Economic development of the Russian Arctic space by upgrading transport and logistics sector

1. **IMPACT OF CHANGES IN NATIONAL AND GLOBAL GEOPOLITICAL AND GEO-ECONOMIC SITUATION, THE INSTITUTIONAL CONDITIONS AFFECTING THE SITUATION IN THE RUSSIAN ARCTIC**

Importance of the Arctic as a global resource base, as strategic territorial reserve of all mankind, as the reactor of global weather, and as a region having the great economic, cultural and civilizational value, gave rise to growing interest of the international community to Arctic, which has led to the fact that the Arctic states have developed and adopted at the state level policy documents, expressing their intentions in the development of the Arctic region.

Analysis of strategies of Arctic countries allows to make a conclusion that acceptable conditions for their peaceful interaction in the Arctic world have been developed, which are based on the following key documents:

− UN Convention on the Law of the Sea 1982;
− The Arctic Council (1996) - the only circumpolar and political authority on matters relating to the Arctic Coy;
− Ilulissat Declaration of 2008, in which countries agreed to cooperate on the basis of existing international law;
− Transregional integration Education: Council Barents / Euro-Arctic Region (BEAR 1993), Nordic Council of Ministers (NCM -1971), the European Union ("Northern Dimension" -1995), and others;
− Treaty between the Russian Federation and the Kingdom of Norway on maritime delimitation and cooperation in the Barents Sea and the Arctic Ocean (2010-2011);
− Non-governmental organizations: the World Wildlife Fund, the International Arctic Science Committee, the Advisory Committee for the seas, International Work Group for Indigenous Affairs, University of the Arctic, and many others;
− Social structures of indigenous peoples of the North: the Inuit Circumpolar Conference, Aleut International Association, the Saami Council, Association of Indigenous Peoples of the North, Siberia and the Russian Far East, etc.

All this allows us to consider the Arctic in the future as a base for international cooperation, for which we have created the basic institutional conditions. The need for the widest possible international cooperation in the various fields of Arctic exploration is largely due to the complexity of natural settings, scale mineral and biological resources, fragile Arctic environment.

Analysis of the situation in the Russian Arctic from the standpoint of its security legal and regulatory system to regulate economic activity and population living on Arctic territories, revealed the following:

1. Actually all laws and regulations in force in the territory of Russia, are hardly adapted or not adapted to the Arctic at all, including federal laws, specific for the North;

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3 Reid A. Chilingarova and planting of the Russian flag on the seabed at the North Pole, to some extent "provoked" simultaneous adoption of strategic documents by all Arctic states.
4 Arctic countries: Denmark, Iceland, Canada, Norway, Russia, the USA, Finland and Sweden.
5 "Convention" was ratified by all the Arctic countries except the United States (in real US actions do not violate this convention).
2. Hitherto fundamental laws are not accepted: "On the Arctic zone of the Russian Federation" and "On special modes of nature and environmental protection in the Arctic zone of the Russian Federation";

3. Russian Federation in terms of legislative support development of the Arctic zone is laggings behind the other Arctic countries;

4. In the last two - three years, the situation began to change in a positive way, and has been a shift from rhetoric and numerous declarations to action:
   - In 2008 were developed and approved "Principles of State Policy in the Arctic for the period up to 2020 and beyond" (Presidential Decree of 18 September 2008, № PR-1969). This document was the recognition that the Arctic zone of the Russian Federation (Russian Arctic) is the subject of a specific public policy because of its nature and specifics that distinguish it from other regions of the country;
   - July 28, 2012, the Federal Law № 132-FZ "On Amendments to Certain Legislative Acts of the Russian Federation regarding state regulation of commercial navigation in the waters of the Northern Sea Route," which defines the status and NSR, conditions for navigation along the route, determination of charges (payment), etc;
   - July 30, 2012 adopted a law "On the creation of the federal treasury institution" Administration of the Northern Sea Route".
   - In the near future several important documents should be introduced: they are – long-suffering the law6 "On the Russian Arctic zone", and the law "On special modes of nature use and environmental protection in the Arctic zone of the Russian Federation"; These laws should define the status and boundaries of the Arctic zone, especially budget, investment and social policy in the Arctic, the principles of relations between the state and subsoil users, the relationship of the state with the indigenous peoples small in number, measures to ensure the protection of the environment and security of this territory, and others;
   - It is necessary to adopt the "Strategy for the Development of the Russian Arctic and national security up to 2020" and the subprogram "Economic and Social Development of the Russian Arctic 2012-2020". These documents are mostly complete formation of the basic contours of the Russian Arctic policy and internal institutional environment in the Russian Arctic.

But to ensure sustainable development of the Russian Arctic as a region, geopolitically and economically extremely important for Russia must be comprehensive, large-scale policy in formation of new institutes and mechanisms of their interaction on the whole of the Russian Arctic are required adapted to the realities of the Arctic and geo-economic challenges. In particular, the role of the state and business in the development of the Arctic is not fully defined. The problem is compounded by the fact that the costs and risks of infrastructure and technologically Arctic projects are very high, and they can be successfully implemented only on the basis of the formation and development of the institute partnership of business, government and society.

2. INFLUENCE OF ECONOMIC FACTORS AND CLIMATE CHANGE ON THE DEVELOPMENT OF TRANSPORT SYSTEMS IN THE ARCTIC

Maintaining the stability of the Russian economy and ensure the competitiveness of the Russian Arctic raw materials in global commodity markets can be achieved primarily by reducing transport costs in prices of export products. Consequently, one of the most important areas of development in the Arctic is a rational, economically sound formation of transport and logistics infrastructure, including the development of transport networks having high throughput and handling freight forwarding processes.

Currently, the transport system of the Russian Arctic is characterized by extremely uneven development and low-level transport development. Most of the Russian Arctic, particularly its eastern regions do not have full ties with Russian transport highways, as well as intra-communications.

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6 This law was submitted to the State Duma as early as 1999.
The basic element of the Arctic transport system is the Northern Sea Route (NSR). NSR is a natural transport structure that has the latitudinal strike along the coast and north-south strike formed by the largest European (Pechora, Northern Dvina) and Siberian (Ob, Yenisey, Lena, Kolyma, Indigirka etc.) rivers. Throughout the NSR seaports and airports were constructed, from Murmansk in the West and ending by Pevek province in the East. Meridional direction of the Siberian rivers, moreover, provided a link between NSR and Trans-Siberian Railway (Transsib), that is connection of NSR with the rest of the country.

NSR almost fit the canons of modern ideas about the transport and logistics systems. In fact, all development of the North and the Arctic within the USSR was based on the transport system NSR, including servicing of companies, construction Arctic and northern towns and villages, to ensure viability of the population of the territories at the expense of "northern delivery", etc. The only drawback of this system was the limited availability of seasonal rivers and sea routes in the winter.

During the transformation of the Russian economy to market principles NSR infrastructure, especially in terms of maintaining the Arctic sea ports, airports, meteorological stations was practically destroyed. "Northern delivery" reduced, exploration works, hydro- and scientific meteorological research decreased as well as shipping by the NSR, etc.

The discovery of new oil and gas onshore and offshore Arctic fields along with the forecast of global warming and the possibility of year-round navigation, substantially increased interest in natural resources of the Russian Arctic and the use of NSR. Now NSR can be seen as a real transport route to accelerate and reduce goods delivery period on a national and global scale. This means that the resources of the Russian Arctic, particularly difficult to develop for reasons of profitability, can be all actively involved in the global economic cycle and play an increasingly important role at the national and global markets.

In 2009, actually the revival of the NSR started. It is associated primarily with the beginning of the implementation of oil and gas projects by major oil and gas companies. Estimated the Ministry of Transport, the turnover in the Arctic by 2016 can reach 30 million tons (including 15 million tons due to foreign carriers), and by 2020 even 50 million tons. Restoration of the NSR will require the development of shipbuilding (nuclear and other types of ships), communications infrastructure development (GLONASS and International Space Station/ISS), rehabilitation or construction of new ports and airports, development of rescue and border services, i.e. it will lead to the development and modernization of various economic activities and the formation of demand for innovation and innovative products within the whole countries.

Consequently, the transport potential of the Russian Arctic, including the Northern Sea Route, may, at its effective use and development, ensure enhancement of the role and status of the Russian Arctic, both at the national level and in the international arena and become one of the tools of system modernization of the country economy. This is particularly important in the context of increasing globalization and the need for integration of Russia into new geo-economic model of global development as a full-fledged global player.

3. **FORMATION OF THE MODEL TRANSPORT AND LOGISTICS SECTOR ON THE BASIS OF THE MURMANSK TRANSPORT HUB**

The weakest point of the NSR is a port infrastructure, which includes more than 20 ports, airports, cities, towns and other settlements. These are essentially transportation connection points, i.e. the necessary part of

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7 "Under the water area of the Northern Sea Route is understood expanse of water adjacent to the northern coast of the Russian Federation, covering the internal waters, territorial sea, contiguous zone and the exclusive economic zone of the Russian Federation, and bounded on the east line of maritime delimitation with the US and parallel Cape Dezhnev in the Bering Strait, in the west to the meridian of Cape Desire Novaya Zemlya archipelago, eastern coastline of Novaya Zemlya and western boundaries Matochkin Strait, Kara Gate, Ugra Bow" (article 5.1 - Federal Law № 132-FZ).

8 Transport logistic system - a combination of transport infrastructure, transport companies, transport vehicle and control.

9 Northern Sea Route - is free access to the Atlantic Ocean in the west and the Pacific Ocean in the East, this reduction length delivery of goods from Asia to Europe by 25%. NSR is a national marine highway free from the pressure of other countries.

10 One of the key players is the company "Novatek" realizing the Yamal peninsula project to build a plant for LNG and the new Arctic port multifunction Sabetta. With the release of the planned power plant the company intends it to carry on the North path 15 million tons of LNG and up to 1 million tons of condensate. Intend to increase the transit through the NSR Company "Eurochem" up to 3 million tons, and "Lukoil", "Gazprom", fishing enterprises from the Far East, "Northern territories", etc.

the transport system. Solution of the integrated development of transport nodes in the NSR will increase foreign trade cargo transportation, improve the competitiveness of the Russian transport system and attract additional financial resources in the coastal regions of the Arctic, much of which is subsidized. When selecting priority projects for the development of NSR port infrastructure, the most acceptable are the principles of spatial development of transport and logistics sector of maritime transport. This definition is most suitable Murmansk seaport.

Transport importance of the Murmansk region due to the region location at the crossroads of transportation routes with year-round navigation and access to the Northern Sea Route, i.e. NAR (North Atlantic region) and Asia-Pacific region. In the Murmansk region the following kinds of transport are well developed: automobile, rail, aviation and marine.

The port of Murmansk was traditionally considered as the beginning of the NSR\textsuperscript{12}, though in the law on the NSR it is not included. However, because it is the largest transportation hub in the Russian Arctic, the formation of the model of Murmansk transport and logistics complex (MTLC) is quite a relevant task.

Within the framework of the Federal Target Program "Modernization of transport system of Russia (2010-2015)" the project "Integrated Development of the Murmansk Transport Hub" has been developed and OSHC "Management Company "Murmansk Transport Hub" (MC MTH) has been founded. The Shareholders are: OSHC "Murmansk Commercial Seaport" (40%), OSHC "NK "Rosneft"(15%), OSHC "Russian Railways" (25%), the Government of the Murmansk region (5%), FSUE "Rosmorport" (15%). Nowadays total oil exports through the terminals of the Kola Bay is about 12 million tons per year\textsuperscript{13}.

Transport and logistics complex (TLC) in the Murmansk region is based on the principles neologistics\textsuperscript{14}. TLC subsystems are terminal facilities, as well as elements of the logistic transport network. In 2009, a consortium in Murmansk "Murmanshelf Logistics"\textsuperscript{15}, one of whose functions is to create independent regional system capable of collecting and analyzing information, to create conditions to attract investments for the development of transport and logistics sector.

Among the most promising types of cargo in the development program of MTH, primarily are coal, iron ore and apatite concentrate, copper and nickel production, handling Arctic oil and liquefied natural gas, which are projected for supplies to Europe and the United States.

October 12, 2010 the Government of the Russian Federation signed a decree on the establishment in Murmansk of the port special economic zone (PSEZ). Obtaining the status of Special Economic Zone was directed primarily to accelerate MTH project development and attract investors. In 2011, the engineering design of railway st. Vyhodnoy MTH - st. Lavna, the most important railroad for MTH began. Work started also within the zone of PSEZ: the concept of creation and development of the port area was developed and approved by the Supervisory Board, a draft plan for the territory of the new cargo area "Lavna" was developed with total

\textsuperscript{12} In the law of NSR beginning of the route of this road is New Land archipelago.

\textsuperscript{13} http://www.rusnorge.com

\textsuperscript{14} Neologistika - logistics second generation, which is characterized by the predominance of an integrated approach to the development of systems based on the goal of achieving maximum efficiency. An integrated approach has been a new development in the form of the concept of "shared responsibility." The criterion for the concept of "shared responsibility" is the maximum ratio of output and costs. In this approach, logistics systems have gone beyond the economic sphere and steel into account the social, environmental and political aspects.

\textsuperscript{15} The structure includes: OSHC "Murmansk Shipping Company", "Barents Logistics", "Wilson Murmansk", "International customs terminal", "RambolSturvik."
planned volume of transshipment (at full capacity) for more than 50 million tons. Status PSEZ stimulates attracting new investors, and should help the development of related activities: shipbuilding and ship repair, processing of aquatic biological resources.

Development of transport complex in conjunction with the terminal complex, the availability of informational center indicates that Murmansk region has the necessary prerequisites for the creation of a modern transport and logistics complex (MTLC), whose structure is shown in Figure 1.

The main constraint for the development of MTLC is low railway infrastructure capacity. In addition, at present there is no common approach to the development of the port, which in fact, is divided into two parts: a new - within the boundaries of PSEZ, mostly on the western shore of the Kola Bay and the old, which will include existing capacity on the eastern shore.

In developing the model of the TLC, the main factors influencing the development of TLC have been analyzed, and significance of each factor have been determined based on expert conclusions.

With the help of the software Powersim a conceptual model of the Murmansk transport and logistics complex (MTLC) has been created (Figure 2).

![Figure 2. Conceptual model of the Murmansk transport and logistics complex](image)

_Basis of the model consists of four "flow", three "levels", five "auxiliary variables", three streams "Managed by bound variable tempo" and six "Constant". The "flows" mean traffic flows of four modes of transport: air, road, sea, rail. Three streams are "Levels" accumulating changes, i.e. information about the difference in the intensity of flows. If the input and output is the same, then the accumulation of changes is zero.

"Highway" flow does not have "Level", due to the fact that the road serves not only for delivery of goods to the region, but also for redistributed to other carriers. Therefore, in the flow "Motorways" an auxiliary variable is used to calculate the other flows. The same auxiliary variables are contained in the flow..._
of "MCS" and "railway junction". They are involved in the calculation of the elements providing transshipment by all modes of transport and affect the "level" of these flows.

Auxiliary variables are the elements: "Business", "Terminal Complex", "Forwarding Company", "Information and logistics center", "MC MTH". These elements do not create a flow, but affect it by their activity (for example, "Business" stimulate investment activities in MTH, "Information and logistics center" accumulates the information which will be required in the future for a decision on upgrading transport hub).

Constants in this system are: bandwidth (railway junction, MMTH), as well as icebreakers, having power restrictions and supply of goods, and Administration "Murmanshelf Logistics". The last two elements can be taken as not changing as the conditions generated by these elements will operate more than one year, creating a normative data base for future activities OF Murmansk transport hub. All these factors are additive, independent and have the same weight. Therefore, we can combine these factors with the factors of flow by a simple equation relatedness or proportionality. To do this, between elements of the system conducted informational links are created to relate the auxiliary variables in regard of the values of other variables, with that, the rate of constant will be the starting point or the initial level for the calculation.

To make this model dynamic and predicting the development of MTLC, identifying ways and the level of modernization, quantitative and the degree of influence of the system elements upon each other shall be set up. The notations accepted in dynamic modeling have been used for the creation of the present simulation model (Table 1).

Table 1. Symbols and elements used in the model MTLC

<table>
<thead>
<tr>
<th>Level</th>
<th>Flow with rate</th>
<th>Auxiliary</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>type of the variable that stores changes. It's value changes due to flow</td>
<td>type of the variable affecting the levels, which is usually a reference value</td>
<td>type of the variable that contains the calculations based on the other variable</td>
<td>provides information to auxiliary variables regarding values of other variables</td>
</tr>
<tr>
<td>Constant</td>
<td>Initialization Link</td>
<td>type of the variable that contains a fixed value</td>
<td>gives basic information to align variables relative values of other variables</td>
</tr>
<tr>
<td>Flow</td>
<td>Cloud</td>
<td>type of the variable affecting the levels and changing their values</td>
<td>uncertain source. Means that we - in one of the outer limits of the model.</td>
</tr>
</tbody>
</table>

Source: The Author’s material.

Abstract

The article characterizes the growing interest of the Arctic states and the world community to the development of the vast natural resources in the harsh environment of the Arctic, including the development of programs and the strategy, the importance of international cooperation, harmonization of legal framework of economic activities in the macro-region. The essential modernization and development of transport and logistics complex in the effective development of the Arctic zone is substantiated. A conceptual model for creating the modern transport and logistics complex applicable to Murmansk transport hub, the largest in the Russian Arctic, has been developed.

Keywords: Arctic zone, natural resources, transport hub, modeling, the transport and logistics complex.

Rozwój ekonomiczny rosyjskiego obszaru arktycznego poprzez rozwój sektora transportowego i logistycznego

Streszczenie

Artykuł omawia rosnące zainteresowanie państw arktycznych i światowej społeczności ogromnymi zasobami przyrodniczymi znajdującymi się w surowym środowisku Arktyki. Omówiono koncepcje programów i strategii, przedstawiono znaczenie współpracy międzynarodowej, harmonizację ram prawnych działalności gospodarczej w makroregionie. Scharakteryzowano zakres niezbędnej modernizacji i rozwój transportu i logistyki potrzebnego do skutecznego rozwoju strefy arktycznej. Opracowano koncepcyjny model utworzenia nowoczesnego układu logistycznego i transportowego powiązanego z Murmańskim węzłem komunikacyjnym, który jest największy w rosyjskiej Arktyce.

Słowa kluczowe: strefa arktyczna, zasoby naturalne, węzeł transportowy, modelowanie układów transportowych i logistycznych.