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Outlook for the economic development of Northern regions of Asian Russia

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Abstract

Northern territories in Asian Part of Russia hold significant mineral resource abundance. This region can also be viewed as an outstanding geopolitical and military potential of Russia. On the other hand, economic development here is embarrassed with severe climatic conditions, low population density and unavailability of infrastructure. Targeting to proportion costs and benefits of the rising economic activity on the territory we analyze its prospects and challenges. For the central point would be taken intricacies with transport component when running projects of the local deposits deployment. As non-ferrous metals and oil&gas industry are the most likely to form the essential branches of Northern industry, they will originate substantial material flow in the area. This leads us to the point local transportation lines should be improved by far. Sea carriage is almost exclusive mode of transportation available for the purposes of Arctic littoral regions and furthermore the most expensive. Therefore reinforcement of Northern Sea Route (NSR) plays the vital role in developing of in question regions' economy. Interbranch multi-regional model allows to link growth of non-ferrous metals complex and progress of sea transport corridor (NSR). Suppose the whole country is oriented for the maximization of public welfare and economic growth rate. In these terms our investigation led to a key-note conclusion: long-term goals of the whole country are attained superior when running active economical policy in the North. The crux is large non-ferrous metals sector companies are ready to enter the area if the government provides substantial financial support for infrastructure improvements. Simultaneously, in our case economic development should not implicate people to settle the territory. Rotation system is implied. All potential resource abundant zones are to be attached to the congruent NSR harbors, thereby regional centers. The system of aqua-territorial industrial complexes is suggested as an efficient form of economic life in Northern regions of Asian Russia.

Key words

Arctic zone, natural resources potential, geopolitical potential, transport accessibility, Northern Sea route (NSR), aqua-territorial production (industrial) complexes.

Northern territories in Asian Part of Russia are slightly involved in the country's economic life. An outstanding mineral, geopolitical and strategic defensive potential of the Russian North appear to be an insurance reserve for the country's sustainable development. At the same time extremely severe life conditions, lack of production and transport infrastructure complexify and rise in price every project of resource deployment on the littoral territory and offshore territory of the Arctic ocean way up.

In spite of the fact geologic knowledge about the territory is on a high level (information about North mineral resources was gathered in 1960-s and estimations of deposits reserves were made at the time) a variety of exploration projects did not start, they were commercially ineffective. Moreover, other resource abandoned regions entirely satisfied the demand and thus made it possible to leave Arctic resources backup. Today it became obvious that "cheap" resources are scarce and would not last long: needs of domestic as well as world economy increase constantly and drastically. Along with the reasons of resource endowment of national economy and strengthening country's position on mineral resource markets strategic concerns of Arctic regions of Russia development are becoming more and more acute.

Data about field reserves in the oil and gas sector and non-ferrous metals sector deposits lead us to a conclusion their exploitation could generate substantial material flow in the region [1]. In this case a demand for transport infrastructure could not be satisfied by its currently available capacities. Development of the territory based on resource exploitation will inquire local transportation lines significant improvement. However, sea carriage being almost exclusive mode of transportation available for the purposes of Arctic littoral regions is furthermore the list expensive (eg. comparatively with air carriers). Therefore reinforcement of Northern Sea Route (NSR) plays the vital role in developing of in question regions' economy. This paper's aim is estimation of transport factor for regions with emerging economic activities: it is investigated if transport bounds rapid development of local raw materials sector.

Historical experience of economic expansion to North and Siberia shows that initiative is to belong to the state. One should not expect these processes to bring immediate economic benefits. Being the region of emerging economy the Arctic zone of Asian Russia needs specific measures of government backing, particular regional policy stimulating private investments foremost to raw material sector and supportive branches. In this paper we consider different variants of national policy in the Arctic, different levels of government

assistance in essential transport corridor (NSR) development and further economic life evolution underlying.

Unique economic conditions in North regions impose “patchy” reclaiming. For an effective form of economic life arrangement in the North stands a system of aqua-territorial production (industrial) complexes (ATPC). This form of local industry arrangement allows taking an advantage of littoral spacing and incorporates peculiarities of Northern economy such as immaturity of overland transport and underpopulation.

«Transport – resource» specificity of development

A broad variety of natural resources is embedded in the Earth interior on the Arctic part of Asian Russia [1]. Yet for the goals of our inquiry we would emphasize the most important strategic resources. Their exploitation in the foreseeable future is the most likely to form the original basis of Arctic region economy. Analysis of global raw materials markets trends and global consumption trends led us to the conclusion enlargement of mineral raw material base by means of development of deposits of Russian Arctic is reasonable under the assumption other regions can not provide comparable enlargement [1,2,3]. To support this we discourse from the following point of view: “what if no projects of exploitation of new mineral deposits are implemented?” Here appear to be two different results: either a huge import dependence redouble (a threat for reliable raw materials maintenance of economy) or possible intricacies with export contracts fulfillment (our country has the lead position in some resources production along with the lead in the level of their export).

In Russia second level of processing of metallic minerals is conducted in several metallurgical centers while extraction and primary processing are scattered on the country’s space. Thus we take as a rule a large haul distance between deposits and metallurgical plants. Furthermore very often the product is exported after the primary processing. To make long story short shipping through the long distances of Arctic non-ferrous metals sector product would be a standard practice. This output allows leaving aside huge investments in human capital connected with establishing labor intensive northern metallurgical plants as well as investments in unique capital equipment fitted for northern operating conditions. That is why development of novel deposits in the Arctic zone to a greater degree is predetermined and in return determines transport system radical improvement. Obviously, same is regarding oil and gas sector of North.

The Table 1 gives a list of the most promising deposits of resources on the in question area. It also shows shipping approaches to them through which on the first stage of new

economic development construction materials and industrial machinery carriage and then freight of manufactured product is recommended.

Tabl. 1. Transport accessibility of deposits of Arctic zone of Asian Russia

Minerals	Mineral deposits	Shipping approach	Accessibility
Manganese	Ogangsko-Talotinskaya zone, Nunderminskoe	r/w Kotlas-Vorkuta	Feeble
Chrome	Rai-iz	r/w Chum-Labytnagi	Satisfactory
Niobium	Tomtor	New transportation modes, NSR (port Khatanga, Tiksy)	Feeble
	Taikeusskoe	r/w Chum-Labytnagi	Satisfactory
Wolfram	Churpunnya, Odinkoe	Air carriers, NSR (port Tiksy), R. Yana	Feeble
	Krutoy Shtokverk, Svetloe	NSR (port Pevek)	Feeble
Tin (Stannum)	Deputatskoe	Air carriers	Feeble
	Valkumeiskoe, Iultinskoe	NSR (port Pevek)	Feeble
Gas	Bovanenkovskoe, Harasaveiskoe	r/w Harp - Bovanenkovo, pipe line Uhta - Bovanenkovo, NSR (port Harasavei)	Satisfactory
	Shelves of East Arctic seas, Lomonosov Ridge	NSR (port Tiksy, Pevek)	Feeble
Oil	Vankor	Pipe line Vankor - Purpe, NSR (port Dudinka, R. Bolshaya Heta)	Satisfactory
Copper, Nickel	Norilsk group - Talnah, Oktyabrskoe etc.	Branch r/w line to Dudinka, NSR (port Dudinka), R. Enisey	Satisfactory
Gold	Maiskoe, Kupol, Reveemskoe, Kular	NSR (port Pevek), winter snow road	Feeble

Worked out in association with L.A. Bondarenko, Institute of Economics and Industrial Engineering, Siberian Branch of the Russia

Transport accessibility is characterized as «Satisfactory» if a deposit has an all-season reach ness by transport: necessary communications are already constructed or existent railways run nearby prospective allotment. When existent capacities of chosen transport approaches do not match with the needs of novel development, transportation costs are predicted on a heavy level (for instance, in case of air carriers to Deputatskoe or a necessity invention of new transportation modes for Tomtor exploitation), transport accessibility is characterized as «Feeble». In these cases namely transport limits potentialities of development.

Today gas and oil from the deposits of Arctic zone is transported by using pipe line system, yet «Lukoil» already began using ocean transport (from «Varandei» field), having

applied ice-class vessels. As it is with the NSR progress and, in particular with prospective of gas liquidation capacities foundation in northern regions, ocean transport may and ought to acquire greater value [4]. Stated in the table above sea ports will serve as an alternative or at list weighty addendum for the approach from the continent. One can see from the table that Polar Ural deposits locate nearby existent railroads or necessary transport communications they are projected. At the same time eastern deposits (Yakutia, Chukotka) could be attached only to the rivers, to the seas, to sea harbors. Therefore NSR improvement and modernization is a necessary condition of novel resources development and intensification of extraction on exploited deposits.

Northern Sea Route. NSR has been created in USSR in the middle 1930-s years of last century as a large transcontinental highway and provided transportation of cargoes for the Arctic zone of Russia arrangement and export of cargoes in Europe, Japan and China. Economic reforms of 1990-s have rejected far back both volumes of transportations on NSR, and a state of coastal infrastructure, especially in its east sector. Volumes of cargo transportation on NSR were reduced in 4 times (with 6 to 1, 5 million tones) that even with the increased rates is not conducive to return transportation. Within the International Northern Sea route Programme (INSROP) [5] revealed a definite advantage of using NSR to transport cargo from Europe to Asia compared with the sea routes through the Suez and Panama canals, as well as the potential effectiveness of NSR as compared to rail through Siberia and Central Asia. But these same studies have shown a number of bottlenecks in the functioning of the NSR as an international transport highway. Many of these bottlenecks could be eliminated in case of the approach to NSR as to a multipurpose transport infrastructure. In this case, and the majority of development projects of the northern fields would be oriented primarily on the NSR¹. In addition, the NSR ports could form a base for shelf oil fields development and gas, under condition of specific innovative introductions for maintenance of functioning of the equipment in the conditions of the northern seas.

Currently NSR as an important part of the Thule economic complex infrastructure and the link between the Far East and western areas of the country, uniting into a single transport network of major river arteries of Russia acquires decisive importance in the economic development of Northern regions of Asian Russia, not to speak about geopolitical value of this zone of Arctic ocean for Russia.

¹ Thus, for example, we consider construction of pipeline from Vancor deposit to Dickson and then using NSR is more reasonable than ESPO pipeline

Estimation of prospects of Arctic zone of Asian Russia resource development

Deposits of the Arctic zone could bring profit to companies, incomes to the state, but their development and management are hampered by high costs associated with an extremely low level of infrastructure arrangement of the territory. Unless the current government policy in respect of the territories do not change, the large and, especially, medium and small companies of raw sector may refuse even the idea of implementing projects to develop the northern fields. For situation change interest both federal, and regional authorities should take place. Our task consists in estimating the economic significance of development of resources of Northern regions of Asian Russia and to reveal conditions under which you may receive the commercial interest of private investors. However, we emphasize that the mechanisms, the institutional conditions of the "transformation" of public interest into commercial remain behind work frameworks.

Two blocks of calculations in accordance with the characteristics of the two industries which are most perspective for considered territory were conducted: the natural gas industry and mining of ores of nonferrous metals.

Development of gas fields. In the IEIE of SB RAS on the interbranch multi-regional model a group of authors [see 6] carried out calculations to justify the accelerated development of gas fields on the Yamal Peninsula. Measured reduction of the final product of the Russian economy as a result of delay in the development of resources of the peninsula. Changing the index of the gross output of the gas industry in the Yamal autonomous area provides an opportunity to evaluate two variants of development of the economy: *accelerated* version - with the assumption of achieving production levels in the fields of Yamal in 2030 of 300 billion cbm. of natural gas per year, and *slow* - only 150 billion cbm.

It is taken into account that there other deposits prepared for development: in Eastern Siberia and the Barents Sea shelf, in Yakutia and Sakhalin. The existing and being built infrastructure on the Yamal Peninsula as well as a unique level of reserves makes these projects incomparable. Therefore, it is only a choice between the maximum and partial use of fields on the Yamal peninsula. It is possible that additional cubic meters of gas is "cheaper" to get at other sites in Siberia. Despite the fact that the world economic crisis of 2008-2009 resulted in a significant reduction in consumption of Russian gas in Europe, suggest that by 2030 consumption will recover and accompanied with an increase of domestic energy consumption. In such conditions, according to our calculations, the delay in the development of fields on Yamal leads to a necessity to engage in active turnover of other gas fields of the

country. According to calculations, "closing", less effective appeared to be gas fields in Eastern Siberia (Evenkia).

Accelerated development of Yamal will give time for more careful elaboration of more complex projects of gas production in the regions of Eastern Siberia, in particular, and allow preparing transport and energy infrastructure. In general slowdown in the development of gas fields in Yamal results in substantial losses of final product (2.4 trillion Rubles annually to 2030) and a slowdown in the economy growth of Russia on 0.27 percentage points, making it difficult to achieve planned for the future economic and social guidelines. Thus, the intensification of working out of Bovanenkovo and other fields which are in the Arctic zone on peninsula Yamal and on a shelf of Kara sea should become a priority direction of development of gas branch. The state's role in the case of the gas industry, in our opinion, is the Yamal-support vector development, and create favorable conditions for the establishment by private investors production and transportation infrastructure (pipelines, rail and port Harasavei strengthening), to ensure an acceptable standard of living for workers occupied on objects. Thereby western sector of NSR should be developed only in connection with the intensification of development of the Yamal and the continuation of the Norilsk Nickel activities.

Development of mine deposits. Since the extraction of ores of nonferrous metals will take a significant place in the structure of the economy of the newly developed regions of the Russian Arctic, an estimation of projects to develop ore deposits of the Arctic zone of Asian Russia is required. For this purpose we used interbranch multi-regional model, that let us trace the chain of inter-industry changes associated with the implementation of these projects and assess their impact on the economic growth of the country as a whole. Embedding of projects into the model occurred as follows: from the aggregated variant «ores of nonferrous metals» have been allocated "«variants of Northern projects», that correspond with the development in regions of the Arctic zone. The latter are realized in case of the limitation on prepared reserves of cheaper "variants of Southern projects». Moreover, in an inter-regional cross-sectoral task of national-economic level NSR is highlighted as an independent transport artery connecting the Far East, Krasnoyarsk Krai and North-West of Russia (in addition to rail, aviation and pipeline). It is also assumed that the demand for non-ferrous metal products have the steady tendency to growth. This is because, first of all, the objectives of the transition to a qualitatively new ferrous metallurgy and machine building in the country, with wide use of alloying and rare metals, as well as growing demand from outside world community. Import is limited for the reasons of resource safety of the country.

Three possible scenarios of development of a national economy were generated:

- "Market" - assumes "free" development of NSR, only the needs of the additional capacity of economic complex in the Arctic zone, which are determined regardless of "other" public interests in the North. Additional funds from the budget for development are not envisaged.

- "The geopolitical" variant simulates state of the economy with an active policy of north vector advancement. The State finances the intensive development of a perspective transport corridor, NSR, for the purposes of defense problems of Russia in the Arctic zone, and also carries out support of prospecting works invoked for an intensification in the Arctic zone creation of facilities for ores of metals extraction.

- "Defensive" scenario implies a requirement for the development of NSR only for defense purposes. State policy in this case expresses indifference concerning an economic component of northern regions of Asian Russia development and settlement.

Taking as a performance indicator the level of final consumption in the economy in the forecast year 2030, we can conclude that most effective would be the first, market, scenario development. «Northern projects» do not get to number of the prime, sea transport in waters of Arctic ocean does not develop, possibilities of transit Europe-Asia on NSR is not realized. All new facilities for the extraction of non-ferrous metals are created in southern regions of Siberia, going out on the limit for the magnitude of possible extraction. In this case the maximum possible rate of its development needs the transport complex of Siberia and the Far East (first of all - Trans-Siberian railway).

Implementation of "geopolitical" scenario causes the final product losses of 12 billion rubles (in 2005 prices): the part of extraction capacities "shifted" to the north, using the NSR and capacities of the cargo handling complex created first of all for the defensive purposes, but partially free and for commercial needs. In southern regions of Siberia lasted reserves for continuing operations in the mining industry and beyond 2030. Certain reserves stored in the transport sector.

The third variant – "defensive" - appears the most unprofitable, losses make 50 billion rubles of an final product. The considerable part of port capacities stands idle. Companies engaged in mining operations without having received support from the government in enhancing the geological prospecting, chose to implement "the southern projects". Rail transport in South Siberia is working at maximum capacity, limiting the development of many others, including processing, industries in the Asian part of Russia.

Revival of NSR with financial support from the state is a necessary but not sufficient condition for the development of deposits of nonferrous metals of the Arctic zone of Asian Russia. A system of preferences for companies intending to address funds to the projects on area is required also or as an option - the financing of prospecting works and simplification of procedures of licenses for development delivery. Implementation of the State of geopolitical and defense purposes to better implemented (in accordance with the calculations - with the least loss of the final product in the economy) with the support of economic development of the Arctic zone.

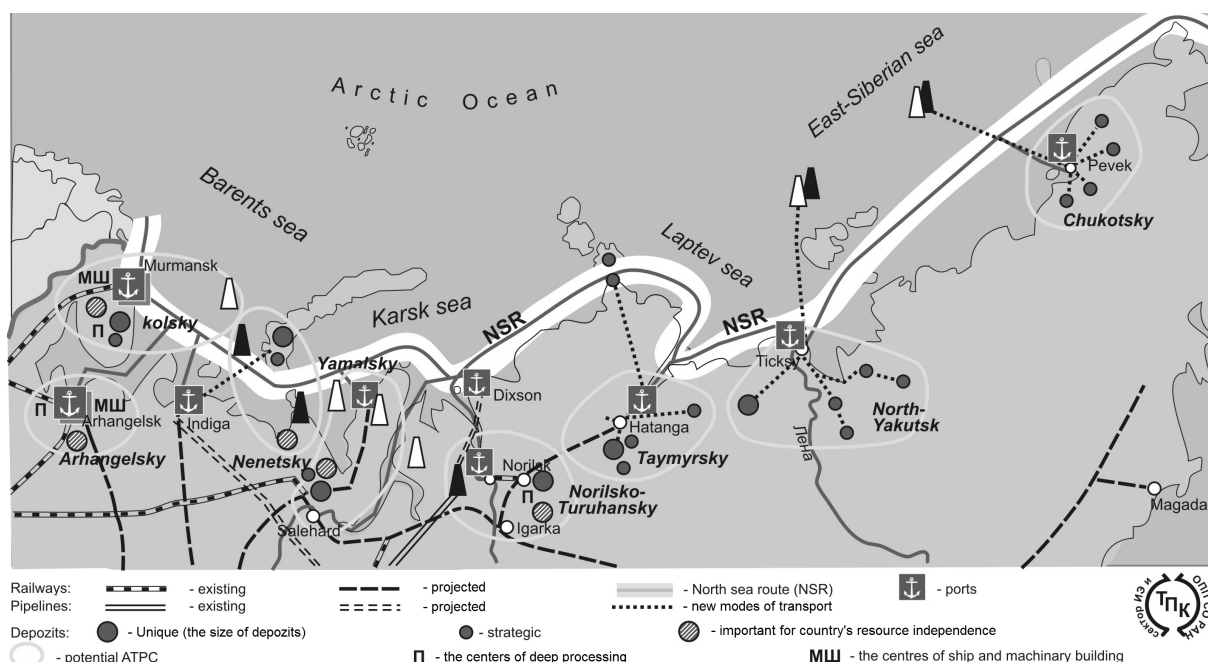
The performance of the state geopolitical and defensive purposes is in the best way realized (according to calculations - with the least losses of the final product in the economy) with its support of economic development in the Arctic zone.

Formation ATPC as a promising way to develop the region

We have shown that the state support for NSR and geological prospecting is capable to "warm up" the interest of investors in development of some deposits of nonferrous metals in the Arctic zone of Asian Russia. The transport component of the company's expenses as a result of such measures is to decrease significantly, the burden of risk borne by company carrying out exploration will be reduced. Hence, competitiveness of the Arctic area resources in the domestic and external markets will increase.

Thus, the process of development of the Russian Arctic zone is useful to begin with establishing and somewhere restoration of port and industrial sites and centers. Strengthening the NSR (as well as the geological prospecting intensification), in turn, opens the prospects for utilize such form of organization of productive forces as the aqua-territorial production complexes (here and after ATPC) (see Figure 1.) [7]. It is meant that each ATPC is a separate project in the system, which is administered by a single non-departmental ("over-corporate") organizational structure (perhaps temporary - for the period to obtain ex ante specified operating parameters). The essence of ATPC is the following - several large and unique deposits should form an economic complex, sea transport enclosed with a considerable weight. Objects of sea transport, ship repair, oil & gas offshore and onshore processing industries, etc. in this case are not simply co-exist on the territory, but must necessarily co-operate. And here appears continuity with the previously proposed "TPC-approach" [8].

Figure 1 – General scheme of anticipated ATPC



Scale industrial development and, especially, territory settling in existing conditions is not expedient. All resource extraction should unite by a base-centre which, according to a high role of the transport factor in the conditions of Arctic regions, it is logical to name corresponding port of NSR (see the Fig. 1) - Harasavej on Yamal, Dixon, Dudinka and Hatanga in Krasnoyarsk region, Tiksy in Yakutia, Pevek on Chukotka. Separate deposits could be accustomed on a rotational basis, which is relevant in the conditions of the sparsely populated North with a deficit of skilled labor and extremely uncomfortable living conditions. The mechanism of proposed patchy variant of development should include the overall consideration of environmental constraints. Then anthropogenous influence on territories of new development will be significantly less than when the permanent residence of the population here and infringements of the way of economic life of low-numbered peoples of the North will be minimal.

Most of deposits in the Arctic Zone of Asian Russia are complex (multicomponent), and demand for specific technologies of extraction and enrichment of completely different mineral components. Development of promising new deposits must be held on a single production and social infrastructure that allows take advantage of a scale effect. The common infrastructure will "draw" a few extractive enterprises, possibly belonging to different companies.

Thereupon the example of Norilsk nickel is illustrative: extraction of all useful components from the ore together with an active policy of the company in sphere of sea

transportations on NSR allows the company conducting its business successfully in the extreme conditions of Thule throughout many decades.

In general, Yamalsky, Norilsko-Turukhansky and Chukotsky ATPC can be identified as a priority. Here mineral resources are already developed, transportation is debugged, or the necessary infrastructure is being prepared. For some objects (not all big, not to speak about small and medium) within these complexes the companies-investors are fixed. It is public company Gazprom on the Yamal Peninsula, Norilsk Nickel in the Krasnoyarsk region and the local companies on Chukotka. However, mastering all mentioned perspective deposits will require the development of NSR and stimulating private capital.

Despite the fact that each ATPC will rely on its mineral resource base, different minerals, all of them will reveal similar claims-orders to the economy: on a special shipbuilding (ice breakers, bulk carriers, tankers, LNG carriers), new modes (dirigible balloons, flare crafts, String transport), a small nuclear power plants engineering². Also be required special system of system of settlement, new type of housing and public utilities. Thus, the economy could accelerate the pace of growth is not only due to the extensive development of the mineral complex, but also through the development of conjugate, supporting industries.

Development of the Arctic zone of Russia, should not occur accidentally in the form of raids on the richest deposits of the most demanded ores. Promotion to the North is a long-term strategic goal of Russia. Many researchers [eg, 9] also indicate that the development of NSR is a prerequisite for the creation of new and reconstruction of previously existing points of support of Russian statehood on the Arctic open spaces. Adjustment there an economic life is very important when the resources of this space and even space itself are of interest of many neighboring states, claiming the resources of the Arctic Ocean, its islands and coastal areas.

Oil and gas projects clearly demonstrated its national economic significance. Their implementation can be viewed as an impetus for the development of Russian Arctic. This should be followed by the formation of a new non-ferrous metallurgy base in the North Asian part of Russia, and the NSR shall be a new latitudinal transport line of Russia that tighten an economic space of the country. A necessary condition for promoting the active development

² More details about the necessity and the existing technological breakthroughs in transportation and energy development of the North see the Baikal Economic Forum materials, for example [10]

of deposits of nonferrous metals in Northern regions of Asian Russia is the public funding of the Northern Sea Route and prospecting works.

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