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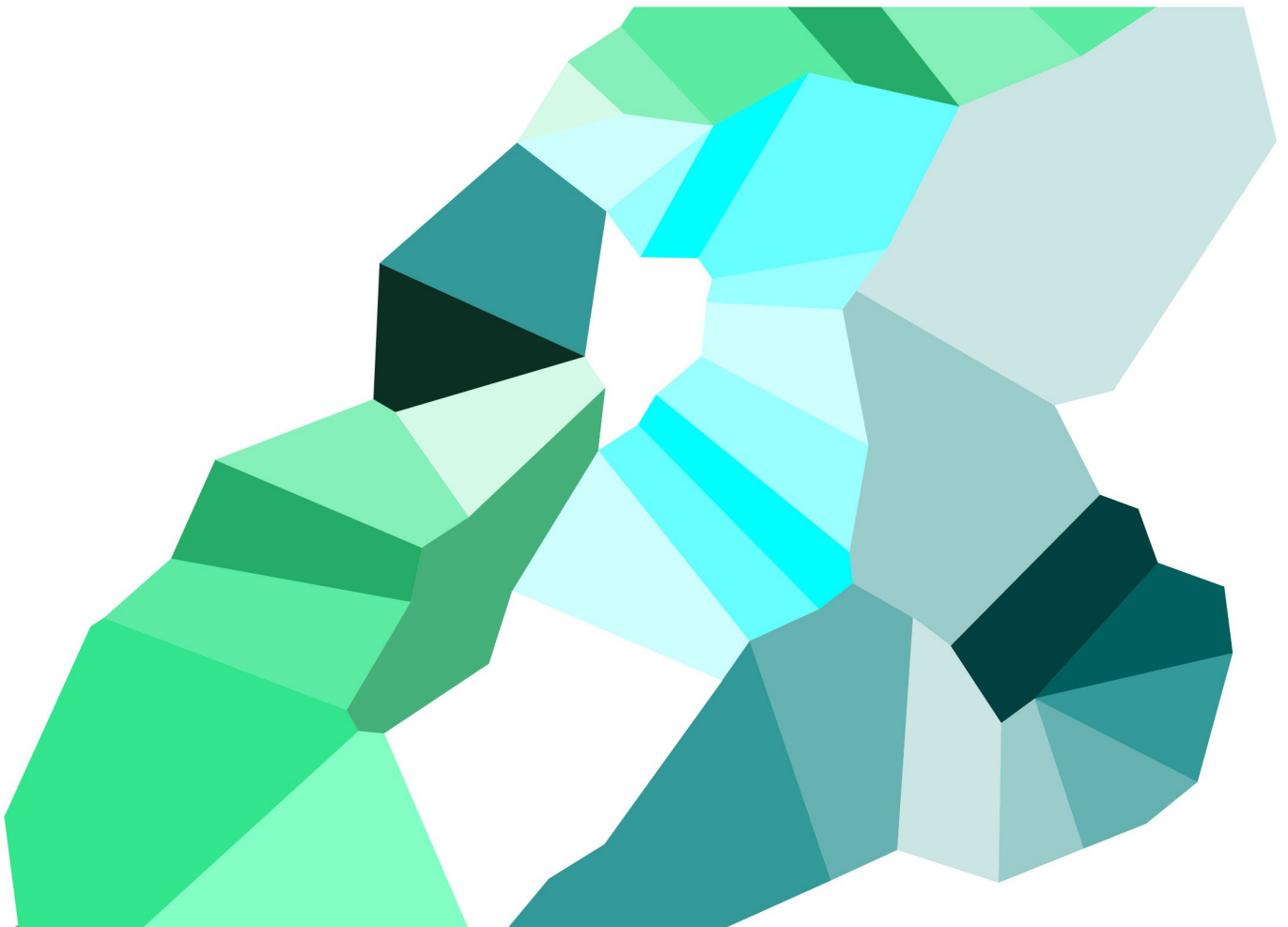
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MASTEROPPGAVE

Innovation in the Russian Oil & Gas sector -
prepared for Arctic offshore development?

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BE327E - MBA Business in Russia, June 2014



Acknowledgements

As a first we would like to thank the University of Nordland for enabling us to study within the area of Russian business development and write this thesis. We have learnt a lot along the courses, lectures and seminars organised by the University and the High North Center at Bodø Graduate School of Business.

A special thanks goes to our Supervisor, Dr. Frode Mellemvik, Director, High North Center for Business at the Bodø Graduate School of Business, University of Nordland, who has given us important and valuable feedback and comments along the process of developing our master-thesis.

We would also like to thank our informants for their precious comments and information, we appreciate that they took the time and effort in contributing to our project.

Furthermore we would like to thank our employer, Roxar, for allowing us to carry out this project along with an otherwise busy business schedule.

Last but not least we would like to thank families, friends and colleagues, for their encouragements, understanding and support.

Sofiemyr & Stavanger, June 5th, 2014

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Abstract

Russian interest in Arctic shelf hydrocarbon resources has intensified. Extraction of hydrocarbon resources is essential to the sustained growth of the Russian economy, and as on-shore hydrocarbon discoveries decline, off-shore resources are increasingly becoming important.

Due to a challenging Arctic offshore environment, innovation is considered a significant factor for the feasibility of resource extraction. Certain conditions must be in place, however, for successful innovation—innovation may thrive or decline depending on both internal and external factors.

Interviews with five authoritative informants experienced and knowledgeable in the domain in question form the primary empirical data, while a document study forms a secondary and supplementary empirical basis. The data is analysed qualitatively with the aim to assess Russian preparedness for developing their Arctic shelf hydrocarbon resources.

The exploration, development and operation of Arctic Russian shelf hydrocarbon resources are constrained by several technical and institutional factors. Technical challenges, such as a harsh Arctic climate and a limited transportation infrastructure, emphasise the need for an innovative approach to developing the Russian Arctic shelf. At the same time, institutional factors, such as the licensing of resources, strengthen Russian national oil companies' control over Arctic shelf resources and reflect the state's interest to control its resources.

The Russian national oil companies tend to vertically integrate its supply chain, but there are also examples of co-operation with international oil companies as well as with their contractors and suppliers.

Although the Russian government responds to recommendations and best practices for nurturing innovation, the drive for innovation is in general relatively weak in Russia.

Decisions in the Russian sphere of business are driven from the top rather than by consensus, which reflects the importance of control and hierarchy in Russian business

culture. This inhibits openness in innovation processes and thus may inhibit innovation in general.

The observed structures of control may reflect Russian companies' desire to protect from uncertainties in their organisational environment.

Innovation in Russian industry is not strong enough on its own to overcome the technical challenges of Arctic shelf development. However, Russian national oil companies are co-operating with international partners and are thus applying international best practices in Arctic shelf projects.

List of Figures

- 3.1 Capability cluster 17
- 3.2 Sawhney’s “innovation radar.” 22
- 3.3 R&D spending in the oil and gas industry 25

List of Tables

4.1	Scope and extent of the interview guide.	38
5.1	Informants' statements on <i>development challenges</i>	60
5.2	Informants' statements on <i>government interests</i>	62
5.3	Informants' statements on <i>government incentives</i>	64
5.4	Informants' statements on <i>corporate strategy</i>	66
5.5	Informants' statements on <i>corporate innovation</i>	69
6.1	Importance of institutional factors, according to informants <i>A</i> through <i>E</i>	75
6.2	Importance of technical factors, according to informants <i>A</i> through <i>E</i>	77
6.3	Observations of innovation in the Russian Arctic offshore supply chain.	79
6.4	Importance of innovation on a macro level, according to informants <i>A</i> through <i>E</i>	87
6.5	Importance of innovation strategies on a company level, according to informants <i>A</i> through <i>E</i>	92

Contents

1	Summary	1
2	Introduction	5
2.1	Arctic offshore	6
2.2	Innovation in Russia	8
2.3	Russian society and culture	8
2.4	Research question and purpose	10
3	Theoretical perspectives	13
3.1	Development challenges	13
3.1.1	Uncertainty in the organisation's environment	15
3.2	Supply and value chain in Russian Arctic oil and gas development	17
3.3	Innovation	20
3.3.1	The extent of innovation	21
3.3.2	Macro strategies for innovation	22
3.3.3	Innovation in the oil and gas sector	24
3.3.4	Innovation strategies and leadership - organisational level	27
3.4	Culture and business traits	30
4	Methodology	33
4.1	Philosophy	33
4.2	Design	34
4.2.1	Open individual interview	37
4.2.2	Document study	41
4.2.3	Qualitative data analysis	42

5 Empirical data	43
5.1 Documents	43
5.1.1 Development challenges	43
5.1.2 Government interests	47
5.1.3 Government incentives	51
5.1.4 Corporate strategy	52
5.1.5 Corporate innovation	55
5.2 Interviews	59
5.2.1 Development challenges	60
5.2.2 Government interests	61
5.2.3 Government incentives	64
5.2.4 Corporate strategy	66
5.2.5 Corporate innovation	69
6 Analysis	73
6.1 Development challenges	73
6.1.1 Institutional factors	75
6.1.2 Technical factors	76
6.2 Supply and value chain	77
6.3 Innovation	81
6.3.1 Innovation at large - macro strategies for innovation	82
6.3.2 Innovation at close - open innovation approach and extent of in- novation in organisations	88
6.4 Culture and business traits	92
6.5 Conclusion	93
Appendix A: Interview guide	97
Appendix B: Interview transcripts	99
1 Informant A	99
1.1 Development challenges	99
1.2 Government interests	100
1.3 Government incentives	101
1.4 Corporate strategy	102
1.5 Corporate innovation	103

2	Informant B	104
	2.1 Development challenges	104
	2.2 Government interests	105
	2.3 Government incentives	106
	2.4 Corporate strategy	107
	2.5 Corporate innovation	108
3	Informant C	109
	3.1 Development challenges	109
	3.2 Government interests	110
	3.3 Government incentives	112
	3.4 Corporate strategy	113
	3.5 Corporate innovation	114
4	Informant D	115
	4.1 Development challenges	116
	4.2 Government interests	116
	4.3 Government incentives	117
	4.4 Corporate strategy	118
	4.5 Corporate innovation	119
5	Informant E	119
	5.1 Development challenges	120
	5.2 Government interests	121
	5.3 Government incentives	121
	5.4 Corporate strategy	122
	5.5 Corporate innovation	123

1 Summary

Focus on the Arctic is intensifying due to vast discoveries of natural resources, and Russia is a major stakeholder. Yet, the development of the Russian Arctic offshore resources remains relatively stagnant. A central question in this regard is whether Russia is prepared for Arctic offshore development. Innovation is considered a decisive factor for Arctic offshore activities, and thus Russia's ability to innovate decides their potential for developing its resources. This study attempts to assess the state of innovation in this domain, through qualitative analysis of collected empirical data.

While the risk and cost of developing Arctic offshore resources are significant, innovations in knowledge and technology can help mitigate such concerns. However, innovation has to be understood in its widest terms, not just purely technical research and development, like detailed by Sawhney, Wolcott & Arroniz (2006). Furthermore, given the complexities and risk at stake, firms and organisations would possibly gain by co-operating in order to overcome the challenges, engaging in knowledge sharing and open innovation processes, as recommended by Chesbrough, Vanhaverbeke & West (2006, p. 2). The importance of the supply-network is particular within the oil and gas sector, by some considered as a "relationship-based innovation system" (Sasson & Blomgren 2011, p. 69), where much of the innovation and development within the oil and gas industry is carried out by service and technology providers, according to Crooks (2008). The innovation process and knowledge sharing can be easier if there is a well established cluster of companies, supply network and institutions in place already, but less so if the capabilities have to be built from the ground up. Hence in order to develop innovation in the larger society, the Organisation for Economic Co-operation and Development, OECD has developed a framework (OECD/Eurostat 2005), and also outlined a set of recommended policies for the Russian economy in particular (OECD 2011).

Our study is based on a hermeneutic scientific philosophy. Rather than basing the study on a hypothesis, the theory is built from the empirical data which is collected in the study, following an inductive approach.

1 Summary

The proposed theme of the study is *innovation*, however we limit the scope to within the context of the oil & gas sector active on the Russian Arctic shelf. We further identify a set of entities and variables that fall within and further narrow down this scope. We also recognise that our study is exploratory and that this study's criteria for innovation may change during the course of the study.

It follows that the design of this study focuses on *qualitative* empirical data. The nature of studying a foreign and somewhat secretive industry poses some challenges to data collection. Given a limited number of entities, open interviews is suggested as suitable data collection method. We also outline a tentative set of themes as a guide for the interviews. As a final methodological design consideration, we propose a strategy for selecting candidates which tries to cover the breadth of the mentioned themes as well as the possibility of finding interesting candidates from tips given by previous interview subjects.

Interviews with five authoritative informants experienced and knowledgeable in the domain in question form the primary empirical data, while a document study forms a secondary and supplementary empirical basis. Data from interview transcripts and documents are represented systematically in order to aid in a subsequent methodological empirical analysis. A theoretical framework forms an a priori analytical framework, while, at the same time, themes are discovered inductively from the empirical data and are also used in the analysis.

Among this study's findings are a set of factors that inhibit the Russian industry's exploitation of the Arctic shelf.

Both according to literature and the informants, influence from an international supply chain is needed to fill the technology and competence gaps in the Russian oil & gas industry. The general sentiment of the informants, however, is that the dominant players on the Russian Arctic shelf, are vertically integrated companies that wish to control all activities of the oil & gas value chain.

Thus we see the outlines of a paradoxical state of affairs that inhibits the innovation necessary to overcome the development challenges of the Russian Arctic shelf: On the one hand, hydrocarbon resources are of strategic importance to the Russian state, being its major source of income, and thus it seeks to control the licensing of these resources. The result is the dominance of a few vertically oriented companies. On the other hand, technological innovation and competence is clearly needed to overcome the technical challenges of the Arctic climate and infrastructure, while preserving the environment.

We have noted that the level and strength of innovation in the Russian society is at a lower level than in other nation states.

We have seen that the Russian governmental level is putting in place a lot of OECD recommended framework as the need for innovation and modernisation has crept up on the political agenda and awareness the last years. However, there are varying degrees of implementation and focus. Thus the overall score is somewhat clouded by challenges in certain areas and in particular within the area of the judicial sector, where several shortcomings are exposed.

Moreover in a Russian perspective we have found that there is little stimulation of the wider supply network in Russia, and that there is a lack of a dynamic process when it comes to innovation across organisations. Furthermore there is a disposition towards a top-down approach where control of decision-making and the importance of hierarchy plays in. These tendencies go against the ideas of an open innovation approach as described in our theoretical perspectives and thus might inhibit innovation in general.

That said the tendency towards vertical structures and conglomerates of interest could be a protective shield from external factors and especially from the judicial situation prevailing in Russia.

Concluding to our overall question regarding innovation in the Russian oil and gas sector—and if prepared for Arctic offshore development, we would have to answer with a no and a yes.

No to the fact that it seems that the innovation strength in Russian industry, as per today, is not strong enough to carry out and face the development challenges related to offshore Arctic development on its own. That said we would answer with a yes to the fact that at least Rosneft is preparing itself for Arctic offshore development in a way where it is taking in best practice from international partners and setting up co-operation projects whenever needed. Using best-practice from other partners would help in overcoming the specific development challenges related to Arctic offshore development.

2 Introduction

Innovation can mean a lot of things to different people, but looked at through the prism of evolution and historical view one can possibly say that evolution, progress and innovation are linked. Without innovation humanity would not have been able to evolve into what it is today, neither as society nor as benefiting the individual human being. In order to evolve one must innovate, and in order for progress to happen one must innovate. Doing things and creating things differently, quicker, better, more intelligent, humans are all part of the innovation process or making innovation happening. Being so linked to progress itself it is worth studying the deeper workings of innovation.

Russia and Norway have for centuries shared a common history and land, bordering the Arctic together in the North. Some of the most prevalent traits were the common trade and exchange of goods, produce and merchandise during the so-called Pomor-trade period. A period marked by integration of the peoples of the North, and even a rudimentary start of a new mixed language, a pidgin language in-between Norwegian dialects and Russian. Little remains of this today, frozen down one might say or died out, largely because of the results of the Russian revolution and communist period, Norway's own independence and strengthening of state-hood, and last and most importantly the cold war period. With Russia out of the Soviet Union straight-jacket and developing according to own national interests there is a new opening up of the border zone and areas between the two countries. Norway also has played in and opened up the border zone to Russian interest and exchange, supporting small and bigger initiatives in order to play down the previous cold-war agenda and feelings.

Despite this thawing up and rebirth of relations between Norway and Russia, there is still a great potential in spreading news, knowledge and analysis about Russia in Norway. As a border country to Norway, Russia is many times still portrayed through the glasses and veils of the cold-war period, where differences are magnified and facts sometimes put out of proportions, rather than focusing on what unites, common geography, shared history and similarities between peoples. One of the aims of this study, and driving our

motivation, is therefore to bridge some of these gaps, and contribute to strengthen the Norwegian and Russian collaboration and exchange. We see this as important given last months political and governmental confrontations.

2.1 Arctic offshore

The Arctic was earlier an area where the cold-war really had an impact and could be felt close at hand, for instance at areas such as Spitzbergen, where both Norway and Russia had a foothold, Greenland with its US bases at Thule, and Novaya Zemlya being a Soviet Union closed military zone. With the demise of the communist block in the 1990's, the relations warmed up, reducing mistrust and opening up borders for exchange and trade. The Arctic Council, established in 1996, is testament to the more open relations and trust now in place for all things Arctic. That said the hydrocarbon and metals boom now witnessed around the world has also spilled into the Arctic arena, giving states and nations a sense of urgency with regard to land-grab, flag-planting, surveying and developing resources. Another factor playing in is the thawing of ice and increase of accessible areas, new areas can now be developed, mined and used for industrial purpose than earlier. The added value of new logistics routes is a multiplying factor, putting extractive industries in the North much closer to markets in Asia than ever before. In sum the changes are giving a new impetus and importance to the Arctic, something that is worth studying.

The energy sector is one of the biggest industries in Norway. The sector encompasses operating companies responsible for developing the oil and gas fields offshore, equipment, software and service suppliers, and finally research and educational institutions. The equipment, software and service suppliers are providing local operational companies as well as international markets, especially within subsea and offshore development, typical and similar to developments on the Norwegian Continental Shelf (NCS). Hydrocarbon extraction is one of many other industries that unites Norway and Russia, and the energy sector therefore represents one arena where co-operation, trade and exchange can be further developed.

Hydrocarbon extraction, like any other extractive industry is based on finite resources, the Arctic represents an area not much developed from before and already is an area of interest for the oil and gas industry. In the Norwegian sector the developments and interests are moving North, with the opening up of licenses and acreage in the Barents

sea, and recent discoveries such as Gotha, Havis and Skrugard fields, now know as the Johan Castberg development.

Similarly Russian interest in the Arctic has intensified, as exploration in Arctic seas has uncovered vast oil and gas resources. Some of the most prominent offshore oil and gas fields are located far north of the Russian mainland and require advanced technological equipment and knowledge to develop, like for instance the Shtokman field.

As discussed in Section 2.2, hydrocarbon resources are important to sustain economic growth and stability in Russia and are thus of great economical, political and strategical importance to the Russian government. As in many other countries, a significant state share ownership in oil & gas companies helps to protect the state's interests. Simoniya (2011) debates the Russian government's role in the Russian oil & gas industry. Western criticism against government influence in major oil & gas companies, such as e.g. Gazprom, is challenged by his analysis of the relation between state and business in the sector. The Russian government has been accused of exerting control as a dominant European energy supplier, while Simoniya (2011) argues that Russian oil & gas industry is primarily commercial, with considerable foreign ownership, and that the government's role is primarily instrumental.

Most of Russia's undeveloped Arctic offshore hydrocarbon resources are located on the Barents and Kara sea continental shelves. In the Barents sea we find the Shtokmanskoje, Ledovoye, Ludlovskoye, Murmanskoye and North-Kildinskoye prospects, and in the Kara sea we find the Yamal shelf and the Kharasaveyskoye and Kruzenshternskoye fields (Zolotukhin 2011). It was long expected that the Shtokman field would become commercially feasible to develop, but its development has been delayed, in part because of recent changes in the international gas market, with cheaper shale gas extraction delivering a boost to supplies in the USA, and new gas-fields in East-Africa and Australia, both areas closer to the key markets in Asia. Gazprom and Rosneft are two notable stakeholders in the region having been granted acreage based on the state being the majority owner of the shares and thus controlling both companies. Other firms such as privately owned Lukoil and foreign companies, including Exxon Mobil, Total, Shell, BP and Statoil, have also shown interest, but have not been granted licenses.

2.2 Innovation in Russia

Like any other oil and gas producing country, Russia has to invest heavily in the sector to stand still, meaning extract the same volume and quantities of oil and gas as today. The easiest and most accessible oil and gas fields in Russia have reasonably been developed, hence the future wave of development will increasingly be offshore, Arctic, subsea, high temperature and high pressure reservoirs. In essence pushing boundaries technology wise. Russian oil and gas industry already has great experience from onshore and Arctic development and will probably build further on this strength, but lack knowledge and experience in other areas such as subsea and offshore development and production. Simoniya (2011) suggests that Russian industry is not itself technologically prepared for the harsh conditions posed by development of offshore Arctic hydrocarbon resources. Further, technological innovations in production and refining may help increase the relatively low recovery rate in Russian oil & gas industry.

There has been an expressed interest and focus by the Russian government to boost innovation in Russia. In his “10-step plan,” Dmitry Medvedev proposed ten measures for improving the climate for innovative industry and education in Russia (Ernst & Young 2011), including a government backed investment fund and efforts towards improving Foreign Direct Investment attractiveness. It is recognised that dependence on resource exports leaves the Russian economy vulnerable, and that diversification and knowledge based industry may further realise Russia’s industrial potential. The World Bank (2006) mentions a set of innovation oriented initiatives developed by the Russian government, including special economic zones, funding and other incentives—directed policies representing a shift away from liberal principles of previous Russian market policy.

2.3 Russian society and culture

Much of the peculiarities of Russian business can be attributed to a distinct cultural and societal context. As an outsider studying Russian business, an understanding of this background can help to explain Russian business culture and practice.

In particular, a distinct historical background has shaped Russian society and culture. Indeed, Russian national history holds appeal and is admired with pride among Russians, which is also reflected through promotion of national identity and pride in Russia’s

political arena. It is perhaps a historical exercise in political extremes that attracts interest in Russia's modern history; nonetheless as the effects thereof arguably permeate today's Russian society and culture.

Divided by the Urals, Russia is neither entirely European nor entirely Asian. In post-Soviet Russia can be observed an increased openness towards Western economical principles and corporate governance. In contrast to this Western orientation stands the legacy of the stereotypical Asian leadership tradition. Although internationalisation has inspired changes in post-Soviet Russia through international organisations, such as recently the World Trade Organisation, and opening up to foreign markets and stock exchanges, other financial policy changes bear more resemblance to centrally planned reforms. From Yeltsin through Medvedev and Putin's presidential terms the main priority has remained securing domestic growth and stability.

As corporations were owned and directed by the government, through central planning, a market oriented corporate governance system did not exist during the Soviet era. The collapse of the Soviet Union was followed by a decade of "Wild West" capitalism, following a drastic attempt to reform Russian economy through "shock therapy," towards market economy, liberalism and privatisation. From this turbulent transition it became clear that a stricter corporate governance system would need to be in place in order to attract investors' confidence. In addition to central reforms towards international standards, internationally exposed corporations in Russia have adapted norms, standards and practices from their foreign counterparts.

Nevertheless, Soviet power structures remain to some extent, and it is argued that much of Russian corporate activity falls within "the vertikal" (Monaghan 2012). With the Russian government holding a tight grip on institutions, the line between business and government is blurred, and the level of transparency offered is not as would be expected in most developed countries. A growing well educated, modern and otherwise open Russian society thus represents another duality in contrast to the legacy of Soviet power networks. McCarthy & Puffer (2002) argue that personal relations are important in Russia, and a tight personal sphere of trust is caused by the historically harsh political climate. Also, dealing with state affairs is traditionally considered risky and is often avoided. Many Russians are still today reluctant to talk directly about matters that concern state and government.

Some of the above suggested traits of Russian society can be categorised in Hofstede's (1980) model of national cultures, which is further discussed in Section 3.4. He argues

that national cultures have consequences for norms and practices in businesses. Consequently, for an outsider, understanding of these distinct aspects of the Russian society is fundamental to understanding how business is practised in Russia.

2.4 Research question and purpose

Our aim with this study is to assess the capabilities and preparedness of the Russian oil & gas industry and its supply chain to enter into Arctic offshore hydrocarbon extraction. Our research question is to determine and capture what is done in order to stimulate such capabilities, preparedness and possible innovation. We handle this research question by establishing a theoretical framework for innovation in this domain, collecting empirical data on the topic, and then analysing the data, while taking the theoretical framework into account.

Our motivation is based on the Arctic being an arena that poses challenges and interest in terms of geography, politics and climate. Due to its geography, Russia inherently holds a major stake in the development of the Arctic, while other northern countries have shown interest and wish to secure their claim and presence. It is not until recent years interest has intensified, largely in part because of newly discovered metals and hydrocarbon resources and easier access to the same because of thawing of icy conditions.

Hydrocarbon extraction is central to both Norwegian and Russian industry and economies, and given their dominant position in Arctic hydrocarbon extraction, Russian activity affects and has consequence for other Arctic nations as well as the global market and society. Russia thus is a natural object to study in this context. Of particular interest to Norwegian industry is increased activity in the Barents sea as discoveries in the South of Norway are harder to find after years of intense exploration and development.

Although Russian onshore oil & gas production is well established, Arctic offshore development is a new arena for Russian oil & gas companies. That said, exploration has been carried out in some Arctic areas earlier. Given new Arctic hydrocarbon discoveries and the extreme conditions of the Arctic, this arena is new also to well established international oil & gas companies. The Russian oil & gas industry can address these challenges in several different ways, including taking advantage of existing domestic or foreign networks and supply chains, but innovation is a precondition for success in this context. We see innovation, in its widest definition, as a driving force and decisive factor in the domain of Arctic offshore development. Thus we wish to establish Russia's

integral ability and potential to find solutions to challenges faced in this domain.

This study assesses the Russian potential through several perspectives. Firstly, the challenging environment that surrounds Russian industry operating on the Arctic shelf is described. By assessing the risks and uncertainties and their impact on business we see a picture how organisations can or should adapt to their environment.

Secondly, the study addresses the political perspective of Russian Arctic shelf exploitation. The political environment is a major force and lays conditions for the industry through its laws, regulations and institutions. By capturing the interests of the Russian government, we gain a better understanding of the industry's institutional environment, the rationale behind it, and how organisations may innovate to adapt to it.

The political perspective will also be analysing what is done on a political and governmental level in order to encourage and develop innovation, and ready the Russian oil and gas industry for the Arctic development. Thus taking into account policies that stimulates innovation on a macro-level, modernisation of legal framework, concession policies, taxation and infrastructure and national supply-chain development. The government is likely to be an important factor, given the challenges posed by extracting hydrocarbons in the Arctic oceans.

Finally, we address what is done on a company level, or more specifically on the level of oil and gas operating companies in Russia, exemplified by Rosneft. From the company point of view we will try to see what is done in order to prepare and stimulate the supply chain and wider network of sub-suppliers for the Arctic offshore development, and how innovation is nurtured in order to overcome Arctic offshore challenges.

3 Theoretical perspectives

Given the challenging nature of development and production in Arctic and offshore conditions, we consider ability to innovate as a deciding and decisive factor. As suggested by Zolotukhin (2011), development of petroleum resources in Arctic seas poses challenges because of lacking technology and knowledge. We suggest that Russian preparedness to develop these resources thus depends strongly on their ability to overcome the respective technological challenges and innovate.

In the following sections we will thus shed light on some of the development challenges for Arctic offshore development, before moving over to the theme of supply and value chain in Russian Arctic oil and gas development. Since we consider innovation a decisive factor in order to overcome the challenges, we will try to explain what can be considered as innovation, before going into macro strategies for nurturing innovation, furthermore shedding light on the innovation in the international oil and gas industry. The innovation theme will be ending with an overview of different strategies for stimulating innovation on a company and organisation level. Since we are analysing developments in another country, seeing issues and facts through the lenses as foreigners, we are adding a final chapter on culture and business traits.

3.1 Development challenges

It is well known that developing offshore petroleum resources is more challenging than conventional onshore oil fields. Firstly, offshore development and production pose significant logistical challenges by nature of operating often far away from shore, having to transport personnel, equipment and resulting production to and from mainland and supply base. In addition, drilling and production operations have to be conducted in harsh or deep waters, or even subsea depending on the water depths and field characteristics. All pose severe technological and practical constraints for oil and gas development. Furthermore, operating at sea poses significant risk both from potential oil spills, which can

3 Theoretical perspectives

have a devastating effect on ecosystems, as well as personnel working in a potentially hazardous environment with limited possibility for rescue in case of disaster.

Arctic conditions, ice and the harsh weather climate add to these constraints. Distance from shore is another severe challenge for some Arctic fields, which means greater logistical distances as well as increased response time for rescue helicopters and supply vessels - if helicopters are even within range from shore or platform. For instance the most northern parts of the Arctic even fall outside the range of a functional Global Positioning System. Drifting icebergs are another source of risk; their path can be difficult to predict and the risk of impact with drilling rigs, supply vessels and production platforms needs to be managed (Gudmestad 2011). Shifting layers and thickness of ice, ice build-up on constructions and vessels are other sources of concern. Finally darkness through large parts of the year should not be underestimated as a risk factor to overcome during Arctic oil and gas development.

In addition to these specific challenges developing an oil and gas field offshore, one would of course need to overcome the more conventional challenges, similar to onshore developments and projects in more benign waters. Some of these challenges could be linked to reservoir chemical qualities, temperature and pressure level, either individually or in combinations. For instance presence of H₂S would demand special metal alloys and sour service specifications for wetted parts and increased safety measures, whereas a high pressure level would require strengthened piping, valves and specialised well control equipment. A heavy oil application would need other specifics depending on the level of viscosity, for instance steam injection and heating equipment, or injection of chemical solvers. Finally building pipelines and offshore loading buoys delivering and transporting the resulting production to the market could also be represent possible challenges that would have to be addressed.

Exploiting natural resources under the above mentioned constraints is limited by available domain specific technology and knowledge. Resources in the Arctic seas are largely undeveloped and consequently there exists little experience and knowledge about how to operate in the area, as well as a lack of necessary technology and solutions. For instance oil-spill recovery in icy conditions remains a challenge for most of the drilling and operating companies, an area where a lot of different solutions and technologies are under development. Examples are not only oil dispersing technologies on the surface, but also capping and control devices above the well-head. Arctic un-preparedness increases the risk of developing and producing under such conditions, and the need for bleeding edge

technology or research also increases cost. Other attributes of Arctic conditions add to this cost; for example, great distances from shore and the need to build infrastructure on land in often underdeveloped areas far away from main transportation hubs.

For many in the industry the risk and cost associated with Arctic development are so important that according to a recent interview of Lukoil vice-president Mr Fedun by Chazan (2013a, 31 Mar.)

It would be much cheaper for oil companies to exploit Russia's onshore shale reserves than the oil in its remote Arctic oceans.

Furthermore he stated that Lukoil has many more investment opportunities that carries less risk than development oil and gasfields under the Arctic seabed. As a note, onshore shale reserves have not yet been developed on a significant scale in Russia, contrary to the development in USA, where shale reserves have contributed to an upswing in gas and oil extraction.

The increased risk and cost factors indicate that the profitability of operating in the Arctic seas is correspondingly constrained. Innovation, by building knowledge, technology and solutions, can help the Russian industry to adapt better to such conditions, and thus improve the profitability and reduce risk related to development and production projects in the Arctic.

3.1.1 Uncertainty in the organisation's environment

Risk is caused by the inability to control one's surroundings and affects how organisations operate, ie. they need to adapt in order to be successful (Jacobsen & Thorsvik 2007). Moreover, all organisations are dependent on their surrounding environment. Jacobsen & Thorsvik (2007) classifies an organisation's environment into *technical* and *institutional*, but also suggest that certain elements of its surroundings may fall into both categories. Meyer & Rowan (1977, p. 355) further suggest that demands of the respective environment types may be conflicting:

Categorical rules conflict with the logic of efficiency.

Subject to risk from either technical or institutional factors, organisations may adjust their strategies or structure (Jacobsen & Thorsvik 2007). In order to reduce uncertainties in its technical environment, organisations may

3 *Theoretical perspectives*

- establish buffers to protect its internal operations from external interruptions
- attempt to reduce spikes in workloads by evening out the work over time
- try to predict fluctuations in workloads
- attempt to grow
- vertically integrate
- horizontally integrate
- diversify
- outsource
- cooperate with other organisations
- interlocking directorates with other organisations

Strategies for handling its institutional environment include conforming to what is publicly perceived as an efficient or rational

- organisational structure,
- operational procedure, or
- choice of personnel.

Subject to conflicting forces in its technical and institutional environments, organisations may

- de-couple operations from the organisations formal structure
- negotiate with its institutional environment
- resist and protest
- try to influence its publically perceived legitimacy

Bourmistrov & Mineev (2011) suggest that Russian companies often employ analytical systems for managing technical risk factors of the domain. However, for the more qualitative factors of a non-technical nature, techniques such as total quality management, value chain analysis, SWOT and lifetime costing are less widely used in the Russian industry.

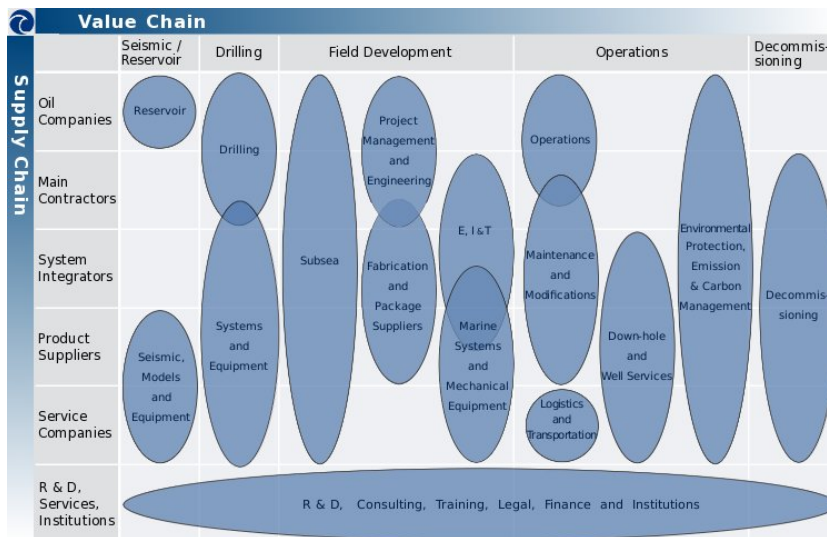


Figure 3.1: Capability cluster

3.2 Supply and value chain in Russian Arctic oil and gas development

An organisation typically depends on a network of suppliers of products and services necessary for its activities. In order to handle a challenging environment, it may seek to reduce risk or improve performance by taking a strategic form adapted to its environment. Two typical opposing strategies in this context are vertical integration and outsourcing. By integrating suppliers into its own organisation, the supplier dependence is removed, and the risk of the supplier's operations may be managed by the organisation itself. Conversely, by outsourcing operations to a supplier, risk and cost may be reduced resulting from the availability of competing suppliers. Typically, however, organisational networks are more complex than a supply chain, and there are several other ways for organisations to cooperate than the supplier and consumer roles (Jacobsen & Thorsvik 2007).

Skretting (2011) identifies four main categories in the supply chain leading up to oil & gas companies, namely contractors, technology integrators, product suppliers and service suppliers. Moreover, INTSOK (2010) provides a more detailed analysis of the oil & gas value and supply chains in terms of capability clusters, as illustrated in Fig. 3.1. Thus a typical value chain in this context might consist of the following activities

- Geomapping, geographical and resource mapping in the Arctic

3 Theoretical perspectives

- Drilling and exploration activities
- Field development and first oil
- Transportation - piping, loading and shipping are all challenging operations where the reliability and safety must be assured.
- Maintenance and modification activities
- Increased oil recovery
- Decommissioning and abandon

We have already established in Section 3.1 that developing Arctic shelf resources poses significant challenges. Zolotukhin (2011) stresses the need for new technological solutions and better grounds for making informed decisions in this context. He further suggests that indeed, the Russian oil & gas industry may lack certain technology for offshore production, and taking advantage of an international supply chain as a means for filling the gaps in the Russian industry.

Zolotukhin (2011) lists a number of technical factors associated with the development of Arctic resources, including

- Fragile environment—the possible impact and repercussions of carrying out extractive industries in a fragile environment are not to be taken lightly, especially when it comes to oil spill and hydrocarbon recovery in such areas. Innovations and adaptations to current and existing capabilities will have to be developed and put in place.
- Harsh conditions and ice management—existing equipment, work methods and operations will have to be adapted to the harsh, dark, windy and icy conditions prevalent in the Arctic area.
- Offshore—many of the fields are far away from shore and new techniques, work methods and safety skills will have to be developed
- Subsea development, depending on water depths, distance from shore and reservoir characteristics—many fields will have to be developed through a combination of subsea equipment and techniques.

3.2 Supply and value chain in Russian Arctic oil and gas development

All above mentioned constraints carry a significant amount of risk and thus place a significant burden on each activity in the value chain of an organisation operating in this domain. Both outsourcing and integration are viable approaches to mitigating these risks. By outsourcing activities, the organisation can choose a supplier best fit to handle the risk; vice-versa, by integrating activities, the organisation can handle the risk itself and gain a better understanding of the risk.

Nonetheless, Russian industry may need to address these challenges by seeking expertise and technology outside Russian borders. This is not uncommon in today's Russian industry, but in general, international cooperation often poses trade restrictions and regulation idiosyncrasies of respective host countries. Further, Jacobsen & Thorsvik (2007) suggest that cooperation between organisations can be affected by several factors, including agreement on the respective responsibilities of each entity, common goals, mutual benefit, coordination and trust. The significance of such factors is amplified by diverging business cultures (Skretting 2011) and practices (Bourmistrov & Mineev 2011) as well as language and other cultural differences.

On the other hand, Russian participation in international forums and organisations may improve bilateral understanding and build a common trade platform. For example, Russian participation in the World Trade Organisation helps ensure fair conditions for international trade with Russian companies, while the Arctic Council helps to facilitate cooperation between industries bilaterally, in the Arctic region (Staalesen 2012).

Furthermore, state and regional policies affect international trade and thus government can both boost or inhibit bilateral industry cooperation. For example, infrastructure for transportation has a particular significance in Arctic Russia, as distances are great. But also how governance is practised affects industry cooperation; in particular unpredictable governance may inhibit trust between partners. The World Bank (2013) lists several factors that may affect a foreign supplier establishing in Russia. For example, the difficulty of getting basic amenities such as electricity may inhibit a foreign supplier's presence in Russia, and import difficulty may inhibit sale of foreign goods to Russian industry.

Porter (1985) suggests that understanding the organisation's role in an overall value system, external to the organisation's internal value chain, is necessary to achieve competitive advantage. For example, agreements with a supplier to optimise delivery methods can give a competitive advantage. Skretting (2011) reiterates this sentiment in the context of the Russian oil & gas industry, ie. that understanding the consequences of

the company's position in the supply chain is of significance to forming a successful strategy. For example, he suggests that foreign technology integrators may need to physically locate in Russia in order to be successful, as opposed to product suppliers, for whom physical presence is of lesser significance. With local presence some of the above mentioned idiosyncrasies between Russian and foreign industry may be overcome. For example, local workers may overcome visa restrictions, and locally produced components may more easily be approved by Russian authorities. Skretting (2011) also suggests that for a foreign supplier to enter the Russian market, partnering with Russian industry may be the easiest route. A Russian partnership may help reduce cost and overcome risk of establishing business in Russia.

3.3 Innovation

Innovation although difficult to define in a precise manner is probably easier to characterise. One of the first to describe innovation and put it into an economic and development context was Joseph Schumpeter. In his "Theory of Economic Development" Schumpeter (1911) argues that the status-quo and stable situation is upset by entrepreneurs creating and causing economic development through their actions and innovations. Thereby the previous stability is uprooted and the economy enters cycles and flows according to innovations and consequential developments and new innovations again. Thus, the main ideas of Schumpeter, as summarised by Kay (2007, 08 Sep.)

The success of a market economy rests not primarily on the accumulation of capital but on innovation, which was the product of entrepreneurship.

Thus in the Schumpeter sense, innovation can be introduction of a new good or a new quality of a product, introduction of a new method of production, opening of a new market, conquest of a new source of supply, or finally a new organisation of an industry. Seen in this light innovation represents something bigger, uprooting and almost revolutionary, however according to Witzel (2005, 25 Aug.):

Most innovation is not radical or breakthrough in nature. The majority of innovations consists of small, often very small, incremental changes or improvements to existing products, and also to production processes, organisations, management methods and so on,

Witzel (2005, 25 Aug.) furthermore states that

Innovation is necessary, to improve products and processes and keep the business aligned with the shifting needs of the market, but the most successful—and profitable—innovations are usually slow, gradual and incremental.

3.3.1 The extent of innovation

Going further, a more extensive description and characterisation of innovation than the Schumpeter one, is presented by Hamel & Breen (2007) structuring innovations in a hierarchy and layers of innovation. According to Hamel operational innovations are at the bottom of the pyramid, followed by product and service innovations one above, strategic innovations one step further up, and finally management innovations at the top of the pyramid. By presenting innovations in a hierarchy Hamel differs from Schumpeter, however both agree on characterising innovations in a wide sense and terms.

In the same vein although with a finer and more granular approach to innovation, Larry Keeley, together with The Doblin Group, are identifying ten types of innovation (Keeley, Walters, Pikkell & Quinn 2013). According to Keely, the ten types and areas of innovation are business models, networks and alliances, enabling process, core process, product performance, product system, service, channel, brand and customer experience. The different variants of innovations are not structured in a hierarchy, but again innovation is understood in its widest possible terms, encompassing any changes improving the outcome and final product and service.

Almost similarly, Sawhney et al. (2006) in another approach describe twelve different innovation dimensions. Following Sawhney the twelve dimensions of business innovation are offerings such as new products and services, platform meaning components to create new offerings, solutions that solve customer problems, customers that satisfies unmet customer needs and segments, customer experience, value capture in the sense of payment and revenue streams, processes enabling efficiency and effectiveness, organisation, supply chain, presence through distribution channels, networking with integrated offerings, and finally brand innovations. Sawhney et al. (2006) presents these dimensions in something called an innovation radar. As seen in Fig. 3.2, these dimensions can be grouped into four main areas consisting of, (i) offerings created by the company or organisation (what), (ii) customers and clients served (who), (iii) processes employed and put in use (how) and finally (iv) points of presence it uses to take its offerings to

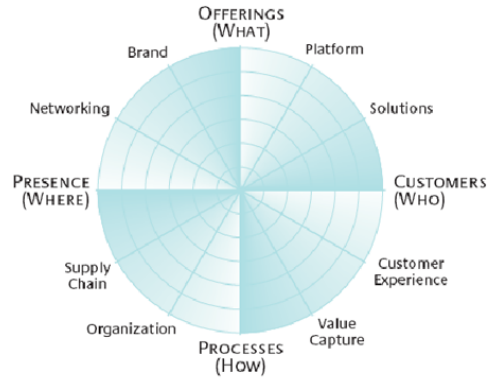


Figure 3.2: Sawhney’s “innovation radar.”

the market (where).

Hence all the various characterisations of innovation show the extent of innovation and what can be understood as innovation. This is relevant for our analysis of innovation in the Russian oil and gas sector. A specific question in this regard and of interest for our analysis is if Russian oil and gas companies sees innovation in the same manner as above mentioned theorists. Finally the characterisations show how important innovation is for change, adaptation, development and progress; for finding new solutions to existing and new challenges and for overcoming waste and spoilage of resources.

3.3.2 Macro strategies for innovation

Adopting an encompassing view on innovation, the Organisation for Economic Co-operation and Development (OECD) has developed a macro-level approach and framework in order to analyse and study innovation. The framework is widely known as the “Oslo Manual - Guidelines for collecting and interpreting innovation data” (OECD/Eurostat 2005). OECD has published several studies on innovation and how to measure and assess innovation on country by country level. In its assessment of innovation policies in Russia, OECD (2011, p. 13) states

Modernisation and innovation are two faces of the same fundamental process through which a country can optimise the accumulation, renewal, allocation and use of the material and immaterial capital in order to increase its sustainable growth potential.

Thus OECD likens innovation to modernisation in the case of Russia, and furthermore publishes a list of different policies and recommendations that should be put in place in order to nurture and develop innovation in Russia. Some of the policies and dimensions applicable for Russia according to OECD are:

- Monetary policy—a stable monetary environment
- Budgetary policy—fiscal sustainability
- Competition and trade policy—discourage rent-seeking behaviour and help improve Russian businesses in global innovation networks and markets.
- Financial policy—promote financial institutions that are able to value properly innovation-related investments and manage efficiently the risks inherent to innovation.
- Education and training policy—secure quantity, quality and efficient allocation of human resources needed for more knowledge-intensive and market-oriented productive activities.
- Research policy— help develop and mobilise, for socially useful purposes, mutually reinforcing research capabilities in the public and private sector.
- Industrial and regional policy—must provide appropriate infrastructure, frameworks and other support to realise the innovation potential of specific sectors and clusters.
- Social and health policy—consider innovation a means, but also a result of, the improvement of quality of life.
- Environmental policy—pro-innovation regulations and incentives as important means to encourage value creating responses to the need to decouple economic growth and use of natural resources.
- Judiciary policy—enforce rule of law, protecting innovation activities that are already inherently risky against additional uncertainties.

It is clear that OECD sees innovation as something wider and encompassing, the whole society at large has to be encouraging innovation, and several different policies have to play in harmony and together in order to nurture innovation. That said the

3 Theoretical perspectives

OECD prism is not the only way to analyse and approach growth and modernisation in a set geographical area. Ricardo Hausmann (2007, p. 5) claims that:

Depending on where a country has developed its comparative advantage, its opportunities for structural transformation will be affected by the structure of the product space in its neighbourhood.

Hausman's study shows that countries develop through products that are closely related or similar. In other words the width and depth of the existing production structure limits the scope for future national change, transformation and development. Hence the strength of a certain cluster, clusters or breadth of clusters will impact the future possibilities and opportunities for any given country or geographical area. Hausman's theory could thus be seen as contradicting the OECD policy framework, in the sense that whatever policies and best practices that are put in place there are limits to what transformation can be achieved due to the existing production structure. For instance, for Russia this means that the relatively important metals and hydrocarbon extractive industries could impact the directions for future innovations and transformation.

That said, both the approach of OECD and that of Hausman are relevant for analysing innovation within the Russian oil and gas industry. The OECD study in the sense of setting out clear policies for modernisation and a framework for nurturing innovation, and Hausman's theory in the questioning the influence of past and current capabilities in the future innovation opportunities.

3.3.3 Innovation in the oil and gas sector

Taking an industrial and international level and approach to innovation in the oil and gas industry, one of the first things that one will discover is that the oil and gas industry has traditionally fared quite low on research and development charts, especially in contrast to other industries. In an article about oil innovation, Crooks (2008, 28 July) presents the chart in Fig. 3.3.

The rankings speak for themselves with oil and gas operators spending little or very low levels of their turnover in pure research and development activities. However, Crooks (2008, 28 July) claims that these numbers are not representative for the true level of innovation carried out in the industry:



Figure 3.3: R&D spending in the oil and gas industry

3 *Theoretical perspectives*

Developing an oilfield often means pushing back the frontiers of what is technically possible, just like R&D, but it is not defined as such under standard accounting rules.

The same idea is also put forward by Sasson & Blomgren (2011, p. 69):

The nature of innovation among firms in a cluster and the reduced importance of patenting in a relationship-based innovation system like in the oil and gas industry, also contribute to a generally low innovative score.

This is exemplified by the fact that more and more of research and development is taking place within the service and equipment suppliers, and hence outside the oil and gas operating companies, or the owners of the fields. For instance witnessed by the higher level of research and development spending of Schlumberger, one of the major oil and gas equipment, software and service suppliers, as shown in Fig. 3.3, compared to oil and gas operating companies such as ExxonMobil or Statoil. Similar numbers can be found by analysing R&D spending in other companies in the oil and gas supplier industry, such as Roxar, CGG Veritas, PGS, Technip, Aker Solutions. Crooks (2008, 28 July) pinpoints that oil and gas technology is either held by all the oil and gas operators or in the hands of service companies,

As a result, big oil companies do not generally control much distinctive technology that only they can offer.

That said the overview and the comments do not speak about the innovation carried out by research institutions and universities. Something that would certainly have to be taken into account for a more complete analysis. In sum this points to a direction where the analysis of innovation within Russian oil and gas sector should include the strength of networks, and a wide notion of oil and gas companies, and not just the direct operators or research institutions dedicated to oil and gas development. Furthermore the notion of innovation must be understood as a wider definition, including overcoming typical challenges that oil and gas development and extraction will phase in general, and for Arctic development in particular. Our analysis will develop further on this idea and we will assess the strength and use of network and open innovation in the Russian oil and gas industry.

3.3.4 Innovation strategies and leadership - organisational level

Looking at innovation in companies and organisations, innovations, either internal or external, will impact any type of organisation. Some innovations might be a menace for certain types of organisations, whereas other organisations draw their entire existence, development and competitive position from innovations according to Détrie (1993).

On a company level Détrie (1993) claims that technological innovations can impact the activities of the organisations (growth, maturity, value, limits, borders and segmentation), on the competitive positions (cost structures, product differentiations) and finally on the very structure of competition itself (disappearance of competitors, new competitors emerging). Hence the way an organisation or a company approaches innovation will determine if a company is successful or eventually risking to whither away or ending up in irrelevance.

Research has shown that some types of business environments and organisations are better at nurturing innovations than others. In order to create a propitious environment Midgley (2010) claims that one has to open up for innovations in the organisation, showing direction and setting up clear guidelines. Another building block according to the theories of Midgley is to choose, prepare and support the team set to carry out the innovations, a third aspect is to create innovations together with the customers, however it has to be the right customers and at the right moment. A fourth element according to Midgley is to change the organisation that is to carry out the innovation, change management is thus a crucial part of the innovation process, and a final element is to build up a market for the outcome of the innovation process.

From another viewpoint and through another research study focusing on organisational culture that stimulates creativity and innovation Martins & Terblanche (2003), put forward that such organisations can be characterised by a strategy with a common vision and purpose, second a certain type of structure, preferably flexibility, freedom, teamwork and co-operation, third support mechanisms that reward and recognise, availability of resources and acceptance of risk-taking, a fourth element consisting of behaviour that encourages innovation, learning and competition and finally a fifth element of open and clear communication.

Approaching innovation, not just from the perspective of a single organisation or entity, an alternative strategy to innovation can also come through the process of open innovation, defined by Chesbrough et al. (2006, p. 2)

3 Theoretical perspectives

as the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology.

As per this definition and point of view, innovation can come from many directions and dimensions surrounding the company or the organisation. For instance, even customers and end-users can participate in the innovation and development of new product and solutions. According to the promoters of the ideas behind open innovation, van de Vrande, Spruijt, de Rochemont & Chesbrough (2013), more and more companies are moving towards an open way of innovating. Several factors contribute to this drive, (i) people have increased mobility and change jobs more often, (ii) venture capital is available for spin-offs and new ideas to be developed outside or on the side of the existing structure, (iii) companies in the supply chain participate in the innovation process.

Open innovation is often opposed to closed innovation, Gassmann & Enkel (2004, p. 14) describes the closed and open innovation approach with the following characteristics:

Open Innovation Approach

- High product modularity
- High industry speed
- Much explicit and tacit knowledge required
- Highly complex interfaces
- Creating positive externalities

Closed Innovation Approach

- Low product modularity
- Low industry speed
- Less tacit knowledge required
- Low complex interfaces
- No positive external effects through licensing

According to the supporters of this line of thinking, open innovation is catching on in today's networked and connected environment, and Enkel, Gassmann & Chesbrough (2009, p. 311) go as far as stating that

Once the notion of inter-organizational innovation collaboration has entered an industry, everyone who does not participate will cope with serious competitive disadvantages.

They furthermore claim that

The future lies in an appropriate balance of the open innovation approach, where the company or the institution uses every available tool to create successful products and services faster than their competitor and at the same time fosters the building of core competencies and protects their intellectual property.

Different approaches to innovation can be identified within the open innovation set-up, for instance Shuen (2008, p. 135) has identified four different approaches. The definitions are based on various alternatives between user groups and company:

- Company to end user—innovations on a platform, open, ecosystem based
- Company to company—recombinant innovation, where different fields of technology are combined in new settings, fields or connections
- End user to end user—democratised innovation
- End user to company—innovation through combined efforts

The various theories on innovations within organisation demonstrate that there are many and different approaches in order to foster and develop innovations. This is relevant for our analysis of the strength of the innovation level within Russian oil and gas sector, and the preparedness for the Arctic offshore development. Especially the theories and possible relevance of open innovation and innovation collaboration in order to solve challenges will have to be analysed further in a Russian setting. A specific question in this regard, is to what extent collaboration is nurtured in order to overcome common challenges and innovate. For instance Russian oil and gas companies are used to be working on developing on-shore fields alone, whereas internationally, most of the more challenging projects such as subsea and offshore projects are developed through co-operation between partners and joint-ventures.

3.4 Culture and business traits

Like presented in earlier chapters, Russia has had its very own history with regards to industrialisation and business development. Whether positive or negative, the past has most likely influenced the current climate and business culture.

One of the first to develop a comprehensive analysis of cultural aspects in a business setting was G. Hofstede, especially with his cultural dimensions theory, first developed through research inside IBM, the multinational information technology firm, later published in "Culture's consequences" (Hofstede 1980). In his works, Hofstede summarises aspects that are different from culture to culture and nation to nation. The dimensions of the different cultures as quoted from Hofstede are:

- Power distance index defined as "Power distance is the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally."
- Individualism versus collectivism defined as "The degree to which individuals are integrated into groups".
- Uncertainty avoidance index defined as "a society's tolerance for uncertainty and ambiguity".
- Masculinity versus femininity or as defined by Hofstede "The distribution of emotional roles between the genders"
- Long term orientation versus short term orientation.

Hofstede's study pinpoints differences in national cultures and are thus not applicable for individual differences on a personal level. Furthermore within nations there can be wide variations of business cultures, on a regional level, professional level or just simply in between different companies. However, the analysis can be used as a first approach to studying differences between varying national business cultures.

Hofstede has published his own analysis of Russia (Hofstede 2014) using the cultural dimensions scoring. According to Hofstede Russia is one of the most power distant countries in the world, where the major differences between those in power or not are reinforcing the importance of status symbols.

Regarding the second value, individualism, Russian people have a lower score on the index, meaning that for Russian people, close friends and families are important in order

to face the challenges of daily life. Similarly, close relationships are important for more business related activities such as negotiations, get hold of information or network.

Regarding masculinity versus femininity scoring, the third dimension in Hofstede's analysis, Russia has a low score, reflecting attitudes such as acceptance of dominant behaviour from superior levels in the organisational hierarchy. However the same is not acceptable if dominant behaviour is exercised by someone on the same level.

Regarding uncertainty avoidance Russians show a high score again, showing that Russians are feeling threatened by uncertainty and ambiguity. Hence according to Hofstede Russians prefer to plan in detail and have overview of background and contextual information. On a person to person level Russians prefer a formalistic and distance seeking attitude towards strangers, that said it is also a sign of respect according to Hofstede.

In other studies of Russian business culture, Bourmistrov & Mineev (2011) conclude that Russian companies are more expert-oriented with regards to information gathering. Companies are also characterised by decision making processes that are both hierarchical and centralised. In addition control systems are managed through a process where there are "few formal tools used for managing non-technical factors" (Bourmistrov & Mineev 2011, p. 23), meaning that decisions are "often based on intuition, experience and simple logic," (Bourmistrov & Mineev 2011, p. 23) according to the research study.

Bourmistrov & Mineev (2011, p. 24) put forward some tentative explanations and state that

Russia is still characterised by a highly risky business environment leading to unpredictability and volatility, risks and uncertainty.

The interesting questions are thus how these specifics impacts innovation in general and innovation in Russia especially. Trying to summarise some of the more prevalent specifics of Russian business and management culture one can see a pattern where direct control factors have importance, typically like strict hierarchy, importance of power, need for context and background information.

4 Methodology

This section intends to describe the design of our proposed study. The choice of method serves as an aid for the design and an instrument to help conduct the study. Our aim is to better understand the forces that govern in context of our topic; it is thus crucial to find a study strategy that suits the nature of these dynamics.

4.1 Philosophy

A qualitative study is based on a *hermeneutic* philosophy. In contrast to another—somewhat conflicting—philosophy, *positivism*, hermeneutics assume that there are no universal laws that social systems follow. Universal laws, for example such laws that physical nature abides with, rather belong to the domain of positivism. Jacobsen (2005) argues that universal laws in social studies are difficult to capture as, as opposed to dead physical matter, humans react and adapt to knowledge.

Positivist epistemology stresses that there is an objective reality distinct from the person, and the scientist can thus conduct research and understand the world objectively and neutrally. The hermeneutic philosophy, on the other hand, emphasises that there are individual interpretations of the perceived reality. Thus, the scientist must understand how people themselves understand and interpret reality and what meaning they attribute to it.

Consequently, the two different philosophies suggest different methods of conducting a study. The hermeneutic approach values written and verbal communication and the qualitative meaning conveyed with it. Open interviews and field work are mentioned as qualitative approaches to studying social phenomena (Jacobsen 2005). The positivist approach, however, relies exclusively on quantitative empirical data. Quantitative data can be collected by means of instruments that reveal information in the form of numbers. For example, electronic questionnaires, where the respondent responds on a continuous scale, are a means to collect quantitative data, which can then be analysed statistically.

Another central question is whether the study should be designed from the theory, ie. a hypothesis, or vice versa—the theory should be built from the empirical data resulting from the study. The former, *deductive*, strategy often starts with an observation or a previous study, of a certain phenomenon, leading to an expectation of a certain causal interrelation between a set of events. A hypothesis is formed from this expectation, and the researcher, with the study, aims to prove the hypothesis empirically. The latter, *inductive*, strategy approaches the problem with “an open mind” (Jacobsen 2005)—rather than designing the study from an expected result, the study is designed with an appreciation that reality is not fully understood *a priori*, ie. without assumption, prejudice or expectation. *Grounded theory* (Glaser & Strauss 1967) suggests a scheme for an inductive qualitative research strategy. Following the qualitative model, it suggests embarking the study with data collection. A set of tools for analysing the data is then used to make the data easier to study and to finally draw a theory based on grounds of the collected data.

Finally, in a social study—if we accept that reality in this context is what is understood rather than physically in existence—the researcher needs to grasp how the research subject constructs his or her understanding of reality. Thus it is necessary that the method of the study is suitable to understand the research subject. Jacobsen (2005) suggests by being physically close to the research subject one can better understand him or her, and that through a dialogue that is flexible and open, the researcher can understand a reality that is constructed during the course of the study.

Moreover, Jacobsen (2005) also suggests that neither the ontologies, epistemologies nor methods of qualitative and quantitative approaches are mutually exclusive. Glaser & Strauss (1967) also claim, in relation to collected data, that (Glaser & Strauss 1967, p. 17)

“each form of data is useful for both verification and generation of theory,”

and (Glaser & Strauss 1967, p. 18)

“In many instances, both forms of data are necessary.”

4.2 Design

The theme of this study is innovation. In order for a study on such an extensive topic to be successful, the scope must be limited. For this reason, as well as those outlined in

Section 2, we wish to limit the scope to include only the oil & gas sector and only with significance within the geographical scope of the Russian Arctic shelf.

This study is of an exploratory nature. Exploration, development and production of resources on the Arctic shelf are in their infancy. Thus, knowledge on the topic has developed during the course of the study. Which entities and variables to study have also been discovered during the study. The exploratory nature of the study further makes it difficult to form a clear hypothesis. This suggests that a theory thus should be developed inductively rather than deductively.

Given the scope of this study, a selection of entities to study can be found by considering criterias for innovation, as outlined in Section 3.3. Naturally, oil & gas companies can innovate themselves by, for instance, improving production methods or restructuring their organisation. A priori, this makes Russian oil & gas companies operating on the Arctic shelf themselves, a natural candidate entity. But, as outlined in Section 3.1.1, organisations depend on and interface with their environment. For example, the Russian state may provide regulations that pressure oil & gas companies to operate in a certain way, or oil & gas companies may exchange knowledge and technology with surrounding entities. Thus it is natural to also include the surrounding entities that have significance to innovation or the ability to innovate. The final a priori list of entities that we identify as having significance within the scope of the study are

- Oil & gas companies
- State and regional government
- Companies in the oil & gas supply chain
- Education and research institutions

Section 3 lists several criterias for strengthening innovation in Russia. It is less clear which effects the constraints of operating on the Arctic shelf have on the significance of these criterias. For example, there may be regional or geographical differences that dictate or change the balance of the impact of criterias. In addition, the industrial domain in question, given its challenging nature, is technologically and financially intensive, which may further affect the relative significance of criterias for innovation. Given the exploratory nature of the study, the relative significance of criterias and forces for innovation is thus discovered as part of the study.

Also, we admit that a complete list of variables is not given a priori, and is instead developed inductively as part of the empirical and analytical studies. We have, however, determined a scope, which helps to form guidelines for the empirical data collection. An a priori set of broadly scoped variables forms the basis of the empirical study, as follows. Using these variables as a starting points, we further induce the variables that form the basis of the analytical study.

Challenges What challenges are faced by the entities involved? From this question we can further induce more concrete variables, such as, e.g., environmental or legislative factors.

Interests What interests do the involved entities have? Do they see a need to drive innovation?

Incentives What incentives are put in place by the involved entities? Do they catalyse or inhibit innovation?

Further, our study does not aim to discover what the Russian oil and gas industry and their supply chain should or must to do in order to meet the constraints of Arctic sea exploration, development and production. In other words, we do not expect to discover *why* some entities have a higher potential for successful operation than others—there are many variables that affect this, which makes it difficult to find a direct causal link. Rather, we aim to describe the current situation based on our criterias for innovation, and wish to explore and discover the potential of the industry.

A final admission is that the choice of relevant entities for the study poses some challenges. Firstly, both oil & gas companies as well as their supply chains are often enshrouded in secrecy, for strategical reasons. Secondly, there is a great distance to the geographical area that the study focuses on. Finally, there is a language barrier, as the researchers in this study do not command the Russian language. Consequently, the *selection* of entities is chosen strategically with emphasis on language, availability, distance and available time and resources.

Given the above constraints, including a high number of variables and a limited selection of entities, Jacobsen (2005) suggests an *intensive* method design. Also, given the exploratory and descriptive nature of the study, a *qualitative* approach is suggested. He also suggests that the *open individual interview* is a suitable qualitative method for data collection when there is a limited number of entities in the study.

4.2.1 Open individual interview

The open interview can be conducted by different means, for example face-to-face, by e-mail or by phone. It is often easier for the interviewer to conduct an open interview when being physically present with the subject, since the interviewer can easier pick up reactions and signals from the subject and adjust the interview accordingly. However, a face-to-face interview is more costly to conduct than a phone or e-mail interview. Another advantage to the distant interview is that the subject may feel more anonymous and thus able to answer more freely. In this study there are several factors that affect the choice of whether the interview should be conducted in physical presence of the subject.

- There may, again, be a great geographical distance between the researchers and the informant, which induces cost.
- The subject may command written English better than spoken English.
- The subject may want a degree of anonymity, given the secretive nature of the industry.

On the other hand, by choosing the informants strategically, these factors may be alleviated somewhat.

The open interview should have a guideline containing a set of questions or themes that the interview should traverse. Most importantly, the subject should answer openly to the questions or talk openly around the themes, rather than just choosing one alternative among a chosen set of alternatives. The interview guide should include themes relevant for the variables considered central to the study and should aim to help evaluate the respective entities in terms of these variables.

Moreover, by properly announcing to the subject the intention and topic of the study, ie. clearly stating that we are interested in the context of Russian activity in Arctic oceans in particular, the interview subject can appreciate that the relevance of the themes is mainly in this context. This may help guide the interview on a track that remains relevant to the main topic of the study.

A set of guiding questions for the interview guide was formed with the following considerations.

Openness and neutrality We wish to guide the informants as little as possible. With open and neutral questions we want to capture the informants' own sentiments

Variable / entity	O&G companies	Government	Supply chain	Education, research
Challenges				
Interests				
Incentives				

Table 4.1: Scope and extent of the interview guide.

and their own expressed emphasis. Open discussions may also help the inductive process of discovering new relevant entities and variables.

Relevance and scope Questions must be relevant to the subject of the study and should not extend its scope.

Coverage The complete set of questions should aim to cover the scope of the subject of the study, including its entities and variables, as completely as possible.

Consistency All informants should be asked the same guiding questions. This allows a consistent empirical representation and analysis of the data.

A list of a priori entities and variables is outlined in the above design. The list of entities forms one dimension to the extent of the guide, while the list of variables forms another. The scope and extent of the guide is thus illustrated in Table 4.1.

In the interviews we address these topics through a set of open questions that aim cover both the entity dimension of the table, as well as each of the variables. The resulting interview guide, with the interview questions formulated, is listed in Appendix A: Interview guide.

The final part of the design of this study is the selection of interview candidates. One concern is the number of candidates. Since this study is qualitative and intensive rather than quantitative and extensive, and given the limited time and other previous mentioned constraints of the study, it is natural to limit the selection of candidates to a reasonable number. Jacobsen (2005) suggests upwards to 20, although a lower number may be reasonable, given the constraints of the study. Ideally, the selection should include informants who are actively working within the domain of the study, which, in practice, might be difficult to find. A more pragmatic selection might in addition include several informants, who are not necessarily directly involved in the domain but possess valuable knowledge on the domain in question. Also, the breadth of

the selection should be such that it covers all the themes of the study. Finally, since finding viable candidates poses a challenge to some degree, the selection may benefit from incorporating a technique that Jacobsen (2005) calls the “snowball method.” This means that the selection develops during the course of the study, as new interview subjects are discovered through tips and ideas, resulting from a set of initial interviews.

In practice, finding an initial set of candidate informants who were relevant to the study, was not difficult, based on tips and ideas from people attached the field of our study. At the end of each interview, we asked the informant for suggestions for further candidates, which we then added to our list of candidates. Candidates were also discovered through studies of interesting documents of whose authors had relevant backgrounds. Relevant candidates were usually contacted by e-mail, and usually the candidates were willing to offer an hour of their time, even though some of them had a busy schedule.

Given the above scope and constraints—both due to the nature of the domain and the design of the study—we have chosen candidates strategically. For example, major constraints, such as the availability or willingness of central persons, as well as geographical distance, are mentioned above. Given such constraints, candidates are selected with a degree of realism, i.e. people that we expect could be willing and able to contribute to our study. Considering scope and extent, a certain breadth in informants’ respective backgrounds has been sought after—both in terms of expertise and geographical origin. For example, we have strived to include a Russian perspective as well as diverse backgrounds, such as academic, industry and political. Finally, authoritativeness of the interview data benefits from having informants who are authoritative and knowledgeable in their fields.

Our final set of five informants are referred to as *informant A* through *E*, respectively, throughout this study, both for practical reasons and in order to anonymise the informants. Their respective backgrounds, however, has some significance to the study—for example, it is interesting to differentiate informants’ views on a topic based on their backgrounds—and thus we give a brief summary in the following.

Informant A Oil & gas industry background—central figure with experience in Russian-Norwegian oil & gas collaboration.

Informant B Oil & gas industry background—analyst with ties to industry and government and with technical experience.

Informant C Oil & gas academic research background—authoritative figure in oil & gas in Russian academia.

Informant D Public sector background—central in Russian-Norwegian collaboration in industry and innovation.

Informant E Research background—specialist in Arctic politics and Russian oil & gas industry.

The interviews have been conducted with some structure, although, as mentioned before, openness is an overarching aim. Having some structure—for example, with a uniform interview duration and by covering all topics roughly equally—allows us to consider each interview roughly equal in empirical significance. The interview guide (Section 6.5) was used as a reference when conducting interviews. Each interview was conducted via a three-way phone conference with the interviewee and the two interviewers each at separate locations. This was mainly due to constraints of time and location of the involved persons. The topics for the interview were also announced by e-mail to the informants a few days before each respective interview, allowing them to prepare for the interview.

The interviews usually started with an introduction of the researchers, the purpose of the research and the interview, and an explanation of the procedure of the interview. In some cases, however, the informants were eager to go right ahead to the research questions, which we allowed. We also allowed follow-up questions at any time during the interview, from any of the participants in the interview. Before commencing with the research topics we also asked for permission to record the interview and informed the interviewee about the possibility to remain anonymous. In each case, the informant allowed us to record the conversation, and in some cases the informant opted to remain anonymous. However, we decided eventually that it was more practical to anonymise all informants.

It is also of significance to this study to note that the interviews were conducted in the period between November 2013 and March 2014. As this study is nearing its conclusion, the 2014 Crimean crisis has perturbed Russian international relations on a political level. The effects of the resulting imposed sanctions affecting Russian industry and other consequences of the crisis were not known during the interview period and are thus not captured in the interviews.

From the interview notes and recordings, we formed the interview transcripts in Section 6.5. Our approach to representing and analysing the interviews in our study is further outlined in Section 4.2.3.

4.2.2 Document study

Certain data is difficult to collect through interviews, for several reasons. Especially, given the secrecy that often enshrouds the oil & gas industry and its supply chain, it may be in the informants' strategical interests to keep information obscured. Also political considerations may constrain informants' ability or interest in divulging too much information. For the same reasons, information gathered from our primary data sources may also be influenced by the informants' interests. Other constraints that need to be taken into consideration are the availability of informants, both due to the above considerations as well as the nature of the subject of our research, which is foreign and at a great geographical distance from the researchers themselves.

A document study supplements our interviews, which are our primary empirical data sources. The document sources that are used in the study include articles, websites, news articles and presentations. The availability and reliability of documents on the subject in question suffers from some of the same constraints as our interviews. However, secondary sources may provide information that normally would not be provided by primary sources. For example, journalists may provide inquisitive or insider information and analyses, and institutions may publish documents providing additional information about regulations and legislations.

Our approach to finding document sources is based on a number of starting points, namely tips from those knowledgeable in the field, news sources with relevance to the study, e.g. Barents observer, company websites, and not least, searching the web using Google. With these starting points we are often given ideas for additional interesting sources to follow up. For example, an article in Barents observer about Arctic shelf development, may mention a supplier with relevance for the study, which could be worth studying closer.

By nature of being secondary, extra care must be taken when selecting and studying document sources. As mentioned above, the availability and reliability of document sources is affected by some of the same factors as primary sources. For example, due to secrecy and strategical interests, some oil & gas companies may be interested in

controlling the information that is published about themselves. Moreover, when using secondary data, we are using data collected and published by others. Likely, the data has been collected with a different purpose than our study in mind.

With the above constraints in mind, we have selected the document sources with the aim of fulfilling some of the same considerations as our interviews (see Section 4.2.1), namely *relevance*, *scope*, *coverage* and *consistency*. Finding neutral secondary sources poses a significant constraint, considering the nature of the subject matter, and thus we instead aim to achieve a *balanced* selection of document sources.

Our approach to representing and analysing the secondary data in our study is further outlined in Section 4.2.3.

4.2.3 Qualitative data analysis

The collected primary interview and secondary document data is summarised in Section 5. From the raw text of interview transcriptions and document sources, respectively, we collect statements that address the themes of the study (see Table 4.1). When selecting relevant statements, we aim to reflect the original meaning of the text, ie. we aim to represent the data as faithfully as possible. In order to facilitate further analysis of the data, it needs to be represented in a condensed format—representing the data in its original format presents a too overwhelming amount of data for detailed analysis. Also to facilitate further analysis, the data should be arranged systematically, in order to reduce the complexity of the data.

The first step in analysing the data qualitatively is to capture themes or phenomena in the data, which are extracted as categories that describe them. In order to remain faithful to the original data, these categories should all be found in the data itself, ie. the researchers should not influence or add any information in this phase. The collected statements and observations are then organised into these categories.

Finally, our analysis is presented in Section 6. In the analysis, the goal is to discover correlations between phenomena, across categories, which may indicate a relationship between the phenomena. Using the theoretical background presented in Section 3, we compare the results of our empirical analysis against other theoretical perspectives.

5 Empirical data

Two main types of data sources form the empirical basis for this study, namely *documents* and *interviews*. They are presented in the following Sections, 5.1 and 5.2, respectively.

5.1 Documents

The document search process and structuring is explained in more detail in Section 4.2, and listing of all sources are presented in Bibliography section. Subsections of each Section are developed and grouped based on findings from our document study and listed when found naturally. For instance the next Section, 5.1.1 is divided into smaller sub-sections, grouping themes and topics close to each other. The themes are not exhaustive, rather set up to ease access to the various empirical data. They are also identified through collecting the empirical data, and not pre-set or pre-defined. Hence each section will have a set of sub-themes and grouping of data.

5.1.1 Development challenges

From our document study, and research process we see several different development challenges to Arctic offshore oil and gas development. Some of the themes mentioned in literature and articles centre around the environmental challenges, in addition to the special Arctic weather and climate situation. Another recurring theme focuses on the infrastructure situation or even the lack of necessary infrastructure. Yet another theme relates to the regulatory and legislative characteristics and finally the conditions of the energy market itself as well as the resource potential in Arctic waters also plays in the risk/reward calculations for development projects.

Environment

Environmental challenges are often cited as one of the major challenges with Arctic offshore oil and gas development. Moscow Times (2013) points to an habitat with low temperatures, limited capacity to regenerate and rebuild, where oil spills will not be dispersed. This idea is emphasised by environmental protection organisations like Greenpeace, arguing that any spill will have huge impacts and would last for a long time (Voorhar & Myllyvirta 2013). Furthermore there is lack of knowledge about Arctic environments and habitats according to Eine (2013). Not only animals and the habitat are at risk, also indigenous peoples in the area would be impacted in the case of a worst-case scenario according to Voorhar & Myllyvirta (2013). From the Russian side, as referred by another environmental protection agency, Bellona, the Arctic shelf is considered fragile and at risk in case of opening up for hydrocarbon extraction and transportation (Bellona 2013). Whereas projects are often analysed one by one, some see the risk in totality, including all projects and activities carried out together in the Arctic as referred by an article in Moscow Times (Moscow Times 2013). The environmental situation in the Arctic is on the agenda of international media, according to Ernst & Young Global Limited (2013), pointing to a unique environment and a place where external impacts can not be reversed.

Arctic weather and climate

The uniqueness of the Arctic weather and climate but also the consequences of such specific climate, are emphasised in many sources, not least by the non-governmental organisations. Voorhar & Myllyvirta (2013) claiming that extreme conditions of the Arctic climate would augment risk factors to operations and logistics. Loe (2011) points to similar weather conditions and Arctic specifics, mentioning fast-moving ice, ocean-spray icing up vessels and heavy-wind conditions. Such conditions means that drilling activities are reduced to a shorter period of the year, as pinpointed by Voorhar & Myllyvirta (2013). The unique climatic conditions will demand specialised transportation and operational equipment as noted by Fadeyev (2014). Even climate change, with warmer conditions might not necessarily be benign for Arctic development, as claimed by Loe (2011), receding permafrost might actually impact land-based infrastructure in a fundamental manner.

Infrastructure or lack thereof

Far from major population hubs and industrial sites, the lack of infrastructure is highlighted by several sources. For instance Fadeyev (2014) arguing that necessary infrastructure is simply not there yet. This will certainly add to the cost of the projects, as claimed by Loe (2011), noting that infrastructure development costs and longer logistics lines will influence the overall risk-reward picture and possibly put the Arctic oil and gas prospects at an disadvantage to other regions where oil and gas can be extracted.

Regulatory and legislative

The regulatory and legislative situation in Russia in general and Arctic in special have been cited as development challenges. That said there are some areas cleared up and where issues have been sorted out, like the maritime delimitation treaty between Russia and Norway establishing the maritime borders between the two countries as noted by GeoPolitics in the High North (2011). Another area where there has been clear policies and guidelines put in place relates to the allocation of Arctic oil and gas exploration acreage. According to Yarovoy, Sergunin & Heininen (2013) both Rosneft and Gazprom have got all of the recently available offshore acreage despite earlier discussions about a more open allocation process. Foreign partners are only allowed in as junior partners in the development ventures. Furthermore the tax situation has been clarified with special tax regimes and a new offshore shelf tax legislation (Yarovoy et al. 2013), for projects started after 2016.

On a more general level, the legal situation in Russia is still a cause for concern, even for companies such as Rosneft, as stated during the initial public offering of its shares (Rosneft 2006), questioning the uncertain legal environment and its possible impact on investments and business in general. Rosneft cites several legal and judicial inconsistencies, gaps in legal structure, competence of judges, and even judges subject to influences from external factors, and finally a bankruptcy procedure that is not sufficiently developed. Rosneft even mentions that the government activities could impact business in a negative manner, for instance by changing terms of licenses, taxes and criminal laws.

Summarising the overall view and challenge with project developments in Russia, as quoted from Rosneft (2006, p. 52)

Political and governmental instability could adversely affect the value of investments in Russia. Since 1991, Russia has sought to transform itself from

a one-party state with a centrally planned economy to a market-oriented economy. The Russian political system remains vulnerable to popular dissatisfaction, including dissatisfaction with the results of privatizations in the 1990s, as well as to demands for autonomy from particular regional and ethnic groups. The course of political, economic and other reforms has in some respects been uneven, and the composition of the Russian government—the prime minister and the other heads of federal ministries—has at times been unstable.

The energy market and attractiveness of prospects

The overall situation in the energy market can and will be a challenge for any project development, be it in the Arctic or anywhere else. The risk and reward calculation will play in for all projects. Increased availability of conventional and unconventional gas resources will compete with gas development projects in the Arctic, according to Ernst & Young Global Limited (2013), thus making gas from the Arctic less interesting. This opinion is shared by Henderson (2012), pinpointing that Arctic offshore gas would have a limited commercial value. Significant and particular development and infrastructure cost would have to be added in to the economic calculations. Some opinions also voice concern about the overall attractiveness of the acreage in the Arctic like for instance Trenin & Pavel K. Baev (2010), comparing it in unfavourable terms with the availability of resources in for instance the Middle East. Although not sharing this strong opinion, but with more nuanced perspective (Richard Milne 2013, 30 Oct.),

“No doubt there is a huge resource potential in the Arctic,” Helge Lund, chief executive [Statoil].. “But I think you need to think about the Arctic in several dimensions.” He contrasted the “workable Arctic” with the so-called “stretch Arctic”,. “[There] you have more permanent ice conditions and a much harsher environment. I think it will be many years before you can have a development [there].”

This opinion about a tiered-level access to prospects in the Arctic is also also shared by Dynkin (2013, 28 Nov.), classifying the Arctic:

- Ice-free areas: can be developed with existing technologies

- Areas covered with ice part of the year: can be developed with incremental innovations
- Areas covered with ice most of the year: can be developed with breakthrough innovations.

An example of challenges even when the resource potential is great, is witnessed by the fate of the Shtokman project. Like analysed by Mitrova (2013), the huge size of the project proved to be of a too great financial risk, despite offering economies of scale.

5.1.2 Government interests

Geopolitical

There are many sources and detailed information about the Russian government's plans, strategies and visions for the Arctic. They are all testimonials of the Russian government interest in the area and its future. In its most direct form, *Russia—The Fundamentals of the Russian Federation's State Policy in the Arctic* (2009) spells out the direct national interest, centring around using the Arctic area as a resource base for social and economic development, maintain peace and co-operation, preserving the environment in the Arctic and developing the Northern Sea Route. People are analysing this in different ways, and for instance, Zysk (2008) points to Russia's desire and plans to develop the Arctic as an important strategic resource base and source of revenue from energy extraction and maritime transport, thereby maintaining the status as a leading Arctic power. From other sources the same is put forward, by for instance Øverland (2011) claiming that not only is the content of the Russian strategy for the Arctic similar to Western opinions and preoccupations, but is also using part of the same language. Thus according to Øverland (2011) the way and the manner that Russia is approaching the Arctic is not fundamentally very different from the way other Arctic nations like Canada and Norway is approaching it. Furthermore Russia contrary to USA and other countries has ratified the international convention from United Nations on the rights of the sea and offshore acreage and thus aims to pursue its interests in the Arctic through a legal framework.

On another note and taking into account the relative economical importance of the Arctic, Zysk (2010) claims that a substantial part of Russia's gross domestic product comes from activities north of the Arctic circle. As concerns the hydrocarbon resource situation, Moe (2012) mentions that Russia's main offshore oil and gas resources are

in the Arctic. However in order to develop these resources Moe (2012) argues that international partnerships are needed in order to develop these resources, based on the need for financial backing and technology input. However, plans are moving slowly as notes Trenin & Pavel K. Baev (2010), making it possible that the Arctic becomes a shipping route instead of an oil and gas production area. This is echoed by Moe (2012), with development plans going at a slower pace than what the overall Russian Arctic strategy calls for. This argument is based on time-span of other similar offshore oil and gas development projects and that the geological situation of the area is still not fully understood. That said there are expectations that the oil and gas fields in the Arctic are expected to be rather big, fitting in with structure of the Russian companies and industry, with a few and very big companies dominating the scene, according to Moe (2012).

Climate change might alter the plans as highlighted by Loe (2011), with opening up of areas for easier access to resources and transportation, furthermore that receding permafrost might pose challenges to onshore infrastructure, thereby increasing the attractiveness of offshore projects.

Finally Russia's interest in the Arctic and as summarised from a Russian perspective (Pilyasov 2012, 24 Aug.),

Russia's interests in Arctic research can be described as a revival of the best Soviet tradition of complexity and interconnection of various disciplines in the organization of research teams, scientific expeditions, and polar explorations.

Diversification of resources and development

Since oil and gas are per definition a finite resource, there are many opinions, documents and analysis about Russia's desire and plans for diversification of resources and development. Also there are quite strong opinions pointing to a decline of existing resource base, for instance Dynkin (2013) mentions several challenges maintaining existing production levels. Maintaining today's production levels is seen as critical by Russian political level, according to Chazan (2013b), diversification of resources is thus high on the agenda. Even Russia's national security strategy mentions the need for future development, like highlighted in *GeoPolitics in the High North* (2011), seeing the raw material dependency as a possible risk factor and need for diversifying energy reserves, includ-

ing Arctic area development of such reserves. The same is echoed by Farchy (2014), mentioning the need to develop shale resources, the Arctic, fields in East-Siberia and stemming decline of existing fields. The decline of existing resources is also highlighted by Loe (2011, p. 23):

However, it is probable that production from the conventional energy provinces of Russia will soon enter rapid terminal decline, which will create a need for new fields to exploit. The big gas fields in Western Siberia started their rapid decline several years ago and depletion rates are high. This will most likely make the Arctic region more interesting for oil and gas development.

That new prospects should be developed is also emphasised in *The future of Russian oil exploration Beyond 2025* (2011, p. 3) commenting on the Russian Energy Strategy 2030:

According to Russia's Energy Strategy, by 2030, domestic oil and condensate should reach the target production level of 530 million tons. The conclusion is obvious: from 2025—assuming that Russia intends to maintain its leading position among the oil-producing nations—the potential of existing and allocated onshore fields will not be sufficient to reach the target production level of 500 million tons that was announced by the Russian Government. [...] Russia will have to undertake systematic offshore exploration to maintain a production level of 500 million tons.

The Russian energy ministry has circulated an update of the energy strategy, taking the time horizon to 2035, the main point according to Platts (2014) is to accentuate the entry into markets in the Asia-Pacific region. In order to achieve better entry to Asia Pacific markets goes through the Liquefied Natural Gas development, according to Mitrova (2013). In addition LNG development is seen as also having other benefits such as technology development, and strengthening of the Northern Sea route as logistics path-way following Mitrova (2013). However, the focus on markets in Asia Pacific might not be that easy either, according to Poussenkova (2013), with China for instance having access to other oil and gas opportunities. The positive effects of new developments are noted by Mironova (2014) seeing the energy sector as a vector for additional development of other sectors of the economy and thus a vehicle for overall modernisation. Loe (2011) sees Arctic oil and gas resources as a necessary source for financing modernisation of the economy.

Modernisation and application of international best practices

In the same vein as diversifying resources, many comments, analysis and documents point to the need and desires of the Russian political level to modernise and apply internationally proven best practices in industries, organisations and state structures. Especially the drive to reduce the dependence of the hydrocarbon rent has attracted a lot of focus, for instance from the analysis by OECD (2011). That said the challenge seems formidable, given comments such as by the European Bank of Reconstruction and Development (EBRD) (EBRD 2013, p. 69)

Russia is held back by its poor protection of intellectual property rights, the limited availability of finance in certain sectors, the limited complementary investment in information and communication technology, its skills gaps, and the low efficiency of public R&D activity,

EBRD (2013) also claims that the Russian economy is even more skewed towards raw materials than before. The risks are outlined by Arckhipov et al. (2013) since energy markets are in transformation. Furthermore the dependency can also have wider consequences according to EBRD (2013), since it can stimulate rent-seeking behaviour and work counter to the building up of other sectors not related to raw materials. That said, Russian society can possibly maintain an acceptable level of welfare per capita with continued good income from raw materials and a declining population (Interfax Center for Economic Analysis 2007).

Trying to explain this situation, Interfax Center for Economic Analysis (2007) points to lack of demand for innovations in the home-market. Whereas EBRD points to missing link between research in public institutions and demand in the market place (EBRD 2013).

In order to improve the recommendations from OECD are clear-cut (OECD 2011, p. 1):

The review concludes that the primary goal of Russia's innovation policy should be to shift the national innovation system's "centre of gravity" away from the publicly-owned R&D system and towards production firms, whether public or private. [...] the main obstacle lies with firms themselves, which have too few capabilities to innovate, little absorptive capacity for innovations, weak links to public research institutes and universities, and, above all else, easy access to economic rents that provide few incentives to innovate.

The review by OECD (2011) recommends support of innovation in small and large firms in a complementary way, innovation should also encompass service business, more international input and knowledge complementing existing Russian know-how, stimulate the demand side of innovation, and balancing the need between industry competition and consolidation.

The picture is not totally one-sided, according to OECD (2011), noting the high level of education and excellence in particular fields of science and technology. Moreover, Russia is doing many things according to international recommendations as noted by Gorst (2013), with adoption of international compliant intellectual property legislation and intellectual property court to rule on patent disputes for instance.

5.1.3 Government incentives

In order to stimulate the development of its overall strategies, including the Arctic development strategy, the Russian government has put in place various initiatives. It seems like there is a broad approach and initiatives either in practice or under development.

Tax structure

From various sources and from the official publications from the Russian Federation, we have seen updates to the tax structure for more difficult and challenging fields. The Russian state thus sees that there is a need for additional investments or higher financial insecurity linked to these fields and thus a need for sharing the risk. For instance more business friendly tax and customs situation for offshore oil and gas projects have recently been put in place (*Russian Duma passes in third reading draft law on tax and customs regime for offshore hydrocarbon extraction activities* 2013). This is also noted by Rosneft (2013), listing other tax and customs advantages introduced recently, for fields with challenging conditions, both geological and infrastructure wise. This form of risk sharing has thus enticed international oil companies as well according to Farchy (2014), enticing them to sign up on joint agreements with Russian partners.

Regulatory and legislative

The Russian government has laid out a special regulatory and legislative regime for the development of the Arctic offshore acreage. Like highlighted by Moe (2010), the offshore resources are significant for the state and thus only state controlled companies

are allowed to operate. However, this absolute terms are debated internally in Russia, and Ernst & Young Global Limited (2013) claims that other companies are interested in participating in the offshore development, not least privately owned Russian company Lukoil.

5.1.4 Corporate strategy

Corporates and firms in Russia are approaching challenges and development in different ways. Our document search on Arctic offshore oil and gas development has lead to three themes, namely about co-operation, development per se, and planning and control.

Co-operation

Given the challenges linked to Arctic offshore oil and gas development, as eschewed earlier, corporations are increasingly turning to co-operation as a mean to solve and overcome the hindrances, and possibly also share risk and then future reward. Among the co-operation agreements, the ones involving Rosneft have created the most of the headlines and comments as they are far-reaching and involving different international partners. Like stated by Ernst & Young Global Limited (2013), the agreement between ExxonMobil and Rosneft calls for substantial investments in the Barents-, Kara- and Black seas. Similar deals are also signed with ENI and Statoil. According to Overland, Godzimirski, Lunden & Fjærtøft (2012) some of the motivation behind these co-operation deals could be explained by the need for technology and expertise, but also in order to reduce risk and investment exposure. The joint-ventures are so constructed that most of the exploration expenses are paid for by the international partner, whereas Rosneft keeps the two thirds ownership regardless if any oil or gas is found. In addition Overland et al. (2012) mentions the importance of being seen as an equal partner with more established international oil and gas companies. That said there might be other reasons as well, since both Rosneft and Gazprom had been granted important acreage and had to make use of it as soon as possible. Both were thus under pressure according to Overland et al. (2012).

Outside the offshore Arctic arena, the private company Novatek has entered into a co-operation agreement with Total and the Chinese oil company CNPC for the Yamal LNG project, as noted by Staalesen (2014c). Again there is a special risk sharing agreement, where Novatek only pays for one fifth of the development cost, the rest funded by the

international partners according to Staalesen (2014b)

Another example of partnership evolves yet again around Rosneft, this time with BP over the TNK-BP change of ownership. With BP exchanging TNK-BP ownership into equity of Rosneft, BP is putting a lot of faith into Rosneft's development plans and future growth plans (*BP in Russia: options. Hiving off US operations is good, but Russia is more important* 2014).

In another type of agreement, leaning towards a more supplier to end-user relationship, Rosneft has signed up agreements with both Mitsui & Co., Ltd and GE. The agreement with Mitsui & Co., Ltd, for instance, calls for co-operation within both supply chains and services for oil and gas pipes according to Rosneft (2014b)

Development

Companies are approaching development of the Arctic in general and Arctic waters in different ways. For instance according to Ernst & Young Global Limited (2013), Rosneft is penching more towards the Barents sea and the Okhotsk seas, whereas Gazprom is concentrating on acreage and developments in the Kara sea. A specific axis of development has been the LNG market, enabling gas to be shipped around the world to customers. As noted by Murmanshelf (2013), Gazprom for instance wants to develop its presence in the LNG market in order to maintain the market share in the global gas market. One important project is thus the Vladivostok LNG development. The strategic value of LNG development is witnessed by the rise of Novatek, that according to Weaver (2014), has been more efficient at establishing itself as an LNG supplier from Russia. Furthermore like commented by Mitrova (2013), the Yamal LNG project developed by Novatek has received substantial governmental backing and investments, not least in infrastructure and port development. The main argument being that the project helps developing the Northern Sea Route.

Another axis of development has been pursued in establishing Rosneft as a major oil and gas company, capable of pursuing development of the more challenging fields and markets. Like stated by Poussenkova (2013), there was a goal to develop the presence in Eastern parts of Russia and tap into markets in Asia-Pacific. According to Yenikeeff & Mehdi (2013, p. 6 and p. 26),

The rise of Rosneft as Russia's super National Oil Company (NOC) has been driven just as much by internal political elite dynamics as it has by

the challenges which Russia's oil industry faces, as it attempts to tap more remote fields in East Siberia and the Arctic....the truly crucial factor behind Kremlin thinking was the need for a national oil champion to manage the domestic oil industry's jump from traditional brownfield sites of the Middle Volga region and West Siberia to greenfield sites of East Siberia and the Arctic.

Planning and control

Companies in Russia are approaching development in a specific manner. Some articles point to a certain way towards planning and control, typically characterised by a top-down approach. This is also manifested by strong state-influence, on many of the deemed strategic companies. This is even pinpointed by Rosneft (Rosneft 2006), arguing that Rosneft is controlled by the government and thus might be led into ventures that are of less interest to other shareholders. Yenikieff & Mehdi (2013, p. 6 and p. 7) even claims that

The contest for control of Russia's oil industry has been an integral feature of the country's politics ever since the collapse of the Soviet Union. [...]...the elective affinities of political elites to specific corporate oil assets confirm a neat institutional logic that has been in operation in Russia since the collapse of the USSR in 1991: the use of the oil industry as a maximalist vehicle for elite survival and political consolidation.

Moreover the political pre-occupations and control can lead to involvement on choice of suppliers and own sourcing in of equipment, like for instance as noted by Staalesen (2013b), where Rosneft is campaigning against a law proposal demanding 70 percent Russian content in offshore projects. Coming to the companies themselves, there are some testimonials of a certain top-down approach, like stated by Lunden & Fjærtøft (2012, p. 11, and p. 12), after analysing the Prirazlomnoe field development

Top-down information flows. Strong dependence on the immediate superior fosters a management-is-always-right culture. [...]..decisions either accumulate at the top or stall in mid-level echelons to consider whether a decision relates to their sphere of competence, [...].. the value of knowledge sharing is less recognized in Russia. [...] the receiver could, perhaps even deliberately, misinterpret the information thus harming the transmitter

5.1.5 Corporate innovation

Studies about corporate innovation and innovation in private companies in Russia point to specific characteristics. First and foremost according to Kempener, Anadon & Condor (2010), the R&D spending in general and also in companies are lower than what one can find on an international level. In addition to low spending there are few start-ups and question marks on legal structures of venture capital funds, as pinpointed by Kempener et al. (2010). Lack of investors and investors with the right risk profile and attitude is also highlighted in an article by Clover (2012). Also EBRD (2013) points to limited availability of funding for new companies and ventures in Russia. Trying to explain why the situation is as it is, *National innovation system and state innovation policy of the Russian Federation, Background Report to the OECD Country Review of the Russian Innovation Policy* (2009) claims that there might be a crowding out of business models in Russia. Meaning that other types of businesses and ventures not specifically related to innovation are more successful, and that there is limited competition in many regional marketplaces. That said according to Gorst (2013, 17 Oct.),

Russian scientists need to learn how to commercialise their inventions [...] It's the missing link in Russia's drive to innovate.

On the positive side, (EBRD 2013, p. 10)

Russia's human capital compares favourably with that of most other countries with such income levels. One important exception, however, is the quality of management a specific type of skill that has been neglected until now. [...] The picture is one of widespread skills gaps, which are particularly pronounced in relatively innovative activities,

Finally the oil and gas sector might develop the premises for an increase in the overall innovative strength. There are claims that the overall energy sector is one of the most innovation-intensive parts of the economy in Russia today (Interfax Center for Economic Analysis 2007). It can thus serve as an engine for development of innovation in the wider economy. This will be even more accentuated in the future when new technologies will be needed to develop challenging fields.

Co-operation

One possible method in order to increase the innovative strength is to co-operate and work together, sharing knowledge and best practices. Russian companies are approaching co-operation in different ways, according to need, project and specificities as witnessed by the ensuing comments. For many years the situation was as portrayed by Henderson (2012, p. 2):

The key reasons for this relative lack of international involvement have been clear from both a domestic and an IOC (International Oil Company) viewpoint. Having recovered from the post - Soviet collapse in the 1990s, Russian companies have successfully used cash-flow from higher oil prices, domestic technology and international service companies to recover the Soviet -era brownfield assets that have formed the core of the Russian production base in West Siberia without the need to offer equity in those assets to international companies looking to participate in Russia's huge resource base.

That said there are changes towards more co-operation, and like commented in *The future of Russian oil exploration Beyond 2025* (2011) especially concerning developments that requires additional or new technology or where there is a need to bring in specific experiences for the developments. For instance the recent agreements between Rosneft and its international oil and gas partners will also establish specific R&D centres (*The future of Russian oil exploration Beyond 2025* 2011, p. 15):

These centers will promote the development of highly qualified staff and the sharing of leading practices that will improve the use of present-day technologies and ensure that Russian companies will be able to handle complex projects on their own in the future.

That said the co-operation is not only one sided as witnessed by the statements of Chazan (2014, 10 Apr.):

Bob Dudley, BP's chief executive, [...] defended BP's involvement in Russia, saying its interest in Rosneft "gives us nearly a fifth of the world's largest publicly traded oil company operating in a country with massive reserves and massive potential". [...] Russia accounts for nearly a third of BP's global oil production and more than a third of its reserves, while Rosneft contributed

about 16 per cent of BP's annual profit last year and 2 per cent of its net cash flow from operations.

That Russia is an important partner is also witnessed by agreements between ENI and Rosneft relating to more down-stream oil co-operating activities according to Rosneft (2013). The supply agreement can be linked to other co-operation agreements such as the one mentioned about the exploration joint-venture between ENI and Rosneft for Barents Sea acreage (Staalesen 2013*a*). In more east-ward direction Rosneft also signed a co-operation agreement with the Vietnam Oil and Gas group for possible development of the Pechora Sea acreage (Rosneft 2013).

Another type of agreement, between a supplier and an oil and gas company is symbolised by the recent co-operation agreement between Rosneft and General Electric relating to science and technology co-operation. Rosneft (2014*a*, 11 Feb.):

[...] The centers will allow Rosneft,[...] to maintain efficient onshore production and to enhance Arctic and offshore shelf projects by implementing the most sophisticated and safe technologies,

Supply and value chain

There is a clear tendency towards a strong vertical integration among Russia's oil & gas companies. Many examples abound of this lenience, with for instance Gazprom building an own fleet of tankers (Staalesen 2014*a*), Rosneft investing in terminals (Staalesen 2013*c*). According to Lunden & Fjærtøft (2012, p. 13) this could be explained by:

The Soviet economy was characterized by a shortage of inputs. This situation continued into the 1990s due to supply chain disruptions and cash shortages. Maintaining in-house input supply and maintenance capacities thus became a crucial part of supporting production. As a result Russian organizations attempt to build or integrate needed capacities into their organizations using ownership as a steering mechanism rather than contractual relationships.

That said there are many areas where the oil and gas companies also depend on monopolies and are approaching limits to where and how they can integrate vertically, like for instance Rosneft depending on a monopoly for oil transport (Rosneft 2006). Furthermore, another limitation to vertical integration could be lack of necessary knowledge

in the adjacent industry; Moe (2010) sees that Russian shipyards have challenges with handling civil projects.

There are also examples of usage of both internal and external resources, witnessed by the recent seismic surveys in the Pechora Sea commissioned by Rosneft, where both contractors and Rosneft subsidiaries and research centres were involved (*Rosneft has started exploration at licensed areas in the Kara and Pechora Seas* 2012).

Rosneft continues to strengthen its capacity through agreements with product and service providers. A recent example is a deal between Rosneft and contractor North Atlantic Drilling Ltd. (NADL) (*NADL - Seadrill and North Atlantic Drilling announce Investment and Co-operation Agreement with Rosneft to partner in Russian market* 2014). In the agreement, the contractor is awarded new drilling contracts, while Rosneft acquires a stake in the company. The contractor sees the agreement as a significant opportunity to enter the Russian Arctic market.

International standards and best practices

The modernisation drive witnessed in the public sector is also ongoing in the private sector with for instance efforts to modernise internal processes and procedures and applying international best practices. For instance Rosneft (2013) mentions new finance reporting standards introduced on one side and on the technical side, projects for better use of associated gas (Rosneft 2013), and introduction of improved HSE standards (Casimiro 2013).

That said the challenges are important, as claimed by Moscow Times (2013, 23 Oct.):

Questions have been raised not only about the equipment to be used in the Arctic, but also about the people working with them and controlling them. ..even if the technologies were as innovative as the Russian government said they were, it was unlikely that Russian employees were well prepared to use them because there still was no adequate education for such specialists in Russia.

The “Barents 2020” project aims to improve and amend standards for offshore operations in the Barents sea (Det Norske Veritas 2012). It includes both Russian and international industry partners, including Gazprom as a major stakeholder and Rosneft as a member of the steering committee, among others. Representatives from Russian

suppliers and contractors, including Gazprom subsidiary VNIIGAZ, the SakhalinNip-iMorneft research institution and oil & gas services supplier Giprospeetsgaz, are also involved in the process. Specific standards for Arctic offshore operations, however, are fairly recent developments. Two notable examples are the ISO 19906 and DNV-OS-A201 winterization standards. One example of the application of winterization is mentioned by Gudmestad (2010), where winterization techniques are applied to Gazprom subsidiary Gazflot's drilling rigs.

Optimisation

Casimiro (2013) mentions several downstream synergies resulting from the integration of TNK-BP's activities. A first set of optimisations concern Rosneft's refining activities, where Rosneft claims to have increased throughput by improving operations continuity and load optimisation. They further claim to have increased efficiency of procurements and investments through harmonisation and unification, while reducing general and administrative expenses.

Improvements are also observed in retail activities, in optimising logistics and supply chain as well as cost optimisation through centralisation and standardisation. And in trading and logistics activities, Rosneft claims optimised sales channels flows, diversification, and improved scaling and extended international coverage. It claims to have become a "sizeable player on the global market" (Casimiro 2013, p. 11).

5.2 Interviews

Interviews form the primary empirical basis of this study and are an integral part of the design of the study. An interview guide was used as a reference when conducting the interviews, which divided the interviews into five main topics, each with a guided question. The informants were asked to speak freely to the posed questions, and the five following key topics reflect the topic of each respective question.

- Development challenges
- Government interests
- Government incentives

- Corporate strategy
- Corporate innovation

These key topics are used to categorise the summarised transcriptions in the following. The interview design and process is explained in more detail in Section 4.2, and transcripts of all interviews are documented in Appendix B: Interview transcripts.

Summaries of the interview transcriptions are presented in a tabular format—each topic in a separate table—in order to facilitate a comparative view of the respondents’ respective statements. Tables 5.1, 5.2, 5.3, 5.4 and 5.5 summarise the respondents’ respective sentiments through quotes extracted from the interview transcripts.

5.2.1 Development challenges

A summary of some key statements on development challenges is given in Table 5.1.

Table 5.1: Informants’ statements on *development challenges*.

Informant	Development challenges
A	<p>“The biggest challenge [...] is the cost level”</p> <p>“[Ice] brings challenges for drilling-technology in particular, but also structures.”</p> <p>“lack of infrastructure, with long distances.”</p> <p>“HSE applies throughout the entire lifespan [...] It is cold, and there is ice, wind and waves”</p> <p>“Overall, the legal situation in the North is mostly clear and is thus not the main challenge.”</p>
B	<p>“a combination of licensing and tax systems.”</p> <p>“Rosneft lacks money, competence and people”</p> <p>“license agreements span aspects such as mapping, seismic segmentation and financing. Consequently, planning can take significant time.”</p>
C	<p>“It is a very fragile environment”</p> <p>“[Russia should] give equal opportunity and equal rights for Russian and international companies so that the best and most competent succeeds. [...] Today there is a preference towards Russian owned companies.”</p>

Table 5.1 – continued

Informant	Development challenges
D	“severe climate and harsh environment, lack of developed infrastructure. ”
	“lack of technology, competence and experience. ”
	“long distance from market and far away from infrastructure ”
	“ice, cold, and darkness ”
	“Russia lacks experience and technology in order to develop the Arctic themselves and must get help and expertise from abroad.”
	“there is insecurity with regard to pricing of gas long term wise.”
E	“the environmental side of conducting oil and gas production in icy conditions.”
	“Oil spill mitigation and rescue”
	“Arctic gas is no longer interesting because of the prices in the international markets.”
	“Rosneft’s capacity can in a way hinder future development”
	“the development phase is shared on a pro-rata of the ownerships. [...] maybe offshore development is not the most economically interesting for Rosneft”
“presence of ice, bad weather conditions complicating design. In addition distance from infrastructure and land facilities.”	

The respondents have quite clear and concordant opinions about the economical challenges of potential prospects in the Arctic. Although there is a difference in weighting of the more important factors playing in. Experience, capacity and expertise or outright lack thereof plays in as challenges as well. The natural habitat with severe climate and harsh conditions, with direct and indirect effects, should not be underestimated either.

5.2.2 Government interests

A summary of key statements on government interests is given in Table 5.2.

Table 5.2: Informants' statements on *government interests*.

Informant	Government interests
A	<p>“Oil and gas is the prime source of revenue and supporting the Russian economy”</p> <p>“Russia wants to replace declining production in Siberia, and maintain production levels with fields in the Arctic and Sakhalin. ”</p> <p>“An important goal is to enter the LNG market. Although piping gas East, to for instance China is also important”</p> <p>“Russia is giving all licenses in the Arctic to Rosneft or Gazprom, creating a monopoly situation.[.] Thus there is a reduction in competition on the Russian shelf, although Statoil and Eni are working in co-operation with operators.”</p> <p>“The only change is that they have opened up for export of LNG, reducing the Gazprom monopoly on gas exports.”</p>
B	<p>“The Russian government has made a programme for Arctic development, “2020 and beyond.”</p> <p>“ Russia will develop resources where it is profitable and competitive, and Arctic resources are far down on the list.”</p>
C	<p>“The most important is the national interest and a spring tide prosperity of the nation, in general. This is the main driving force for developing Arctic resources in the long term.”</p> <p>“Second is the development of new territories, new regions and giving new dimensions to existing territories. Furthermore enabling indigenous people as real stakeholders and participants in the development. ”</p> <p>“ A third one would be [..] in development of international relations in trading petroleum, oil and gas products...[.]. The proximity of transportation routes, like LNG carriers and oil and gas tankers to Europe and Asia-Pacific regions through the Northern territories.”</p>

Table 5.2 – continued

Informant	Government interests
D	“ Regarding priorities.. Arctic resources, in Yamal peninsula are the most important new assets. The second option is to develop Siberian and Far East resources. The third option is to develop idling fields and to implement enhanced recovery methods. Fourth option, Arctic offshore in nearby territories.”
	“Russia has to develop new fields in order to maintain production levels, and this is where the Arctic comes in, as being one of the new acreage to develop.”
	“All agree that this will not be easy. Hence the interest in developing East-Siberia first, or even shale-oil and other unconventional resources before the Arctic.”
	“Russian authorities released Energy Strategy 2035 document where it is predicted that Arctic should represent some per cent of production. ”
	“Russia is concerned about and wanting to appear as a central Arctic player. The interest is in the Arctic in general terms, and not as an area of competition. ”
E	“The Russian authorities look at the Arctic as an important part of the country’s resource-base. It is told that the area has potential for big discoveries and fields. ”
	“From a political level it is considered that activity in the North is a demonstration of geopolitical interests and rights, and the authorities thus have a regional development perspective on project.”
	“ There is also hope that offshore activities will have positive effects on Russian shipping industry.”

The respondent expressed quite similar sounding facts and conclusions. A major point is the government drive to replace existing production and fields with new developments and maintain production and revenue from oil and gas extraction. Arctic offshore is on the list of earmarked areas of development, although not on the top of the list.

Another point high on the list of interests, is the industry structure and that the Arctic

should be developed and resources exploited. Positive effects on adjacent industries would be considered a plus, like for instance the shipping industry could serve the offshore development and projects. Oil and gas resources in the Arctic offshore are monopolised by Russian state controlled companies.

A third point relates to the regional development and Russia puts great focus into the development of the Arctic regions with the Northern Sea Route as one of the key elements, in addition to developing the Arctic as an important resource-base.

A last point relates to the geopolitical situation and Russia sees it as important to maintain and develop presence in order to be seen and act as an Arctic player.

5.2.3 Government incentives

A summary of key statements on government incentives is given in Table 5.3.

Table 5.3: Informants' statements on *government incentives*.

Informant	Government incentives
A	<p>“It is important with a legal system that works. [...] that agreements can be respected, but also access to licenses/resources.”</p> <p>“Tax incentive are important.”</p> <p>“Research, [...] do not see much of that. Russian industry is afraid of ownership rights and control. Many are trusting in-house and self-contained solution rather than the market-place. Thus companies becoming conglomerates of interest.”</p>
B	<p>“The Russian state is not directly involved in oil and gas activities [...] Instead Gazprom and Rosneft are used to protect the state’s interest.”</p> <p>“On the contrary, there is a lack of government incentives. [...] There is too little progress through modernisation and innovation.”</p>

Table 5.3 – continued

Informant	Government incentives
C	<p>“ The government should establish clear, stable, predictable and efficient rules and regulations for all participants of the Arctic shelf development, based on the overall goal of most efficient way of developing national prosperity, international trustworthy relations and a long-term security of supply of petroleum resources. It should not give privilege to any company or entity, if it does not meet the overall goal requirements.”</p> <p>“[.]..the government should put a fair competition policy to those companies who would like to participate in developing Russian Arctic offshore; both majors and service companies.</p>
D	<p>“Russian authorities tries to stimulate and put the framework in place for future development of the Arctic. One of the key factors is the last years tax reform giving substantial tax rebates for Arctic offshore development.”</p> <p>“Another sign of the stimulation of the Arctic development was that the authorities were quick in granting licenses to Rosneft and Gazprom.”</p> <p>“A third sign of the contribution is the logistical support. One example is Yamal LNG where the authorities have developed infrastructure.”</p> <p>“A fourth sign is improving search and rescue infrastructure.”</p>
E	<p>“The Russian government contributes in creating tax-concessions for offshore development in the North, helping the projects to become more profitable. The rebates are also stipulated over a longer period.”</p> <p>“The last 3 years the authorities have also signalled a change in policy albeit not in the legal texts, that they are open to give international companies some influence on the Arctic shelf. [.] The new agreements signals that the authorities see the importance of international companies. ”</p>

Table 5.3 – continued

Informant	Government incentives
	“[..].Russian content is high on the agenda. Right now there is a law in debate for setting demands for local content and how this should be defined.”

Based on the statements and information from the respondents we see that the respondents are putting the legal system high on the agenda and as a requirement for Arctic offshore development. Emphasising the importance of an efficient legal system.

Another topic concerns the license situation, where state controlled companies are seen as protectors of the Russian state interests.

A third area relates to the tax situation where the recent tax reform has given rebates for Arctic offshore oil and gas development. Thereby stimulating activity and economical interest in the development.

On another issue there is a lack of research in Russia in general, and many companies are vertically integrated trusting in-house solutions rather than the marketplace. Although universities with petroleum related science research are considered good.

The respondents raise the fact that local content is on the agenda of Russian lawmakers. And finally that the industry structure is dominated by two state controlled companies.

5.2.4 Corporate strategy

A summary of some key statements on corporate strategy is given in Table 5.4.

Table 5.4: Informants' statements on *corporate strategy*.

Informant	Corporate strategy
A	“Gazprom and Rosneft [...] are Russian flag-bearers.” “there is an internationalisation on-going that might change things, for instance Rosneft is establishing itself internationally, learning how things are done.”
B	“A central strategy for Russian oil companies is to obtain and maintain monopoly status.”

Table 5.4 – continued

Informant	Corporate strategy
C	<p>“Given the technical challenges, Russian operators are not active west of Novaya Zemlija. The priority for Russian oil companies is to develop where they have a competitive advantage, in areas closer to shore and ice-covered.”</p>
	<p>“Characteristic key-words for corporate structures in Russian oil & gas include, top- down management, inexperienced management, political networks, divide and conquer, departmental structures in big corporations with little horizontal cooperation (behaving like independent companies), fear of making mistakes, and vertical orientation. That said there are competent people and experts in the departments.”</p>
	<p>“Rosneft and Gazprom are doing nothing to stimulate the Russian supply network. They are instead trying to extend the competencies they have from onshore to close-to- shore and shallow water depth conditions.”</p>
	<p>“The foreign operators partnering with the Russian oil and gas operators will bring their supply-network.”</p>
	<p>“players seem to be aiming for getting more resources.”</p> <p>“today’s strategy of big corporations is to acquire most of the resources in the Arctic shelf in order to have a long lasting business.”</p> <p>“Arctic split between the 2 giants.”</p>
D	<p>“Projects carried out by ambitions of leaders of the companies and some political leaders.”</p>
	<p>“Between Gazprom and Rosneft, it is the latter that has the most active and forward leaning strategy of becoming a serious international oil and gas operator, also in the Arctic arena.”</p>
	<p>“Gazprom is more leaning towards own resources and has a less ambitious strategy towards the Arctic offshore.”</p> <p>“things take time and it will not be many fields developed before 2025.”</p>

Table 5.4 – continued

Informant	Corporate strategy
E	<p>“Rosneft’s goal is to become a major player in the international scene and thus is open about sourcing in competence and experience from other areas and partners. [...] they would need others experience and knowledge in order to develop. Among other things they see a need for foreign experience in project management.”</p> <p>“Gazprom on the contrary is more on the defensive side... ambitions were lowered after the Shtokman project postponement. Also Rosneft is moving into Gazprom territory for gas-resource development.”</p> <p>“In practical terms this concerns Rosneft only, since Gazprom is side-lined because of the gas-market development. There are also some smaller actors with old licenses from before the monopolisation in 2008, but they will probably be swallowed by Rosneft or closed down.”</p> <p>“Regarding the offshore they [Rosneft] are more or less a monopolist, through legislation given in 2008, and thus do not need to do that much, since Rosneft is controlling many parts and areas.”</p> <p>“Somewhat defensively Rosneft has entered agreements, beginning in The Black Sea and then later in the Arctic, which has been lifted up in Rosneft’s development strategy as an important area.”</p> <p>“These agreements..between Rosneft, ExxonMobil and Statoil,.. the exploration phase is paid up for by the foreign partners taking all the risk and cost upfront. Thus these agreements free Rosneft from cost and place the risk burden on foreign partners.”</p> <p>“The development phase could be especially expensive and push Rosneft not to prioritise such field development and such cost. The prioritisation process will thus be influenced by the oil prices at the moment of decision and overall project profitability, as well as what other alternatives exist.”</p>

Table 5.4 – continued

Informant	Corporate strategy
	“..the political aspect could play in and the prestige of being a fully fledged offshore operator and a global actor could also well lead to some distortions of the priorities and ranking of future oil and gas investments and projects. Expansion for the sake of expansion has so far been one of the characteristics of Rosneft.”

The respondents are yet again expressing concordant views about the overall corporate strategy. Nuances abound, but they see the sector dominated, if not monopolised by the two state controlled oil and gas companies, with little room for opening up to others, except possibly Novatek. The companies integrate vertically, with a top-down management approach. Little is done in order to stimulate the supply network. There is a need for foreign involvement in project management in order to develop Arctic resources. Rosneft is seen as the more ambitious player regarding plans for the Arctic offshore development, with Gazprom planning on a slower pace of development.

5.2.5 Corporate innovation

A summary of some key statements on corporate innovation is given in Table 5.5.

Table 5.5: Informants’ statements on *corporate innovation*.

Informant	Corporate innovation
A	“Do more on the research side, for instance Rosneft and Exxon has set up a research centre together.” “there is little substance and few realities, and in the end no dynamique. This shows that they have not really considered the challenges. The development and push forward will start when the international companies will get access.”
B	“The Russians are trying to take knowledge from onshore to offshore activities, and areas with ice and cold conditions where they have development experience.”

Table 5.5 – continued

Informant	Corporate innovation
C	<p>“There is close to no innovation on the Russian side, and. [...] a need for more co-operation.”</p> <p>“The Russians also often choose partners who represent a market, which a recent partnership with a Vietnamese company is an example of.”</p> <p>“It is a time of active build up of the technological and engineering competence of the Russian corporations—both producing and service companies. The main trend here is collaboration with international companies and joint projects.”</p> <p>“Increased collaboration with research centres in Russian and international universities, through international companies.”</p> <p>“[...] a trend where Russian companies are required by international best practices to share their experience in logistics and the concepts of development projects, in conceptual thinking, in conceptual design, in logistics, and delivery, and so on.”</p>
D	<p>“they [Rosneft] are open about the need for foreign experience and technology, but wants to develop competence and knowledge about the whole value and supply-chain. It is a vertically integrated company.”</p> <p>“The ultimate goal is as much as possible in-house. Similarly Gazprom is doing all things themselves. Behind this goal there is a wish of controlling as much as possible.”</p> <p>“Regarding co-operation with Universities both Gazprom and Rosneft sponsors studies at Universities and research institutes, for instance Gubkin university in Moscow. That said Gazprom has their own research centers operating as institutes.”</p>
E	<p>“The co-operation between Rosneft and ExxonMobil, ENI and Statoil is clearly a step towards exchange of information and training.”</p>

Table 5.5 – continued

Informant	Corporate innovation
	<p>“Russian management prefers established technologies and thus are very preservative. New technology can be difficult to introduce and it can be difficult to get acceptance for. Innovation in a rigid system is difficult. There are a lot of technological research but it is not a dynamic process.”</p>

The respondents are quick to point to the recent research agreements between Rosneft and international partners. There is increased co-operation, although some points to the need for even more co-operation and exchange of knowledge across companies and borders. That said the extent of co-operation is almost hindered by the vertical integration of companies and policies aiming for self-sufficiency. Russian oil and gas companies collaborate with research institutes, but Russian management is more reluctant towards introducing new technology.

6 Analysis

Our aim with this study is to assess the capabilities and preparedness of the Russian oil & gas industry and supply chain to enter into Arctic offshore hydrocarbon extraction. Thus in order to determine and capture what is done in order to stimulate such capabilities, preparedness and possible innovation, we have divided the analysis part in several sections. We see innovation as a driving force and decisive factor in the domain of Arctic offshore development, and hence innovation will be seen from different angles, namely from the view of supply chain, macro strategies, innovation in firms and organisations and finally through a cultural and business traits perspective.

The empirical data gathered in Chapter 5 is in this chapter analysed; the theoretical perspectives presented in Chapter 3 forms the theoretical framework for the analysis. This chapter thus starts with the perspective of *development challenges* (see Section 3.1) analysing the main challenges in Russian Arctic shelf development based on empirical data. Then, in Section 6.2, the Russian oil & gas supply chain is analysed, taking into account these challenges, as well as the theoretical perspectives outlined in Section 3.2. Followed by a section analysis on innovation, in Section 6.3, itself divided into two parts, one about macro-strategies for innovation and another about innovation in organisations. Finally, Section 6.4 deals with culture and business traits and its possible impact on innovation.

6.1 Development challenges

A view on the situation in current Russian Arctic offshore development is presented in our empirical study. This section aims to assess the current state of development, which challenges are met, and how they are handled. A background in Section 3.1 presents perspectives from literature, to which our data is compared against.

Several claims are made about challenges and their respective significance. A clear understanding of risk factors helps to identify and understand what are the most sig-

nificant challenges and criterias for success. Capturing how—and how well—the actors handle these challenges helps in analysing the preparedness of the Russian industry, which is addressed in the sections below.

The first topic of our primary empirical study addresses the challenges of developing hydrocarbon resources on the Russian Arctic shelf (see Section 5.2.1). All of the informants in this study have had clear opinions on this matter. Most agree that development currently is held back by the current state of conditions for exploration and operation. The informants emphasise on a wide span of factors that affect companies that attempt to develop in this environment. From the interview transcripts we observe both technical factors, given the harsh climatic conditions, as well as institutional factors, often related to political conditions in Russia, as well as political interests in the Arctic regions. It is thus natural to use Jacobsen & Thorsvik's (2007) classification of external factors (see Section 3.1) to categorise the empirical observations.

The informants mention several inhibiting factors that relate to the institutional environment, and from these observations we derive the following list of *institutional* factors.

Tax system E.g. special taxes or concessions on hydrocarbon resources.

Licensing system How the hydrocarbon resources are distributed among companies.

Geopolitical How the state's geopolitical interests affects the industry.

Judicial system How law is enforced.

They also mention several constraints that are of a more technical nature, and from these observations we derive the following list of *technical* factors.

Infrastructure The ability and effectiveness of transporting resources to where they are needed.

Environment The risk of negatively affecting the surrounding natural environment and ecosystems.

Climate The risks associated with operating in an Arctic offshore climate.

Market The price of oil and gas on the international market.

Variable	A	B	C	D	E
Tax system	-	High	-	-	-
Licensing system	High	High	High	-	High
Geopolitical	Low	-	-	-	-
Judicial system	High	-	-	-	-

Table 6.1: Importance of institutional factors, according to informants *A* through *E*.

6.1.1 Institutional factors

The regulatory and legislative context of oil companies falls within the *institutional* category, as they need to comply with regulations in order to remain legitimate. At the same time profitability—and thus development—of projects are severely affected by the same regulations, thus making this a *technical* condition as well.

An overview of claims made about institutional factors is given in Table 6.1. The table attempts to summarise, based on their statements, each informant’s views on the importance of each variable. The value in each category is either *high*, *low* or not qualified—signified with a hyphen—and is interpreted from the informants’ respective statements, as given in Section 5.2. How the relative importance is interpreted depends on the formulation of the informants’ statements, for example how emphasis is expressed through the statements. Variables that are not mentioned by the informants are not qualified in the table.

The classification derived above is used as variables, and each variable represents a factor that companies operating on the Arctic shelf need to adjust to. From the table we see a clear emphasis towards the Russian licensing system as an inhibiting factor. All informants except informant *D*, emphasise problems with Russian licensing of hydrocarbon resources.

According to informant *B*, the extent of the state’s control over the oil & gas companies’ operations through licensing, causes a significant constraint and inhibits development. Informant *B* further suggests that (see Table 5.3)

Gazprom and Rosneft are used to protect the state’s interests.

Moreover, informant *B* also suggests that (see Table 5.4)

A central strategy for Russian oil companies is to obtain and maintain monopoly status.

Thus, following informant *B*'s observations, the state, using licensing to manifest its interests, discourages companies that are without the state's support.

Informant *C*, with ties to Russia, reinforces the view of a "preference towards Russian owned companies" (see Table 5.1). The consequence, according to informant *C*, is that Russia misses the opportunity to take advantage of foreign companies' competence, experience and technology. Informant *D* reiterates Russia's need for foreign technology and expertise.

Following the above observations, Russian Arctic licensing policies are driven by the state's interests to control resources. Consequently, there is a limited foreign influence of competence, experience and technology. The end result is limited progress in developing the Russian Arctic shelf.

We also observe a varying degree of emphasis on institutional factors in general. For example, informant *A*—with experience from Russia-Norway oil & gas collaboration—emphasizes both tax, licensing and judicial systems as inhibiting factors, while informant *D* does not mention any institutional factors at all.

As discussed in Section 3.1.1, Russian industry may not be well equipped to handle non-technical risk factors. Bourmistrov & Mineev (2011) point to the challenges of a continuously changing and unpredictably regulatory framework, and further suggest that long term planning is thus less meaningful and establishing connections with regulatory authorities as a defensive strategy against such challenges. The legacy of an ex-Soviet industry structure is suggested as another plausible explanation.

6.1.2 Technical factors

An overview of claims made about technical factors is given in Table 6.2. The same system of qualifying relative importance of variables as in Table 6.1, is used in this table.

In this table, Arctic climate conditions are mentioned by all but one informant as a significant factor, but the state of infrastructure, a fragile Arctic environment and a volatile market for gas are also significant factors, judging from the table. Again we observe differing emphasis between institutional and technical factors: informant *B*—with a technical oil & gas background—surely is aware of the technical limitations, yet emphasis rests on institutional factors. Thus there appears to be a balance between the emphasis on institutional versus technical factors, and no clear overall prioritisation

Risk factors	A	B	C	D	E
Infrastructure	High	-	-	High	High
Environment	-	-	High	High	-
Climate	High	-	High	High	High
Market	-	-	-	High	High

Table 6.2: Importance of technical factors, according to informants *A* through *E*.

between the two categories, among the informants.

Clearly the adverse climatic conditions place a significant constraint on all oil & gas related activities on the Arctic shelf. This is mainly a technological constraint in that it may be overcome by improved technological solutions. For example, ice is mentioned by our informants as a climatic constraint, which may be overcome by drilling rig and equipment innovations. However, as suggested in the previous Section, 6.1.1, the lack of foreign influence may pose a significant challenge to the Russian industry's ability to overcome these technical challenges.

6.2 Supply and value chain

We found little data on innovation in Russian supply chains specific to Arctic shelf oil & gas development and production. On the contrary, our informants indicated a tendency for Russian oil & gas companies to vertically integrate their supply chains, although some examples of co-operation horizontally are mentioned. Thus, in this part of the study, data from the document study (see Section 5.1) supplements the primary empirical data. Moreover, most real world evidence of supply chain innovation was found in the document study, rather than in observations from our informants.

In studying the supply chains of the companies relevant to our study, we observe four main types of innovations, namely

Integration Mentioned by the informants is a tendency for the Russian oil & gas companies to intergrate activities vertically. For example, informant *D* mentions both Rosneft and Gazprom as two companies that wish to do as much as possible in-house.

Standards A few examples of modernisation and application of international best prac-

tices are observed in Section 5.1.5.

Optimisation Rosneft claims to have increased efficiency of several activities through optimising their supply chain through improved management and coordination of activities (see Section 5.1.5).

Co-operation There are several examples of co-operation related to Russian Arctic shelf hydrocarbon extraction. The examples span the entire supply chain from supply and logistics up to exploration and R&D. Co-operation in this context can be manifested in joint ventures with partners horizontally as well as strategic agreements with contractors or suppliers.

The supply chain leading up to Russian oil & gas companies operating on the Russian Arctic shelf can be categorised using Skretting's (2011) classification of contractors, technology integrators, product suppliers and service suppliers (see Section 3.2). A summary of observed supply chain innovations is given in Table 6.2. The table uses the above derived categories of innovations observed in the oil & gas supply chain. These categories form the columns in the table, while different activities in Skretting's (2011) supply chain classification forms the other dimension. Empirical observations are marked in the table with a reference pointing to an explanation below the table. This gives an overview of some of the innovation examples found in our study and allows us to compare the relative magnitudes between different types of innovation.

A significant change in supply chain organisation has been Rosneft's acquisition of TNK-BP, which has resulted in integration of many of TNK-BP downstream service suppliers, including refining, retail, trading and logistics services. Jacobsen & Thorsvik (2007) suggest that vertically integrating suppliers may help overcome risks in the supply chain. Through integration of TNK-BP's activities, Rosneft may increasingly be able control risk factors in the supply chain. Rosneft also seeks to control risk in its seismic contractors' exploration activities in the Pechora Sea. In this example, cooperative scientific and R&D activities are meant to increase understanding of Arctic climatic and environmental risk factors.

Zolotukhin (2011) emphasises the need for an international supply chain to fill the technological gaps in the Russian Arctic shelf oil & gas industry. Rosneft has cooperative agreements with international oil and supply companies such as ENI and General Electric, and thus we observe some presence of foreign suppliers in several levels in the supply chain.

Activity/innovation	Integration	Standards	Optimisation	Co-operation
Contractors	k	j		h, k
Technology integrators				c
Product suppliers				c
Service suppliers	a, e, f	b	i	c, d, g

^a Integration of TNK-BP's services into Rosneft (see Section 5.1.5).

^b Improved HSE standards (see Section 5.1.5).

^c Rosneft and General Electric technology cooperation agreement (see Section 5.1.5).

^d Joint venture between Novatek and foreign investors (see Section 5.1.4).

^e Rosneft's investments in Murmansk Transport Hub and terminal facilities (see Section 5.1.4).

^f Gazprom's LNG shipping integration strategy (see Section 5.1.4).

^g Rosneft's co-operation agreement with ENI on downstream supply and logistics (see Section 5.1.5).

^h Rosneft's exploration R&D co-operation (see Section 5.1.5).

ⁱ Rosneft's optimisations in refining, retail and logistics (see Section 5.1.5).

^j Gazprom subsidiary Gazflot's standardised winterization (see Section 5.1.5).

^k Rosneft's planned joint venture in combination with acquisition of NADL stake (see Section 5.1.5).

Table 6.3: Observations of innovation in the Russian Arctic offshore supply chain.

The informants also see a need for a competent supply chain and see international collaboration as a way to take advantage of foreign technology and competence. Informants *B*, *C* and *D* mention lack of competence as a inhibiting factor, while informants *C* and *D* mention also lack of technology. Rosneft is addressing this mainly through horizontal co-operation with international oil companies, according to the informants. The cooperation mentioned revolves around research, training and information exchange, involving international oil companies, such as ExxonMobil, ENI and Statoil, although Russian universities are involved as well. Table 6.2 however, shows examples of collaborations also with their suppliers and contractors, which shows that co-operation vertically also exists. Moreover, we may also observe a cooperative strategy aimed towards taking advantage of export markets rather than competence and technology exchange. For example, as claimed by informant *B*, Rosneft has recently chosen a Vietnamese partner, which may open up to the Vietnamese market.

Nonetheless, informant *D* claims that both Rosneft and Gazprom are vertically integrated companies. Moreover, there is a tendency in the empirical data towards both integration and co-operation—both vertically and horizontally—although the general sentiment of the informants is that integration is relatively strong and co-operation relatively weak.

According to Jacobsen & Thorsvik (2007), both horizontal and vertical integration, and co-operation, are strategies employed in managing uncertainties in an organisation's technical environment. Rosneft and Gazprom may address their technical challenges through such strategies, but for their suppliers or foreign oil & gas companies in the Russian market, the situation is apparently reversed: According to informant *A*, Gazprom and Rosneft are Russian flag-bearers, while informants *B* and *C* also hint to the two Russian oil giants' political ties (see Section 5.2.4). Informant *E* further points to the legal situation allowing Rosneft to maintain a monopolistic position. Such privileges do not extend beyond these two companies, judging from the empirical data, leaving other companies and suppliers exposed to a differently balanced set of environmental constraints.

In Section 6.1 we establish that the licensing system is considered a major institutional factor of the Russian Arctic development context. Given the span of the licensing system, as described by informant *B* (see Section 5.2.1), licensing affects the supply chain as well as the oil & gas companies themselves. Co-operation may also be a strategy for a supplier to enter this market, for example through a joint venture, which we see a few examples

of in Table 6.2.

In some cases a joint venture and integration strategies may coincide in an agreement between two companies. For example, in the case of *NADL - Seadrill and North Atlantic Drilling announce Investment and Co-operation Agreement with Rosneft to partner in Russian market* (2014), NADL is allowed entry to a new market, while Rosneft is given equity in return. In order to secure or improve its capacity, Rosneft may seek to integrate parts of the oil & gas supply chain. For a supplier or contractor, however, integration in this case means giving up its assets in Rosneft's favour. In this case we may consider co-operation and integration as two opposing forces—deals are made between the Russian national oil companies and suppliers where the two forces reach a balanced compromise between the stakeholders. It is clear from the informants' point of view, however, that the Russian national oil companies control the market and thus who enters the market.

There are fewer examples of other types of innovations in the supply chain. Only a few examples of standardisation are found in the empirical data. A possible explanation is that empirical data on the subject is difficult to find. A hint to another explanation is put forth by Bourmistrov & Mineev (2011), namely a continuously changing and unpredictable regulatory framework (see Section 6.1.1). Idiosyncrasies between international and national standards, which in addition might change unpredictably, makes planning for standardisation difficult. As mentioned by some of the informants, as well as Bourmistrov & Mineev (2011), seeking to influence regulatory authorities might be a better approach. A third explanation could be that, although Russian industry may have some influence on international standards, for example through the Barents 2020 collaboration (Det Norske Veritas 2012), the standards are mainly driven by foreign and international oil companies and organisations. Russian industry is new to offshore oil & gas activities, and existing standards have been laid down by experienced and established international players in the field. There is, however, a hint of improvement, as informant *C* suggests a positive trend “where Russian companies are required by international best practices to share their experience” (see Table 5.5) in several of their activities.

6.3 Innovation

Viewpoints about innovation in Russia are presented in our empirical study section. A theoretical perspective on innovation is presented in Section 3.3. We have seen innovation from a supply-chain perspective in the previous section, just above. In this part we will

proceed with a more general analysis of innovation.

The analysis is divided in two in two phases, in the first phase we will we will analyse actions, policies and measures undertaken by the governmental level, comparing it with relevant theoretical perspectives about innovation. This section is called innovation at large in order to see the wider societal picture regarding innovation and development in Russia.

In the second phase we will analyse the approach to innovation undertaken by the the various companies and organisations, again comparing it with relevant theoretical perspectives regarding innovation. This section is called innovation at close in order to zoom in on constituents and building blocks of the businesses and industry typical in Russia and in the oil and gas business.

6.3.1 Innovation at large - macro strategies for innovation

One way of approaching innovation is presented through the OECD macro-level framework (OECD 2011), macro strategies for promoting and developing innovation, presented in Section 3.3.2.

From the empirical findings we can identify a pattern where the overall recommendations from OECD are put in practice in the Russian Federation. That said, in practice and with time there are varying degrees of implementation of the many and different policies put forward and recommended by OECD. Furthermore the overall level and strength of innovation is seen as being in the lower end comparing with other nation states according to our empirical material. Regarding the macro strategies for innovation we also see that the political level in Russia also has a strong impact on the main companies, at least in the oil and gas industry. For instance this is witnessed by the handling of ownership and control over Rosneft and Gazprom, as stated by some of our informants and according to our empirical findings. Hence the political level is not contenting itself with putting the general framework in place, there is also a strong interest and guidance of direction of the main players in the industry. A question in this regard is thus if the Russian main players are tasked to carry out innovation and drive the modernisation on behalf of the Russian government of or if there is a more blended approach with governmental macro strategies for innovation for the society at large coupled with a certain guidance of the main players in strategic industries and sectors.

From the OECD framework (OECD 2011), we see that there is a clear recommendation of a stable monetary environment as one of the pre-requisites for nurturing innovation. The importance of monetary stability, or at least the possible negative impact of varying monetary changes is also clearly stated by Rosneft at various moments, first at the time of the initial public offering of Rosneft shares and later on in subsequent annual reports and financial publications. It can be argued that Russian authorities have taken this need for general stability at heart, since economic disruptions of the 1990's are clearly in the past, despite the economic recession in 2008 and its social impact. According to OECD (2011), the Russian economy grew by 7 per cent in average per year between 1999 to 2008, and even more so on a per capita basis, since the population declined over the same period.

In the same vein, OECD recommends a budgetary policy based upon fiscal sustainability. The requirement for stability is thus a common theme. From the empirical study we see that Russia still depends heavily of income from extractive industries, in order to balance the budgets. Moreover the importance of the hydrocarbon sector has increased over time, not so much due to increased volumes, but more due to increasing world-market prices for the products sold. Thus it seems that the dependence on the hydrocarbon rent is higher today than earlier. That said the hydrocarbon revenue permits the state to meet its obligations. Furthermore with a declining population the situation can be maintained as is for some time as claimed by Interfax Center for Economic Analysis (2007). However, extractive industries are in principle finite and thus there will be a future need for investments and development of new resources. In addition, there is always the risk of possible changes and fluctuations of world-market and commodity prices impacting the overall hydrocarbon revenue.

On another area OECD promotes the idea of a strong competition and trade policy, discouraging rent-seeking behaviour. Such behaviour, if setting root, is seen as carving out and attracting talent, capital, and investments and hence works in detriment to innovation and fresh and new thinking. This is one of the areas where several of our informants and also our document study points to areas where there is less development in Russia. Although the recent adhesion to World Trade Organization regime has put the long term policy framework in place with regards to trade, there are still areas and pockets in the market place where competition is lacking in Russia. Our study of the supply-chain goes further into the details on this topic, where especially the leading oil and gas companies and also suppliers to some extent are integrating vertically along the

supply-chain, even also horizontally in order to control adjacent industries, suppliers or customer. This is totally in opposite to international trends with dependence on the market-place for supplying and offering best practice and best suited technology and solutions. That said there are some indications on why such vertical and horizontal integration happens in Russia, as revealed through our empirical study, for instance caused by shortage of inputs, supply chain disruptions and cash shortages during the Soviet economy time and then in another fashion during the 1990's economic change period, as claimed by Lunden & Fjærtøft (2012). Moreover the same tendency where big conglomerates dominate entire sectors and pans of the economy in a country, can be seen in other countries as well, for instance in South Korea, according to Choi et al. (2013).

In a fourth dimension in order to nurture innovation, OECD recommends a financial policy that promotes financial institutions that are able to value innovation-related investments and manage risks inherent to innovation. Our material does not extend very far on this dimension and we have to relate to symbolic decisions regarding like the Skolkovo initiative, the business park and innovation centre outside Moscow (Morris 2010), and the venture capital initiatives channelled through Rusnano for instance. Rusnano is spearheading growth and innovation firms within the nano-technology industry in Russia (Rusnano 2014). That said some sources from our empirical study mentions the lack of finance and funding in order to kick-off and value new ventures in Russia. A lack of specific seed money for entrepreneurs is also seen as a hindrance for further strengthening of innovation in Russia according to our empirical material, (EBRD 2013).

A fifth direction from the OECD framework focuses on the education and training policies put in place, an area where Russia is, according to our empirical study, well placed, thanks to its relatively strong educational system, schools and universities. Although it seems that vocational training is lacking in some areas and employees are not sufficiently trained along their career-development. Some of the empirical data suggest that in fact management training and knowledge is insufficient in Russia, thus pointing to gaps in the overall curriculum according to claimants, EBRD (2013).

In a sixth area OECD recommends a research policy that is drawing on the mutually reinforcing capabilities of the public and private sector. Our empirical data tells us a that Russia has some strong environments within public research. However, it seems like there is a lack of connection between the public and private sector, or more precisely between public research and the market place. Accordingly the co-operation and synergies are

low and there seems to be little flow-over of experience and research from the public sector to the private domain, and eventually back again. This underlined by statements saying that Russian scientists need to learn how to commercialise their inventions, Gorst (2013). Furthermore one of our informants argues that one does not see much research in general, but a need for more co-operation. Another informant says that there is a lot of technological research, but not in a dynamic process, since Russian management in general prefers established technologies.

Additionally OECD recommends an industrial and regional policy, providing appropriate infrastructure and other support structures in order to realise innovation potential of specific sectors and clusters. From the empirical data we see a varying degree of support for such measures, though without a clear pattern. For instance the Yamal LNG project is spearheaded with important support from the Russian state, with funding of port facilities and other relevant infrastructure, based on the idea that the project will help develop the Northern Sea Route. On another side and within the same geographical area, Yamal peninsula, Gazprom had to fund necessary infrastructure such as rail-ways and roads from their own project specific budget.

OECD considers innovation a means and a result of the improvement of quality of life, hence puts the focus on an active and forward-leaning social and health policy. We have little information from our empirical data lending to any appropriate discussions at this moment. Hence we suggest this as an area for further investigation and development for the future. A specific question could thus be about the quality of life and its impact on innovation in Russia.

In a ninth dimension from OECD, sees an environmental policy with pro-innovation regulations and incentives as important means to encourage value creating responses in order to decouple economic growth and use of natural resources. From some of the informants' claims we see that, although the legal side of environmental protection is taken care of there are question marks over the practices and day-to-day following of such legal requirements. This fact is further emphasised by some of the statements from our empirical data, questioning the environmental readiness and seriousness of the major Russian oil and gas operators. Especially environmental protection organisations are putting out important question marks about Arctic readiness and preparations (Voorhar & Myllyvirta 2013, Bellona 2013).

Finally, OECD recommends a judiciary policy enforcing rule of law, protecting innovation activities. OECD sees innovation activities as inherently risky and that they

must be protected against additional uncertainties. In general terms about the judicial situation in Russia, informants identify this as an area where there are challenges and where there is insufficient actions. One informant mentions outright corruption as a challenge, going counter to a law abiding society. Part of this also found in the empirical data material, with even for instance Rosneft stating challenges with the judicial system as one of the risks of operating in Russia, this in its information document to future investors at the moment of the initial public offering of shares in the company (Rosneft 2006). Furthermore the shape of the supply-chain and the extent of vertical integration in Russian oil and gas sector could also testify that keeping competence and capabilities in-house is considered easier than relying on the market place where contracts regulate relationships.

The OECD framework sets out quite clear policies for modernisation and recommendations for nurturing innovation. As we have pinpointed, some of them are followed by the leadership in Russia and applied almost as recommended and according to the book, whereas other policies seems to take longer time or are at least prove to be more difficult to implement if not postponed or outright discarded. Among the policies it can be argued that one of the biggest challenges resides in the judiciary system and rule of law, where sources from our empirical study point to questionable practices, lack of legal fairness and rights-protection.

One of our questions from the theoretical perspectives relates to the theories of Ricardo Hausmann (2007) where countries develop through products that are closely related. Hence according to this train of thoughts, existing industrial structure will impact the future possibilities and opportunities for any given geographical area. Taking Hausman's theory to a Russian context this means that existing and important industries such as hydrocarbon and metals sectors will impact directions for future innovations and transformations. Reflections of this relevance and directions are seen in the empirical material relating to for instance the Russian Federations Arctic strategy, that clearly sees existing industries as spearheading the development of the Arctic area in the coming years.

Elements from the OECD framework, presented in Section 3.3.2, is condensed in Table 6.4. We compare opinions from the informants with the OECD recommended policies and dimensions. The table intends to summarise, based on their statements, each informants' views on the importance of each variable. The value in each category is either *high*, *low* or none, and is interpreted from the informants' respective statements,

as given in Section 5.2. How the relative importance is interpreted depends on the formulation of the informants' statements, for example how emphasis is used. Variables that are not mentioned by the informants are not qualified in the table.

An overview of points made about innovation factors on a macro level given in Table 6.4.

Innovation	A	B	C	D	E
Monetary policy	-	-	-	-	-
Budgetary policy	-	-	-	-	-
Competition and trade policy	High	High	High	-	-
Financial policy	High	-	-	High	High
Education and training policy	-	-	High	-	-
Research policy	-	-	High	-	-
Industrial and regional policy	-	-	High	High	-
Social and health policy	-	-	-	-	-
Environmental policy	-	-	-	-	-
Judiciary policy	High	High	High	-	-

Table 6.4: Importance of innovation on a macro level, according to informants *A* through *E*.

From the table we see picture where competition and trade policy, financial policy and judiciary policy are mentioned as the most important factors and relevant in a Russian context. Followed by a second grouping of industrial and regional policy, research and education policies.

Informant C, with an oil & gas academic research background and an authoritative figure in oil & gas in Russian academia, mentions a wider spectre of policies whereas informant E, with research background and specialist in Arctic politics and Russian oil & gas industry emphasises the least, with only one factor highlighted, namely the financial policy.

Another observation from the table relates to factors not mentioned by the informants as relevant or less emphasised in a Russian context, like social, health, environmental policies and monetary and budgetary policies.

That said we can not see that OECD either has emphasised one policy over the other, as more important or relevant, more that there needs to be a broad approach to nurturing

innovation and development.

6.3.2 Innovation at close - open innovation approach and extent of innovation in organisations

Looking more towards a micro-level and concerning organisations and companies, according to Détrie (1993) the way an organisation or a company approaches innovation will determine if a company is successful or eventually is risking to wither away or ending up in irrelevance. Midgley (2010) lists some propitious environmental conditions for nurturing innovation. Another approach to innovation comes from the thinking around open innovation, in the sense that innovation can come from many directions and dimensions surrounding the company and organisation, as described by Chesbrough et al. (2006). The open innovation concept can be considered especially relevant in the oil and gas industry since much of the innovation in the industry is done outside the oil and gas operators, Crooks (2008) pinpoints that big oil companies do not control much distinctive technology, but rather rely on service and technology providers around them.

Extent of innovation in organisations

One of our questions from the theoretical perspectives section was if Russian organisations saw innovation in the same wide and extensive manner as theorists such as Keeley et al. (2013), Hamel & Breen (2007) and Sawhney et al. (2006). Where for instance the latter sees innovations as any type of offerings created, how customers and clients are served, process employed and finally points of presence in order to take products and services to the market. The empirical material does not answer this question in a direct manner, however some tendencies can be read out from remarks such as those emanating from OECD (2011), recommending more innovation to be carried out within service businesses and the need to stimulate the demand side of innovation in Russia. Moreover Russia is characterised by low R&D spending and few start-ups according to material from Kempener et al. (2010). One informant from the empirical study observes that Russian industry is trusting in-house solutions rather than the market-place, and companies becoming conglomerates of interest. Another informant also highlights that the two biggest Russian oil and gas companies are doing little to stimulate the wider supply network. Regarding research there as a lack of a dynamic process according to

one informant and another sees a conservative and preserving tendency among Russian management, with preference for established and trusted technologies and solutions.

Hence it can possibly be argued that Russian organisations have some way left until they see innovations in the same wide and extensive manner as the above mentioned theorists. That said the, energy sector is considered as one of the most innovation-intensive parts of the economy in Russia, according to Interfax Center for Economic Analysis (2007). One informant is pointing to the fact that Russian companies are trying to take knowledge from onshore activities to offshore, with special attention to areas with ice and cold conditions for instance. An example of using existing knowledge in a new area.

Stimulating innovation in organisations

From our theoretical perspectives section, we saw theories by Midgley (2010) and Martins & Terblanche (2003) regarding what could be done in order to nurture and stimulate innovation within organisations. Both theories mention that such organisations should preferably open up to innovations, show clear direction, communication and purpose, with a structure characterised by flexibility, freedom, teamwork and co-operation. Midgley (2010) adds that innovations should preferably be developed together with customers, and build up a market for the result of the innovation process. Whereas Martins & Terblanche (2003) mention behaviour that accepts risk-taking, and encourage learning and competition as important parts in order to encourage innovation. They furthermore add availability of resources as another important element.

From the empirical material we see a tendency towards a top-down approach in Russia, where top management is deciding and dominating the development. There might also be reluctance to knowledge-sharing according to Lunden & Fjærtøft (2012). These tendencies go clearly against some of the recommended theories as mentioned above with a free flow of information in all directions, flexibility and team-work.

That said we see clear pattern of more and more co-operation agreements put in place, especially with focus on the offshore development area, witnessed by the various agreements that both Rosneft and Gazprom have entered into recently. In some examples there is even R&D centres part of the agreement, where the idea behind is to learn from each of the partners and stimulate new thinking and approach. This might thus balance the picture somewhat, however the agreements are based on top management agreeing

to co-operate, and again is an example of top-down approach at the onset, although it lays the premises for co-operation and sharing deeper down in the organisations. A question in this regard will thus be how effective these agreements will be down in the lower layers of the organisations.

Open innovation approach

Open innovation as defined by Chesbrough et al. (2006) identifies that innovation can come from many directions and dimensions surrounding the company, and that organisations should use this to advance their technology.

A question from our earlier theoretical perspectives section asks about the strength of networks, co-operation and working together in order to solve challenges. Relating this idea to the oil and gas industry one can deduct that since every reservoir and oil and gas field is different from each other in varying degrees, there will always be a need for non-standardised solutions and new thinking in order to develop and extract the hydrocarbon resources. Following this logic it would thus be difficult for one company or one organisation to present solutions and innovations for all the eventualities, possibilities and opportunities presented by such reservoirs and resources. Hence the need for an open approach to sourcing in and finding alternatives, if time-lines and project budgets are to be kept. Sasson & Blomgren (2011) even classifies the oil and gas industry as a relationship-based innovation system. As such one can possibly say that oil and gas industry and especially the Arctic development will most likely benefit from a more open innovation attitude.

For the oil and gas industry in general we see that the supply industry plays an important role with regard to innovation and finding new solutions, cf. Section 3.3.3. In a Russian perspective we have seen from our earlier Section 6.2, that there are some varying approaches to how the supply chain is structured, with sometimes a penchant towards vertical integration if possible. Such closed knit integration goes contrary to the ideas of the open innovation theories and might thus hamper the development if one is to believe the statements as per Enkel et al. (2009). That said the recent developments and co-operation agreements signed between Russian and international oil and gas companies testify a more open attitude, and willingness to learn and share from each other's knowledge and competence.

Innovation factors

From the theoretical perspectives presented in Section 3.3.4 we derive a set of innovation factors for analysing collected empirical material from the interviewees.

Our selection of innovation factors starts with a certain degree of opening up for innovations in the organisation and supporting the team working on the innovation as per Midgley (2010). Show direction and setting up clear guidelines with a clear vision and purpose, according to Midgley (2010). Create innovations that are desired and needed by the end-users and the market through innovation processes with customers like outlined by Midgley (2010). Another important step is to allow for changes in the organisation that is to carry out the innovation through change management as per Midgley (2010). Building up a market for the outcome of the innovation process and having a market for innovations is another innovation factor from theory of Midgley (2010). From another set of theories (Martins & Terblanche 2003), we derive another factor, namely a flexible, free and co-operating structure, meaning an organisation structure that is flexible and free nurturing team-work and co-operation. From the same deck of thought by Martins & Terblanche (2003), there should be acceptance of risk taking, meaning support mechanisms that reward, recognise and accepts risks. Another behavioural element and innovation factor relates to behaviour encouraging innovation, learning and competition across the organisation as per Martins & Terblanche (2003). They also recommend open and clear communication. The last innovation factor, degree of open innovation, meaning the degree of accepting and taking into consideration innovation coming from many directions and dimensions surrounding the company, as per Chesbrough et al. (2006).

Elements and points made about innovation factors on a company level are condensed in Table 6.5. The table intends to summarise, based on their statements, each informants' views on the importance of each variable. The value in each category is either *high*, *low* or *none*, and is interpreted from the informants' respective statements, as given in Section 5.2. How the relative importance is interpreted depends on the formulation of the informants' statements, for example how emphasis is use. Variables that are not mentioned by the informants are not qualified in the table.

From the table we see the importance of innovating with customers, a certain degree of open innovation and encouraging a behaviour fostering innovation, learning and competition as important policies. As we have seen from the theoretical perspectives and from the document part of the empirical material these are all relevant policies in

Innovation	A	B	C	D	E
Open up for innovations in organisation	-	-	-	-	-
Vision and purpose	-	-	-	High	-
Innovate with customers	-	High	High	High	High
Change management	-	High	-	-	-
Market for innovations	-	-	-	-	-
Flexible, free and co-operating structure	High	-	-	-	-
Acceptance of risk-taking	-	-	-	-	-
Behaviour encouraging innovation, learning & competition	High	High	High	-	-
Open and clear communication	-	-	-	-	-
Degree of open innovation	-	High	High	High	-

Table 6.5: Importance of innovation strategies on a company level, according to informants *A* through *E*.

the oil and gas industry, defined as a relationship-based innovative system by Sasson & Blomgren (2011), whereby innovations are carried out in co-operation between operators and service and technology providers.

6.4 Culture and business traits

Viewpoints about culture and business traits in Russia are presented in our empirical study section. A theoretical perspective is presented in Section 3.4 Culture and business traits.

In this part we will proceed with the analysis of culture and business traits with basis formed by theories developed by Hofstede (1980), and studies carried out by Bourmistrov & Mineev (2011). In his works Hofstede has defined a set of dimensions in order to summarise and compare aspects that are different from culture to culture and nation to nation. Hofstede has published his own analysis of Russia, using his cultural dimensions scoring and analysis tool (Hofstede 2014).

From the empirical material we have seen some specific traits of Russian business and management culture underlining the findings from Hofstede about Russia. Like for instance a penchant towards a top-down approach and a pattern where direct control

factors have importance. One informant going as far as saying that Russian oil and gas companies are characterised by little horizontal co-operation, and traits such as fear of making mistakes and leniency towards vertical orientation. Another source is mentioning that Russian management are preservative since they prefer established technologies, in addition that innovation in a rigid system is difficult.

Similar ideas, are brought forward in other studies of Russian business culture. Bourmistrov & Mineev (2011) conclude that Russian companies are more expert-oriented with regards to information gathering, and that decision-making is centralised and hierarchical. This underlines the idea of a top-down approach.

A question from our earlier theoretical perspectives centred around if and how specific culture and business traits impact innovation in general and innovation in Russia especially. In this regard it could be said that a top-down approach could work for certain types of innovations and possibly for research and development situations and for specific technological developments. In such situations the top management would set out path and direction or aim for a specific technological development to be obtained, giving the teams at lower echelons clear guidance, vision and direction. However, a strict top-down approach would certainly lead to information flowing less freely and in more pre-determined directions, thus at some point hampering innovations or delaying the innovation process. The promoters of the open innovation approach, Chesbrough et al. (2006) would certainly agree that a flatter structure would be more beneficial to innovation in general. If the culture and business traits are truly as characterised above, one could say that innovation in general has a more difficult path towards fruition in Russia.

6.5 Conclusion

Development of the Russian Arctic shelf is held back by both technical and institutional factors. Respectively, two major factors emphasised by the informants, are the harsh Arctic climate and politicised licensing of hydrocarbon resources.

Due to current licensing Rosneft is in a monopoly situation, and the industry misses the opportunity to take advantage of foreign competence and technology, which, in turn, limits the progress of Russian Arctic shelf development.

There is no clear overall emphasis towards either institutional or technical factors—some informants emphasise institutional factors over technical, and some vice-versa.

Both according to literature and the informants, influence from an international supply chain is needed to fill the technology and competence gaps in the Russian oil & gas industry. The informants mention some examples of horizontal co-operation with international oil companies, but in the document study we also find examples of collaboration vertically in the supply chain. The general sentiment of the informants, however, is that the dominant players on the Russian Arctic shelf, are vertically integrated companies that wish to control all activities of the oil & gas value chain.

For suppliers or other oil companies trying to enter this market, the politicised dominance of the existing license holders is an inhibiting factor. Co-operating with license holders might be the only viable strategy.

Thus we see the outlines of a paradoxical state of affairs that inhibits the innovation necessary to overcome the development challenges of the Russian Arctic shelf: On the one hand, hydrocarbon resources are of strategic importance to the Russian state, being its major source of income, and thus it seeks to control the licensing of these resources. The result is the dominance of a few vertically oriented companies. On the other hand, technological innovation and competence is clearly needed to overcome the technical challenges of the Arctic climate and infrastructure, while preserving the environment. Due to the licensing conditions, however, companies with necessary expertise are not given many opportunities to enter the market.

We have noted that the level and strength of innovation in the Russian society is at a lower level than in other nation states. However, the need for innovation and modernisation has crept up on the political agenda and awareness the last years. We have seen that the Russian governmental level is putting in place a lot of the OECD recommended framework, however there are varying degrees of implementation and focus, and we can not see any of the policies implemented in its fullest or completed, more like work in progress. Thus the overall score is somewhat clouded by challenges in certain areas and in particular within the area of judicial sector, where several shortcomings are exposed. The implication of challenges in this domain should not be underestimated. For instance the shortcomings in the judicial sector are sufficient enough to lead companies and private actors not to trust the market-place and seek out alternative relationships and organisational structures. Thus there is a certain behavioural impact on the organisations and companies operating in Russia. The same impression is reinforced by elements from our micro-level and supply-chain studies, where companies are becoming conglomerates of interests rather than relying on the market-place.

We have seen that the oil and gas industry is classified as a relationship-based innovation system, according to where the big oil and gas operating companies rely on service and technology providers around them for providing solutions and contributing to innovation. However, in a Russian perspective we have found that there is little stimulation of the wider supply network in Russia, and that there is a lack of a dynamic process when it comes to innovation across organisations.

Furthermore there is a disposition towards a top-down approach where control of decision-making and the importance of hierarchy plays in. These tendencies go against the ideas of an open innovation approach as described in our theoretical perspectives and thus might inhibit innovation in general.

That said the last years agreements signed between Russian and international oil and gas companies and international service and equipment providers are testimonials of a more open attitude and a willingness to share from each other's various experiences, knowledge and technology. Although they are yet again examples of a top-down approach and thus opening up to questions about how these agreements are supposed to stir up and encourage innovation deeper down in the organisations.

The same question is relevant from a cultural and business trait perspective, a top-down approach could work for certain types of innovations and for specific technological developments, where management is setting out the path and direction for specific technological development, giving clear guidance and direction to the teams contributing to the specific development. However, a strict top-down approach would hamper information flows and thus go counter to the ideas of the open innovation approach, thus impacting innovation in general.

That said the tendency towards vertical structures and conglomerates of interest could be a protective shield from external factors and especially from the judicial situation prevailing in Russia. Internationally there are other successful and similar examples of vertical integration and strong business groups controlling parts of the economy, like for instance in South Korea as described by Choi et al. (2013). Strong business groups and their very existence, could at times be interpreted as tools for carrying out the modernisation drive and innovation on behalf of the respective governmental state. The question in this regard is thus if the Russian government level is using the major oil and gas operators in Russia to carry out the modernisation and innovation drive on its behalf throughout the industry. It could either be a predetermined policy or a fact just happening in a coincidental manner. Much lead to say that at least the rise of Rosneft

is not coincidental, and seems planned, with a thorough strategy and development plan, at least witnessed through statements in its official publications at the initial public offering of shares in the company and our empirical material. This is thus leading us to say that the major Russian oil and gas companies are the true holders of the ambitions of the Russian state within the oil and gas sector.

Concluding to our overall question regarding innovation in the Russian oil and gas sector - and if prepared for Arctic offshore development, we would have to answer with a no and a yes.

No to the fact that it seems that the innovation strength in Russian industry, as per today, is not strong enough to carry out and face the development challenges related to offshore Arctic development on its own. The technological challenges can certainly be solved through a top-down approach, where project teams are tasked to carry out and overcome specific challenges. However the Arctic offshore challenges are not just technological but also wider and general and would need fresh thinking and new ways of working, not so easily ordered from the top.

That said we would answer with a yes to the fact that at least Rosneft is preparing itself for Arctic offshore development in a way where it is taking in best practice from international partners and setting up co-operation projects whenever needed. Using best-practice from other partners would help in overcoming the specific development challenges related to Arctic offshore development. Co-operation is not just buying in necessary technical kit, but also extended to services and technology co-operation. We also see that international partners are more than willing to participate in such developments, and co-operation go on unabated despite high-level political confrontations. That said we estimate that the path towards becoming so-called prepared will take time, as the human factor should not be underestimated, it will take a certain period to train teams and develop co-operation, something that can not be ordered and imposed from the top, but rather grow through efforts and learning over time.

Appendix A: Interview guide

Five key questions:

- What are the main challenges for developing oil & gas resources on the Russian Arctic shelf?
- What are the Russian government's interests for the short and long term, in Arctic shelf oil & gas resources?
- How does the Russian government contribute to meet the development challenges?
- What are the strategies of Russian corporations developing or planning to develop oil & gas resources on the Russian Arctic shelf?
- How do Russian corporations approach the (technical) challenges of developing oil & gas resources on the Arctic shelf?

Appendix A: Interview guide

Phase	Topic	Duration / minutes
Background	Informal introduction	5
	Introduce theme for conversation	
	Explain purpose of interview, anonymity, non-disclosure	
	Inform about optional anonymity and/or non-disclosure	
	Questions from respondent	
	Inform about recording	
Focus	Start recording	50
	5 key questions	
	List of follow-up questions, if necessary.	
Review	Additional information?	5
	Possibility to come back and review topics/questions already discussed	
	Suggestions for other informants or respondents	

Appendix B: Interview transcripts

1 Informant A

Date: 13.11.2013

After initial e-mail contact with person recommended by our supervisor, the meeting was set up through telephone conference facility. Meeting started with presentation of purpose, topic and students. Followed by a short briefing about possibility to have an anonymous interview. The informant allowed for recording of the conversation. The interview lasted some 60 minutes. The informant had asked for key questions being shared upfront the conversation.

Before closing the interview, we asked the informant for other potential candidates that we might use as informants. The informant gave us three names that we could follow up on.

The informant's replies to the respective topics were as follows.

1.1 Development challenges

The biggest challenge for Arctic offshore development is the cost level of such developments. A key-word is Shtokman, where Norsk Hydro participated in first explorations back in 1988–1990, is still not developed today. Several studies have been conducted. Establishment of the Sthokman Development Company AG in 2007 carrying out concept studies and discovering that the costs are formidable. Phase one was stipulated to some 35 billion USD, for the same output in gas as the Norwegian Ormen Lange development, carried out from 2000 to 2004 with a cost range of 35 billion NOK. Hence a difference of 1 to 6 with regards to cost for the same gas output. So cost is to me a main challenge.

A second challenge is technology. In the areas where there is no ice, the situation is OK. In many areas of the Russian Arctic there is ice, and the farther east, the more ice-related problems there are. This brings technological challenges for drilling-technology

in particular, but also structures.

A third challenge is the lack of infrastructure, with long distances. Shtokman exemplifies this—650 kilometers from shore and the need to build everything from scratch themselves, as there is no synergy with other industries in the same areas.

HSE applies throughout the entire lifespan, from seismic studies, exploration, field development and operation. It is cold, and there is ice, wind and waves—demanding conditions. All this means that Arctic is the place for only the best players in the world, and not an arena for smaller players—whether they are oil or technology companies or suppliers.

A fifth element concerns the transport situation and similar to infrastructure. Helicopters need to have the assurance of being able to return. For the SDAG project they even planned ships that could be used as helicopter landing facility, although expensive solution.

Concerning the legal side, today the demarcation line and borders between Norway and Russia are settled. Not so on the Eastern side closer to Japan. Overall, the legal situation in the North is mostly clear and is thus not the main challenge.

1.2 Government interests

Oil and gas is the prime source of revenue and supporting the Russian economy. It represents approximately two thirds of all Russian export in value. Russia is thus extremely dependent on oil and gas, but also on high prices.

However there are geopolitical changes in play now with shale gas as an alternative at least in US as a local phenomenon, but also possibly internationally with US turning into, not a port of import of LNG but export. Turning the tables upside down. Western Europe is now importing coal and thus replacing gas consumption from Russia.

Russia is thus working to secure sales (of gas and oil) Eastwards and towards China.

The market for gas is not in balance with big price differences, 2NOK in EU.

Russia wants to replace declining production in Sibira, and maintain production levels with fields in Arctic and Sakhalin.

However 65 per cent of the resources are demanding to develop, with for instance need to build infrastructure (Yamal example).

Despite the needs little concrete is coming out. One example of the opposite though is the tax rebates offered to LNG projects from Yamal.

An important goal is to enter the LNG market and strengthen position in that market. Although piping gas East, to for instance China is also important.

Despite these overall goals there is little support of technology-development.

However, a good incentive put in place is that it has been allowed international competition, not just among oil and gas operators, but also from suppliers of the operators, (TBD.)

Russia is giving all licenses in the Arctic to Rosneft or Gazprom, thus creating a monopoly situation. The only change is that they have opened up for a export of LNG, reducing the Gazprom monopoly on gas exports.

I beleive in competition in order for the best development solution to win, solutions created through market-forces, giving better..

Thus there is a a reduction in competition on the Russian shelf, although Statoil and Eni are working in co-operation with operators (Rosneft).

1.3 Government incentives

It is important with a legal system that works—that disagreements can be handled in a predictable way. This is a broader issue in Russia. It is important that international companies are not only given agreements but also direct access to resources—that they participate directly in licenses. Tax-incentives are also important. It was attempted with Shtokman, but it was not achieved, which was a disappointment. On the other hand, the project was likely not profitable enough already before taxes, so tax-incentives would not help. Nonetheless, there is a need for tax-incentives.

In Russian offshore there has been little exploration activities the last years, in fact since the collapse of the Soviet Union. Only in two years since then has there been discovered more than produced, meaning that reserves are going down, despite that we know they exist.

Rules and regulations, such as recommendations from DNV, it is questionable to what extent these are implemented. There is a lot of talks and few practical traces from meetings.

When it comes to research, in Norway we have achieved a cooperative environment between institutions, supply companies and oil companies, which has worked very well and has been regarded as a successful model. But I do not see many traces of that in Russia. Russian industry is afraid of ownership rights and control. Many are trusting in-

house and self-contained solutions rather than using the market-place. Thus companies becoming conglomerates of interest. This negatively affects the ability to innovate, compared to a competition based model. There is a hierarchical organisation where control is the most important feature, and fear of losing control is dominant.

1.4 Corporate strategy

I have seen Gazprom and Rosneft at close, where both are Russian flag-bearers. But then how should I know? That said there are bad experience from for instance the Prirazlomnye project which has turned into a catastrophe. The project started up in 1996, and one can say that there were not the correct incentives put in place and even possible corruption. Not using the best project management techniques, with unclear and fuzzy principles with regards to roles and responsibilities. So far the project has taken 17 years where a similar project would have taken 3 years.

Another Gazprom project Dolginskaya has little movement forward and development.

Rosneft is co-operation with Exxon on Sakhalin, both I and II are profitable. Phase 1 built by Exxon and Sakhalin 2 built by Shell, where Gazprom is now part-owner, was initially a catastrophe costing 20 billion USD vs estimated 10 billion USD.

From my own experience and knowledge regarding Shtokman Development AG, Gazprom was the leader of that company and secured people, however none of these actually came from Gazprom to SDAG since they had to end their careers in Gazprom. An example of no incentives put in place for exchange, for instance the model of more international oil and gas companies, where people work and go from one project to the other and are hired out internally. So for SDAG that meant there were people from Statoil, Total and then Russian consultants, from Gazprom no-one, and thus they have learnt nothing from the development phase now. It is possible that this problem comes from historic reasons where no-one really takes responsibility. It has to do with culture and heritage from thousands of years. Do not have the capability to work in projects and prefer to work in a line organisation in order to do the job. Has to do with the fear of losing control. For instance a company is managed from the top where people do not take decisions or learn from their mistakes.

I saw the same in Statoil Russia where employees were afraid of doing mistakes and thus being punished.

However there is an internationalisation on-going that might change things, for in-

stance Rosneft is establishing itself internationally, learning how things are done. But all in all it takes time, and the essence is that project management does not fit in here.

Lukoil as a privately owned company is the most efficient one, but did not governmental accept, and has thus turned its eyes on international development, in Iraq, Norway in order to get the Russian governmental accept.

Zarubazhneft has some fields for instance Kharyaga, is a not very impressive company. They have some concessions.

The real teaching from Prirazlomnye is that no-one takes responsibility. Not even responsible Alexander Mandel, speaking at conferences, saying start-up is next year with a smile.

1.5 Corporate innovation

Do more on the research side, for instance Rosneft and Exxon has set up a research centre together. Stimulating new technology, which for instance is needed in the Kara sea, where there is shallow waters. Aker Solutions and Kvaerner are suited for this development. Furthermore to invent new solutions for seismic and drilling in the Kara sea. Rosneft has reached the furthest with regards to the planning and Exxon is a good partner.

Rosneft is furthermore co-operating with ENI and Statoil up to the Spitbergen area, but this will be far out in time. Eni and Rosneft are shooting seismic data no on the Hjalmar Janssen structure.

But that said the Russians have singled out some of the most challenging structures now. There are for instance easier accessible resources closer to land.

The Russians are extremely good at participating in seminars, talking about what is needed, but there is little substance and few realities, and in the end no dynamique. This shows that they have not really considered the challenges. The development and push forward will start when the international companies will get access.

Concerning the supply network in North West Russia, Statoil participated in qualifying the sub-suppliers for Achilles, working on HSE, environmental standards, project management, quality control and so on.

The supplier network in Murmansk and Arkhangelsk are more focused towards the land and onshore developments. The companies are there but there is not much happening, and not many concrete projects, no real tasks and projects. An example is

Reinertsen in Murmansk that does not have projects in Russia, working technically very good, despite some struggles, and is now supplying goods to Norwegian sector instead.

2 Informant B

Date: 19.11.2013

The meeting started with presentation of purpose, topic and students. Followed by a short briefing about possibility to have an anonymous interview. At the end of the interview, the informant decided not to stay anonymous. The informant allowed for recording of the conversation. The interview lasted some 60 minutes. The key topics were shared with the informant upfront the conversation.

The informant's replies to the respective topics were as follows.

2.1 Development challenges

One challenge is a combination of licensing and tax systems. Russian policy is directed towards state control. All resources should be under Russian control and no foreign companies or actors should be able to control them, which is to an extent a fundamental Russian attitude.

Forces say that licenses in the northern offshore area should be dedicated to Rosneft, the Russian state oil company. But Gazprom also plays a role. There is a fight over licenses between the state controlled Russian oil and gas companies.

There was a suggestion in the autumn of 2012, when the Ministry of natural resources came with a legislative suggestion for how to create a new legal system for the Russian shelf. The two monopolists did not manage to stop this. In 2011 to 2012 Rosneft was going to be awarded all licenses in the Arctic seas.

Gazprom was consequently insulted, which resulted in strong disagreement between Gazprom and Rosneft. Autumn 2011 Gazprom managed to stop the new law allocating offshore resources. Although they in the end got some and now rather want to be in Asia.

The picture today is, in general terms, that Rosneft has received all license areas from the Bering strait to the Kola peninsula. Rosneft lacks money, competence and people for Arctic offshore development, but has partners, like ExxonMobil in the Kara sea, Vietnampetro, Statoil and ENI.

Licensing in the area does not resemble the Norwegian system—the areas covered by the licenses are larger. Also, license agreements span aspects such as mapping, seismic segmentation and financing. Consequently, planning can take significant time. The system is set up in order to get foreign companies to invest into development, for instance ExxonMobil is financing development in the Kara-sea.

No industry on land is capable of offshore development. There are no overall workprogrammes or plans.

Arctic offshore industry in the North-West is standing still and Russian industry at land is at a level which Norway was at in 1980. Nothing has been done in order to develop the industry and invest. There is less activity in the Barents sea than other places, such as the Kara sea.

That said some of the more competitive advantages for Russia are the more icy covered areas such as the Kara and Pechora seas. With Pechora sea the most important, with depths of only 20 meters and covered by ice .

There has recently been improvements in the tax system (14 days ago).

Still, foreign companies do not have the same rights as domestic companies.

There are few incentives for foreign oil & gas companies to take part in development.

ENI, for example, has a long term strategy: their purpose of taking part in the Russian industry is to position themselves in the market in the long term. However, the incentives to participate in an important and significant way are simply not there. That said the development will happen where there is ice, the industry is not offshore until at least 10 years time.

2.2 Government interests

The Russian government has made a programme for Arctic development, “2020 and beyond.” A long term plan includes exploitation of Arctic resources. The Arctic has to be used! There is plenty of vigorous rhetoric and planning in this respect, but in reality the Russians are not competitive.

For example, it was planned for Shtokman to deliver gas through pipelines to Europe, but effectively this is not competitive with Norwegian exportation. The Ormen Lange development was much more competitively developed than SDAG project.

Further, Russia has vast onshore oil and gas resources, with long term export agreements with other countries.

Russia will develop resources where it is profitable and competitive, and Arctic resources are far down on the list. For instance it is said that Gazprom with current acreage and license areas have enough capacity for supplying another 100 years. Whereas Rosneft is building up resources on the remains of Yukos and others. Rosneft does not have that much competency and has entered into an important agreement with Exxon on the Kara sea and eastwards, and one week ago a deal was made with a Vietnamese company. Interestingly the Vietnamese company has more offshore experience than Rosneft. Showing that if the Russian operators are to develop the resources they have to work with foreign partners.

An important question is, how interested are foreign companies? And at what pace will the development happen. Rosneft is thinking long-term.

2.3 Government incentives

The Russian state is not directly involved in oil & gas activities, the role is much more refrained from taking part than in Norway. For example, Russian government is not involved in making thorough 3D seismic surveys. Instead Gazprom and Rosneft are used to protect the state's interests. One exception is Novatek, who is involved in developing LNG in Yamal.

On the contrary, there is a lack of government incentives. Still, Russia knows they do not have the necessary competence to develop its offshore Arctic resources, and that they depend on a foreign supply network in order to do a better job.

Due to a strong dependence on oil & gas Russia needs cooperation with someone who has special domain experience. There is too little progress through modernisation and innovation. There are limited increases in recovery rates and they get little out of existing fields, there is simply too little maintenance on existing fields.

Russian oil & gas extraction is in decline and there is a great interest in improving the situation, but historically not enough has been done on improving brownfields. New fields become increasingly expensive, and it is cheaper to use existing fields. The economical focus becomes more important.

At the same time, corruption is getting worse, and there is more competition through corruption than through market means. Competitiveness has been damaged by corruption.

There is overall an absence of incentives or correct incentives.

The big companies Rosneft and Gazprom have to deliver. The situation also means that supply companies and supply networks have better opportunities to deliver to Russian oil and gas companies than foreign operators.

2.4 Corporate strategy

A central strategy for Russian oil companies is to obtain and maintain monopoly status. Looking at the license map for the Russian Arctic, it is Rosneft all the way. Their strategy remains securing monopoly through acquiring licenses.

Given the technical challenges, Russian operators are not active west of Novaya Zemlija. Instead they are developing closer to shore, where they do not have competition from others. The priority for Russian oil companies is to develop where they have a competitive advantage, in areas closer to shore and ice-covered. But they now see they need foreign technology. Russian oil companies willingly use foreign technology, for example Norwegian technology for marine operations. For instance the Universtitetskaya drilling plan where 10 Norwegian vessels will participate in the drilling programme. Some shallow water oil rigs are concrete constructions, and there are a few Norwegian suppliers of concrete constructions.

In these areas (closer to shore) they can connect to existing infrastructure on land. The most difficult will be to develop the Kara-sea resources. There is more activity and pressure to develop acreage in the Pechora sea, where Prirazlomnye will start in the summer 2014.

Characteristic key-words for corporate structures in Russian oil & gas include, top-down management, inexperienced management, political networks, divide and conquer, departmental structures in big corporations with little horizontal cooperation (behaving like independent companies), fear of making mistakes, and vertical orientation. That said there are competent people and experts in the departments.

Co-operation is limited and

Moreover, there are few signs of any changes in this respect, although you may have different structures within departments. Also, there is little sharing of knowledge and technology between companies.

The offshore industry in Russia today is more similar to the onshore industry.

There is no government stimulation of supply networks, no stimulation of industry in the north, and there is no offshore activity in the south, so no incentives there either.

Rosneft and Gazprom are doing nothing to stimulate the Russian supply network. They are instead trying to extend the competencies they have from onshore to close-to-shore and shallow water depth conditions.

The foreign operators partnering with the Russian oil and gas operators will bring their supply-network. The Russians will then have a very passive role.

In the case of Shtokman, Russian partners become a bureaucratic problem because of the fear of making mistakes.

The vertical corporate structure stems from a Russian business culture. Russians in Norway are encouraged to forget this part of their Russian culture before trying to make a career in Norway. It is monopolies that drive development, and there are no experienced or diligent professionals at the top.

Strange conditions are in place for activities on the Russian shelf. For example, for seismic exploration, companies may have to give compensation for lack of discoveries.

2.5 Corporate innovation

Initial development of the Russian Arctic shelf is in near coastal areas. Only one field is currently under development, Prirazlomniya. Currently by Gazpromneft without foreign partners. No -one wanted to participate..

The Russians are trying to take knowledge from onshore to offshore activities, and areas with ice and cold conditions where they have development experience.

Russian industry is in need of a completely new transportation infrastructure. For instance there are no suitable harbours for offshore activity.

Both Rosneft and Lukoil have licenses on the Norwegian shelf.

There is close to no innovation on the Russian side, and there is a need for more cooperation. It is difficult for foreign oil & gas companies to enter the Russian market, but easier for foreign supply networks. The time spans and project cycles are much shorter for the suppliers.

The Russians also often choose partners who represent a market, which a recent partnership with a Vietnamese company is an example of.

Russia is not ready for Arctic offshore development. The development will be slow and it will go through Norway. It will also take time to develop the Alaska part of the Arctic.

Furthermore, the Shtokman fobia has passed.

References: Rosneft: Bengt Lie Hansen Russisk perspektiv: Michail Gregoriev
Anonymous? No

3 Informant C

Date: 15.01.2014

The interview scheduled with the informant was in between appointments, and the informant explained that he did not have time for more than 30 minutes. We had set up a three way phone conference from 16:00. The informant had written down answers to our questions beforehand. Due to the limited timeframe, the informant wanted to skip our introduction and background, and thus we only presented the options about anonymity and recording before going straight to the questions. The informant decided not to stay anonymous. The informant allowed for recording of the conversation. The interview lasted some 30 minutes. Our questions were shared upfront with the informant before the interview. The informant sent written replies to the above mentioned questions after the interview.

The informant's replies to the respective topics were as follows.

3.1 Development challenges

First I have to make a waiver: the answers are not necessarily the same as official opinion, but my personal opinion.

First and foremost it is important to develop the right attitude towards the development of Arctic offshore resources.

That means being careful, not applying untested technology. It is a very fragile environment, so we have to be many times more careful than in a normal environment.

Second is to give equal opportunity and equal rights for Russian and international companies so that the best and most competent succeeds. The most important here is that competence and experience benefits the nation and that companies bring experience to the nation. Today there is a preference towards Russian owned companies. Equal opportunity is the way to bring experience to the nation.

Number three is severe climate and harsh environment, lack of developed infrastructure. Along the coastal line of the Russian Federation, which is the longest line in the World, it is very poorly developed.

Finally, there is a lack of technology, competence and experience, which is needed in order to develop in a cost efficient way, the Arctic petroleum resources of the Russian shelf.

Written reply

Unequal opportunities for national and international companies to participate

Most difficult combination of metocean conditions (severe climate, harsh environment, lack of developed infrastructure along the entire coastal line

Lack of technologies, competence, experience

To develop a right attitude

3.2 Government interests

The most important is the national interest and a spring tide prosperity of the nation, in general. This is the main driving force for developing Arctic resources in the long term.

Second is the development of new territories, new regions and giving new dimensions to existing territories. Furthermore enabling indigenous people as real stakeholders and participants in the development - as it is done in Norway. Norway is pumping a lot of resources into developing the High North. So that would be a good example to follow.

A third one would be in the Russian governments interest development of international relations in trading petroleum and oil and gas products. They do not need such vast resources for themselves. We get enough resources on land. But the proximity of transportation routes, like LNG carriers and oil and gas tankers to Europe and Asia-Pacific regions through the Northern territories. Taking into account a warming climate for several decades, this would be a very good option - to develop the resources for the benefit of the whole World.

Compared to on-shore resources what are the priorities of the government?

As regards priorities there are many different views between Government, institutions and organisations that are fighting for the resources.

Arctic resources are the most important new assets—in Yamal peninsula, which is a huge area.

The second opinion is to develop Siberian and far east resources.

The third opinion is to develop idling fields to implement enhanced and improved recovery methods, in order to increase the oil recovery factor, nationwide. That is also a huge opportunity, as there are huge hidden resources of oil. Current recovery levels are stagnating at 30 -33 %, but with increased focus this could be brought to 40 - 45 %.

Fourth opinion, Arctic offshore in nearby territories. My opinion is that we have to develop all of them, in a sustainable way. Western Siberian resources will be the cheapest ones to develop, because we have developed infrastructure—pipelines, specialists, for working in permafrost environments. We are ready for that. East Siberian resources will be a second stage, which has already started, and will continue for maybe 10, 15 or 20 years ahead. Then we have to develop Far east resources—Sakhalin island, Sakha or Yakutia regions, and Kamshatka. These resources are very big, taking into account the opportunity to deliver LNG to the Asia-Pacific region, makes this region important strategically for Russia for this decade. So we have to start now, and it is already going on. The first big Russian LNG plant in Sakhalin has already been in production for a number of years. The new lines of the factory in Vladivostok and Novoport in the Yamal peninsula—this is a gas liquefaction plant. All together we can deliver to the Asia-Pacific region for several decades.

Typically this would not be today, but that does not mean it should be postponed. Not today but we have to be prepared. We have to make geophysical surveys, drill exploration wells, develop conceptual solutions—what kind of structures and equipment should we use in the Arctic? And not the least, we have to develop specialists—tune our universities to graduate specialists who are capable to handle extremely harsh conditions, with right mentality and attitude, and to work on a professional basis.

They should learn Russian, know English fluently, communicate with international companies and be aware of all technologies available worldwide—in Canada, the USA, Norway, Brazil and Russia.

All priorities should be worked on! Not just one and then one and then the last one, but all at the same time.

Written reply

National interests, spring tide of prosperity of the nation (country)

Development of new territories, building infrastructure of the Russian Arctic, industrial development of new regions

Development of international relations in trading petroleum and oil and gas products

3.3 Government incentives

This is not done in the best possible way. The government should make clear and efficient rules for all participants of Arctic shelf development, based on the overall goal of most efficient way of developing national prosperity, international trustworthy relations and a long-term security of supply of petroleum resources. It should not give privilege to any company or entity, if it does not meet the overall goal requirements.

This means giving priority to those who are most qualified, but not who is the most important. This is very important.

The government should pave the road and put strict guidelines for the business to be actively involved in the Arctic shelf development process. The companies should have equal rights for participating in this business based on fair competitive basis.

A good example is the Norwegian continental shelf. In the very beginning of Norwegian history, Statoil and Norsk Hydro and then later Saga petroleum were given exclusive right because they could not compete with international companies—British and American, especially—because they did not have necessary competence, but they were included with fifty per cent shares to all the assets for ten or fifteen years.

Then, when these companies had matured enough, the government took away their priorities, and the companies had to compete on a fair basis with the other companies. That was the only way to develop strong national competence in the Norwegian companies.

I believe Russian companies have already matured. The history of Russian petroleum industry is a 100 to 150 years. This year is the 140th anniversary of the first drill in Russia. So the government should put a fair competition policy to those companies who would like to participate in developing Russian Arctic offshore; both majors and service companies.

Do you see any signs of improvement?

If there is any improvement, then it is very slow. But it is going the right way.

Why is it improving?

Because there are people who think this is the right way, in the government and industry—people who are making the policies of Russia.

Written reply

To my opinion, not in the best way.

The government should establish clear, stable, predictable and efficient rules and regulations for all participants of the Arctic shelf development, based on the overall goal of most efficient way of developing national prosperity, international trustworthy relations and a long-term security of supply of petroleum resources. It should not give privilege to any company or entity, if it does not meet the overall goal requirements.

The government should pave the road (put strict guidelines) for the business to be actively involved in the Arctic shelf development process. The companies should have equal rights for participating in this business based on fair competitive basis.

3.4 Corporate strategy

Company strategies are a hidden thing. However, today a strategy of big corporations is to acquire most of the resources on the Arctic shelf in order to get a long lasting business and get more assets.

The competition of two giants over most of the resources is not the best way to achieve the main goal, which is national prosperity based on the development of Arctic resources.

It is very important that the interests of the companies or ambitions of their leaders will be aligned with national interests, with policies paving the road for business.

Strategies are usually not well described in publications. But I can see the movements. The Arctic shelf is very fast approaching to its limits, already divided into two majors.

The strategies are hidden. However today the biggest corporations have a strategy of acquiring the biggest possible Arctic resources. Competition of two giants for resources is not optimal. It is more like ambitions of people in government, Projects carried out by ambitions of leaders of the companies and some political leaders. Instead they should invite in foreign companies for mutual development and knowledge transfer.

Written reply

I am not informed about these strategies. However, today's strategy of big corporations is to acquire most of the resources in the Arctic shelf in

order to have a long lasting business(?). Competition of two giants for most of resources is not, in my mind, the best way to achieve the main goal (see above). Here again, is very important that the interests of the companies (or ambitions of their leaders) will be aligned with the national interests and their policies following the paved road for the business.

3.5 Corporate innovation

It is a time of active build-up of the technological and engineering competence of the Russian corporations—both production and service companies.

The main trend here is collaboration with international companies and joint projects. Unfortunately, opportunities are unequal and the exchange is not going at full speed. It would be much more efficient with equal opportunities.

Increased collaboration with research centres in Russian and international universities, through international companies. This is a very efficient way to overcome technical challenges of oil and gas resources on the Russian Arctic shelf.

And a third way is support of education through long-term policies, and examples like double degree master-thesis programmes. They run for two years with partner universities, and students participate in this programmes over two years to get diplomas. We have had such a programme with the University of Stavanger on off-shore technology for four years already. And we have two-year graduates already working in international companies in Norway, the USA and in Russia—they are very capable people. Double-degree programmes are supported by all majors, both national and international, in Russia. This supports enables us to get the best qualified and best educated workforce.

In short: collaboration between international and national companies, between majors and service companies. Then, collaboration with shared interests between national and international universities, and with universities through international companies. Thirdly, support of education on a long-term basis, which enables to get best qualified and educated workforce in amounts needed by the industry.

Do corporations stimulate the supply chain? We have our own kind of culture of supply and logistics, but in order to develop it more efficiently, then the companies should take aim with their international partners. And that is what is going on right now. In Russia there is a trend where Russian companies are required by international best practices to share their experience in logistics and the concepts of development

projects, in conceptual thinking, in conceptual design, in logistics, and delivery, and so on. Through case studies and so on. This is also very efficient.

Is anything done to stimulate networks of local industry? Give the Russian companies equal chances to participate, which has been done for thirty years back, in Norway. Norway did not have any logistics and supply infrastructure for off-shore field development industry. Nothing was available there, and Americans suggested to do everything for Norway. The Norwegian government decided to do it in the most efficient way, to develop national competence and qualification. In four years there was a lot of small competence, supply companies and different types of services. It could be competence, delivery of goods, technology, processes, and so forth. In ten years, the Norwegian industry became one of the most progressive, and in twenty years, the strongest in the World. Now is the post-industrial era for Norwegian companies, so they are sharing experience—it is only forty years of experience, but they are sharing it with the rest of the World.

Written reply

It is a time of active build up of the technological and engineering competence of the Russian corporations both producing and service companies. The main trend - collaboration with international companies, joint projects. Unfortunately, opportunities are unequal (see Q&A No.1) and thus, exchange is not going at full speed.

Increased collaboration with Research centers of Russian and International universities (the latter - through international companies).

Support of education (a long-term policy). Double-degree master programs are supported by oil majors and service companies both national and international. This enables to get best qualified and educated work force and engineering staff for the development of the RAO.

4 Informant D

Date: 19.02.2014

Informant *D* was our fourth interview subject. The interview was held on 19 February 2014 at 12:00, lasting one hour. As before the five main interview topics were send a few

days before the interview, and the interview was held via a three-way phone conference. The informant opted to remain anonymous. The informant's answers were as follows.

4.1 Development challenges

The challenges on the Russian Arctic shelf are generally speaking the same as for other areas of the Arctic; long distance from market and far away from infrastructure, especially in Russia. Other than that ice, cold, and darkness makes it an area difficult to develop.

Russia lacks experience and technology in order to develop the Arctic themselves and must get help and expertise from abroad.

Regarding access to markets, the Arctic is especially far away from the Asian markets. In addition there is insecurity with regard to pricing of gas long term wise. Offshore gas and fields that are difficult to access are commercially challenging. In essence distance means higher cost. Even the Shtokman field proved to be challenging profit wise. The partners tried initially to obtain a tax rebate, something that was at first rejected, but later on approved to some extent.

Other challenges are of course the environmental side of conducting oil and gas production in icy conditions. Oil spill mitigation and rescue are also on the agenda of conferences and gatherings in Russia. All this must be solved.

4.2 Government interests

It is clear that the Russian authorities want to develop the Russian Arctic. In general oil and gas production in Russia has reached a plateau, and in some cases produce less than earlier. This despite some new fields and some IOR projects. So in essence Russia has to develop new fields in order to maintain production levels, and this is where the Arctic comes in, as being one of the new acreage to develop. That said all agree that this will not be easy. Hence the interest in developing East-Sibira first, or even shale-oil and other unconventional resources before the Arctic.

Russian authorities released recently an energy-strategy document, "Energy strategy 2035," where it is predicted that Arctic should represent some 5 per cent of Russian oil and gas production. Gas is of course difficult to develop in a financially viable way and new resources will essentially come from land, like Yamal where Bogdanov and other big fields are being developed. Hence for the Arctic one is hence looking for oil resources.

Regarding geostrategic interests of the Arctic, Russia is concerned and wanting to appear as a central Arctic player. The interest is in the Arctic in general terms, and not as an area of competition. For instance the border agreement with Norway was finally approved in order to appear as sensible and reasonable co-operation partner, not just because of oil and gas development or economy related reasons.

4.3 Government incentives

Russian authorities tries to stimulate and put the framework in place for future development of the Arctic. For instance one of the key factors is the last years tax reform giving substantial tax rebates for Arctic offshore development.

The tax reform was part of big package also giving rebates and reductions to unconventional resources and even some brown-fields as well. Five categories were set up, giving rebates depending on how difficult to develop and accessibility. In Russia in general, we are talking about gross taxation. For instance a middle-sized field in the Kara sea could be subject to as little as 15 per cent tax on profit according to one source in the financial sector.

Another sign of the stimulation of the Arctic development was that the authorities were quick in granting licenses to Rosneft and Gazprom. However though with no competition, where only Russian owned and government controlled companies got acreage. Another requirement was five years offshore experience. That said there was a possible opening this year and a suggestion for a new law opening up access where other companies could be operators.

However Arctic offshore is something that Rosneft and Gazprom can not develop alone or on their own. They lack experience and must co-operate with others.

A third sign of the contribution is the logistical support. One example is Yamal LNG where the authorities have developed infrastructure, like harbours, similar in Murmansk with a harbour.

A fourth sign is improving search and rescue infrastructure.

Regarding general research and development there are good universities with petroleum related sciences, but the informant has limited knowledge.

As regards the supply chain there is a wish for Russian industry to develop. They have ship-yards that can supply ships, but no experience with platforms or modules. One example though is the Prirazlomnoye platform built at a yard in the White Sea. There

are requirements for local content and this was recently increased and strengthened to 90 per cent. However, 90 per cent of what? In Sakhalin it was claimed 70 (?) per cent local content of worked hours, but not a figure for the value added would of course have lowered the percentage, as much of the expensive kit came from abroad. This somewhat typical with Russia where they decide centrally how things should be and forcing the hand of the industry instead of letting the market forces compete.

Finally the ship-industry can compete in and win in on projects, in Shtokman this was part of the local content plan with supply ships being built in Russia. That said it will take a long time before this can be extended to the offshore industry.

4.4 Corporate strategy

There are essentially two companies with interests on the Arctic shelf, Gazprom and Rosneft. A third one Zarubazhneft has also some acreage but is a negligible player without much experience at all. Surely Lukoil also has interests, but being privately controlled so far has not obtained any fields. There are forces within the authorities working for opening up the licensing for private companies.

Between Gazprom and Rosneft, it is the latter that has the most active and forward leaning strategy of becoming a serious international oil and gas operator, also in the Arctic arena. This is demonstrated through the co-operation agreements between Rosneft and ENI, Exxon and Statoil.

Gazprom is more leaning towards own resources and has a less ambitious strategy towards the Arctic offshore. Currently only one field, Dulgoskoye will be developed, with a time-line towards 2020.

Rosneft is mapping the fields together with Exxon and is preparing to drill a well in the Kara sea this year.

That said, things take time and it will not be many fields developed before 2025.

Of the two players, Rosneft is considered as having good political contacts, where Sechin, the Rosneft CEO being almost more important than the Russian Energy Minister. The recent tax-reform is also said to have come out from suggestions and lobbying from Rosneft for instance.

Continuing with Rosneft, this is a company that has grown very fast very quickly, first through acquisitions of companies like Yukos and lately by acquiring TNK-BP. Time is thus ripe for consolidation of the structures. Rosneft has lost quite a lot of people

from TNK-BP after the acquisition. Rosnefts goal is to become a major player in the international scene and thus is open about sourcing in competence and experience from other areas and partners. Also they would need others experience and knowledge in order to develop. Among other things they see a need for foreign experience in project management.

Gazprom on the contrary is more on the defensive side, and is considered as a quite inefficient company. Some of the motivation was lost and the ambitions were lowered after the Shtokman project postponement. Also Rosneft is moving into Gazprom territory for gas-resource development.

4.5 Corporate innovation

Another point regarding Rosneft is that they are open about the need for foreign experience and technology, but wants to develop competence and knowledge about the whole value and supply-chain. It is a vertically integrated company. For instance Rosneft wants to own yards, something that is typical for big Russian companies, where most of the value and supply-chain should be developed in-house. The ultimate goal is as much as possible in-house. Similarly Gazprom is doing all things themselves. Behind this goal there is a wish of controlling as much as possible

Regarding co-operation with Universities both Gazprom and Rosneft sponsors studies at Universities and research institutes, for instance Gubkin university in Moscow. That said Gazprom has their own research centers operating as institutes.

As regards the overall question if Russia is ready for Arctic offshore development we would likely see activities the next 10-15 years, but it will be at slow speed. That said it might go somewhat too fast if taking into account the risk factors and the safety factors at play by operating in the Arctic. However, the international partners like ENI, Statoil and Exxon will of course make the developments safer. Prirazlomnye is a risk element. So the overall answer is yes, but over time. Of course if there is found reasonable oil-fields that can be developed by Russian operators with international partners.

5 Informant E

Date: 03.03.2014

Informant *E* was the fifth and last interview subject. As with the other informants,

the interview topics were sent up front. The informant did not opt for anonymity, but was sent the transcript for approval. The interview started at 10:00 and lasted 45 minutes.

5.1 Development challenges

Regarding main challenges one has to distinguish between oil and gas sectors. Concerning gas, Arctic gas is no longer interesting because of the prices in the international markets. Big projects are off the agenda, except perhaps the projects around Yamal that are interesting long term wise.

With regard to oil, it is a completely different matter. Russia has in effect declared that Arctic oil is important. However they do not have the capacity themselves to build and hence have accepted that they need to co-operate in order to develop the prospects. That said there has to be a process with exploration that has to yield results. Geological surveys indicate potential successful fields. Furthermore the investments will be quite heavy for the development phase, and who then has the capacity to do that?

Right now it is only Rosneft that has enough strength to develop offshore and stand behind a major field development. This is because Rosneft in fact has the monopoly on oil. Quite typical for Russian system with sector monopolies. The system thus maintains its conserving factor. This means that Rosneft's capacity can in a way hinder future development even though the same company has entered into agreements with ExxonMobil, ENI and Statoil for future development offshore. The exploration phase is covered by the partnering companies, but in the end the development phase is shared on a pro-rata of the ownerships. It could thus mean that maybe offshore development is not the most economically interesting for Rosneft, based on strict economical evaluations and when comparing with other development alternatives.

The technical challenges in the areas are defined by the presence of ice, bad weather conditions complicating design. In addition distance from infrastructure and land facilities. These rough conditions make it more challenging but could be overcome. However the price tag would increase and make the projects more expensive.

The next project up, Kara sea development is going to be developed by Rosneft - ExxonMobil partnership, that has chartered a drilling rig of Norwegian origin, thus exemplifying that international oil industry is involved.

5.2 Government interests

The Russian authorities look at the Arctic as an important part of the country's resource-base. It is told that the area has potential for big discoveries and fields. In context, on land one is finding smaller and smaller fields that are more and more complex to develop. This with an industry that is characterised by a few and big companies, and not many smaller companies to develop the smaller resources. A more differentiated structure is necessary.

Going offshore, on the other hand, one sees the opportunity to continue with what has been the preferred structure, namely large units for large production areas and large fields. This is something that makes offshore very attractive. Still it remains to be seen if offshore will become too expensive.

From a political level it is considered that activity in the North is a demonstration of geopolitical interests and rights, and the authorities thus have a regional development perspective on project. That said it all comes back to the economy in the end. There is also hope that offshore activities will have positive effects on Russian shipping industry.

5.3 Government incentives

The Russian government contributes in creating tax-concessions for offshore development in the North, helping the projects to become more profitable. The tax rebates are also stipulated over a longer period. Such tax-concessions pose some risk, as the state depends on the income.

The last 3 years the authorities have also signalled a change in policy albeit not in the legal texts, that they are open to give international companies some influence on the Arctic shelf. This is a change from earlier, and from earlier policies that aimed to minimise foreign involvement. The new agreements signals that the authorities see the importance of international companies, reflected by Rosneft's cooperation with international partners. These are not formal political agreements, but they fall within current post 2008 legislation, moreover the political mood has been more aligned towards international cooperation the last two or three years. It is possible that Rosneft convinced Putin, given the political clout that the management of Rosneft has with the political authorities in Russia.

Is anything done to stimulate oil and gas supply chains?

Regarding the supply network it is difficult to answer, however in general terms Rus-

sian content is high on the agenda. Right now there is a law in debate for setting demands for local content and how this should be defined. This has existed before, but it has been unclear how to interpret the meaning, for example what is meant by local content. So yes there are clear expectations for this, but there are insecurities with regards to implementation.

On another side there have been tentatives put in place to consolidate Russian yards and modernise this sector, however with limited results. Yards are still limited to building supporting structure and have to rely on other suppliers for the top-deck, for instance yards in South Korea. Most of the value creation thus goes abroad.

Hydro and Statoil ran a project in Murmansk and Arkhangelsk for pre-qualifying companies for offshore activities, which has been successful. However, a market for these qualifications has not manifested itself.

With regard to R&D there are many institutions working on the Arctic and offshore, mostly centered around St. Petersburg. There is even an institute owned by Gazprom. There are also several Western companies in St. Petersburg involved in R&D. That said there is little cross fertilisation and build up of own technology and products for implementation and industrial use. This could be caused by general challenges in the Russian economy like top-heavy organisational structures, limited ownership rights etc.

5.4 Corporate strategy

In practical terms this concerns Rosneft only, since Gazprom is side-lined because of the gas-market development. There are also some smaller actors with old licenses from before the monopolisation in 2008, but they are quite weak and will probably be swallowed by Rosneft or closed down.

Rosneft is the biggest oil-company in the world in terms of production and has a dominant position in Russian oil production, after the acquisition of TNK BP. Regarding the offshore they are more or less a monopolist, through legislation given in 2008, and thus do not need to do that much, since Rosneft is controlling many parts and areas. Rosneft has acted rationally given their monopoly position and continued to gain control over resources.

That said there might be political pressure to develop the offshore fields at a quicker pace than what dictated by pure economical terms. Somewhat defensively Rosneft has entered agreements, beginning in The Black Sea and then later in the Arctic, which has

been lifted up in Rosneft's development strategy as an important area.

These agreements are a very special case, between Rosneft, ExxonMobil and Statoil, which is that they are based on creating a partnership company owned one third by foreign companies and two thirds by Rosneft.

Furthermore the exploration phase is paid up for by the foreign partners taking all the risk and cost upfront. Thus these agreements free Rosneft from cost and place the risk burden on foreign partners.

The development phase could be especially expensive and push Rosneft not to prioritise such field development and such cost, since the alternatives could be more lucrative. In this setting even unconventional fields might prove more profitable. The prioritisation process will thus be influenced by the oil prices at the moment of decision and overall project profitability, as well as what other alternatives exist.

Finally the political aspect could play in and the prestige of being a fully fledged offshore operator and a global actor could also well lead to some distortions of the priorities and ranking of future oil and gas investments and projects. Expansion for the sake of expansion has so far been one of the characteristics of Rosneft.

Do you know any internal structural or cultural traits of Russian oil companies?

Regarding the company culture there is a heavy tendency to centralisation where many decisions are depending on the autonomous top. A single person with political attachment often dominates over the board. This is true not only in state owned companies but also in private companies, such as Lukoil. Corporate governance is not practiced in the same manner as in the West, even though it appears like that. Inside the companies one is penching towards standards and conservational attitudes.

5.5 Corporate innovation

Can not say that much about this.

The co-operation between Rosneft and ExxonMobil, ENI and Statoil is clearly a step towards exchange of information and training. Also ExxonMobil and Rosneft will finance a Arctic centre in St. Petersburg

One can say that Russian management prefers established technologies and thus are very preservative. New technology can be difficult to introduce and it can be difficult to get acceptance for. Innovation in a rigid system is difficult. There are a lot of technological research but it is not a dynamic process.

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