murmansk
13	Murmansk Branch of Oktiabrjskaya railways <a href="http://www.ozd.rzd.ru">www.ozd.rzd.ru</a>	Murmansk
14	Maritime logistics H. Grimm, AS	Murmansk
15	Murmansk shipping company <a href="http://www.msco.ru">www.msco.ru</a>	Murmansk
16	Murmansk Shipyard of the Navy <a href="http://www.msrz.ru">www.msrz.ru</a>	Murmansk
17	SeverTransService, Ltd	Murmansk
18	Severavto, Ltd	Murmansk
19	Severtehsnab, JSC <a href="http://www.stsnab.ru">www.stsnab.ru</a>	Kandalaksha
20	Technosnab-Murmansk, Ltd <a href="http://www.tsn.ru">www.tsn.ru</a>	Murmansk
21	TEKKO, Ltd	Murmansk
22	Transflot, JSC	Murmansk
23	Wilson Murmansk, Ltd <a href="http://www.wilsonship.no">www.wilsonship.no</a>	Murmansk

