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**MAJOR TRENDS IN EFFICIENCY UPGRADING
OF THE ECONOMIC ACTIVITY IN THE ARCTIC ZONE
OF RUSSIAN FEDERATION**

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Organization of efficient economic activity in the Arctic zone requires development of human potential, transport infrastructure, exploitation of natural resources under the conditions of greatest possible environmental safety. In order to choose preferable trends of economic development and to provide efficiency of operations in the Arctic zone it is crucial to perform research in the areas of industrial efficiency upgrading and rational use of fuel, energy, mineral, chemical and biological resources of the Ocean and littoral areas of Russian Arctic.

The paper analyzes major trends in the research on increasing economic efficiency of operations aimed at territory development in the Arctic zone. The authors justify the need to examine economic problems of rational resource use in the Arctic zone of Russia based on the proposed system of resource-estimation indicators and their application in establishing a mechanism of rational resource use with a due regard to protection of the marine environment. The paper also focuses on methodological problems of the target programme approach to complex development of the Arctic zone, creation of target programmes, industrial development and rational use of natural resources. The authors give rationale for the key task in this area – development of methodological principles of forming federal and regional target programmes, aimed at exploration, exploitation and rational use of natural resources in the Arctic zone of Russian Federation. An analysis is provided that focuses on the problems of creating a scientifically justified hierarchical system of programmes and regional regulations, creation of a scientific information data bank and other methodological issues.

Key words: Arctic zone, maritime clusters, national economy, target programmes, littoral territories, mineral resource complex, target programme approach

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Introduction. The Strategy of Development for the Arctic Zone of Russian Federation and Provision of National Security for the Period Until 2020, which was adopted in February 2013, defines long-term national goals and interests, as well as priority areas of regional development, specifies mechanisms, approaches and means of their realization. Among the key factors that impact the social and economic situation in the Arctic one can highlight severe climate conditions; spot industrial development of the territories; low population density; bad transport accessibility; great dependence on external supplies; relatively high resource consumption.

When estimating different development scenarios of Russian economy, it is necessary to take into account that Arctic territories, including the Northeast Passage, belong to strategic national resources. Therefore, all types of economic activity in the Russian Arctic zone (AZ) that aim at development of transport infrastructure, formation of human capital, exploitation of natural resources, maintenance of high standards of environmental safety, gain enormous significance.

As of today, the AZ economy has shaped into a diversified complex, encompassing the mineral resources sector, fuel and energy sector, sea transport, fishery, ship construction and repair, marine engineering, marine construction, marine tourism etc. It is a complex system of branches and industries that facilitate economic development of Arctic resources. At the same time there is a need to adapt existing economic mechanisms to heterogeneous social and economic conditions of Russian AZ territories. Intensive research and active development of Arctic resources is a characteristic trait of modern global economy. A new era has begun for the Russian Arctic as well, as there is a growing demand in fuel, energy, biological and mineral resources from the national economy. The speci-



fied goal – expansion of natural resource development in the Arctic – sets the tasks of their rational use and exploitation of seabed resources outside the continental shelf of Russia under the guidelines of the UN Convention on the Laws of the Sea.

Economic research on specific branches (mineral resources and fuel-energy sectors [8, 11, 16, 22-24], fishery [12], sea and other types of transport [2], ship construction [18] etc.) has a narrow focus on separate types of economic activity in the Arctic. Provided recommendations offer a gain in efficiency only for isolated industries with regard to their AZ specifics. Such results and operational practice laid the foundations of economic sectors: fishery, sea transport, ship construction – not to underestimate their theoretical and practical significance. The problems of small enterprises in the Arctic, as well as issues of innovative technologies also attract attention of researchers [6, 10]. However, complicated intertwining of scientific, technological, economic, social, environmental, diplomatic and legal issues, associated with Arctic resource development, increasing interconnection and mutual dependence between different sectors and types of economic activity place complex investigation of the Arctic economy on the agenda [1, 14, 17].

The need to reduce the time line of innovations in Arctic resource and territory development requires systematization of scientific knowledge about the Arctic zone as an integral object of economic activity, accumulation and analysis of the available experience. Multipurpose trends of the Arctic economy set the goal of providing continuous similarity of various aspects of scientific research for the sake of achieving the greatest possible contribution of the Arctic to the national economy of Russia. Hence, it is logical to develop a cohesive system of scientific research in the area of AZ economy, indispensably with the solution of economic and social problems of the entire national economy and in close collaboration with natural and engineering sciences.

Methodology. To facilitate a qualitative shift from using advantageous littoral location of the Arctic territories, aimed at gaining in the efficiency of national economy [9], economics should solve an array of topical problems, associated with defining the most promising trends of Arctic resource exploitation and rational development of the marine sector from the viewpoint of its final effect on the national economy. Under current conditions of production intensification, efficiency of economic operations cannot be examined traditionally, i.e. in terms of volumes and quantities. It should be reassessed, and special attention should be paid to its quality content, taking into account interconnected operation of different sectors, creation of complimentary industries, expansion of foreign economic trade.

The aim of this research is to highlight main possible trends of scientific research solving the problems of efficiency upgrading for the economic activity in the Russian AZ.

Investigation of economic problems in the industrial development and rational use of fuel, energy, mineral, chemical and biological resources of the Ocean and the littoral areas of Russian Arctic. Target orientation on large-scale development of AZ natural resources for the solution of key challenges of the national economy (energy, mineral resources and food problems) require creation and development of new industries based on the exploitation of these resources. The Russian part of the AZ is characterized by great diversity of geological structures that explain a wide range of associated mineral resources [25]. There are federal and regional mining companies operating in the AZ: extracting oil and natural gas in Timan-Pechora, West-Siberian and Yenisei-Anabar regions, mining coal at the deposits of Pechora and Tungus coal basins, as well as coal-bearing areas of Chukotka Autonomous Okrug. AZ mineral resources, its proven and prospective reserves account for a major share of the Russian mineral wealth: over 90 % of nickel and cobalt, 60 % of copper, over 96 % of platinum group metals, approximately 80 % of natural gas and 60 % of oil [13].

Severe technical, economic, social and environmental conditions that accompany the process of resource exploitation and territory development in the AZ encourage creation of industrial and multisectoral clusters, emerging at the contact of aquatic and littoral territories. These clusters are characterized by conditions of economic operations and population activities, different from those of traditional clusters located on the mainland [21]. E.g., the process of resource exploitation in the AZ is accompanied by



the introduction of new economic activities, it shapes social and professional structure of the workforce and the population of littoral zones. Specific character of Northern cluster policies is closely related to the cluster specialization, in its own turn determined by the natural resources in place and enormous wild territories around them. Cluster policies coming from local authorities have to be adequately compatible with innovative transformation of the Russian North. It is necessary to organize gradual transformation of industrial facilities, which in many Northern regions date back to Soviet times, to a high-tech competitive postindustrial cluster. It is a complex systematic task that requires mutual adaptation of modernized facilities and the entire infrastructure of the Northern territories [4].

Special attention should be paid to the improvement of cluster spatial organization by means of rational formation of maritime clusters, covering both the littoral area and the sea. Spatial organization of such clusters is different from that of traditional ones, created in continental territories. One can divide all the maritime clusters into two groups, significantly different in their industrial specialization and spatial structure:

- based on maritime sectors and developing resources of the Ocean;
- using littoral location and advantages of sea transport.

One of the most important trends in efficiency upgrading of large-scale exploitation of natural resources and territories development in the Arctic, as well as in sustainable development of littoral regions, is result-oriented process management, rationalizing the structure of AZ economy, its specialization and cooperation with the national economy, as well as with the economies of separate regions. Hence, it is critically important to deepen and widen research aimed at improvement and practical implementation of the system approach in order to optimize development of complex economic-environmental systems [7, 31], and to investigate specific conditions of maritime cluster formation with the purpose of balancing the development of marine economy with the resource potential of the ocean and littoral regions.

Investigation of economic problems of rational resource use in the Russian Arctic zone, based on the developed system of resource-estimation indicators and their application in establishing a mechanism of rational resource use with a due regard to protection of the marine environment. Research in this area [19, 30, 32] is linked to the need of economic justification for the prospects of development and rational use of AZ natural resources, taking into account protection and reproduction of its resource potential. Expanding scale and intensification of economic activity in the Arctic increase its impact on the marine environment, raise «industrial pressure» on the ecological systems of the ocean and littoral areas [28, 29, 33]. These conditions dramatically increase the importance of developing principles and methods, aimed at managing natural resource exploitation; scientific foundations and practical recommendations on the improvement of the economic mechanism, facilitating their rational use and protection of the marine environment [27].

At the same time it is important to start and subsequently expand research on specific economic problems of marine resource use, e.g. to lay scientific foundations of forming economic inventory of natural marine resources, their economic estimation, assessment of damages and economic efficiency of marine resource use and environmental initiatives. Economic resource inventories, which accumulate results of multidisciplinary research on the ocean and marine economy, have to become informational basis for the management of natural resources exploitation in the Arctic. Economic estimation of resources implies development and introduction of indicators showing public value of exploited (or scheduled for exploitation) resources and objects of marine resource use through comparison of economic costs and effects (including external ones). It is necessary to decide on unified calculation methods for such indicators and to define limits of their application, when estimating the efficiency of Arctic resource projects.

Research on economic efficiency of creating brand new technological tools of marine resource exploitation and acceleration of the scientific progress. It is in the area of Arctic research and development of its resources and territories, that the accumulation of new scientific knowledge, creation



of brand new equipment and technologies occur at the quickest pace and exert decisive influence on all areas of multisectoral and diversified economic activity in the Russian Arctic. The Strategy implies that technological progress, on the one hand, forms the scale and structure of public needs in resource and transport exploitation of the Arctic; on the other hand, it opens up opportunities to utilize new marine resources, to develop efficient industrial port facilities, integrated transport-technological system and the entire economy of littoral regions. Acceleration of the technological progress exerts dominant influence on the equipment development and creates new opportunities of involving additional natural resources and Arctic territories into the economic cycle. The progress in the areas of equipment engineering, technologies of extraction and processing of marine resources, using different types of energy and Arctic spaces changes the perception about accessibility, practical significance and value of certain marine resources and objects of marine resource use. Accumulated experience demonstrates how quickly the progress alters the notions of economic efficiency of resource use, development of various forms and types of economic activity. Many types of marine resources, earlier perceived as unsuitable for exploitation, with the development of new technologies have become highly effective and even competitive with their mainland analogues, e.g., modern innovative technologies of underwater hydrocarbon extraction in the Arctic shelf [16].

Economic research in the area of forecasting technological progress and its consequences, opportunity analysis of near-future large-scale use of currently unavailable resources should be based on the system approach and encompass the whole range of operations on exploration, exploitation and rational use of Arctic resources. A narrow industry-specific approach to creating new equipment, detached from the accumulated experience of complex resource exploitation, can result in significant errors of judgment and decrease economic efficiency of their use. Active forecasting of technological progress and its consequences is critically important. One should not only foresee, but with a sufficient degree of precision assess economic consequences of the changes in our understanding of the Arctic, which will allow to come up with requirements, terms and solutions to accelerate innovative activity in the above mentioned directions.

Widespread application and effective use of cutting edge equipment and technologies of Arctic resource and territory development require a strategy of forming and improving a complex of specialized sectors and engineering branches, turning it into marine engineering. This poses a wide range of theoretical and practical questions, demanding a solution. Particularly, there is a need to develop uniform methods and recommendations on assessing economic efficiency of investment into retrofitting and new construction of marine engineering plants, their location in the Arctic territories, defining optimal ratio between the production of new industrial tools and repair, reconstruction and modernization of the existing ones.

It is important to mention another trend that has to be taken into account when forming development programmes for the regions whose natural environment does not recover easily from man-made intrusion. Exploration of Arctic territories must comply with strict environmental standards, which render it impossible to apply certain technologies used in resource exploitation in other regions, and this should be reflected in the methods proposed.

Efficiency research on the development of sea transport systems, creation of new transport means and related technological processes. According to the Strategy of Development for the Arctic Zone of Russian Federation and Provision of National Security for the Period Until 2020, a special role in regional development belongs to sea transport; creation of new highly efficient ships and transportation systems reduces the costs associated with sea transport. Under these conditions there is a need to investigate the influence that sea transport exerts upon economic development in the Arctic zone and Russian foreign trade. Other problems demanding attention from the scientists are: efficiency upgrading in the context of an integrated transportation system and its separate regions, interaction between different transport means and upgrading of the transportation service efficiency. Answering these questions implies scientific justification of the devel-



opment strategy for Arctic sea transport and its separate regions, which will ensure maximal utilization of technological progress and take into account changes that occur in the economy development. A great importance should be assigned to creation and widespread implementation of new highly efficient means of sea transport with multipurpose functions. It must be noted that despite relatively low amounts of shipments, the transportation system of the Northeast Passage has a very complex structure [26].

Great importance of the transportation system of the Northeast Passage, as the main supply source of basic goods and resources for the communities living along the coast, is explained by significant outstretch of the Arctic coastal line and either total absence or very weak development of year-around mainland communication system. One should also note the connecting function of inner sea routes of the Arctic zone and largest longitudinal railroads of the country. Crucial role of the Arctic transportation system is caused by geopolitical and transnational significance of maritime traffic along the Northeast Passage, the need to control the sea areas, to perform interregional shipments between north-western and far-eastern regions of the country, between the ports of European and Pacific regions.

Investigation of social and economic problems associated with Arctic resource exploitation.

At the current stage of national economy development, the role of social factors has risen significantly, which can be explained, on the one hand, by the growing influence that social problems have on the rates of economic development and production efficiency, on the other – by the lack of resources to solve these social issues. Numerous investigations confirm the relevance of social and economic problems [5, 15, 24]. Social problems in the AZ are intensified by extreme weather conditions, specifics of labour and everyday life of the population, working in distant and weakly developed littoral region of the Arctic [20]. All these factors predetermine the great importance of solving a wide range of theoretical and practical issues associated with the reproduction of labour resources, personnel retention, improvement and development of social infrastructure.

As of today, qualitative changes in the production facilities happen significantly quicker than those in non-production ones, which only enhances the role of strategic planning and social process management. Extreme working conditions require complex research on professional and social adaptation, raising productivity, labour safety, prevention of general and occupational health problems, recreational initiatives. In order to increase the level of social and economic development in the Arctic, the issues of its social development should be included not only into strategies of long-term social and economic development of the regions, but also into industry-specific strategies and programmes. State programmes for the entire country should be aligned with the programmes of separate regions at all levels of administration; social and economic development of the AZ should be closely and continuously monitored.

Investigation of international legislation problems of Arctic resource development, analysis of economic, political and legal issues of gaining access to them in order to ensure efficient economic activity in the AZ, analysis of foreign methods of Arctic resource development. The need to solve international economic, political and legal problems, both theoretical and practical, is especially pressing when foreign states conduct research in the Arctic, fish, develop seabed mineral resources in the Russian economic zone, not to mention such sectors as maritime traffic, marine environment protection, international marine tourism etc. Changes to the maritime policy of littoral states have significantly hindered Russian economic and scientific activity in the Arctic. Foreign trade factors, together with international legislation terms, will continue to demand higher standards from economic decision in the AZ.

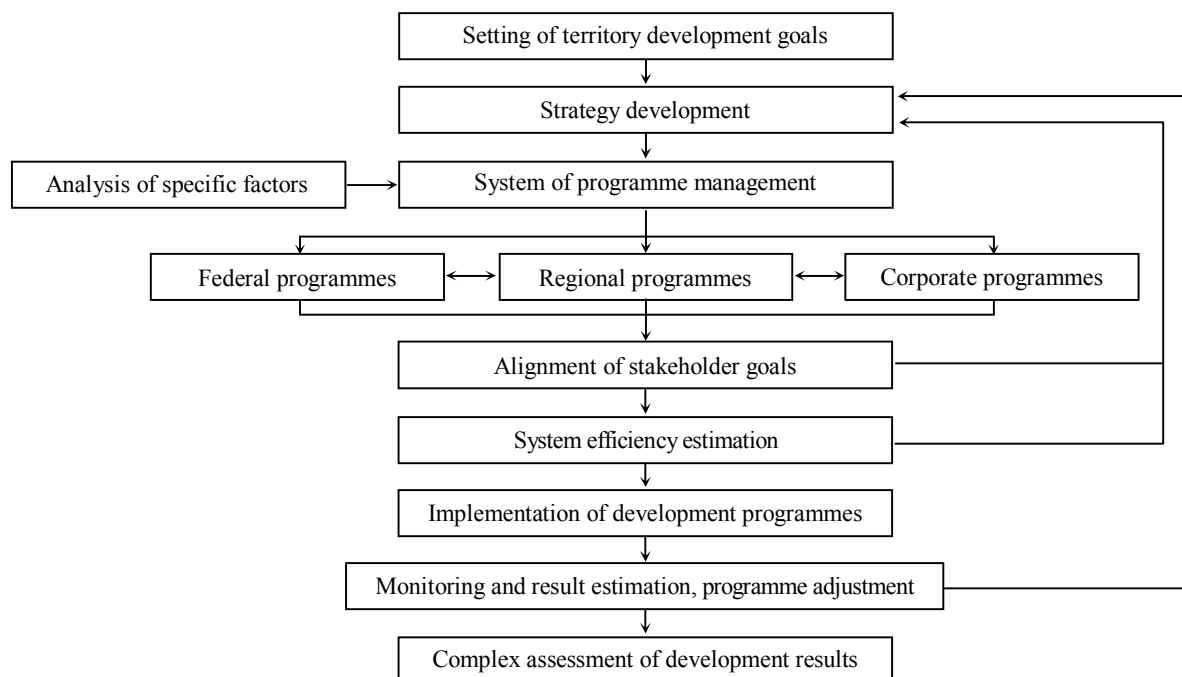
Analysis of foreign marine economies demonstrates that in the latest decades development of marine industries has become a global trend. This process has been supported by «transport revolution», development of highly productive transport systems like specialized ships and handling terminals. Rising efficiency of deep-sea fishing can be explained by the introduction of specialized

vessels (including the ones for coastal fishery), modern tools for navigation, light and economical fishing gear, highly productive industrial mechanisms. Scientific achievements occur both in «traditional» and developing marine sectors and have a significant impact on the efficiency of marine economy in foreign countries. It dictates the need to analyze international practices of Arctic resource exploitation.

Development of methodological aspects of target programme approach to complex exploitation of the Russian AZ, creation of target programmes, industrial development and rational use of natural resources. Target programme approach to solving the critical problems of national economy and development of long-term target programmes are objectively becoming essential for exploration and efficient use of natural and territorial resources of the Arctic. Division of the economy into relatively isolated sectors and regional complexes is an important stage of creating target programmes that have their own methodological foundations (methods of estimating target indicators, construction principles, predefined structure and composition). Programmes differ [3] according to their scale, patterns of construction, development and location of sectoral and multisectoral production systems, technological processes etc., i.e. each has an individual content, unique qualitative and quantitative characteristics.

Hence, the main task of research in this area is to develop methodological foundations of forming federal and regional target programmes, aimed at exploration, development and rational use of natural resources in the Russian Arctic zone. It is essentially important to develop a justified hierarchical system of programmes and regional standards, to create a scientific information data bank and to solve other methodological issues. The programmes include five key sub-programmes: economic, technical, social, environmental and international legislative ones. Interdependence and correlation between their terms and factors in the process of Arctic resource exploitation require their coordination in space and time both on the federal and local levels.

Another problem is the task to align the interests of stakeholders. The issue concerns not only interests of federal and local authorities and corporations doing business in the Arctic, one should also take into account the population of Arctic territories (see Figure). Insufficient attention, paid to the problem of interest alignment, leads to the conflict of interests and to structural disproportions in



Principal scheme of the programme management system aimed at AZ territory development



the distribution of income among stakeholders, which in their own turn hinder formation of new economic connections and destroy already existing ones. Without any doubt, all this slows down development of Arctic territories and reduces the effect from the proposed system of programme AZ management.

Conclusions. Hence, further development of Arctic economy is associated with dramatic changes brought around by scientific and technological progress, improvement of utilizing production and economic potential of the territories and attraction of additional financial investments, labour and material resources. Implementation of complex target programmes, aimed at exploration and exploitation of natural and territorial resources of the Russian Arctic zone, requires coordinated efforts of many industries and will alter the structure of national economy and its separate regions.

A complicated intertwining of national economy development processes with marine economic activity, as well as target orientation on solving critical issues predetermine the relevance and urgency of research on interdependencies between the economic activity in the Russian Arctic and reproduction parameters, rates, proportions, sectoral and industrial structure of national economy and separate regions. Diversity of natural resources in the Arctic zone, types and forms of economic activity give unique distinctions to the problems rooted in specialized industries and branches. As new resources of the Arctic zone get involved in the economic cycle, its economy becomes more diversified.

At the same time it is critically important not to focus exclusively on isolated problems of Arctic development, but to accumulate knowledge about the region as an integral object of economic activity. Suggested research trends describe the challenges of Arctic development in a broad and comprehensive manner; they can help in solving the problems of efficiency upgrade in the Russian Arctic. Proposed methods of complex indicators estimation are a separate area of research. The target programme approach mentioned in the paper allows to align federal, local and corporate programmes of Arctic development.

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