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Ensuring Environmental Safety in the Arctic While Intensifying Spatial Development and Navigation along the Northern Sea Route

Svetlana A. Lipina [1], Dr. Sci. (Econ.), Professor
Alexandra V. Lipina [2], Cand. Sci. (Tech.), Associate Professor
Nikita M. Kuprikov [3], Dr. Sci. (Econ.), Associate Professor, Senior Researcher
Natalia S. Avdonina [4]✉, Cand. Sci. (Polit.), Associate Professor

[1] All-Russian Research Institute of Environmental Protection, MKAD, 36 km, Str. 1, Bld. 4, Moscow, Russia
[1] Russian Foreign Trade Academy of the Ministry of Economic Development of the Russian Federation, ul. Levoberezhnaya, 32, Bld. 1, Moscow, Russia
[2] University of Science and Technology MISIS, Leninskiy pr., 4, Bld. 1, Moscow, Russia
[3] Moscow Aviation Institute (National Research University), Volokolamskoe shosse, 4, Moscow, Russia
[4] Northern (Arctic) Federal University named after M.V. Lomonosov, Naberezhnaya Severnoy Dviny, 17, Arkhangelsk, Russia
[1] s.lipina@mail.ru, ORCID: https://orcid.org/0000-0002-8551-0653
[2] a.v.lipina@mail.ru, ORCID: https://orcid.org/0000-0003-0835-8878
[3] nkuprikov@yandex.ru, ORCID: https://orcid.org/0000-0003-3152-0941
[4] n.avdonina@narfu.ru ✉, ORCID: https://orcid.org/0000-0001-9871-3452

Abstract. The article examines current issues related to ensuring environmental safety in the Arctic in the context of intensifying economic activity and growing cargo traffic along the Northern Sea Route (NSR). The aim of the study is to formulate scientific and methodological recommendations for reducing and eliminating environmental risks, ensuring a balance between industrial development and the preservation of vulnerable Arctic ecosystems. The methodological basis of the work comprised a systems approach, an analysis of the Russian regulatory framework and international reports (AMAP, HELCOM, Arctic Council), a comparative analysis of environmental management practices in Norway, Canada, and the Baltic states. As a result of the study, 11 groups of environmental risks (climatogenic, operational, cumulative damage risks) have been systematized, and a comprehensive approach to their minimization has been developed. The proposed methodology integrates institutional, technological, and organizational measures, including improved monitoring using satellite systems and UAVs, implementation of "green" shipping technologies, elimination of accumulated pollution, and involvement of indigenous peoples in decision-making. It was concluded that the application of this approach will improve the effectiveness of strategic planning, strengthen the region's environmental security and enhance Russia's position in the Arctic. The results have practical significance for updating government programs and implementing infrastructure projects.
Keywords: *spatial development, strategic planning, sustainable development, environmental risks, management methods, integrated security, environmental safety, Arctic, Northern Sea Route*

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Introduction

The current stage of Arctic development is characterized by an intensification of economic activity, the resumption of year-round shipping along the Northern Sea Route (NSR), and large-scale infrastructure projects. These processes are enshrined in the Russian Federation's strategic documents — the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 and the Strategy for Developing the Northern Sea Route — which set ambitious targets for cargo traffic growth and the comprehensive development of territories[1,2]. However, the implementation of these tasks is taking place in the context of extremely vulnerable Arctic ecosystems, the resilience of which has been significantly reduced due to climate change and accumulated environmental damage (Kudryashova, Lipina, Zaikov, 2019)[3]. The theoretical foundation for understanding contemporary processes in the region was laid by works devoted to the strategic development of Russia's political space in the Arctic (Morozov, Kondral, 2014), the formation of Russia's Arctic strategy as a new type of policy (Podoplekina, Bestuzheva, 2014), as well as regional aspects, such as the policy of the Arkhangelsk Oblast (Zhuravlev, 2012). It is important to remember that these processes are based on a long history of regionalization in Northern Europe, the origins and dynamics of which are explored by F.H. Sokolova and E.A. Trufanova (Sokolova, Trufanova, 2025).

The paradox of the current situation is that, despite the presence of an extensive network of scientific institutes (AARI, "Floating University") and improved monitoring systems (satellite constellation, Roshydromet stations), existing mechanisms for managing environmental risks remain fragmented. They do not fully take into account the synergy of factors such as permafrost thawing, increased transit shipping, and transboundary spread of pollutants. A review of the literature shows that most studies either focus on the technical aspects of spill prevention or are descriptive in nature, documenting the deterioration of the environment. Comprehensive methodologies that integrate strategic planning with environmental protection measures and are adapted to Russian conditions have not yet been developed.

The Arctic and Antarctic Research Institute (AARI) plays a key role in scientific activities in the Arctic. Originally specializing in organizing expeditions, the institute now combines this work with the continuous monitoring of environmental conditions through a network of fixed and drifting stations. AARI regularly conducts marine expeditions and participates in international discussions on these topics. In 2012, NArFU launched the "Arctic Floating University" project, combining an educational program and interdisciplinary natural science research in the Arctic. The project explores pressing issues ranging from the spread of microplastics to climate change. The institu-

[1] Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 (approved by Decree of the President of the Russian Federation No. 74 of February 26, 2020). URL: http://www.kremlin.ru/acts/bank/45972 (accessed 01 October 2025).
[2] Strategy for Developing the Northern Sea Route until 2035 (approved by Decree of the Government of the Russian Federation No. 1097-r of April 28, 2020). URL: http://government.ru/docs/46171/ (accessed 01 October 2025).
[3] Arctic Council. (2017). Arctic Marine Shipping Assessment Report. URL: https://arctic-council.org/projects/arctic-shipping-status-reports/ (accessed 01 October 2025).

tional foundations for modern research, such as the work of the Arctic and Antarctic Research Institute and the "Arctic Floating University" project, were laid decades earlier. As A.A. Saburov notes, active planning and coordination of Arctic scientific expeditions were already underway in Soviet Russia in the 1920s (Saburov, 2016).

In August 2022, a plan for the development of the NSR until 2035 was approved, providing for the creation of a state environmental monitoring system for the waterways under the leadership of the Ministry of Natural Resources and Environment and Rosatom. Currently, monitoring covers the state of the atmosphere, water, and radiation conditions. In addition, the federal project "Clean Air" is being implemented, with the aim of reducing emissions and improving the environment through energy modernization and gasification of the private sector. The results are recorded by an extensive network of monitoring stations[4].

Surface water quality is monitored at numerous stations in the Barents and East Siberian regions, where hydrochemical and hydrobiological parameters are analyzed, including the state of phytoplankton, zooplankton, and zoobenthos. Radiological monitoring is carried out at 94 sites, providing a comprehensive assessment of the environmental situation.

Therefore, a contradiction arises between the strategic focus on accelerated spatial development of the Arctic and the need to preserve its ecosystems. Resolving this contradiction requires the development of a new approach that integrates legal requirements, best international practices, and modern monitoring technologies into a unified risk management system.

The scientific novelty of the study lies in the systematization of 11 groups of environmental risks in the Arctic, taking into account the synergistic effects between climatogenic, operational and cumulative factors; in the development of a comprehensive approach to risk reduction, integrating institutional, technological and organizational measures, adapted to Russian legal and natural-climatic conditions; in the justification of the possibilities and limitations of adapting international practices (Norway, Canada, HELCOM) for the Northern Sea Route based on a comparative analysis with specific quantitative indicators.

The aim of this article is to develop scientific and methodological recommendations for reducing and eliminating environmental risks in the Arctic and in the waters of the Northern Sea Route, ensuring a balance between industrial development and the preservation of the natural environment. To achieve this aim, the following tasks were carried out: an analysis of the current environmental situation and strategic documents was conducted, key risk groups were systematized, and a set of risk minimization measures was proposed, taking into account Russian institutional conditions and international experience.

[4] The Northern Sea Route: what it is and how it works today. URL: https://www.rbc.ru/base/10/09/2025/68c075ee9a79472708d42f86 (accessed 20 February 2026).

Materials and methods

As part of the study, a comprehensive analytical review was conducted to examine and systematize the regulatory and legal acts, strategic documents and scientific and methodological recommendations regulating the spatial development of the Arctic region and ensuring environmental safety along the Northern Sea Route (NSR).

The first stage involved a regulatory and legal analysis of strategic documents defining the vectors of spatial development of the Arctic zone of the Russian Federation and regulating environmental safety requirements. The empirical base included:

- Federal Law No. 193-FZ "On the Arctic Zone of the Russian Federation"[5];
- Decree of the President of the Russian Federation No. 164 "On the Fundamentals of the State Policy of the Russian Federation in the Arctic until 2035"[6];
- Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035[7];
- Strategy for Developing the Northern Sea Route until 2035[8];
- Passport of the National Project "Ecology"[9].

The aim of the analysis was to identify target indicators in the field of environmental protection, as well as to determine existing regulatory gaps requiring the development of additional tools.

In the second stage, data on environmental risks specific to the Arctic region were collected and systematized. The source base included:

- scientific publications on climate change in high latitudes, anthropogenic impact and the state of biodiversity;
- reports from international organizations: the Arctic Council (Arctic Marine Shipping Assessment, 2017)[10], the Helsinki Commission (HELCOM, 2018)[11], and the UN Environment Programme (UNDP Arctic Initiative, 2020)[12];

[5] Federal Law No. 193-FZ "On the Arctic Zone of the Russian Federation". URL: http://www.kremlin.ru/acts/bank/45677 (accessed 01 October 2025).
[6] Decree of the President of the Russian Federation No. 164 of March 5, 2020 "On the Fundamentals of the State Policy of the Russian Federation in the Arctic until 2035". URL: http://www.kremlin.ru/acts/bank/45255 (accessed 01 October 2025).
[7] Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 (approved by Decree of the President of the Russian Federation No. 74 of February 26, 2020,). URL: http://www.kremlin.ru/acts/bank/45972 (accessed 01 October 2025).
[8] Strategy for Developing the Northern Sea Route until 2035 (approved by Decree of the Government of the Russian Federation No. 1097-r of April 28, 2020). URL: http://government.ru/docs/46171/ (accessed 01 October 2025).
[9] National Project "Ecology". URL: https://www.mnr.gov.ru/activity/np_ecology/ (accessed 01 October 2025).
[10] Arctic Council. (2017). Arctic Marine Shipping Assessment Report. URL: https://arctic-council.org/projects/arctic-shipping-status-reports/ (accessed 01 October 2025).
[11] HELCOM. (2018). Baltic Sea Action Plan. URL: https://helcom.fi/baltic-sea-action-plan/ (accessed 01 October 2025).
[12] UNDP Arctic Initiative. (2020). Community Engagement and Environmental Stewardship in the Arctic. URL: https://oaarchive.arctic-council.org/bitstream/handle/11374/2614/arctic-resilience-forum-2020_web.pdf (accessed 01 October 2025).

- materials from national environmental agencies (Environment Canada[13], Norwegian Maritime Authority[14]), containing descriptions of successful adaptive management practices.

Content analysis was used to process this diverse information, enabling the identification of recurring threat patterns and their structuring according to source: climate-related, operational (related to shipping and extraction), and accumulated (historical pollution).

In the third stage, a comparative analysis method was applied to study international approaches to minimizing environmental risks in Arctic and subarctic conditions. Case studies from Norway (implementation of electric shipping and hybrid technologies), Canada (adaptive infrastructure management plans), Sweden, and Finland (limiting noise impact in the Baltic Sea as an analogy for Arctic waters) were considered. The selection criteria included the availability of documented results, similarity of natural and climatic conditions, and potential applicability within the Russian institutional environment.

In the fourth stage, the obtained data was synthesized, resulting in the development of a set of measures to reduce environmental risks. This approach is presented in the form of a classification table (Table 1), in which each of the eleven identified risk types is matched with a list of measures differentiated by functional criteria:

- institutional (improving the regulatory framework, creating coordinating bodies);
- technological (implementing innovative monitoring systems, wastewater treatment facilities, and noise-free equipment);
- organizational and preparatory (staff training, conducting exercises, public awareness campaigns).

The methodological basis of the study was a systems approach to assessing and managing environmental risks, which involves integrating various planning levels — from strategic to operational. This approach took into account the specific features of the region's spatial development, including changing climate conditions, increased shipping along the NSR, and the development of infrastructure and the extractive industry. The study additionally utilized comparative analysis, systems modeling, and expert assessment, ensuring the comprehensiveness and objectivity of the results.

The approach applied takes into account both natural and anthropogenic factors influencing the ecosystem's condition, and contributes to the formulation of balanced management decisions regarding spatial development and the sustainable management of the Arctic region.

[13] Environment Canada. (2019). Canada's Adaptation Strategy for the Arctic. URL: https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/action-plan.html (accessed 01 October 2025).

[14] Norwegian Maritime Authority. (2021). Green Shipping Initiatives in Norway. URL: https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/Air%20pollution/The%20Governments%20action%20plan%20for%20green%20shipping.pdf (accessed 01 October 2025).

Discussion

The intensification of Arctic economic development, reflected in the unprecedented growth of cargo traffic along the Northern Sea Route, is creating a fundamentally new context for ensuring the region's environmental security. The increase in shipping volumes from 4 million tons in 2014 to nearly 38 million tons in 2024[15] and the strategic goal of reaching 70–100 million tons by 2030[16] indicate the transformation of the Northern Sea Route into a fully-fledged transport corridor of global significance. However, such a large-scale increase in shipping objectively increases the pressure on vulnerable Arctic ecosystems, which requires adequate improvements to risk management mechanisms. The set of measures proposed in this study represents an attempt to provide a comprehensive response to this challenge; nevertheless, its viability should be assessed within the context of current data, international experience and existing institutional constraints. It is important to understand that the current intensification of NSR use is not an isolated phenomenon, but a new stage in a long-term historical and geopolitical process. Researchers such as V.I. Goldin consider the evolution from the North-Eastern Passage to the modern Northern Sea Route as a process the significance of which has been understood for millennia (Goldin, 2024). Moreover, as N.M. Terebikhin demonstrates, the very logic of the development of these spaces can be understood through the prism of the "north-eastern text" of Russian geo-historiosophy and sacred geography (Terebikhin, 2023).

Analysis of the latest scientific data confirms that the problem of anthropogenic impact on the Arctic is not limited to direct threats associated with shipping. Research by the Arctic Monitoring and Assessment Programme (AMAP) demonstrates the presence of high concentrations of persistent organic pollutants in indigenous populations of Greenland, Nunavik, Canada, and coastal areas of Chukotka (Adlard, Bonefeld-Jørgensen, Dudarev et al., 2024). This fact is particularly significant in the context of the developed approach, as it highlights the presence of at least two interrelated problems. Firstly, despite an overall decline in emissions of "classical" POPs, their accumulation in food chains continues to impact human health and biodiversity. Secondly, the existence of transboundary transfer of toxicants emphasizes the inadequacy of national measures and the need to coordinate efforts at the international level — even in circumstances where political cooperation is considerably complicated.

Russia, which accounts for a significant portion of the Arctic coastline and the region's population, continues to implement its own development strategy, relying on the potential of national scientific institutions and interaction with friendly observer states. In this regard, issues of information security and transboundary cooperation are particularly important. As A.M. Tamitskiy notes, information security is a crucial factor in contemporary international relations in the Arctic (Tamitskiy, 2013; Tamitskiy, 2014). The historical experience of similar cross-border interaction, for

[15] Decree of the President of the Russian Federation No. 164 of March 5, 2020 "On the Fundamentals of the State Policy of the Russian Federation in the Arctic until 2035". URL: http://www.kremlin.ru/acts/bank/45255 (accessed 01 October 2025).
[16] Ibid.

example, between Norway and Russia in the Far North, including its socio-cultural dimension, has been examined in detail by V.V. Tevlina (Tevlina, 2012).

In these circumstances, the role of networks such as SAON[17] and AMAP, which maintain a scientific rather than political nature of interaction, becomes critically important. The developed set of measures takes this reality into account: the emphasis on establishing an interagency coordination center and improving the national monitoring system reflects the desire to ensure the sovereignty of environmental data while maintaining the possibility of integrating it into international databases as trust is restored.

International experience allows us to verify certain provisions of the proposed set of measures and identify areas for further improvement. Norwegian practice of electrifying[18] shipping and creating shore-based power supply infrastructure for ports confirms the potential of technological measures outlined in the sections on promoting green technologies and reducing atmospheric emissions. Canadian developments, in particular the POLARIS methodology and its further development in the work of Kubat and co-authors[19], who propose integrating into risk models not only the probability of vessel damage, but also the potential consequences for human life and the environment, are of direct interest to Russian practice in planning ice navigation. Besides, HELCOM's standardized approaches to noise pollution monitoring using octave bands to assess impacts on marine mammals can be adapted when implementing the relevant set of measures, as Russian practice does not yet have similar regulations. Overall, as M.M. Panikar emphasizes, we are currently witnessing processes of profound transformation in the international Arctic region and the formation of its new geopolitical contours (Panikar, 2023), which requires flexibility in adapting any international methodologies.

The socio-cultural dimension of environmental security deserves particular attention in this discussion, as it is not always adequately reflected in technically oriented strategies. The uniqueness of the Arctic Council lay in granting indigenous peoples' organizations the status of Permanent Participants, which ensured the integration of traditional knowledge into the decision-making process. In Russian practice, mechanisms for such participation are significantly less developed, and the proposed set of measures includes a component aimed at environmental education, public consultations and support for initiatives by indigenous communities. Implementing this set of measures can not only enhance the legitimacy of decisions taken but also ensure that local

[17] SAON. Sustaining Arctic Observing Networks: Strategic Plan 2022–2030. 2022. URL: https://www.arcticobserving.org (accessed 01 October 2025).

[18] Norwegian Maritime Authority. (2021). Green Shipping Initiatives in Norway. URL: https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/Air%20pollution/The%20Governments%20action%20plan%20for%20green%20shipping.pdf (accessed 01 October 2025).

[19] Kubat I., Babaei M.H., Sayed M., Millan J. A framework for integrating life-safety and environmental consequences into conventional Arctic shipping risk models. National Research Council of Canada Publications. 2025. URL: https://publications-cnrc.canada.ca/eng/view/object/?id=2d7abf8f-4002-4204-8817-bdc7aa02f8ba (accessed 01 October 2025).

knowledge about the state of the environment is taken into account, which is particularly valuable given the limited network of fixed observation stations.

The comparative analysis conducted allows for a specific assessment of the applicability of international practices in the Russian context. Norway's experience of electrifying shipping and introducing onshore power supply in ports demonstrates a 35–40% reduction in CO_2 emissions in port areas. However, its direct application to the Northern Sea Route is complicated by the lack of shore-based power generation in most Arctic ports (Murmansk and Arkhangelsk being the exceptions), as well as the need to modernize ships' power systems. The Canadian POLARIS methodology, which takes into account not only the likelihood of vessel damage but also the consequences for life and the environment, has reduced accidents by 22% over five years. Its implementation in Russia requires adaptation to the national ice classification of vessels and NSR navigation regulations, which is possible with the support of relevant scientific organizations (AARI, Krylov Center) in the medium term. HELCOM standards for monitoring noise pollution using octave bands are technically feasible, but are not yet supported by Russian regulations and lack trained personnel; therefore, their implementation will take at least three to five years and will require the creation of national regulations. Thus, the Canadian approach to integrated risk assessment has the highest degree of adaptation readiness (medium level), while the Norwegian and Baltic practices require significant infrastructure and regulatory investments (low readiness in the short term).

Whilst the proposed measures are well-founded, it is important to be aware of the limitations of the study. The proposed set of measures is conceptual in nature and requires a quantitative assessment of implementation costs, which necessitates separate economic calculations. The effectiveness of technologies such as bioremediation under low-temperature conditions should be empirically tested in the Arctic's natural environment, as laboratory data are not always reproducible in the real world. Furthermore, this study deliberately did not rank risks according to their severity and the urgency of response; this area may become the subject of further research using multi-criteria analysis methods.

Therefore, it can be argued that the implementation of the proposed set of measures requires a phased approach. In the short term (1–3 years), the top priorities are the establishment of an interdepartmental coordination center and the updating of the regulatory framework in accordance with the requirements of the Polar Code. The medium-term phase (up to 2030) should be devoted to the deployment of a full-scale monitoring system and the launch of remediation programs for the most hazardous sites where damage has been accumulated. In the long-term phase (up to 2035 and beyond), it is advisable to complete the transition of shipping to environmentally friendly fuels and ensure the integration of the Russian monitoring system into international research networks. Interdepartmental cooperation, involvement of independent experts and active participation of all stakeholders — including the scientific community, industrial enterprises and the indigenous peoples of the North — are essential for success at every stage.

Results

The study systematized the environmental risks associated with the intensification of economic activity in the Arctic zone of the Russian Federation and along the Northern Sea Route, and developed a set of measures to mitigate and eliminate these risks, adapted to Russia's institutional framework and the region's natural and climatic characteristics. The implementation of large-scale projects to eliminate this damage, in particular, the clean-up of Arctic territories, has become an important part of contemporary state policy, and the imperatives of this policy regarding the development of the Far North are analyzed by M.M. Panikar and A.E. Shaparov (Panikar, Shaparov, 2016).

Based on an analysis of scientific literature, international reports, government monitoring data, and expert assessments, 11 risk groups were identified, classified by their sources and mechanisms of impact on ecosystems. The proposed classification takes into account not only isolated threats, but also their synergistic effects, which are characteristic of polar regions.

Contemporary development of the Arctic is associated with the impact of a complex set of natural and anthropogenic factors, forming a multi-component system of environmental risks. This system is typically divided into several key categories, each distinguished by specific sources of hazard and mechanisms of environmental impact. Climate-related risks are currently acting as a fundamental driver of change, as climate parameters are rapidly transforming at high latitudes. In particular, the increase in average annual temperatures in the Arctic exceeds the global average by two to three times[20], leading to permafrost degradation, accompanied by a reduction in soil bearing capacity by up to 50% in some areas, as well as a reduction in the area and thickness of the ice cover. According to satellite monitoring data, the area of Arctic sea ice in September has decreased by 13% over the past twenty years, significantly altering the hydrological regime and increasing the frequency of hazardous events, including storms and ice shifts, requiring constant adjustments to infrastructure construction and operation standards.

Along with climate change, pressure from operational risks directly related to the intensification of shipping and industrial activity is increasing. The growth of cargo traffic along the Northern Sea Route from 4 million tons in 2015 to 34 million tons in 2022 proportionally increases the likelihood of accidents, the most dangerous of which are spills of heavy fuel oils, which can persist in Arctic conditions for decades[21] (Zhuravlev, 2012). Ship engines and industrial facilities emit sulfur dioxide, nitrogen oxides, and black carbon into the atmosphere, the deposition of which on ice and snow reduces the surface albedo and accelerates melting. Furthermore, physical impacts in the form of noise pollution from ship engines and vibration during icebreaking operations create a chronic stress factor for marine mammals, disrupting their communication, orientation, and re-

[20] AMAP. Arctic Climate Change Update 2021: Key Trends and Impacts. Summary for Policy-makers. Arctic Monitoring and Assessment Programme, Tromsø, Norway. 2021. URL: https://www.amap.no/documents/doc/arctic-climate-change-update-2021-key-trends-and-impacts.-summary-for-policy-makers/3508 (accessed 01 October 2025).
[21] Arctic Council. Arctic Marine Shipping Assessment Report. 2017. URL: https://arctic-council.org/projects/arctic-shipping-status-reports/ (accessed 01 October 2025).

productive cycles. The increase in cargo traffic and the number of crew members also leads to the accumulation of solid municipal and industrial waste, the disposal of which is extremely difficult in the absence of developed infrastructure.

A special category of risks arises from the accumulated environmental damage caused by decades of economic activity during the Soviet and post-Soviet periods. As a result, persistent pollution sources have emerged in the form of abandoned military facilities, fuel and lubricant depots, and unauthorized landfills, leading to the accumulation of petroleum products, heavy metals and polychlorinated biphenyls in concentrations exceeding maximum permissible levels by five to ten times in local areas[22] (Zhuravleva, Artyushina, Vinogradova et al., 2020). The situation is exacerbated by transboundary transfers, in which air and sea currents bring persistent organic pollutants from industrial regions of Europe, Asia, and North America to the Arctic. These toxicants are accumulated in food chains, reaching maximum concentrations in the bodies of predators and indigenous populations consuming traditional foods. Socio-ecological risks further complicate the overall picture, manifesting themselves in the reduction of biodiversity, the erosion of the resource base for traditional natural resource management, personnel shortages, and the technological backwardness of monitoring systems.

A key feature of the Arctic region is the high degree of interdependence between various risk groups, with climate change acting as a catalyst, amplifying the negative impacts of anthropogenic factors. Permafrost degradation reduces the resilience of infrastructure, increasing the likelihood of man-made accidents and fuel spills[23] (Kudryashova, Lipina, Zaikov, et al., 2019); shrinking ice cover opens up new waters for shipping, creating additional pressure on previously undisturbed ecosystems. Rising water temperatures accelerate biogeochemical processes, increasing the mobility of toxicants and their entry into food chains, while melting glaciers and permafrost releases previously sequestered pollutants, creating a secondary pollution effect. Taking these interrelationships into account is a prerequisite for developing effective management solutions, as fragmented measures aimed at isolating a single risk will not produce the expected result without simultaneously addressing related factors.

The developed set of measures to reduce and eliminate environmental risks represents a comprehensive tool that integrates regulatory, technological, and organizational measures into a single management system, the structure of which is based on the principles of adaptive management and provides for the differentiation of measures according to their functional purpose, implementation timeframe, and levels of responsibility. This approach corresponds to contemporary research on Arctic identity, where, as S.V. Shachin demonstrates, analyzing the history and

[22] AMAP. Arctic Climate Change Update 2021: Key Trends and Impacts. Summary for Policy-makers. Arctic Monitoring and Assessment Programme, Tromsø, Norway. 2021. URL: https://www.amap.no/documents/doc/arctic-climate-change-update-2021-key-trends-and-impacts.-summary-for-policy-makers/3508 (accessed 01 October 2025).
[23] Roshydromet. Review of the State and Pollution of the Environment in the Russian Federation for 2021. Moscow: Roshydromet. 219 p. URL: https://www.meteorf.gov.ru/upload/iblock/88f/Обзор%20за%202024%20год_300625.pdf (accessed 01 October 2025).

present-day situation of the North from the perspective of dialectical methodology allows for the complexity and contradictions of the region's development processes to be taken into account, which is crucial for formulating flexible management solutions (Shachin, 2019). The set of measures is based on a systematized list of measures, grouped by functional criterion into 11 blocks corresponding to specific risk categories. Institutional measures include improving the regulatory framework, creating coordinating structures, and developing standards aligned with the international requirements of the IMO Polar Code[24] and HELCOM recommendations. Technological measures are aimed at implementing continuous monitoring systems using satellite constellations, drones, and automated buoy stations, applying treatment technologies based on bioremediation and phytoremediation, and switching to environmentally friendly fuels. Organizational and preparatory measures include personnel training, regular exercises, environmental education of the population, and the creation of mechanisms for involving indigenous peoples in decision-making processes, which ensure the necessary level of information transparency and emergency preparedness. Table 1 lists the measures for each risk group in descending order of priority: from institutional (regulatory and legal framework) through technological (monitoring and treatment systems) to organizational and preparatory (training, exercises, and public awareness). The ranking is based on the authors' expert assessment, taking into account the implementation timeframes (short-term — institutional, medium-term — technological, long-term — organizational) and the degree of impact on risk reduction.

Table 1

Measures for implementation of scientific and methodological recommendations on reducing environmental risks in the Arctic and on the NSR

No.	Environmental risks	Measures in order of priority and significance
1	Monitoring and adaptation to climate change	• analysis of existing monitoring systems in Russia (e.g., Roshydromet, Arctic and Antarctic Research Institute); • development of requirements for expanding the network of automated stations and incorporating satellite data, taking into account integration with international platforms (e.g., Arctic Observing Network); • establishment of an interagency coordination center for climate monitoring, consolidating data from various organizations; • implementation of adaptive management through regular updates of norms and standards, taking into account new climate scenarios; • personnel training and preparation of specialists to work with modern monitoring technologies
2	Prevention and response to fuel spills	• updating the regulatory framework (e.g., Federal Law No. 7-FZ "On Environmental Protection") to take into account the IMO MARPOL international standards; • development and testing of bioremediation technologies and sorbents adapted to Arctic conditions, in collaboration with leading research centers; • creation of regional emergency response units equipped with specialized equipment;

[24] IMO. International Code for Ships Operating in Polar Waters (Polar Code). London: International Maritime Organization. 2015. URL: https://www.imo.org/en/ourwork/safety/pages/polar-code.aspx (accessed 01 October 2025).

		• organization of regular exercises in collaboration with the private sector and military units; • implementation of a satellite and drone monitoring system for rapid detection of incidents
3	Reduction of atmospheric pollutant emissions	• development of incentive mechanisms for the transition to LNG and alternative fuels (tax breaks, subsidies); • tightening control and monitoring of emissions through the installation of automated monitoring systems on vessels and industrial sites; • modernizing port infrastructure to receive and process marine fuel with minimal emissions; • conducting scientific research to assess impacts and develop local emission standards
4	Elimination of accumulated background pollution	• mapping contaminated areas and prioritizing remediation planning; • implementation of innovative soil and water treatment technologies (phytoremediation, microbiological methods); • attracting funding through government programs and international grants (e.g., BRICS Bank); • monitoring the effectiveness of measures using digital platforms
5	Minimisation of the impact of physical factors	• development and adoption of standards for noise and vibration in the marine environment, taking into account the recommendations of HELCOM and the International Maritime Organization; • implementation of noise reduction technologies on vessels and industrial equipment; • identification and prohibition of navigation in particularly sensitive areas during specific periods of animal migration; • educating shipowners and operators on the need to comply with these standards
6	Reduction of water pollution and transboundary transfer of toxins	• development and implementation of comprehensive wastewater treatment and discharge control programs; • use of modern technologies for the treatment and restoration of aquatic ecosystems; • ensuring transparency and accessibility of monitoring data for stakeholders
7	Waste management	• creation of regional waste management centers taking into account climatic conditions; • introduction of a system for separate waste collection and recycling, including incentives for businesses and the public; • organization of educational campaigns and training on waste management issues; • monitoring and reporting on the volume and quality of recycled waste
8	Combating chemical pollution and preserving biodiversity	• strengthening control over the use and disposal of hazardous substances; • expanding the network of specially protected natural areas and establishing buffer zones around key ecosystems; • support for scientific research and monitoring of biodiversity; • involvement of local communities in nature conserva-

		tion programs
9	Increasing environmental education and public participation	• development and implementation of educational programs in schools and universities across the region; • organization of public hearings and consultations on environmental policy; • creation of platforms for information exchange and engagement of indigenous peoples and local residents; • support for NGO and environmental organization initiatives
10	Improving the technological infrastructure for monitoring and response	• investing in digital technologies, including AI and Big Data for environmental data analysis; • creation of a unified, integrated, open-access monitoring platform; • training personnel to use modern monitoring and response systems; • organization of emergency centers to coordinate responses to environmental incidents
11	Promoting the implementation of environmentally friendly technologies	• development of government programs to support innovation and environmentally friendly technologies; • introduction of tax incentives and subsidies for businesses implementing green technologies; • promotion of international cooperation and technology transfer; • organization of competitions and grant programs for innovative projects

The proposed system of measures to ensure the environmental safety of shipping and economic activity in the waters of the Northern Sea Route is based on four key areas, which form a comprehensive set of technological, regulatory, and organizational solutions. Fundamental importance is attached to the creation of a three- level system for monitoring and adapting to climate change, as the timeliness and reliability of environmental data determine the effectiveness of all subsequent environmental protection measures. This system includes a space-based system using remote sensing satellites (“Arktika-M” and “Meteor” series) to monitor ice conditions, surface temperature and concentration of pollutants in the atmosphere; an aerial system using unmanned aerial vehicles for detailed surveys of localized areas; and land-based and marine systems relying on the expansion of the network of automated hydrometeorological stations and drifting buoys. It is proposed that the coordination of data collection and processing should be entrusted to an interdepartmental center under the Ministry of Natural Resources and Environment of the Russian Federation, with the participation of Roshydromet, the Rosatom State Corporation, and scientific organizations (AARI, All-Russian Research Institute “Ecology”). This will ensure regular updates of climate scenarios and economic activity standards.

The second area focuses on the prevention and response to fuel spills, where a set of measures is aimed at reducing the likelihood of accidents and minimizing damage. Key elements include the implementation of technical standards, such as the requirement for double hulls on all tankers and equipping them with automatic leak detection systems, as well as the establish-

ment of a network of regional emergency response centers in major ports with specialized vessels and equipment on permanent duty. Particular attention is paid to response technologies, including the use of biological remedies based on psychrophilic microorganisms and peat-based sorbents, and regular interagency exercises to practice coordination under conditions of polar night and low temperatures.

The third set of measures focuses on reducing atmospheric emissions of pollutants by encouraging the transition of vessels and port infrastructure to environmentally friendly fuels. This involves the introduction of economic incentives, including reduced port charges for vessels powered by liquefied natural gas and electric propulsion, subsidized conversions, and tax breaks. Meanwhile, it is proposed to tighten regulatory requirements by limiting the sulfur content in fuel to 0.1% in the NSR waters and mandating the installation of scrubbers on ships over a certain age, as well as developing onshore infrastructure to provide ships with electricity while moored.

The final area of focus involves the systematic elimination of accumulated background contamination through public-private partnerships. The work involves conducting an inventory and creating a digital register of contaminated sites, assigning a hazard class to each site, applying modern remediation technologies (phytoremediation, microbiological treatments, waste encapsulation), and diversified financing. The financial basis should consist of federal budget funds from the “Clean Country” project, compensation funds from subsoil users, and the attraction of international grants and loans through the Green Climate Fund or the BRICS Bank.

Interagency cooperation is a key condition for successful implementation. It is proposed to establish a permanent working group on Arctic environmental safety under the Government of the Russian Federation, including representatives from the Ministry of Natural Resources, the Ministry of Transport, the Ministry for the Development of the Russian Far East, the Ministry of Emergency Situations, the Rosatom State Corporation, the Russian Academy of Sciences, indigenous peoples’ organizations, and shipowners’ associations.

The developed set of measures can serve as a basis for updating existing strategic documents (the Strategy for Developing the Russian Arctic Zone, the Northern Sea Route Development Plan) and formulating new federal and regional programs in the field of Arctic environmental safety, as well as being used in the preparation of project documentation for specific investment projects in the region. As V.I. Goldin rightly notes in a recent publication on the relationship between “the Arctic — Regions”, it is impossible to fully comprehend contemporary challenges and prospects without taking into account the diversity of regional aspects and their integration into the overall Arctic agenda (Goldin, 2024).

Conclusion

This study, aimed at developing scientific and methodological recommendations for ensuring environmental safety in the Arctic and along the Northern Sea Route in the context of intensifying spatial development, allows formulating the following conclusions.

As a result of a comprehensive analysis of the current state of the natural environment, strategic documents of the Russian Federation and international reports, 11 groups of environmental risks associated with the development of the Arctic region have been identified. The risks are classified according to their sources: climatogenic (degradation of permafrost, reduction in ice cover, increased frequency of hazardous hydrometeorological phenomena), operational (fuel spills, emissions of black carbon and greenhouse gases, noise pollution, waste accumulation), cumulative damage risks (background contamination of soils and water bodies, transboundary transfer of persistent organic pollutants and heavy metals) and socio-environmental risks (loss of biodiversity, threats to indigenous peoples' traditional use of natural resources, a shortage of skilled personnel and technological backwardness of monitoring systems). It has been established that these risks are characterized by a high degree of interdependence and synergistic effects, with climate change acting as a catalyst, significantly amplifying the negative impact of anthropogenic factors.

Analysis of current data (2024–2025) identifies a number of key challenges requiring a scientifically based response:

- the rapid growth of cargo traffic along the Northern Sea Route (38 million tons in 2024), while maintaining a significant share of hydrocarbon cargoes, requires improved navigation safety systems and preparedness for emergency spill response;
- the increase in shipping traffic highlights the need to monitor the technical condition of vessels and ensure compliance with environmental standards by all parties involved in the transportation process;
- the use of various types of marine fuel and their impact on the Arctic environment require further study and development of optimal technical solutions, taking into account the climatic characteristics of the region;
- recent studies by AMAP and Adlard et al. have documented the presence of long-chain perfluoroalkyl substances (PFAS) in the bodies of the Arctic population, which necessitates the inclusion of these substances in national monitoring programs and the development of appropriate control methods.

The development of the environmental safety system in the Arctic is taking place within the context of changing international relations. At the same time, opportunities for scientific collaboration through specialized research networks (AMAP, SAON) and bilateral cooperation with friendly states are still available. The Russian Federation is consistently implementing its sovereign policy in the Arctic, relying on its own scientific and technological competencies, and devel-

oping partnerships with interested countries. In these specific circumstances, the role of national monitoring systems, their technical upgrading, and integration with international databases is becoming critically important for ensuring global environmental security.

The authors propose an approach to reducing and eliminating environmental risks (Table 1), characterized by the integration of three types of measures: institutional, technological, and organizational-preparatory. The proposed approach is based on an adaptive principle that allows for the adjustment of management decisions as new monitoring data becomes available and climate scenarios change.

The comparative analysis confirms the feasibility of adapting successful international practices to Russian conditions:

- Norway's experience of electrifying shipping and introducing onshore power supply in ports can be studied and applied in Murmansk, Arkhangelsk, and other key NSR ports, taking into account Russian specifics;
- the POLARIS methodology and Canadian developments on integrating accident impact assessments into voyage planning are of interest for improving Russian navigation regulations in Arctic conditions;
- standardized approaches to noise pollution monitoring developed by HELCOM can be adapted to Russian practice for the protection of marine mammals.

The comprehensive approach that has been developed is a practical tool that can form the basis for implementing a whole range of management and project-related decisions at various levels. First and foremost, its provisions can serve as a scientifically justified foundation for updating key strategic planning documents, such as the Strategy for Developing the Russian Arctic Zone until 2035 and the Northern Sea Route Development Plan until 2035. This will allow for not only the declaration, but also the inclusion of specific measurable environmental safety indicators, as well as clearly defined mechanisms for achieving them, thereby increasing the effectiveness of public administration in the region.

At the level of implementing specific infrastructure projects, the proposed approaches can be used in developing technical specifications and conducting expert assessments for projects. Integrating this set of measures into these processes ensures that environmental risks are assessed and taken into account during the design stage rather than at the final stages, significantly reducing potential damage and subsequent remediation costs. Furthermore, this approach serves as the basis for developing targeted regional programs aimed at addressing the most pressing issues: from organizing waste management systems and remediating areas with accumulated environmental damage to preserving biodiversity, whilst actively utilizing public-private partnership mechanisms.

Finally, an equally important area of application is the development of human capital. The materials and conclusions contained in the developed approach can be adapted to create specialized educational programs aimed at improving the skills of specialists working in Arctic

conditions. At the same time, this opens up opportunities for the development of environmental education programs for local population, including for the indigenous peoples of the North, which will promote a responsible attitude towards the environment and the sustainable development of the region as a whole.

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Aquaculture in the North-West of Russia: Statistics, Conditions and Development Prospects

Sergey S. Vopilovskiy [1]✉, Cand. Sci. (Econ.), Associate Professor, Leading Researcher

[1] Luzin Institute for Economic Studies — Subdivision of the Federal Research Centre "Kola Science Centre of the Russian Academy of Sciences", ul. Fersmana, 24a, Apatity, Russia
[1] simonovich.63@yandex.ru ✉, ORCID: https://orcid.org/0000-0002-2873-1425

Abstract. The study presents statistical data on the dynamics of aquaculture production volumes in Russia, identifies the main segments in the structure of commercial aquaculture production, and determines the regional specialization of aquaculture production in the North-Western Federal District of Russia. Based on reports of the Federal Agency for Fisheries, the study highlights key performance indicators of the fisheries sector in implementing the country's Food Security Doctrine, in particular, the self-sufficiency rate for fish and fish products exceeded 138%, an increase in the consumption of fish products by the country's population was recorded in 2024, reaching 23.5 kg per person per year. A statistical analysis of commercial aquaculture production in the fisheries sector identifies the North-Western Federal District as the traditional leader in aquaculture production and indicates its regional specialization in the farming of salmonid species. Data is presented on past and current unforeseen circumstances affecting commercial aquaculture production, as well as promising areas for development, such as the construction of new aquaculture complexes, the production of feed and fish seed, the expansion of water areas for aquaculture farms, etc. It is noted that the industry is working on new investment projects and additional measures of state support, updating the legislative framework, advancing fisheries science, and paying particular attention to staffing within Russia's fisheries sector. The research and developments of the All-Russian Research Institute of Fisheries and Oceanography (VNIRO) and its branches to improve the quality of domestic fish feed are presented. Projects for the construction and modernization of commercial aquaculture plants and farms in the regions of the country are examined. The global trend of leading foreign companies in the long-term development of aquaculture production is outlined. The significant contribution of fish farmers of the North-West of Russia to aquaculture production is emphasized.
Keywords: *aquaculture, economy, North-West Russia, aquatic bioresources, fisheries, fish farming, fish seed, fish feed*

Introduction

The Russian fishing industry is working systematically to ensure the country's food security in the current political, economic, and financial conditions. Sanctions imposed by unfriendly countries, the introduction of export duties, and the explicit rejection of fish products from Russian suppliers are complicating the productive operations of the fisheries sector (FS) (Ershov, 2022). Nevertheless, the FS's economic performance indicators for 2024 demonstrate stability in the harvesting and production of fish products, as well as timely adaptation to the impact of sanctions. The catch of fish and seafood amounted to over 4.9 million tons, and the self-sufficiency rate for fish and fish products exceeded 138%, compared to the Food Security Doctrine target of 85% (Va-

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silyev, Lisunova, 2022). Rosrybolovstvo notes an increase in fish consumption by the country's population, which amounted to 23.5 kg per person per year in 2024 (+4.4% compared to 2023 level of 22.5 kg). Fishing industry enterprises have fully supplied the domestic market with fish products and fulfilled all obligations to foreign partners, and a modern fishing fleet ensures efficiency and environmental sustainability (Vopilovskiy, 2025).

The Russian fisheries industry is undergoing a large-scale reorganization: port infrastructure is being developed; new fishing and research vessels, fish processing plants, transport refrigerator vessels, and other facilities are being built. The implementation of investment programs aimed at modernizing the fisheries industry will determine the long-term prospects of the fishing industry.

Russian aquaculture

The development of Russian aquaculture is showing positive trends: since 2016, commercial aquaculture production figures have more than doubled (as shown in Table 1) (Ivashko, Ivashko, 2024).

Table 1

Dynamics of aquaculture production volumes in Russia[1]

Year	Thousand tons	Deviation % current year / previous year
2014	159.9	2.8
2015	153.2	-4.2
2016	173.6	13.3
2017	186.5	7.4
2018	204.0	9.4
2019	286.8	40.6
2020	328.6	14.6
2021	356.6	8.5
2022	383.5	16.7
2023	402.0	4.8
2024	380.0	-5.8

At the end of 2024, commercial aquaculture production, including fish seed, amounted to 380,000 tons, which is 22,000 tons less than in 2023. In 2023, commercial production amounted to 402,000 tons, which is 18,600 tons (4.8%) more than in 2022 (383,500 tons), making it the most productive year in domestic aquaculture (Vasilyev, Lisunova, 2022). In 2024, the first decline in the previous eight years occurred. According to experts, the primary cause was a natural factor. In North-West Russia, particularly in the Murmansk and Leningrad Oblasts, adverse weather conditions and poor-quality salmon seed led to a reduction in commercial aquaculture production. The cold spring and hot summer of 2024 in the North-Western Federal District disrupted the specific temperature conditions that are critical for the production of salmonids — salmon and trout. The summer heat and, as a result, the oxygen deficiency triggered fish diseases. Dependence on im-

[1] Source: (Ivashko, Ivashko, 2024).

ported seed, vaccines, and feed is the cause of the decline in salmon production. Rising operating costs, increased borrowing costs, and other economic factors negatively impacted commercial aquaculture production (Sergeev, Sergeev, 2024).

According to the updated Strategy for the Development of the Agro-Industrial and Fisheries Complex of Russia until 2030[2], commercial aquaculture production in 2025 should amount to 420,000 tons in the baseline (optimistic) scenario, 400,000 tons in the conservative (pessimistic) scenario; in 2030, it is expected to reach 618,000 tons and 502,000 tons, depending on the scenario.

Currently, commercial aquaculture enterprises in the North-West have begun work on the construction of new complexes, including feed and fish seed production, and expansion of water areas for their farms (Zhukova, 2024). In 2024, the Ministry of Agriculture of the Russian Federation proposed compensating fish farmers' capital expenditures on the creation and modernization of hatcheries for the cultivation of salmon and seafood seed. This measure is aimed at accelerating the domestic market's independence from imported products and stimulating the production of domestic salmon seed and high-quality valuable seafood. In 2025, the Federal Agency for Fisheries was allocated over 40.2 billion rubles (+24.1% compared to 2024 level of 32.4 billion rubles) for the artificial reproduction and conservation of aquatic bioresources, funding for fisheries science, repair of rescue vessels, and other purposes. The Russian government will provide support to entrepreneurs investing in salmon farming, who can expect reimbursement of up to 25% of the direct costs incurred in establishing and modernizing hatcheries. In 2025, the budget reserved 8 billion rubles for these purposes.

In 2024, salmon production ranked second in Russian aquaculture production, compared to the leading position in 2023. The production rate decreased by 5.8% compared to 2023 (Table 1).

Figure 1 shows the structure of aquaculture production in 2023.

[2] Strategy for the Development of the Agro-Industrial and Fisheries Complex of Russia until 2030. No. 2567-r of September 8, 2022. URL: http://static.government.ru/media/files/G3hzRyrGPbmFAfBFgmEhxTrec694MaHp.pdf (accessed 15 April 2025).

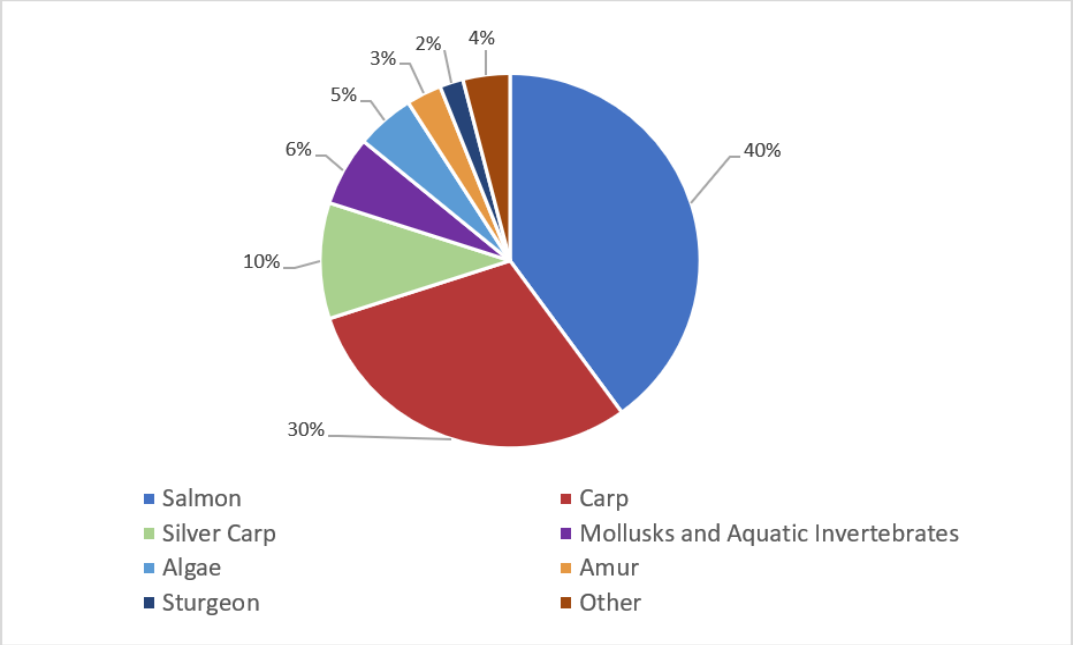


Fig. 1. Structure of aquaculture production in 2023[3].

Figure 2 shows the main segments of aquaculture production in 2024.

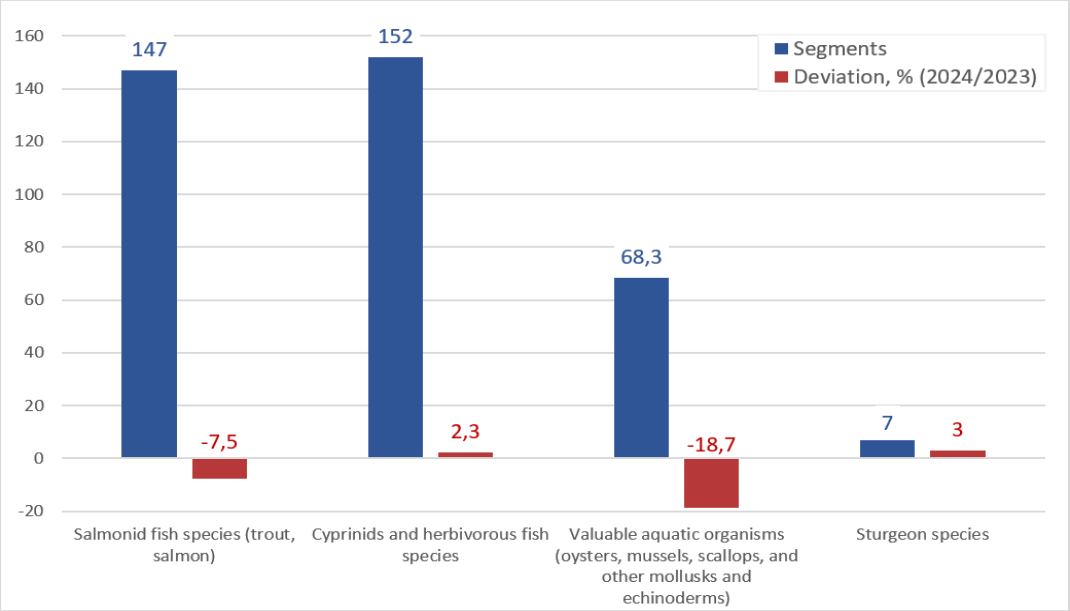


Fig. 2. Main segments of aquaculture production in 2024[4].

The development of domestic salmon farming is of great importance, as this product is in high demand by the population and this segment has consistently increased in growth, with the exception of 2024 (shown in Fig. 3).

[3] Source: (Ivashko, Ivashko, 2024).
[4] The Board of the Federal Agency for Fisheries' (Rosrybolovstvo) activities in 2024 and tasks for 2025. URL: https://fish.gov.ru/main-news/2025/03/31/kollegiya-rosrybolovstva-obsudit-itogi-2024-goda-i-zadachi-na-2025-god/ (accessed 15 April 2025).

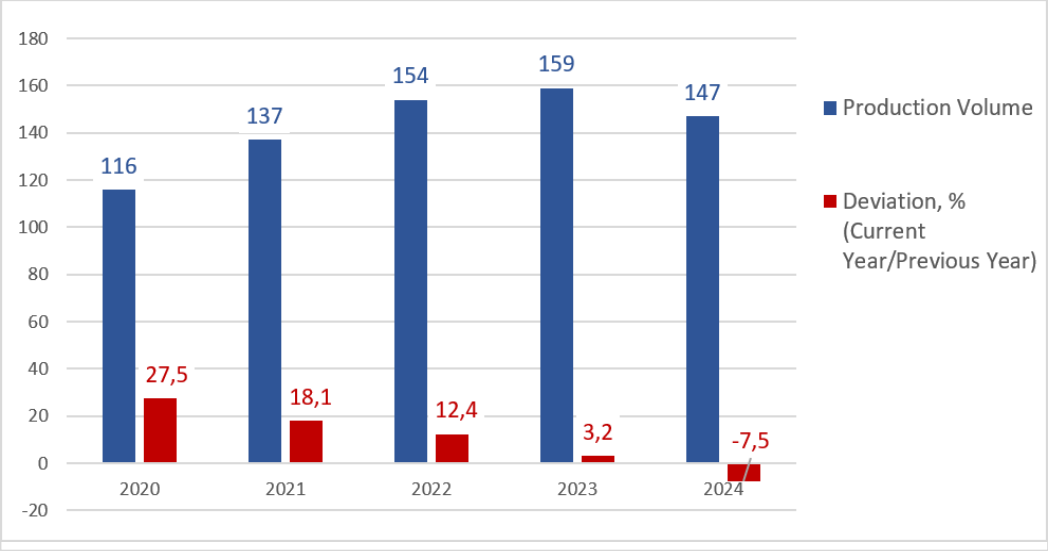


Fig. 3. Dynamics of aquaculture salmonids production in Russia[5].

Over the forecast period up to 2034, salmon farming in Russia is set to rise to 209,000 tons, with imports reaching 75,000 tons per year, compared to 60,000 and 65,000 tons in 2023 and 2024, respectively. Consumption could reach 450 billion rubles in monetary terms, which is 2.8 times more than in 2024[6].

The current regional specialization of aquaculture production shows that in Russia's North-Western Federal District (NWFD), salmonids constitute the key production volume, accounting for 98%. In the Murmansk Oblast, the main products of commercial fish farming are Atlantic salmon, sea trout, and rainbow trout; in the Leningrad Oblast, rainbow trout accounts for 97%; and in the Republic of Karelia, trout accounts for 99% (Zhukova, 2024). The Republic of Karelia leads the NWFD in terms of the number of operating aquaculture facilities (98 facilities), followed by St. Petersburg — 47 facilities, the Murmansk Oblast — 26, the Vologda Oblast — 15, and the Arkhangelsk Oblast — 10. Table 4 shows salmonid production in the Russian Federation.

In 2024, the North-Western Federal District became the traditional leader in aquaculture production, with 103,400 tons, followed by the Southern Federal District with 94,200 tons, and the Far Eastern Federal District with 93,000 tons.

A press release from the North-Western Territorial Administration (NWTA) dated February 17, 2025, stated: "In 2024, the North-Western Territorial Administration (NWTA) produced 46,030 tons of commercial aquaculture products: 32,700 tons of commercial fish and 13,300 tons of fish seed. Compared to 2023 (54.68 thousand tons), the volume of commercial aquaculture production amounted to 84.2%. In 2024, the NWTA held 12 auctions for the right to conclude agreements for the use of fish farming sites; as a result, 6 fishing sites with a total area of 184.7 hectares were provided for aquaculture purposes, leading to the transfer of over 52 million rubles to the federal budget. In order to fulfill the state assignment to compensate for damage caused to aquatic bio-

[5] Source: (Ivashko, Ivashko, 2024).

[6] Analysts predict strong growth in salmonid aquaculture in Russia by 2034. URL: https://www.vedomosti.ru/business/articles/2025/03/04/1095749-analitiki-prognoziruyut-silnii-rost-akvakulturi-lososevih (accessed 15 April 2025).

logical resources (ABR), the first release of juvenile Atlantic salmon in 2025 by the Nevskiy Fish Hatchery into the Neva River amounted to 80,000 specimens. The Atlantic salmon juveniles were hatchery-reared from broodstock caught in the Neva River. In 2024, 267,119 specimens of Arctic char were released into Lake Ladoga; 678,049 specimens of Atlantic salmon — into the rivers of the Gulf of Finland basin; 761,338 specimens of juvenile pike perch — into the lakes of the Leningrad Oblast."[7]

Construction and modernization of fish feed production facilities

The importance of domestic fish feed production is highlighted in the Strategy for the Development of the Fisheries Sector, which states that by 2030, 90% of enterprises' fish feed needs are to be met by domestic production. The Russian salmonid aquaculture market's dependence on foreign feed in 2022 was approximately 90%, but the situation is changing. In 2024, the volume of fish feed production for aquaculture in Russia amounted to 100,000 tons, which is 108.3% more than in 2023 (48,000 tons)[8]. This made it possible to meet approximately 25% of the Russian aquaculture market's needs. In 2024, domestic fish farmers met 15% of the Russian market's demand for salmon seed. According to estimates by experts at the Centre for Market Economics[9], demand for feed could grow to 250,000 tons in the medium term, of which over 139,000 tons will be for salmon feed and over 10,000 tons — for both salmon and sturgeon.

The current trend in the development of the Russian fisheries complex identifies aquaculture as a key area for scientific support in the fields of genetics, breeding and the development of new fish feed formulations.

The Federal State Budgetary Scientific Institution VNIRO, its branches, and higher education institutions involved in the country's fisheries industry are conducting research to improve the quality of domestic fish feed. In particular, researchers at the Kaliningrad State Technical University (KSTU) have patented a unique technology that combines the raw material potential of Russia's marine areas, from Kaliningrad Baltic herring to Kamchatka squid, using amber chelate bonds. The Department of Chemistry at KSTU reports: "...we succeeded in synthesizing amber chelate complexes. The resulting products contain succinate ions, which gives them increased biological and nutritional value, as well as adaptogenic and immunomodulatory properties. Protein hydrolysates obtained in this way can be used in a wide range of industries, from pharmaceutical and food to veterinary and innovative feed products."[10]

[7] The Northwestern Territorial Administration of the Federal Agency for Fisheries (Rosrybolovstvo) reports on the year's results in aquaculture. URL: http://aquacultura.org/news/severo-zapadnoe-terupravlenie-rosrybolovstva-ob-itogakh-goda-v-akvakulture/ (accessed 18 April 2025).
[8] Conference "Agroinvestor: PRO livestock farming and feed". URL: https://www.agroinvestor.ru/conference/43474/ (accessed 15 April 2025).
[9] Center for Market Economics. URL: https://www.agroinvestor.ru/conference/43474/ (accessed 15 April 2025).
[10] Scientists from KSTU have patented a unique technology. URL: https://klgtu.ru/media/novosti/uchenye_iz_kgtu_zapatentovali_unikalnuyu_tekhnologiyu/ (accessed 18 April 2025).

In the Republic of Karelia, the company "RusFish" has been producing fish feed since 2023. It is planned to invest 1.6 billion rubles in the new facility, located in the Kondopoga District of Karelia, and to create 89 new jobs. The products manufactured there will enable the republic's fish farmers to completely eliminate their reliance on imported feed. The project is scheduled for completion in 2026.

In 2024, production facilities in the Nizhny Novgorod and Kursk Oblasts were commissioned, with a total estimated capacity of 18,500 tons of specialized fish feed per year.

In North Ossetia, Ostrov Aquaculture Company completed the first phase of its trout farm development in 2023. As a result, 100 reservoirs were constructed, with annual production reaching 2,500 tons of trout. The second phase of the project is currently at the design stage. The planned completion date for the investment project is 2029.

In the Primorskiy Krai, Vozrozhdenie Company plans to commission a plant for the production of high-quality fish feed in 2025. The plant's annual capacity will be up to 16,000 tons of feed with an original formula for Pacific salmon, trout, carp, catfish, and other aquatic species. The initial stages of the project began with the development of original feed formulas. Scientists, engineers, and technologists from the Advanced Engineering School "Institute of Biotechnology, Bioengineering, and Food Systems" of the Far Eastern Federal University (FEFU) were engaged in the project. As a result, the feed formulations included specialized components such as microalgae, hydrolysates, and others (Tsitskieva, Betlyaeva, Markin, 2024). All feed components are grown, harvested, and produced in Primorye, with the exception of certain vitamin groups. Laboratory testing of feed samples showed that these products are comparable to, and in some respects, superior to, the best Russian and foreign feeds. The company plans to supply salmon hatcheries in the Far East with feed and subsequently to expand into export markets.

One of the promising areas of the fishing industry is mariculture — a form of aquaculture involving the farming of aquatic organisms in controlled artificial environments. In Primorsky Krai, which accounts for 95% of mariculture in the Far East, the draft regional budget allocated over 7.6 million rubles for subsidies for this sector in 2025. Salmon farming and mariculture are the key drivers for achieving the strategic indicators of the Russian fisheries sector.

According to statistics on the Russian fishing industry from the Russian Federal Research Institute Of Fisheries and Oceanography (VNIRO), commercial fish farming in 2021 and 2022 amounted to: (presented in Table 2) (Kolonchin, 2023).

Table 2

Commercial fish farming [11]

Farming facilities	Total
2021	
Number of facilities, units	1 988
Number of farmed species including:	319 342
Freshwater farming	

[11] Source: (Kolonchin, 2023).

— number of facilities, units — farmed by species	1 854 190 479
Mariculture — number of facilities, units — farmed by species	 134 128 863
2022	
Number of facilities, units	2 283
Number of farmed species including:	348 187
Freshwater farming — number of facilities, units — farmed by species	 2 132 195 039
Mariculture — number of facilities, units — farmed by species	 151 153 148

The statistical data demonstrate the potential for their application in analysis and recommendations for improving the efficiency of commercial fish farming.

Domestic aquaculture production ensures a sustainable supply of high-quality aquatic products to the country's population. Enterprises in this sector have economic and social responsibilities — they create new jobs for local residents, play an active role in social life and contribute to the development of the relevant infrastructure. These activities are particularly important in Russia's border regions (Khasanova, Skuratova, Musina, 2024).

International trends

In the long term, aquaculture could become the main driver of global fisheries development — global aquaculture production is growing by approximately 4% per year. According to estimates by the Food and Agriculture Organization of the United Nations (FAO), global fish production increased by 3.3% by the end of 2024, exceeding 100 million tons (The State of Food and Agriculture, 2024).

FAO experts regard the high level of fish farming and aquaculture[12] as a success, as they believe it allows for increased food production from aquatic resources without placing additional pressure on the marine environment. Farming seafood instead of catching it will provide a respite for overexploited species (Ignaciuk, Ilicic, Asprooth et al., 2021; OECD, 2021).

However, global researchers conclude that aquaculture almost never produces more calories or nutrients than it consumes, which contradicts the industry's claim that large-scale fish farming is essential for feeding the world's growing population. Research shows that 23.4 million tons of wild-caught small fish are processed into fishmeal and fish oil annually, most of which is intended for use in feed for predatory fish cultivated on farms and in factories, such as salmon, trout, prawns, and others. Farmed salmon consume up to six times their own weight in wild fish, and prawns — up to one and a half times their own weight in wild fish by the time they reach the

[12] FAO report: Global fisheries and aquaculture production reached historic maximum. URL: https://www.fao.org/newsroom/detail/fao-report-global-fisheries-and-aquaculture-production-reaches-a-new-record-high/ru (accessed 15 April 2025).

market (Nikandrov, Shindavina, Zinchenko et al., 2024). Salmon and prawns are the most popular farmed marine species among consumers in developed countries. In 2022, global salmon sales were estimated to be worth over 21 billion US dollars; the prawn market — nearly 74 billion US dollars in 2024.

As aquaculture production continues to grow, demand for fishmeal and fish oil is increasing.

Cooke (Canada), one of the largest seafood producers, is acquiring Copeinca, a Peruvian producer of fishmeal and fish oil. High-quality fishmeal and fish oil provide safe and nutritious feed for the growth and care of animals across several sectors, including aquaculture. Copeinca holds the largest anchovy quota in Peru — 15.9% of the total — and processes approximately 21% of the country's catch, enabling the company to produce approximately 200,000 tons of fishmeal and 23,000 tons of fish oil annually. The deal will allow Cooke to diversify its geographic presence and product range, strengthening its vertical integration as a producer of aquaculture salmonids.

The Japanese corporation Mitsubishi is investing in Finnish salmon aquaculture producer Finnforel to expand its trout farming facilities. Finnforel's mission is to save the seas and feed the planet. The Finnish company farms fish using its own concept, which involves advanced biofiltration to control all environmental factors in the trout's environment. The concept includes processing and packaging fish products in the farming sites, which minimizes the number of participants in the logistics chain and reduces transportation time. This guarantees the freshness of the fish products and lowers their cost.

Mitsubishi's assets in the fishing industry include the British Princes Group, which processes 30–40% of the bluefin tuna imported into Japan, the Norwegian aquaculture company Cermaq, and the Japanese wholesale company Toyo Reizo.

Global catches of aquatic biological resources have remained in the range of 90–92 million tons for over 10 years. At the same time, global aquaculture production is growing by almost 4% per year, making investment in this segment of the fishing industry feasible.

According to experts, the Russian fishing industry is capable of increasing capacity and producing up to 500,000 tons of feed meal by 2030. According to research by the All-Russian Association of Fishery Enterprises (VARPE), the potential for fishmeal exports by 2030 could reach 1.1 billion US dollars, which is more than four times higher than the figure for 2023.

Aquaculture is currently becoming one of the fastest-growing sectors of Russian agriculture. However, despite this progress, a number of recommendations need to be implemented to improve the efficiency of commercial aquaculture production:

- ensure healthy growth and immunity of aquatic organisms;
- develop innovative high-energy feeds that improve the nutritional value and boost the immunity of valuable fish, in collaboration with Russian higher education institutions and institutes of the Russian Academy of Sciences; this will lead to an improvement in the quality of fish products on the market;

- enable domestic enterprises to increase production volumes in key aquaculture segments using Russian scientific achievements in breeding. For example, in the Republic of Karelia (North-Western Federal District), salmonid production volumes increased in the first three months of 2025 (7.5 thousand tons were farmed, which is 37.2% higher than the result for the same period in 2024), sturgeon production figures in the first quarter increased by 17.5% (4.3 thousand tons of commercial fish were farmed), and in the Sakhalin Oblast, from January to March 2025, there was an increase in the production of seafood — mussels, oysters, scallops and other mollusks and echinoderms, as well as seaweed (more than 14.4 times higher than the figures for the first quarter of 2024).

Conclusion

Aquatic biological resource production in Russia has remained stable for over five years, amounting to approximately 5 million tons. Since 2021, the total allowable catch (TAC) set by the Joint Russian-Norwegian Fisheries Commission (JRNFC) for northern cod in the Barents Sea has been decreasing: 2021 — 378,635 tons; 2022 — 302,605 tons; 2023 — 241,782 tons; 2024 — 193,124 tons; 2025 — 151,436 tons. There are plans to introduce restrictions on cod fishing in two areas of the Far East (specifically during the spring fishing season) (Lisienko, 2024). The reduction in the TAC will affect cod catch volumes and supplies to the domestic and export markets; cod prices are already rising sharply (Vopilovskiy, 2024). Growing demand is noted, and cod remains one of the most popular whitefish species on the global market. Consequently, it would be beneficial to draw on the expertise of Norway, which borders the Murmansk and Arkhangelsk Oblasts (NWFD) and has similar climatic conditions, in the production of farmed cod. Norwegian farmers are actively developing this sector: in 2024, total aquaculture cod production reached 20,000 tons, and by 2026, it could reach 32,000 tons (+60%). Norwegian aquaculture will account for around a third of all exported cod. In the past, cod farming was not economically viable due to high production costs and relatively low market prices for this species. Currently, the situation is changing rapidly: the TAC is being reduced, the supply of cod on the global market is steadily declining, and prices are rising. Russian cod aquaculture is not yet well developed, but there is a good example set by Norwegian farmers that aquaculture farms in the Northern Basin can follow.

The People's Republic of China is intensifying its efforts to develop commercial aquaculture of Pacific cod (Gadus macrocephalus) aquaculture, viewing this sector as promising. The technology developed by Chinese scientists for the full biological cycle of Pacific cod farming in artificial conditions has been recognized as ready for commercialization.

Commercial aquaculture production in Russia showed steady growth from 2016 to 2023 (Table 1), which is related to systematic research into the development of this sector. Further joint work between representatives of fisheries science and fish-farming community reveals strategic prospects for the development of the country's aquaculture sector: increasing export potential, reducing dependence on imports, relieving pressure on wild stocks, and diversifying aquaculture.

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Methodology for Assessing the Export Potential of Arctic Mineral Resources in the New Conditions of Monopolistic Competition

Sergey A. Agarkov [1], Dr. Sci. (Econ.), Professor, Chief Researcher
Medea V. Ivanova [2]✉, Dr. Sci. (Econ.), Professor, Chief Researcher

[1, 2] Luzin Institute for Economic Studies — Subdivision of the Federal Research Centre "Kola Science Centre of the Russian Academy of Sciences", ul. Fersmana, 24a, Apatity, Russia
[1] agarkovsa@yandex.ru, ORCID: https://orcid.org/0000-0002-3417-0265
[2] mv.ivanova@ksc.ru ✉, ORCID: https://orcid.org/0000-0002-6091-8804

Abstract. The article analyzes theoretical and methodological approaches to the spatial organization of neo-geoconvergent development of the Russian Arctic economy in the context of the challenges of 21st-century postmodernity, characterized by high geopolitical instability and the destruction of traditional forms and models of the global economy. Estimation methods based on logarithmic linearization of the gravity equation suffer from serious specification inaccuracy due to omitted variables, which complicates the interpretation of results and leads to unreliable estimates. By contrast, models estimated using an extended specification that accounts for Arctic trade barriers significantly reduce the deviations caused by the influence of multilateral resistance factors, thereby enhancing the reliability of empirical estimates and conclusions. Applying our method to the example of coal reserve development, we demonstrate how the distance elasticity of trade changes when Arctic trade barriers are taken into account and find that the indicators of the Arctic coal industry's development presented in government documents suffer from statistically significant inaccuracies. Trade elasticity coefficients in the traditional gravity equation are systematically lower than those obtained using logarithmically linearized regressions that account for Arctic trade barriers. This study is a continuation of a series of the author's works devoted to the Newest General (and Special) Theory of Neo-Geo-Convergent Development of the Economy of the Russian Arctic.
Keywords: *Arctic zone, neo-geoconvergent approach, spatial complementarity, Arctic trade barriers, gravity equation*

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Introduction

The Russian Federation currently faces complex challenges: in the context of escalating geopolitical entropy, leading to the destruction of established forms and models of world order, it is

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becoming increasingly difficult to ensure sustainable and competitive growth of the national economy, integrated into global value-creation processes, without falling into isolation.

In order to advance national interests within the global system of new world economic relations taking shape right before our eyes, it is no longer sufficient to simply possess large natural resource reserves. It is necessary to propose globally attractive strategies that, based on the principles of mutually beneficial and competitive cooperation (Brandenburger, Nalebuff, 1996), ensure long-term economic growth and development. According to research by D. Moore (Moore, 1996), devoted to the principles of competition in the era of business ecosystems, the most effective long-term strategies are those aimed not at unilateral superiority (the so-called “zero-sum” game, where the winner takes all), but at cultivating business ecosystems that combine environmental influences, competition, and the evolution of multiple stakeholders. D. Moore termed this phenomenon “co-evolution”.

As L. Zobova rightly notes, “in today’s globalized world, the advantage belongs not to those who produce goods, but to those who manage their flows, attract financial resources and highly qualified personnel, and create and disseminate advanced technologies” (Zobova, 2012). Territories capable of influencing global exchanges develop a unique regional rent, which allows for more efficient and diversified resource management, ensuring their greater capitalization and liquidity.

The future global economic order currently remains uncertain. Therefore, Russia’s place in the new system of geo-economic coordinates will largely be determined by strategic choices and the development model of the national economy within the international division of labor. The latter means that at turning points such as today, when a new economic order is taking shape, the variability and significance of historical choices are particularly evident. In our opinion, such choices should be based on a solid scientific foundation, equipped with methodological tools with high predictive power for global economic dynamics. This will not only enable the formulation of a model for the country’s successful socio-economic development, consistent with Russia’s desired future role in the world, but also ensure the achievement of strategic objectives for the globally competitive development of the national economy within the international division of labor.

In this context, the effective use of the Arctic zone’s spatial and resource potential, which is a key factor in ensuring long-term sustainable economic growth for the national economy, is becoming an important element of state strategy, requiring appropriate methodological support that takes into account the new realities of the modern world.

Viewing the Russian Arctic economy as a global world-system project, we consider it necessary to discuss the neo-geoconvergent development of the Arctic economic space, which presupposes a harmonious combination of high-tech, internationalized production cycles of mineral resource extraction with transport and logistics activities facilitating international transit, with the Northern Sea Route serving as the hub for intermodal transport logistics linking the “West–East” and “North–South” international transport corridors (Agarkov, 2025).

Thus, the neo-geoconvergent development of the Arctic economy can be interpreted as the ability to create added value, spatially integrated into the global system of international and national division of labor, based on co-competitive principles of multi-level transregional interaction (Agarkov, 2025).

In relation to the topic of the study, the aim is to develop the methodological foundations for a neo-geoconvergent spatial organization of the Arctic economy, which reproduces a qualitatively new multiregional structure of co-competitive transregional (transnational) market interactions that generate spatially interconnected added value in the international and national division of labor.

The aim of the study is to assess the export potential of Arctic mineral resources under the new conditions of monopolistic competition.

An expanded specification of the gravity equation for trade in Arctic mineral and raw material resources has been developed, taking into account the specific economic and geographical characteristics of economic activity in the Arctic.

An assessment of the export potential of the economic development of Arctic coal deposits has been conducted.

The scientific novelty of the study lies in the development of methodological approaches for assessing the elasticity of trade by distance, taking into account factors of multilateral resistance that characterize the barrier coefficients of Arctic geography and transport logistics. The proposed approach allows for a more accurate assessment of the prospects for economic development of the Arctic zone's resource potential and the scale effects of growth in Arctic extractive production.

Materials and methods

The basic hypothesis of the study is the empirically confirmed assertion that there is a strong correlation between the indicators of the scale effect of economic growth and market and supplier access, which forms the basis of the developed **geoconvergent approach** of the complementary spatial organization of the Arctic economy, integrated into the global and national space of value creation (Agarkov, 2025).

The empirical analysis of the Arctic energy resource export potential was based on the methodology of the new analytical trade model (NATM), developed to substantiate the neo-geoconvergent spatial organization of the Russian Arctic market economy. This model characterizes the freedom of trade in Arctic mineral resources in the N-regional economic (market) space Ω_{ij}^{R} in terms of organized proximity of market and supplier access (Agarkov, 2025):

$$\mathbf{HATM}: \Omega_{ij}^{N} = \begin{cases} V_{ij}^{R}(S_{z,j}, D_{i,z}) \cong \mathrm{P}(Q_{i,z}^{A}, C_{z,j}) :\Rightarrow (S_{j}^{C} \overset{Valras}{\square} D_{iz}^{Q}) \\ Q_{iz}^{AN} = V(\mathrm{K}_{izj}^{A}) :\Rightarrow (V_{z}^{\mathrm{K}} \overset{Nash}{\square} \alpha V_{z}^{R})^{\beta} \mid \vartheta_{ij}^{N} \\ ST(\pi_{0}^{a}) = f_{Q} - f_{E} = 0 \\ EX_{izj}^{\chi} = \mathcal{M}(\hat{A}_{iz}^{s} T_{ij}^{-\eta} \hat{A}_{zj}^{m})^{\psi} \square \chi_{izj}^{\Omega} \mid f^{a}(T_{ij}) \end{cases}, \quad (1)$$

The analytical NATM model (1), based on the theoretical framework of the NEG and the New International Trade, formalizes the conditions for competitive trade equilibrium for Arctic raw materials in a multiregional economic (market) space with a monopolistic competitive structure using the principles of multidimensional balance. The theoretical justification for the NATM is presented in detail in (Agarkov, 2025).

Empirical assessment of the NATM model

In this section of the study, we demonstrate how incorporating Arctic factors of economic geography and transport logistics allows us to create a trade gravity model with a much more plausible interpretation of the estimated export potential and expected scale effects of Arctic extractive industry growth.

Our basic hypothesis is that the current level of development of the Arctic zone's transport and logistics infrastructure is a constraint on the development of Arctic extractive industry and the Arctic economy as a whole. We further argue that forecast estimates of the economic effects of Arctic extractive industry growth (including those within the framework of the NSR Development Plan[1]) should take into account the economic and geographical factors of multilateral resistance characteristic of the Arctic zone. Ignoring these factors in the models (specifications) used to forecast the development potential of the Arctic economy leads to a statistically significant bias in the expected growth effects due to omitted variables.

In order to test our hypothesis, we apply an extended version of the gravity equation developed within the NATM methodology (1), which takes into account multilateral resistance factors associated with Arctic economic geography and transport logistics, market and supplier access. Traditional estimation methods suffer from significant inaccuracy due to omitted variables in the specifications, leading to inconsistent estimates. Our approach, in contrast, avoids these problems, thereby enhancing the reliability of empirical estimates and making the interpretation of findings more robust.

In our study, we rely on the methodology proposed by Anderson and van Wincoop (Anderson, van Wincoop, 2003), interpreting the well-known gravity trade equation (2), taking into account Arctic-specific multilateral resistance factors (Arctic trade barriers).

[1] Order of the Government of the Russian Federation of August 1, 2022 No. 2115-r "On Approval of the Northern Sea Route Development Plan until 2035". URL: http://government.ru/docs/46171/ (accessed 12 August 2025).

$$x_{ij} = \frac{y_i y_j}{d_{ij}^{\eta}} \left(\frac{t_{ij}}{\mathrm{P}_{ij}} \right)^{1-\sigma}, \quad (2),$$

where x_{ij} – value of exports from region (country) *i* to region (country) *j*; y_i, y_j — GDP of region (country) *i* and *j*; t_{ij} — costs of trade between regions (countries) *i* and *j*; σ — elasticity of substitution between goods of different countries ($\sigma > 1$); d_{ij} — distance between trading regions *i* and *j*; η — elasticity of trade by distance; P_{ij} – coefficient (index) characterizing the multilateral resistance factors to trade between regions (countries) *i* and *j*.

The gravity equation (2) shows that bilateral trade between pairs of countries (regions) i and j depends on the scale of their economies y_i, y_j, the distance between them d_{ij}, and the factors of multilateral resistance (trade barriers) P_{ij}, which influence the level of specific costs t_{ij} of international (interregional) trade and economic relations (Anderson, van Wincoop, 2003). Following this logic, the basic specification of the empirical gravity model describing the export potential of Arctic mineral resources can be represented in the following log-linear form:

$$\ln E\hat{X}_{izj,t} = \ln A_{ij}^{sm} - \eta_{ij}^{A} \ln T_{ij} + \varepsilon, \quad (3),$$

where $\ln E\hat{X}_{ij,t}$ — logarithm of the expected (planned) export volume of Arctic raw materials; $\ln A^{sm}$ — logarithm of bilateral market and supplier access, which characterizes the distance-weighted total volume of production capacity $Q_{i,z}^{A}$ and consumer demand $C_{j,z}^{A}$ for Arctic raw materials, $\ln A^{sm} = \ln(Q_{i,z}^{A} + C_{j,z}^{A}) d_{ij}^{-1}$; d_{ij} — distance between the trading regions *i* and *j*; η_{ij}^{A} — distance elasticity of trade, taking into account multilateral resistance factors characterizing the barrier coefficients of Arctic geography b_G^A and transport logistics $b_{L,ij}^{A}$, $\eta_{ij} = 1 + (b_G^A + b_L^A) = 1 + b_{G,L}^{A}$, ε — calculation error.

The gravity model (3) implies that the greater the negative impact of Arctic trade barriers $b_{G,L}^{A}$, the higher the distance elasticity of trade η_{ij}^{A}, which determines the magnitude of trade costs T_{ij} associated with market and supplier access and, consequently, the lower the export potential of Arctic mineral resources (especially low-margin ones, such as coal, where transport costs account for a high proportion of the price).

In our approach, in the absence of trade barriers $b_{G,L}^{A} = 0$, the elasticity of interregional (international) trade is equal to one ($\eta_{ij}^{A} = 1$), meaning that specific market and supplier access trade costs increase proportionally with distance without additional cost-increasing factors affecting export potential (export volume). Accordingly, trade barriers associated with Arctic geography b_G^A and transport logistics $b_{L,}^{A}$ of market and supplier access increase the distance elasticity of trade

$\eta_{ij}^{A} > 1$, and the less developed the transport and communications infrastructure (both domestic and transit) is within the economic space of the trading countries and regions, the greater this increase. In other words, the influence of trade barrier factors leads to an increase in the elasticity coefficient, which amplifies the impact of the distance effect on export volume. However, the functional dependence characterizing the trade costs T_{ij} of interregional trade and economic relations is not obvious and depends on the specific research question (see, for example, (Redding, Venables, 2004); Bosker, Garretsen, 2010)). It follows that there is a critical value of specific costs of transregional trade $T_{ij}^{\eta} = \max :\Longrightarrow (\eta_{ij}^{A} \to \infty)$, when the export of Arctic raw materials becomes economically unprofitable, taking into account the marginal costs of extraction and transportation, which jointly characterize the survival threshold of companies (ST) in conditions of monopolistic competition, $ST(\pi_0^a, T_{ij}^{\eta}) = 0$ (see system of equations 1).

Thus, using Arctic barrier coefficients, we examine the remoteness and heterogeneity of the market and supplier access distance effects to test the hypothesis regarding how economic and geographic factors of multilateral resistance influence the export potential and economies of scale for Arctic extractive production growth.

It is assumed that with the development of multimodal transport logistics, the distance factor ceases to be decisive, and the role of remoteness in transregional trade and economic relations will diminish. In a model-based econometric interpretation, this will lead to a decrease in the distance elasticity of trade $b_{G,L}^{A} \approx 0, \;\; \eta^{A} \to 1.$

Our specification (3) highlights some well-known constraints associated with high-latitude geography and transport logistics, which determine the specific nature of economic activity in the Arctic. This primarily concerns the Northern Sea Route (NSR), which is the main trunk route that forms the backbone of all transport logistics in the Arctic zone and facilitates domestic and international trade flows.

The main challenges associated with Arctic transport logistics include:

- insufficient development of port and navigation infrastructure;
- a lack of modern icebreakers and ice-class transport vessels capable of year-round operation in the extreme natural and climatic conditions of the Arctic;
- limited navigation season (a maximum of three months in open water, from July to October) and the need for icebreaker escort in certain areas, which significantly increases the cost of cargo transportation;
- relatively shallow waters of the Arctic seas, particularly the eastern sector of the Russian Arctic (more than half of the Laptev Sea and East Siberian Sea have depths of no more than 20 meters), which prevents large-tonnage vessels with deep draughts from navigating traditional shallow-water routes (Fig. 1) and requires the development of high-latitude routes, including reliable navigation support.

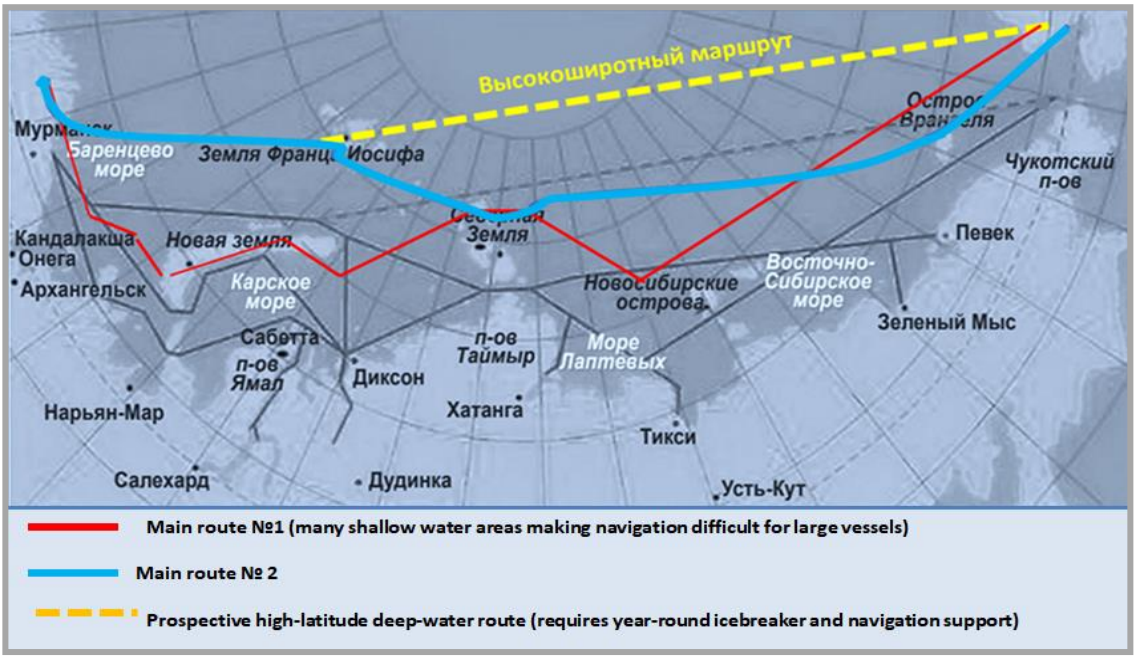


Fig. 1. Existing and prospective high-latitude (deep-water) routes of the Northern Sea Route[2].

Research results

Empirical testing of the NATM trade model using the economic development of the Syradasay coal deposit as an example.

The Taimyr coal basin, one of the largest coal basins in Russia, is located in Krasnoyarsk Krai, on the Taimyr Peninsula, its development began in 2024. According to forecasts stated in the Northern Sea Route Development Plan until 2035, approved by Government Decree No. 2115-r of August 1, 2022[3] (hereinafter referred to as the NSR Development Plan), by 2035, the planned volume of coal production and export will be 113.8 million tons. However, in our view, these stated figures do not reflect the actual situation, as they do not take into account the economic and geographical factors of multilateral resistance characteristic of the Arctic zone.

Table 1 provides an overview of the key statistical data characterizing the assumptions and key indicators of the counterfactual scenario analysis of the potential economic development prospects of the Syradasay coal deposit until 2035.

Table 2

Scenario assumptions for the counterfactual analysis of the prospective economic development of the Syradasay coal deposit until 2035 [4]

	2024	2025	2026	2027	2028	2029	2030	2035	total
Physical volume of exports according to the NSR Development Plan (PhF), mln tons	3.5	5.3	7.0	7.0	7.0	7.0	12.0	60	108.8
Forecast world price per ton of coal, US dollars									average
1. "FIXING" — (fixed world coal price)	150	150	150	150	150	150	150	150	150
2. "GROWTH" —	150	160	170	180	190	200	210	240	205

[2] Source: compiled by the author based on (Afonin, Telikov, 2017).
[3] Order of the Government of the Russian Federation of August 1, 2022 No. 2115-r "On Approval of the Northern Sea Route Development Plan until 2035". URL: http://government.ru/docs/46171/ (accessed 12 August 2025).
[4] Source: compiled by the authors.

(rising world coal price)									
3. "FALL" — (falling world coal price)	150	140	130	130	130	120	120	112	123

We are considering three scenarios:

1. The inertial scenario (*Inertial scenario,* IS) characterizes the current state of development of the transport and communications system, where navigation along the NSR lasts no more than four months and there is a complete absence of specialized ice-class bulk carriers to ensure the transportation of Arctic coal to sales markets. The calculated trade elasticity coefficient, taking into account multilateral resistance factors characterizing the barrier coefficients of Arctic geography b_G^A and transport logistics $b_{L,ij}^A$ (Formula 3), $\eta_{GL}^A \approx 3,2 \Rightarrow (navigat \ \leq 4 \ months)$;

2. The basic modernization scenario (*Basic modernization scenario*, BmS) is characterized by the pace of development of the Arctic transport and communications infrastructure and ice-class transport vessels, which ensures navigation for at least eight months a year, $\eta_{GL}^A \approx 2,2 \Rightarrow (navigation \ \leq 8 \ month)$;

3. The neo-modernization scenario (*Neo-modernization scenario*, NmS) is oriented towards the advanced and comprehensive development of the Arctic transport infrastructure, integrated into global transport corridors, which is based on the neo-industrial type of development of the Arctic economy, focused on the formation of a high-latitude transport and energy complex in the Arctic zone, integrated through a system of transport corridors into global processes (chains) of value creation. This requires an appropriate level of state involvement in strategically important areas of the long-term development of intermodal transport logistics and the advanced development of Arctic shipbuilding (see Fig. 5 for details (Agarkov, Ivanova, 2024; Agarkov, 2023)), $\eta_{GL}^A \to 1 \Rightarrow (all-year \ navigation)$.

Thus, we evaluate the impact of Arctic trade barriers of economic geography b_G^A and transport logistics $b_{L,ij}^A$ on the expected economies of scale and export potential of the Syradasay deposit in three scenarios (inertial, IS; basic, BmS; neo-modernization, NmS):

$$E_t(\hat{X}_{ij}, \hat{x}_{ij}^P, Q^{Ac}, b_{GL}^A) = \begin{cases} \text{InS: } \eta_{GL}^A \approx 3,2 \Rightarrow (navigat \ \leq 4 \ months) \\ \text{BmS: } \eta_{GL}^A \approx 2,2 \Rightarrow (navigation \ \leq 8 \ month) \\ \text{NmS: } \eta_{GL}^A \approx 1 \Rightarrow (all-year \ navigation \approx 12 \ month) \end{cases}, \quad (4)$$

where $E(\hat{X}_{ij}, t)$ — planned physical volume of coal exports mined at the Syradasay deposit in period $t = (2024-2035)$; $E(\hat{x}_{ij}^P, t)$ – planned monetary equivalent of the planned volume of financial revenues from coal exports mined at the Syradasay deposit in period *t*; η_{ij}^A — elasticity of transregional trade, taking into account the barrier coefficients of Arctic geography b_G^A and transport logistics $b_{L,ij}^A$ for a pair of countries (regions) *i* and *j*.

The model showed that the maximum level of Taymyr coal exports in the "inertial" scenario (IS), which characterizes the current state of development of the transport and logistics complex, will amount (estimated) to no more than 44.2 million tons for the period up to 2035, or approximately 41% of the volume of 108.8 million tons declared in the NSR Development Plan. The current situation is characterized by a complete lack of ice-class bulk carriers (at least Arc4), which limits the possibility of transporting coal via the Northern Sea Route exclusively to the summer navigation period, lasting no more than four months a year (August–November). Therefore, approximately 64.6 million tons (which is 60% of the declared volume) will remain unexported.

In the basic "modernization" scenario (BmS), assuming the availability of specialized ice-class bulk carriers capable of navigating for up to eight months, export volumes could reach approximately 85-90 million tons by 2035, which corresponds to more than 78% of the volume stated in the NSR Development Plan.

Modeling revealed that only the neo-modernization scenario makes it possible to achieve the Arctic coal export targets set out in the SMP Development Plan, amounting to 108.8 million tons by 2035. This scenario envisages a strategy for neo-geoconvergent spatial development of the Arctic economic complex, complemented by the spatial organization of production and sales, ensuring diversified access for Arctic producers to domestic and global markets that generate demand for energy resources and other strategic raw materials (see (Agarkov, 2025) for more details).

Table 2 presents data on the export potential of Arctic energy resources based on a counterfactual scenario assessment of the expected cash flow (CF) for the economic development of the Syradasay coal deposit, taking into account the economic and geographical factors characteristic of the Arctic zone that create multilateral resistance to transregional trade.

Table 3

Projected cash flow (CF) from the development of the Syradasay coal deposit, million US dollars[5]

Scenarios for the development of Arctic transport and logistics infrastructure [1)]	Scenarios for the dynamics of global coal prices[2)]	**2025**	**2030**	**2035**	**total for the period**	**in %**
		mln USD	**mln USD**	**mln USD**	**mln USD**	
NSR Development Plan, CF (η=1.0), mln USD		**1320**	**6000**	**9000**	**16 320**	**100**[3)]
1. Inertial scenario, CF (η ≈ 2.7), mln USD	1. "FIXING"	485.9	2208.6	3312.9	6 007	36.8
2. Basic modernization scenario, CF (η ≈ 1.4), mln USD		935.2	4250.9	6376.4	11 562	70.8
3. Neo-modernization scenario, CF (η→1), mln USD		1238.1	5627.7	8441.6	15 307	93.8
1. Inertial scenario, CF (η ≈ 2.7), mln t	2. "GROWTH"	505.4	2834.4	5300.6	8 640	52.9
2. Basic modernization scenario, CF (η ≈ 1.4), mln USD		972.7	5455.3	10202.2	16 630	101.9
3. Neo-modernization scenario, CF (η→1), mln USD		1287.8	7222.3	13506.6	22 017	134.9
1. Inertial scenario, CF (η ≈ 2.7)	3. "FALL"	466.4	1844.2	2473.6	4 784	29.3

[5] Source: compiled by the authors.

mln USD						
2. Basic modernization scenario, CF (η ≈ 1.4), mln USD		897.7	3549.5	4761.0	9 208	56.4
3. Neo-modernization scenario, CF (η→1), mln USD		1188.4	4699.2	6303.1	12 191	74.7

[1] reflects scenarios that take into account Arctic economic and geographic factors of multilateral resistance to transregional trade, depending on the level of development of transport and logistics infrastructure

[2] reflects the data of the assumptions (Table 1)

[3] the target indicator of the NSR Development Plan is taken as the baseline (100%)

As follows from Table 2, the targets specified in the NSR Development Plan (estimated at 16.3 million US dollars – 100%) can only be achieved if global coal prices rise. Calculations show that within the framework of the "basic modernization" and "neo-modernization" scenarios of spatially complementary development of the Arctic economy, these indicators will amount to 102% and 135% of the planned values, which in monetary terms amounts to 16.6 and 22.0 million US dollars, respectively.

The graphs below (Figs. 2, 3, 4) illustrate the results of a counterfactual scenario analysis of the expected effects of the economic development of the coal reserves at the Syradasay deposit, conducted on the basis of the NATM (1) using an extended specification of the gravity equation (3), which includes barrier coefficients for Arctic economic geography and transport logistics.

The graphs (Figs. 1, 2, 3) illustrate the scale effect of growth in physical PhF and cash CF export flows in three scenarios, depending on the trade elasticity η_{ij}^{A} of Arctic energy resources, which characterizes the level of development of intermodal transport logistics, providing Arctic mining companies with access to sales markets. A high trade elasticity coefficient η_{ij}^{A} indicates underdeveloped transport and communications infrastructure, which, given the specific conditions of high-latitude Arctic geography, is a critically important factor negatively affecting international trade and the development of Arctic extractive industries as a whole.

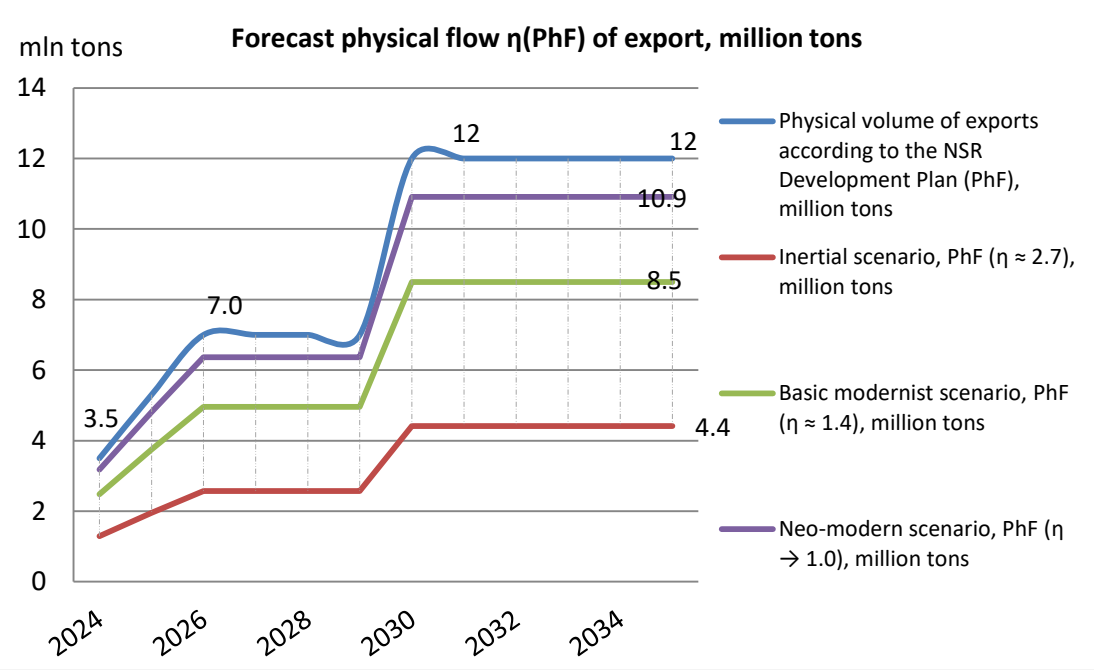


Fig. 2. Projected physical flow (PhF) of Taimyr coal exports, taking into account Arctic economic and geographical barriers, for the period up to 2035[6].

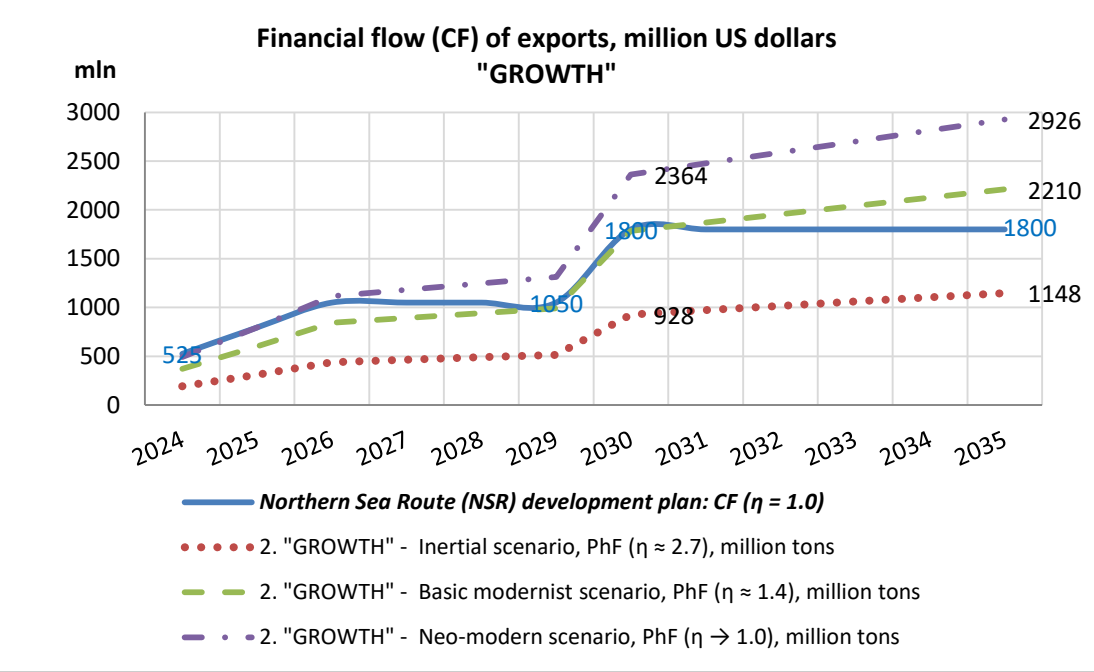


Fig. 3. Projected cash flow (CF) of Taimyr coal exports, taking into account Arctic economic and geographical barriers, for the period up to 2035 (assuming rising global coal prices — the "Growth" scenario)[7].

[6] Source: compiled by the authors based on model forecasting.
[7] Source: compiled by the authors based on model forecasting.

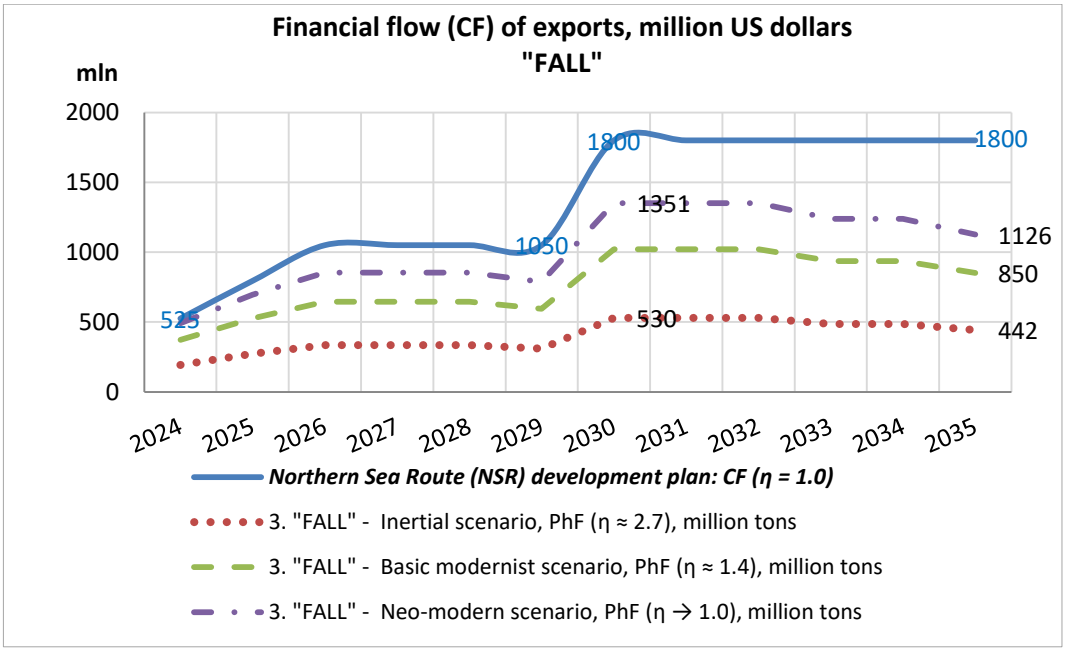


Fig. 4. Projected cash flow (CF) of Taimyr coal exports, taking into account Arctic economic and geographical barriers, for the period up to 2035 (assuming falling global coal prices — the "Fall" scenario)[8].

Overall, we find strong evidence that estimation methods based on logarithmic linearization of the gravity equation suffer from significant specification error due to omitted variables, which complicates the interpretation of the results and leads to unreliable estimates.

In contrast, models estimated using an extended specification that accounts for Arctic trade barriers significantly reduce the biases caused by multilateral resistance factors, increasing the reliability of the empirical findings.

Trade elasticity coefficients in the traditional gravity equation are systematically lower than those obtained using log-linearized regressions that account for Arctic trade barriers.

Thus, we have empirically confirmed the hypothesis that as multimodal transport logistics develop, including specialized ice-class vessels, the factors of high-latitude Arctic geography and remoteness cease to be decisive for international (interregional) trade and economic relations. In economic and mathematical terms, this would imply a decrease in the distance elasticity of trade.

Conclusion

This study analyzed the theoretical basis for substantiating the neo-geoconvergent spatial organization of the Russian Arctic market economy, which is reflected in the NATM analytical trade model. An empirically substantiated gravity model of Arctic energy resource trade was developed, taking into account the specific economic and geographical factors of multilateral resistance characteristic of the Arctic zone.

The presented methodological approaches were tested using the example of the economic development of the Syradasay coal deposit. The developed methodology was used to calculate the distance trade elasticity coefficients, taking into account the economic and geographical factors of

[8] Source: compiled by the authors based on model forecasting.

multilateral resistance characteristic of the Arctic zone. The hypothesis was confirmed that the influence of the distance factor on trade diminishes over time as transport and communications infrastructure develops in a spatially complementary manner, ensuring unimpeded year-round access for Arctic mining companies to domestic and global markets that generate demand for raw materials.

The introduction of Arctic trade barrier indices into the gravity equation is important. This is a significant innovation that expands the applicability of gravity theory to Arctic economic conditions, including increasing the relevance of forecast estimates of export potential and the expected growth effects of Arctic extractive industries and the economy as a whole.

The proposed method enables a consistent and highly accurate evaluation of the theoretical gravity equation, taking into account the unique characteristics and specific features of Arctic economic geography and transport logistics.

This approach can be successfully applied to analyze the impact of various multilateral resistance factors on bilateral trade flows and to assess the effects of scale on Arctic economic growth. The results of this approach should be further developed and generalized in subsequent studies.

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Methodological and Institutional Gaps in the Development Strategies of the Russia's Arctic Regions

Svetlana A. Lipina [1], Dr. Sci (Econ.), Professor
Nikita M. Kuprikov [2], Dr. Sci (Econ.), Associate Professor
Alexandra V. Lipina [3], Cand. Sci. (Tech.), Associate Professor
Denis S. Kortunov [4]✉, Assistant

[1, 3] National University of Science and Technology "MISIS" (NUST MISIS), Leninskiy pr., 4/1, Moscow, Russia
[2] Moscow Aviation Institute (National Research University), Volokolamskoe Shosse, 4, Moscow, Russia
[4] Northern (Arctic) Federal University named after M.V. Lomonosov, Naberezhnaya Severnoy Dviny 17, Arkhangelsk, Russia
[1] s.lipina@mail.ru, ORCID: https://orcid.org/0000-0002-8551-0653
[2] nkuprikov@yandex.ru, ORCID: https://orcid.org/0000-0003-3152-0941
[3] a.v.lipina@mail.ru, ORCID: https://orcid.org/0000-0003-0835-8878
[4] d.kortunov@narfu.ru ✉, ORCID: https://orcid.org/0009-0001-9328-2611

Abstract. The article presents a comparative analysis of key federal and regional strategic documents defining the development trajectories of the regions of the Arctic Zone of the Russian Federation. The study is based on a systematic documentary analysis combined with comparative mapping of strategic goals, priorities, and indicators, as well as an assessment of natural resource management and environmental protection mechanisms, including provisions aimed at safeguarding the rights of the indigenous small-numbered peoples of the North. Particular attention is paid to the compliance of regional strategies with the principles of a risk-based forecasting approach and multi-level integration established by the Decree of the President of the Russian Federation No. 633 of November 8, 2021. The results reveal a common set of priorities related to sustainable territorial development, environmental and social security, and economic resilience, alongside persistent systemic gaps that hinder their effective implementation. The most significant shortcomings include insufficient coordination between federal and regional levels, absence of unified indicators and monitoring procedures, limited consideration of climate and environmental risks, and weak involvement of local communities and indigenous peoples in strategic planning processes. The authors emphasize that the implementation of the provisions of Decree No. 633 requires not only the formal adjustment of strategic documents but also the development of unified methodological approaches to goal-setting, KPI formation, and the organization of evidence-based monitoring. The study proposes the development of a unified system of indicators, strengthening of inter-level coordination, institutionalization of climate risk assessment, and expansion of mechanisms for the participation of indigenous peoples. The research is of an applied nature and is intended for use in public administration practice.

Keywords: *strategic planning, Arctic, Chukotka Autonomous Okrug, Sakha Republic (Yakutia), Yamalo-Nenets Autonomous Okrug, Arkhangelsk Oblast, Nenets Autonomous Okrug, Komi Republic, Murmansk Oblast, regional economy*

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Introduction

The Arctic Zone of the Russian Federation (AZRF) is a territory of exceptional geopolitical, economic, and environmental significance. The region is rich in hydrocarbons and mineral resources, provides the state with strategic depth and influences national security, while simultaneously being home to unique and highly sensitive ecosystems (Goldin, 2014). Intensive development of its natural resource potential, combined with the growing impacts of climate change, creates a range of serious challenges: from environmental threats to technological and social complexities, including issues relating to the preservation of traditional ways of life and ensuring the rights of indigenous peoples of the North (Panikar, 2023).

In such circumstances, a key task of strategic management for the development of the AZRF is finding and maintaining a balance between economic development, environmental sustainability, and social well-being (Panikar, Shaparov, 2016). This task is addressed through a consistent, integrated, and long-term strategic planning system that defines a hierarchy of goals, a coordinated set of objectives, and a range of implementation tools (Sokolova, Trufanova, 2025). The effectiveness of such mechanisms requires a comprehensive set of documents that ensure the coordination of actions across all levels of governance and stakeholders — from the federal center to the constituent entities of the Russian Federation and the corporate sector (Podoplekin, Bestuzheva, 2014).

The legal and organizational foundations of the modern strategic planning system in the Russian Federation were legislatively enshrined in the Federal Law No. 172-FZ of June 28, 2014, "On Strategic Planning in the Russian Federation"[1]. This law introduced uniform principles for structuring a multi-level system of planning documents, defined the composition of strategic instruments and established regulations governing their development, implementation, and monitoring. Within its framework, a set of tools is being developed, such as strategic forecasts, concepts, doctrines, state programs, and territorial planning schemes, designed to ensure the continuity and consistency of strategic initiatives.

An important subsequent step was the approval of Decree of the President of the Russian Federation No. 164 of March 5, 2020, "On the Fundamentals of State Policy of the Russian Federation in the Arctic until 2035"[2], which formed the basis for the priority development agenda of the Arctic Zone of the Russian Federation. This document outlined national interests and strategic priorities regarding the region's socio-economic development, resource development, infrastructure modernization (including the operation and development of the Northern Sea Route), environmental safety, and strengthening the scientific and technological base.

[1] Federal Law of the Russian Federation No. 172-FZ of June 28, 2014 "On Strategic Planning in the Russian Federation" (adopted by the State Duma on June 20, 2014, approved by the Federation Council on June 25, 2014). URL: https://base.garant.ru/70684666/ (accessed 27 December 2025).

[2] Decree of the President of the Russian Federation No. 164 of March 5, 2020 "On the Fundamentals of the State Policy of the Russian Federation in the Arctic until 2035". URL: http://www.kremlin.ru/acts/bank/45255 (accessed 27 December 2025).

However, the strategic landscape of the Arctic extends far beyond the documents mentioned above and includes numerous additional federal and regional strategies (Morozov, Kondral, 2014), state programs (including the State Program "Socio-Economic Development of the Arctic Zone of the Russian Federation"[3]), and territorial planning frameworks. This multitude of regulatory and policy documents is intended to provide comprehensive coverage of the region's challenges and objectives, but simultaneously creates risks of fragmentation, duplication, and regulatory conflicts, as well as functional gaps in the implementation of initiatives.

The existence of a regulatory framework and policy documents does not guarantee the achievement of stated objectives. A key challenge is ensuring consistency and synergy between numerous strategic documents. Contradictions may arise in the formulation of targets (when inconsistent indicators are set for the same territories or sectors), in financing mechanisms (when resource allocation for state programs does not correspond to their targets), in the consideration of climate and environmental risks, and in the distribution of powers and responsibilities between federal agencies, constituent entities of the Russian Federation, and municipalities. All of this slows down the implementation of initiatives and reduces the efficiency of government spending.

Under these conditions, regular and systematic monitoring of the life cycle of strategic documents — from their development and approval to implementation stages, evaluation of achieved results, and introduction of adjustments — becomes crucial. Continuous monitoring makes it possible to identify systemic bottlenecks, assess the appropriateness of priorities in a rapidly changing external environment, and optimize the allocation of resources. Thus, monitoring transforms strategic planning from a static, formal process into an adaptive management mechanism capable of promptly responding to new challenges and ensuring sustainable development in the Arctic Zone (Zaikov, Kondratov, Kudryashova et al., 2019).

In this regard, a reasonable question arises: to what extent are the regional strategies of the Arctic Zone's constituent entities aligned with the key priorities set out in federal documents (primarily in Decree No. 633)? The authors formulated the following research hypothesis: the practical institutionalization of federal priorities in regional strategies at the level of the Arctic Zone of the Russian Federation is fragmented in nature and is accompanied by methodological and resource gaps, which significantly reduces the effectiveness of state policy implementation in the region.

Research methodology

This article presents the results of a comparative analysis of strategic planning documents regulating the development of the Arctic Zone of the Russian Federation (Lipina, Almieva, Balezina et al., 2025). The aim of the study is to conduct a systematic assessment of the degree of consistency, comprehensiveness, and operational effectiveness of the current strategic framework for

[3] State Program of the Russian Federation "Socio-Economic Development of the Arctic Zone of the Russian Federation" was approved by Decree of the Government of the Russian Federation No. 484 of March 30, 2021. URL: https://base.garant.ru/400534977/ (accessed 27 December 2025).

the AZRF. The methodological approach is based on a set of interdisciplinary analytical procedures applied to key federal and regional legislative acts (including Federal Law No. 172-FZ "On Strategic Planning in the Russian Federation", Presidential Decree No. 164 "On the Fundamentals of State Policy of the Russian Federation in the Arctic until 2035", relevant state programs, regional strategies, and territorial planning schemes). The provisions of Presidential Decree No. 633 "On Approval of the Fundamentals of State Policy in the Field of Strategic Planning in the Russian Federation" were used as the regulatory framework for comparing federal and regional documents. A comparison of the key areas outlined in the Decree made it possible to assess the extent to which federal priorities have been institutionally transmitted to the level of the constituent entities of the Arctic Zone of the Russian Federation. The following methodological tools were used: regulatory analysis, structural and content analysis of document texts, comparative analysis, and a matrix comparison technique, which allows for the visual identification of similarities, discrepancies, and gaps between documents.

The analysis procedure included the following stages: formalizing the set of documents — the objects of study — and developing a coding scheme for themes and categories of analysis, identifying analytical blocks and evaluation criteria, and linking them to measurability indicators (the presence of target indicators, baseline values, target timeframes, and funding sources); systematic content analysis of document texts, identifying provisions related to goals, priorities, objectives, implementation tools, monitoring mechanisms, and accountability for implementation; and matrix data aggregation to identify points of intersection, synergies, duplication, and regulatory/institutional conflicts.

The evaluation criteria included the internal coherence of the document (the logic linking aims, tasks and measures), vertical and horizontal consistency between planning levels, measurability and feasibility of target indicators, adequacy of the envisaged financing and accountability mechanisms, comprehensiveness of the integration of climate and environmental risks, and mechanisms for the engagement and protection of the rights of indigenous peoples. Data sources included official texts of regulatory acts and programs, accompanying methodological materials and regulatory documents, as well as publicly available statistical and analytical information at the time of the study.

The limitations of the methodology are primarily due to the nature of the source data: variations in terminology and levels of detail in regional documents, limited availability of accurate and comparable performance indicators for a number of programs, and a lack of alignment in the timeframes of individual legislative acts.

The scientific novelty of this study lies in its comprehensive, critically structured assessment of the Arctic strategic planning system using matrix and content-based analysis tools, which makes it possible not only to identify general policy objectives but also to systematically demonstrate the mechanisms underlying discrepancies, shortcomings and potential points of integration. The practical significance of the findings is evidenced by the substantiation of proposals for im-

proving the consistency of target indicators, strengthening coordination between levels of government, integrating climate and environmental risks into policy frameworks, and improving mechanisms for the participation of indigenous peoples.

The comparison of the documents is organized by thematic blocks: “goals/vision”, “priorities”, “tasks and measures”, “implementation tools and financing”, “monitoring and indicators”, “accounting for climate risks”, and “participation of indigenous peoples”. Taking into account the variability of formulations in regional strategies, the analytical section presents both typical and specific differences and approaches. For clarity, the results are aggregated into comparative matrices and accompanied by interpretive conclusions and recommendations.

Main section

In addition to comparing the federal and regional agendas, it is worth highlighting the differences between the previous and current federal strategies for the development of the Arctic region. The previous strategy was generally more focused on the operational and infrastructural development of the region: the emphasis was on ensuring resource extraction, establishing basic transport and logistics corridors, and strengthening the defense and security component. Environmental and social issues, adaptation to climate change, and mechanisms for integrating the interests of indigenous peoples were often fragmented and less detailed in terms of target indicators and implementation tools.

At the same time, a number of provisions of Presidential Decree No. 633, which have practical significance for regional policy, require separate assessment at the level of the constituent entities of the AZRF.

The current federal strategy (until 2035)[4] sets out a broader and more multifaceted approach, maintaining priorities for the development of resource base and transport and logistics infrastructure (including the Northern Sea Route), while strengthening the emphasis on sustainable development, scientific and technological support, environmental safety, and adaptation to climate risks. The new strategy sets a longer planning horizon, introduces more detailed goals for coordination between levels of government, and contains targets aimed at integrating economic, environmental, and social indicators. It also makes a more explicit statement regarding the need to modernize governance institutions and to strengthen mechanisms for monitoring and evaluating the implementation of strategic measures. A comparison of the previous and current strategies reveals a trend toward expanding federal policy toward sustainability, science, and climate, but its practical implementation is hampered by insufficient vertical synchronization with regional documents and resource disparities. The geographical coverage of the regions of the Arctic Zone of the Russian Federation is shown in Fig. 1.

[4] Decree of the President of the Russian Federation No. 645 of October 26, 2020 “On the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035”. URL: http://www.kremlin.ru/acts/bank/45972 (accessed 03 January 2026).

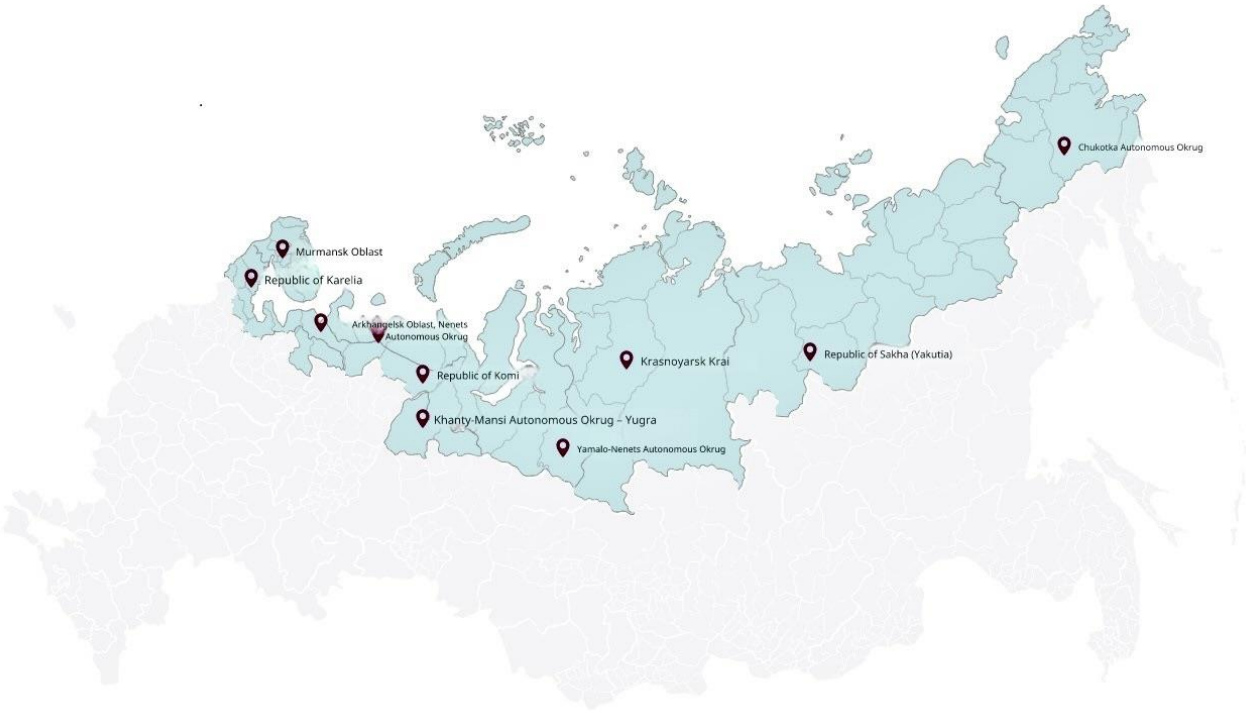


Fig. 1. Map of the Arctic Zone of the Russian Federation[5].

Overcoming this gap requires systemic convergence: standardization of target indicators and monitoring methodologies, a mandatory procedure for assessing the alignment of regional strategies with federal priorities during their approval, and targeted funding for programs aimed at economic diversification and adaptation to climate risks. The inclusion of clear requirements to take into account the interests of indigenous peoples and to carry out environmental assessments of projects at the regional planning stage should become a mandatory element in aligning regional strategies with federal goals. In practice, the incorporation of these federal innovations into regional strategies is uneven. Regional documents tend to retain a pragmatic, locally oriented focus, with regional priorities centered on the development of key sectors (oil and gas production, minerals, fisheries), the development of port and municipal infrastructure, ensuring employment, access to healthcare and education, and support for the local economy and SMEs. This is logical from the perspective of regional economic reasoning; however, it means that many regional strategies either do not fully reflect the updated federal priorities for sustainable development and climate adaptation, or interpret them declaratively, without sufficient resource and institutional support.

For example, the strategic documents of the **Chukotka Autonomous Okrug** largely reflect previous priorities, while strengthening the social agenda; at the same time, there are limited measures to diversify the mining economy and insufficient elaboration of long-term mechanisms for sustainable development. In a number of regions, plans for the development of traditional industries seem economically controversial in terms of profitability and sustainability, and social measures are seen as fragmented and insufficiently supported financially and organizationally.

[5] Source: Far East and Arctic Development Corporation. About the Arctic Zone of the Russian Federation. About the Arctic Zone. URL: https://erdc.ru/about-azrf-old/ (accessed 01 February 2026).

A comparison of the key characteristics of federal strategies and the challenges of their implementation at the regional level is presented in Table 1.

Table 1

Comparison of the federal AZRF strategies (previous/current) and the challenges of their implementation at the regional level[6]

Area	Previous strategy — key features	Current strategy (until 2035) — changes/additions	Regions' reaction / challenges of implementation
Vision and goals	Focus on rapid resource development and ensuring transport and logistics accessibility; short-/medium-term planning	More comprehensive, long-term vision: economic development + sustainability, climate adaptation, and scientific and technological component	Regional documents often retain a pragmatic, short-term approach; federal "broad" goals are perceived as declarative
Economy and resource development	Main focus is on extraction (oil, gas, minerals), business expansion, job creation	Preserving priorities of extraction, but adding diversification, sustainable resource use, and environmental impact assessment	Regions are predominantly focused on their core industries; diversification is weak, projects in traditional industries often remain economically controversial
Transport and logistics (NSR, ports)	Active development of the NSR and port infrastructure as a priority for resource export	Support for the NSR remains, but requirements for ecology, navigation safety, and infrastructure adaptation to climate change are added	Regional plans support port/road development, but funding and planning for alignment with federal goals are often imperfect
Environmental safety and climate	Environmental aspects are fragmented; climate adaptation is not described in sufficient detail	Stronger emphasis on environmental safety, risk management, and adaptation; risk assessment indicators are established	Regional strategies often focus on environmental measures in a declarative manner; mechanisms for implementing and financing climate actions are poorly detailed
Scientific and technical support	Science — a service component (project support), limited R&D	Identifying science and innovation as key factors for sustainable development and technological independence	Regions have limited R&D budgets; implementation of federal scientific objectives requires centralized coordination and incentives
Social policy and quality of life	Social measures are aimed at supporting the population during development (housing, healthcare, employment)	More systemic approach to sustainable living, infrastructure adaptation, and strengthening social protection	Regional documents strengthen social support (for example, the Chukotka AO), but measures are often fragmented and underresourced
Rights and participation of indigenous peoples	The rights of indigenous peoples are mentioned, but mechanisms for participation and protection of rights are poorly regulated	More explicit requirement to consider the interests of indigenous peoples and their participation in planning; recommendations for the preservation of traditions	At the regional level, participation of indigenous peoples is uneven: formal consultations, insufficient integration into projects, and funding for the preservation of traditional economies

[6] Note: the color coding reflects the degree of alignment of regional strategies with federal priorities.

Institutional management and monitoring	Centralized control, limited mechanisms for inter-level coordination and monitoring of implementation	Inclusion of requirements to improve coordination, a unified methodology for indicators and monitoring; strengthening of responsibility	Regional strategies often do not use standardized indicators; there is no mandatory procedure for aligning regional plans with federal priorities
Financing and economic instruments	Project-based funding; significant role of large companies and government programs	More balanced funding, mechanisms to support diversification and climate action; need for targeted resources	Funding for regional initiatives is limited; budget is not aligned with sustainable development objectives; dependence on private capital
Spatial planning and infrastructure projects	Prioritization of project infrastructure (mines, ports, bases)	The importance of taking into account infrastructure sustainability, integration of territorial plans, and environmental constraints is added	Regional plans are economically feasible, but often fail to take into account long-term climate risks and environmental assessment requirements

The structure of financial support for strategic initiatives in the AZRF regions deserves special attention. It is worth noting that most regional strategies rely primarily on budgetary sources of funding and federal state programs. Mechanisms for attracting extra-budgetary funds (public-private partnerships, special investment agreements, regional investment funds) are limited in scope, providing no details on the system for distributing financial responsibility. This confirms the existence of an institutional gap between the strategic objectives and the actual implementation mechanisms.

The results presented in Table 1 demonstrate the persistence of significant institutional and methodological gaps at the stage of implementing federal goals at the regional level, despite the formal expansion of the objectives and priorities of strategic planning in the Arctic Zone of the Russian Federation. The greatest gaps have been identified in the areas of environmental and climate policy, scientific and technical support, institutional management, and financing. In these areas, declarative formulations predominate, without sustainable implementation mechanisms. Infrastructure and social sectors demonstrate a relatively higher degree of coherence, but measures are often fragmented. Overall, the results confirm the need to unify strategic planning methodology and to strengthen coordination.

In **the Republic of Sakha (Yakutia)**, the most notable achievements are in the transport and energy infrastructure sectors: modernization of the Northern Sea Route is approximately 70% complete, ports and navigation systems have been renovated, and cargo traffic has increased by 25%. However, these changes have produced almost no sustainable social effects, and the adaptation of infrastructure to permafrost thawing is progressing slowly[7]. Digital initiatives (permafrost monitoring, biomonitoring, digital archives of indigenous cultures) are approximately 60% complete, but many northern uluses still lack reliable communications, which hinders digital transfor-

[7] Report on the implementation of government programs. Government of the Republic of Sakha (Yakutia). Yakutsk, 2025. URL: https://minpred.old.sakha.gov.ru/gosudarstvennye-programmy-ispolniteljami-kotoryh-javljaetsja-ministerstvo/svodnyj-godovoj-doklad-o-hode-realizatsii-i-otsenki-effektivnosti-gosudarstvennyh-programm-respubliki-saha-jakutija (accessed 27 December 2025).

mation. Social projects are being implemented fragmentarily: only three of the ten planned support centers have been built, the population of the Arctic region has increased by only 5%, and migration outflow remains negative. Infrastructure projects create jobs and improve public services, but prove to be costly and unprofitable in the long term[8] (Kovalenko, 2023). Ecology and tourism are the least funded sectors: environmental programs receive no more than 7% of investments, while transport and mining projects receive five times more. Ecotourism projects have shown an increase in visitor numbers (~15%), but have not produced a significant multiplier effect for local communities. In regional strategies, climate measures are more often of an applied and fragmented nature (cleaning up industrial sites, waste disposal).

In **the Nenets Autonomous Okrug**, there are examples of partial implementation of major initiatives, but they are accompanied by delays and doubts regarding their cost-effectiveness. The reconstruction of Naryan-Mar Airport is included in the plans, but has been postponed to 2027–2030 due to problems with funding and the project's level of readiness. The Indiga port project is viable for the NSR, but remains in its early stages, requiring approval from numerous agencies, significant private investment, and proven profitability. The Nenets Autonomous Okrug (NAO) has numerous initiatives (small refineries, local processing) that have never progressed beyond the conceptual stage due to a lack of investors and a limited market; without significant incentives and subsidies, these projects are unfeasible. Large-scale renewable projects are hampered by the high cost of technologies, logistics, and maintenance in Arctic conditions. Programs for deep diversification of SMEs are largely declarative in nature and are not accompanied by measures relating to sales, human resources and infrastructure.

The main systemic problem is the lack of alignment between federal and regional timeframes and indicators. The federal strategy sets long-term, unified targets (GRP growth, NSR volumes, investment, science, environmental protection, and support for indigenous peoples), while the regions formulate local, predominantly short- and medium-term goals (port modernization, gasification, housing, and healthcare). Quantitative indicators in the regions are either absent or non-standardized, and the documents are not aligned in terms of objectives and measures. As a result, individual projects predominate over systemic interregional initiatives, weakening the impact of federal measures and hindering sustainable development in the Arctic.

The Arkhangelsk Oblast, with its significant resource potential and complex social dynamics, demonstrates a persistent gap between the goals of its strategies and their implementation. The analysis compared two regional strategies: "Strategy for the Socio-Economic Development of the Arkhangelsk Oblast until 2030" (No. 278-ra/48 of December 16, 2008)[9] and "Strategy for the Socio-Economic Development of the Arkhangelsk Oblast until 2035" (Law of the Arkhangelsk Ob-

[8] Federal State Statistics Service (Rosstat). Demographic indicators of the Republic of Sakha (Yakutia) for 2018–2025. Moscow, 2025. URL: https://14.rosstat.gov.ru/folder/39429 (accessed 03 January 2026).
[9] Strategy for the Socio-Economic Development of the Arkhangelsk Oblast until 2030, approved by the Order of the Arkhangelsk Oblast Administration No. 278-ra/48 dated December 16, 2008. URL: https://www.garant.ru/doc/1190675/ (accessed 04 January 2026).

last No. 57-5-OZ of February 18, 2019)[10]. Thus, "Strategy 2030" set extremely ambitious goals (a 3.7-fold increase in GRP per capita, a 4-fold increase in productivity) with an emphasis on traditional sectors — the forestry industry (without a focus on deep processing), shipbuilding, and transportation. By 2019, approximately a third of the plan's measures had been completed; the main reasons were erroneous pricing assumptions, a lack of flexible adjustment mechanisms, and weak alignment with industry programs and budgets. Strategy 2035 shifts the focus towards a "people-centric" approach, but changes in formulations are rarely accompanied by new management tools. Key systemic shortcomings of "Strategy 2035" include its declarative nature (many general statements without linking them to measurable targets, financing, and risk mitigation scenarios); demographic issues (the population has declined from ~1.3 million (2000) to ~1.1 million (2023), regional subsidies do not compensate for the economic drivers of outflow, salaries are below the Russian average, prices in remote areas are higher); passive investment policy (reliance on federal "megaprojects" (Belkomur, port) with weak efforts to improve the investment climate and support SMEs); infrastructure deficit (high depreciation of utility networks (60-70% in some municipalities), low density of paved roads — a fundamental barrier to development); environmental conflict (the dominance of city-forming pulp and paper mills hinders modernization and the transition to a more sustainable economy).

In these circumstances, a change in the management paradigm is required: clear, measurable goals; redistribution of resources in favor of basic infrastructure; transparent system of responsibility and political will for structural reforms, rather than reformulations. Federal approaches combine programs, public-private partnerships, and preferences; regions tend to rely on their own budgets and federal support, rarely establishing interregional financial mechanisms.

A practical example is **the Murmansk Oblast**: mixed funding and grant support for SMEs (up to 4 million rubles for creative projects) have produced a tangible effect in doubling tourist flow (from 350,000 to 670,000 people in 2020–2024) and commissioning social facilities. However, problems with purchasing power, outflow of the working-age population, and slow economic diversification persist[11].

An analysis of the "Strategy for the Socio-Economic Development of **the Krasnoyarsk Krai** until 2030"[12] reveals its ambitious nature and internal contradictions. The strategy proclaims a transition from a raw materials-based model to diversification and social focus through "new industrialization" and human capital development, but simultaneously provides for the large-scale exploitation of new oil, gas, and mineral deposits (Lipina, Almieva, Balezina, et al., 2025). Quanti-

[10] Strategy for the Socio-Economic Development of the Arkhangelsk Oblast until 2035, approved by the Law of the Arkhangelsk Oblast No. 57–5-OZ dated February 18, 2019. URL: https://arkh-gov.ru/doc/74415 (accessed 04 January 2026).
[11] Strategic Development Plan for the Murmansk Oblast until 2030 "To Live — in the North!". URL: https://gov-murman.ru/regulatory/pnszh/ (accessed 07 January 2026).
[12] Strategy for the Socio-Economic Development of Krasnoyarsk Krai until 2030, approved by Decree of the Government of Krasnoyarsk Krai No. 647-p dated October 30, 2018. URL: http://www.econ.krskstate.ru/ser_kray/2030 (accessed 07 January 2026).

tative indicators (production, housing stock) are clearly prioritized over qualitative transformations; mechanisms for reducing spatial and social polarization between the regional center and remote areas (logistics, high cost of living) are poorly developed. The population growth target appears overly optimistic given the migration outflow and the disproportionate funding allocated to the social sector and the fuel and energy complex.

The demographic crisis and inertia in the raw materials sector have led to a revision of strategies in **the Komi Republic**, including a shift in focus of the "Strategy of the Komi Republic — 2020"[13] in the "Strategy of the Komi Republic — 2035"[14]. The "Strategy 2035" demonstrates a trend toward sustainable, people-centered development and a cluster-based approach: regions are divided into several priority areas (Southern, Central, Northern, etc.), which should mitigate inter-municipal disparities and redirect investments according to local advantages. Project management and clustering theoretically enhance the targeting of measures (Lipina, Almieva, Balezina et al., 2025). However, the institutional environment remains dominated by large resource monopolies, hindering the development of SMEs and non-resource innovations. Thus, 10 out of 13 major infrastructure and industrial projects (totaling approximately 956 billion rubles) are related to increasing oil and gas production; in the timber industry, 6 wood-processing projects (approximately 51 billion rubles) have been announced, but public information on their implementation is limited. The transport component (including the long-standing Belkomur project) remains critical, but implementation is delayed. The economic situation is complicated by the fact that, despite high nominal wages and "northern" allowances, prices and logistics costs are significantly higher than the national average, while real purchasing power and disposable income are unstable, which is accompanied by population outflow and reduces the effectiveness of declared migration growth targets. Besides, federal requirements for a unified monitoring system and a forecast- and risk-based approach are often not implemented at the regional level: monitoring remains fragmented and focused on reporting, which hinders comparability and control over the implementation of federal objectives (Lipina, Almieva, Balezina et al., 2025).

This section presents a comparative analysis of the previous and draft versions of the socio-economic development strategy for **the Yamalo-Nenets Autonomous Okrug** (YaNAO). The strategy of 2019[15] and the draft of its update[16] were used as source documents. The comparison was

[13] Strategy for the Socio-Economic Development of the Komi Republic until 2020, approved by Decree of the Government of the Komi Republic No. 45 of March 27, 2006. URL: https://docs.cntd.ru/document/424055636 (accessed 10 January 2026).
[14] Strategy for the Socio-Economic Development of the Komi Republic until 2035, approved by Decree of the Government of the Komi Republic No. 185 of April 11, 2019. URL: https://docs.cntd.ru/document/553237768 (accessed 10 January 2026).
[15] Draft Strategy for the Socio-Economic Development of the Yamalo-Nenets Autonomous Okrug until 2030. URL: https://www.economy.gov.ru/material/file/018e08421ad3d3b523173e61e2f3476b/23.04.2019yanao.pdf (accessed 27 November 2025).
[16] Strategy for the Socio-Economic Development of the Yamalo-Nenets Autonomous Okrug until 2035. URL: https://www.economy.gov.ru/material/file/54b0ca97c75f0c789e733191c545aaf5/PROEKT_STRATEGII.pdf (accessed 27 November 2025).

conducted across key analytical areas: objectives, economic model, socio-demographic policy, infrastructure priorities, environmental agenda, institutional mechanisms and monitoring system.

The previous strategy (2019) primarily addresses the region's development through hydrocarbon resource utilization and ensuring its fiscal sustainability. The main priorities are set in terms of energy production and exports, whereas social and quality-of-life parameters are regarded as secondary objectives. The draft of updated strategy retains the resource base as a strategic foundation, but demonstrates a shift in emphasis toward improving quality of life, human capital, and the sustainability of economic system. Nevertheless, this shift is primarily of a policy and values-based nature. Ontologically, the region remains oil and gas-centric, and the transition to a different development model requires a more specific definition of the sources and mechanisms for transformation. The early strategy is dominated by a "revenue maximization" model with minimal transformation of the production structure. Diversification instruments are formulated fragmentarily and do not contain a consistent set of measures for developing processing and non-resource clusters. The draft strategy introduces more explicit provisions for stimulating local processing, supporting small and medium-sized businesses, and implementing innovative solutions, but lacks detailed financial and institutional support that would ensure the transition from declaration to implementation.

Both versions of the strategies recognize the importance of supporting the population in Arctic regions, ensuring access to housing and healthcare. The draft strategy places increased emphasis on human capital development and access to services in remote settlements. However, the proposed measures are often not accompanied by comprehensive estimates of the budgetary burden or mechanisms for the targeted redistribution of revenue from the fuel and energy sector, which calls into question their feasibility.

Transport corridors, power supply systems, and digital communications remain priorities in both versions. The draft strategy highlights the importance of digital infrastructure and adapting infrastructure to climate risks, but key capital-intensive projects require external financing and cross-level coordination, which are not sufficiently reflected in the implementation plan. An interesting feature of the new version of the strategy is the amendment to the draft version, which demonstrates a more systematic integration of climate risks and environmental sustainability objectives into the region's agenda. At the same time, the implementation of environmental provisions depends on the regulation of large industrial producers and responsibility mechanisms, which are described in general terms in the draft and require formalization of standards and monitoring.

Overall, the comparison shows the persistence of the traditional institutional model based on interaction between the government and large extractive companies. The draft proposes the use of project management, digital tools, and expanded partnerships (including public-private partnerships), but does not provide a comprehensive mechanism for the redistribution of oil and gas revenues in favor of local processing and social investments. This creates a risk that the updat-

ed goals will remain declarative. The new document expands the range of qualitative targets (standard of living, access to services, environmental indicators), which theoretically improves the focus of policy. In practice, there is a need to standardize metrics, to link KPIs to budgetary commitments, and to establish transparent reporting procedures and sanctions for non-compliance. While noting that the new version of the strategy of the Yamalo-Nenets Autonomous Okrug demonstrates a value shift toward sustainability and human development, it should be highlighted that the implementation of these goals is hampered by the lack of a clear financial and institutional mechanism. In order to improve the strategy's effectiveness, it is necessary to:

- formalize mechanisms for the targeted redistribution of revenues from the fuel and energy sector;
- establish a "KPI — financing — responsibility" link for key projects;
- develop detailed plans for the processing industry and SMEs, including tax and investment incentives;
- introduce strict environmental requirements and a system of independent monitoring.

Without linking ambitious goals to sustainable funding sources and specific institutional measures, the updated strategy risks becoming a declarative document. Further research should focus on quantifying the budgetary requirements of the proposed initiatives, modelling scenarios for the redistribution of oil and gas revenues, and developing a methodology for the integrated monitoring of the strategy's implementation.

The results of the analysis have been summarized and a comparative matrix (Table 2) is presented to assess the readiness of the constituent entities of the Arctic Zone of the Russian Federation to implement the federal development strategy.

Table 2

Institutional readiness of the regions of the Arctic Zone of the Russian Federation to implement the federal development strategy[17]

Region	Compliance with federal strategy	Availability of KPI and monitoring	Involvement of indigenous peoples	Budgetary funding
Republic of Sakha	2	1	2	2
Chukotka AO	1	1	2	1
Yamalo-Nenets AO	2	1	1	2
Nenets AO	1	1	1	1
Arkhangelsk Oblast	1	1	1	1
Murmansk Oblast	2	2	1	2
Komi Republic	2	1	1	2

Conclusion

The analysis demonstrates a systemic incompatibility between federal-level targets and regional strategic planning practices in the Arctic Zone of the Russian Federation. Federal documents set interregional, long-term indicators for sustainable development and risk management, while

[17] Note: 0 — absence/ignoring; 1 — declarative nature; 2 — partial institutionalization; 3 — systemic institutionalization (no region has reached the level of systemic institutionalization).

regional strategies remain primarily project- and operational-based, with a clear focus on local economic objectives and raw material advantages. As a result, there is a discrepancy in timeframes, indicator sets, and assessment methodologies, which reduces the overall consistency of forecasts and the accountability of the strategic planning system.

Particular concern is caused by the fragmented nature of monitoring, the lack of standardization in environmental KPIs, and the insufficient integration of predictive risk analysis into regional documents. Many strategies do not include quantitatively substantiated scenarios for key climate factors (permafrost, changes in ice cover, the state of coastal ecosystems), as well as clear mechanisms for assessing and allocating environmental risks. The absence of standardized procedures for engaging indigenous peoples and local communities further undermines the legitimacy and sustainability of decisions. Accumulated discrepancies give rise to practical risks, including an increased likelihood of conflicts of interest between economic participants, an increasing number of environmental incidents, and the ineffective use of limited budget funds. These risks are exacerbated by the accelerating transformation of the Arctic environment and the growth of economic activity in the region, making the need for institutional and methodological synchronization particularly urgent. In order to improve the effectiveness of strategic planning in the Arctic Zone of the Russian Federation, systemic measures are required, including:

- unification of the methodology for setting goals and indicators, linked to specific timeframes;
- mandatory inclusion of multi-level forecast and risk analysis (including scenarios for permafrost and marine ecosystems) in regional strategies;
- creation of regional modules of a unified federal system for monitoring ecosystems, infrastructure, and social indicators;
- formalization of procedures for consulting with indigenous peoples and consideration of their interests;
- mechanisms for the targeted redistribution of oil and gas revenues towards local processing and social investments;
- development of interregional financial instruments and public-private partnerships for the implementation of capital-intensive infrastructure projects;
- active involvement of the scientific community in the development of adaptation technologies and standardized sustainability indicators.

Implementation of these measures requires political will, institutional reforms, and resource provision; however, this coordinated approach ensures that regional plans comply with the requirements of Presidential Decree No. 633 and minimizes systemic risks. Future research should include modelling the budgetary impacts of proposed measures, developing methodologies for integrated monitoring, and assessing the social impacts of resource revenue redistribution mechanisms. Combining scientifically justified methodology, transparent institutions and viable

sources of funding, strategic planning in the Arctic will be able to ensure the sustainable and socially responsible development of the regions.

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Promising Directions of Technological Transformation of Northern Reindeer Husbandry in Russia

Valeriy M. Koshelev [1]✉, Dr. Sci. (Econ.), Professor
Natalya V. Chekmareva [2], Cand. Sci. (Econ.), Associate Professor
Maria A. Romanyuk [3], Cand. Sci. (Econ.), Associate Professor
Maria A. Sukharnikova [4], Cand. Sci. (Econ.), Associate Professor
Arina P. Frolova [5], Assistant

[1, 2, 3, 4, 5] Russian State Agrarian University — Moscow Timiryazev Agricultural Academy, ul. Timiryazevskaya, 49, Moscow, Russia
[1] vmkoshelev@gmail.com ✉, ORCID: https://orcid.org/0000-0002-6573-5898
[2] cnv2005@yandex.ru, ORCID: https://orcid.org/0000-0003-2268-1233
[3] ma.romanyuk@yandex.ru, ORCID: https://orcid.org/0000-0003-0796-2061
[4] masukharnikova@mail.ru, ORCID: https://orcid.org/0000-0002-9960-2698
[5] arina.frolova.0404@mail.ru, ORCID: https://orcid.org/0009-0009-4776-8723

Abstract. The prolonged decline in northern reindeer husbandry is reflected in a reduction of the number of reindeer and the low economic efficiency of the sector. State support for reindeer farms, provided in the form of compensation for up to 95% of operational costs, ensures only the maintenance of current activities, without creating conditions for the development and modernization of production. This practice dates back to Soviet times and has been going on for many decades. In this regard, it is necessary to apply radically new approaches to the organization of production activities. The article presents an analysis of promising areas of technological transformation of the sector, including transition to fenced pasturing, introduction of deep processing of products, and creation of high value-added products. Technological transformation requires significant investments. Will it be possible to cover these costs in the foreseeable future? To answer this question, the article presents the results of a study using the example of a pilot investment project that is planned to be implemented in the Chukotka Autonomous Okrug. The analysis of the project aims to identify the conditions that could ensure its financial viability and economic efficiency. This has resulted in the formation and testing of a methodological approach to evaluating the prospects of such projects, based on previously conducted research. The developed recommendations on the industry's self-financing and increasing its competitiveness can be widely used to create favorable conditions for the sector to overcome the crisis and for sustainable development of the Arctic regions.
Keywords: *Arctic Zone of Russia, northern reindeer husbandry, technological transformation, economic effect, investment project, state support*

Introduction

Russia is the world leader in terms of reindeer population (accounting for 68% of the global livestock). According to recent studies[1], the average annual decline in the reindeer population in the Russian Arctic zone, where almost 90% of the country's total livestock is concentrated, is approximately 2.5%.

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[1] Arguments of the Week. URL: https://argumenti.ru/society/nature/2022/06/776201 (accessed 12 April 2025).

According to official statistics[2], the unprofitability rate of domestic reindeer farming was 51.73% in 2022 and 52.36% in 2023. Reindeer herding in Russia is experiencing a difficult period, characterized by prolonged stagnation. During the early stages of establishment and development of reindeer husbandry, production indicators were strongly impacted by harsh natural and climatic conditions. These included a lack of forage, hypothermia among young reindeer, and increased risks of attack by predators (wolves, bears, lynx, and arctic foxes) and birds. Newborn calves were particularly vulnerable, falling prey to arctic foxes and birds during the calving period, which directly reduced the survival rate of young reindeer (Bryzgalov, 2022). The relevance of this issue is determined not only by economic losses, which represent a serious problem, but also by the significant social role of reindeer husbandry in the North, which forms the basis for the well-being and preservation of the traditional way of life of the indigenous peoples. State support for reindeer herding farms, provided in the form of compensation for up to 95% of operational costs, ensures only the maintenance of current activities, without creating conditions for the development and modernization of production. This practice dates back to Soviet times and has been going on for many decades.

According to experts, the trends towards decline of northern reindeer husbandry, which emerged in the late 1980s and early 1990s, are irreversible unless radical measures are taken to promote the technological and economic development of the sector. Existing methods of state support and traditional management practices do not ensure the sustainable development of reindeer herding in Russia. It is necessary to explore the possibilities for technological transformation and to identify effective approaches to modernizing the industry that can ensure its self-financing, increased competitiveness, and sustainable development of Arctic territories (Dayanova, Egorova, Protopopova et al., 2020; Ginter, Kuzmin, 2020).

Significant transformation of the industry is possible through the introduction of innovative methods of animal husbandry and grazing, as well as the development of processing infrastructure focused on the production of high value-added reindeer products and the minimization of wastes. The study aims to develop a methodological approach for assessing the effectiveness of technological transformation in the reindeer herding industry, as well as to test the proposed tools using a pilot project in the “Omolonskaya Tundra” area of the Chukotka Autonomous Okrug. In addition to developing reindeer husbandry, this project has the objective of establishing facilities for the primary and advanced processing of reindeer husbandry products, as well as creating a favorable environment for the sustainable and comprehensive development of the region’s rural economy and infrastructure. The project is expected to improve the quality of life and well-being of the local population, with a particular emphasis on the indigenous peoples of the North living in this area. The authors believe that if the pilot project is successful, similar technologies could be widely adopted across Russia’s northern territories (Koshelev, Romanyuk, Sukharnikova et al., 2024).

[2] The level of profitability (loss) of sold goods, products, works, services since 2017. URL: https://www.fedstat.ru/indicator/58036 (accessed 12 April 2025).

This article is a continuation of research into the technological transformation of northern reindeer husbandry. The main objective of this study is to conduct an additional analysis focused on identifying and assessing promising areas for the technological transformation of reindeer herding in Russia, thereby complementing and expanding on previously obtained results.

This study aims to identify and evaluate prospective directions for the technological modernization of reindeer husbandry in Russia. Particular attention is paid to the analysis of an investment project that envisages a transition from traditional grazing methods to fenced husbandry in the Arctic zone, as well as the introduction of modern technologies for primary and advanced processing of reindeer products. The goal of the study is to substantiate the potential of the proposed technological innovations for ensuring sustainable development of the industry, increasing its competitiveness, and improving the socio-economic situation in the Arctic regions.

Research methods

The technological transformation of reindeer herding in the north requires significant investments. World Bank and UNIDO methodologies are used in international practice to analyze investment projects (Brown, 1980; Belli, Anderson, Barnum et al., 1998; Gittinger, 1982). However, the project under study has a number of specific features that require adaptation of the methodology. The limited financial resources of reindeer herding enterprises, due to low incomes and a lack of available funds, call into question the appropriateness of taking the alternative cost of capital into account when evaluating investment projects. The lack of real opportunities to invest in alternative areas of activity determines the absence of potential lost profits. In such circumstances, when analyzing the project's cash flows, it is reasonable to disregard discounting, as the discount rate, equal to the alternative cost of capital, approaches zero. In this case, the project's profitability is determined on the basis of nominal cash flows at constant prices.

At the same time, a shortage of own funds and limited opportunities to obtain external capital lead to the need for significant state financial assistance, particularly at the initial stage of the investment project's implementation.

Another peculiarity of applying this methodology is related to the specific consideration of the "Without Project" scenario, which assumes that the project is abandoned and traditional reindeer herding practices continue to be used. The traditional and generally accepted method for evaluating projects is based on a comparison of the "With Project" and "Without Project" scenarios, with the project's cash flows being determined by the difference between the cash flows in these scenarios. When evaluating projects related to the development of northern reindeer herding, this approach is modified to some extent. In particular, maintaining the old technology (the "Without Project" scenario) does not offer the industry a chance of recovering from the crisis, and the cash flows will be negative. Subtracting these negative values from the cash flows in the "With Project" scenario will result in an even higher assessment of the project's effectiveness. In other words, the worse the "Without Project" scenario, the higher the estimated benefit of implement-

ing the project. However, according to the methodology, this is precisely how a project's effectiveness should be assessed. At the same time, it is essential to remember the importance of competent and scientifically justified forecasting of development not only for the "With Project" scenario, but also for the "Without Project" scenario throughout the entire projection period, as the accuracy of the project assessment itself depends on this.

In addition to effectiveness, the financial feasibility of the project should also be assessed. If the project cannot be implemented due to a lack of financial resources at any given point in time, then assessing its effectiveness is irrelevant. Feasibility depends on the availability of sufficient internal and/or attracted financial resources throughout the calculation period to cover operating and investment costs. Moreover, these should be financially accessible resources: previously accumulated, borrowed funds, funds received as state support or in the form of sponsorship, grants, etc., as well as those generated by the project itself. Due to the obvious economic inefficiency of traditional reindeer herding technology and the lack of reindeer herders' own funds, they are practically unable to accumulate any capital or to obtain and service a commercial loan. Since the "Without Project" scenario is purely hypothetical ("what will happen if the project is abandoned"), the cash flows here are conditional, one might say virtual, and it will not be possible to finance the project using these flows. Therefore, to assess the financial viability of the project, the cash flows in the "With Project" scenario are used, as they reflect the real net benefits (revenues minus costs) in monetary terms. The financial feasibility of the project is assessed on the basis of a positive net cash flow at every stage of the projection period. This means that revenues from all sources should exceed total costs, including both operating and capital expenditures.

The project comprises three components: 1) the transition of reindeer husbandry to fenced grazing; 2) the construction of a slaughterhouse and a primary processing facility; 3) the implementation of deep processing technology. These components are relatively independent and can be implemented either separately or sequentially over time. In particular, it is possible to transform the reindeer herding industry to fenced husbandry without creating slaughter and processing facilities, while maintaining the traditional practice of selling live raised reindeer to harvesters. Alternatively, it is possible to postpone the construction of fencing, but to establish facilities for the primary and advanced processing of products obtained from the existing herd, taking into account its potential for extensive growth.

As the authors have already assessed each of these components (Koshelev, Romanyuk, Sukharnikova et al., 2024), this article focuses on analyzing the project as a whole and evaluating its financial feasibility and effectiveness, as well as justifying measures of state support for the sector's technological transformation. The cash flows take into account investments in the construction and equipment of a "smart" fence, a slaughterhouse, and facilities for deep processing of products, as well as ongoing costs for the maintenance, grazing, and slaughter of animals, and for processing and manufacturing of finished products. Revenues are generated from the sale of high value-added, deeply processed products. When calculating the cash flows, constant prices are

used, based on the average prices prevailing in 2024. Inflation is disregarded, as all cash flows are adjusted to a single point in time — the start of the first year of the project's implementation. In other words, all calculated values of the integral indicators used to assess the investment project's effectiveness are adjusted to the "zero" point in time.

Research results and discussion

In accordance with the methodological approach outlined above, research and calculations were conducted in the following areas:

- analysis and forecasting of the "Without Project" scenario;
- analysis and forecasting of the "With Project" scenario;
- assessment of the project's financial viability;
- assessment of the project's economic efficiency.

1. "Without Project" scenario

As already noted, the quality of the assessment of the "Without Project" scenario directly influences the validity of the evaluation of the project's own effectiveness, since all integral indicators (NPV — Net Present Value, IRR — Internal Rate of Return, etc.) are calculated on the basis of incremental cash flows, that is, flows equal to the difference between the "With Project" and "Without Project" cash flows.

The "Without Project" scenario assumes that the project initiator, the Orbat Agricultural Production Cooperative (Omolon village, Bilibinskiy District, Chukotka Autonomous Okrug), refuses to implement the project to introduce new reindeer grazing, slaughter and product processing technologies. In this case, the project initiator will continue to use traditional grazing techniques and sell live reindeer to the harvester. The initial herd size (at time zero, i.e., at the start of the project) is 250 head (200 females and 50 males). There are no plans to purchase breeding stock from external sources, and changes in herd size will be achieved through the reproduction of the herd's own stock. For example, during the first year of the project period, 160 calves (80 females and 80 males) will be added to the initial herd size, taking into account the birth rate of one calf per adult female and a survival rate of 80% (Fig. 1).

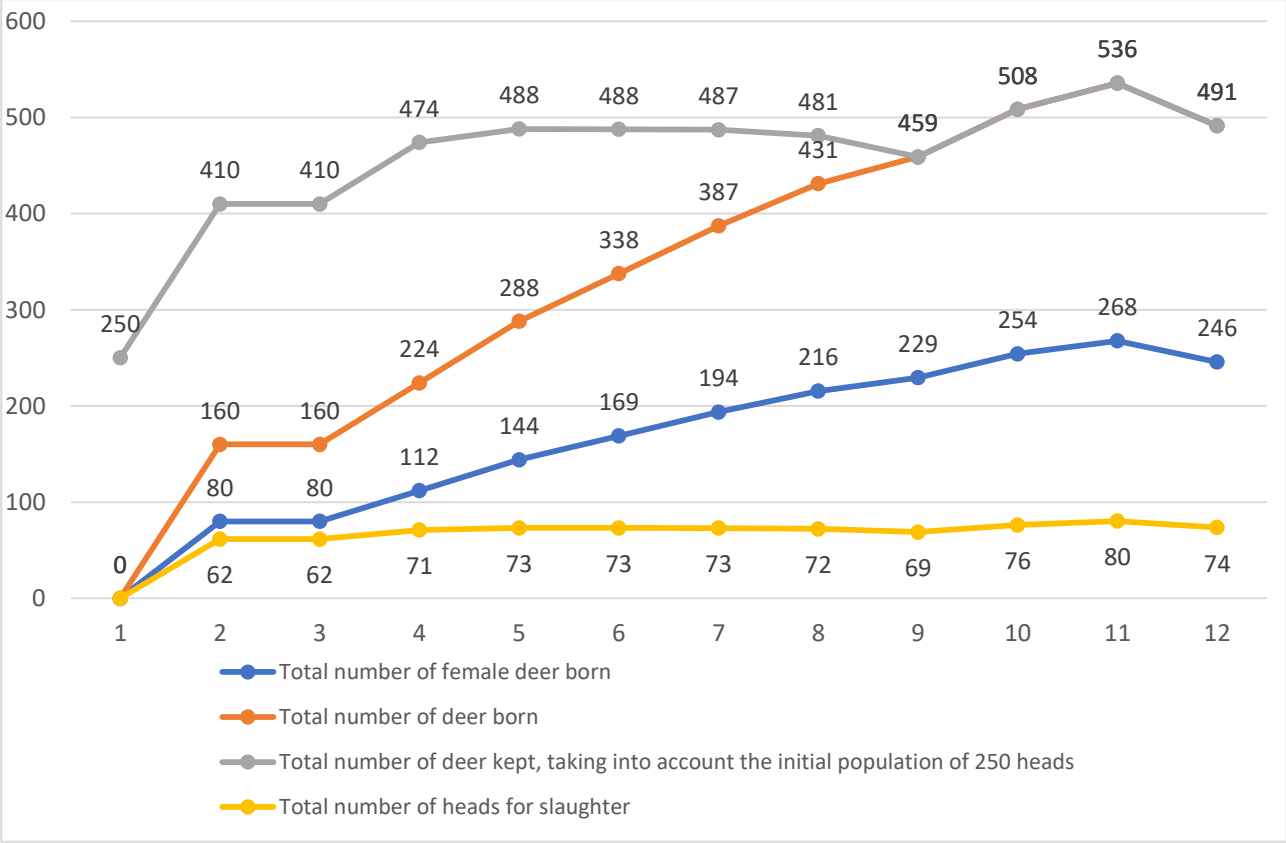


Fig. 1. Reindeer population dynamics in "Without Project" scenario[3], heads

As newly born females reach reproductive age (1.5 years) and are transferred to the heifer age group, they begin to produce calves (at around 3 years of age) and gradually replace the initial herd of adult females after their reproductive performance declines. Thus, by the 8th year, the entire initial population of females will be replaced by newly born females within the estimated period. As can be seen, under these conditions, traditional technology does not allow for sustainable, expanded herd reproduction, resulting in virtually no positive dynamics in sales of reindeer to the slaughterhouse operator.

Obviously, this "Without Project" scenario has a direct impact on revenue generation from deer sales and cash flows (Table 1). Cost items include not only operational expenses (wages of reindeer herders and management personnel, transportation costs, wolf hunting, etc.), but also the purchase and restoration of fixed assets with a limited service life (snowmobiles, radio stations, corrals, satellite phones, etc.). Negative net benefits (the difference between revenue and total costs) confirm the inefficiency of traditional technology, and the farm's production should be sustained through state subsidies, which in recent decades have amounted to 95% of annual costs.

[3] Source: compiled by the authors according to data provided by the project initiator.

Table 1

Cash flows in "Without Project" scenario[4], thousands rubles

Indicators	Years of the calculation period							
	1	2	3	4	5	…	10	11
Costs								
Fixed assets	2 890	50	60	80	240	…	80	0
Protective equipment	245	245	283	291	291	…	320	293
Transport costs	218	218	218	218	218	…	218	218
Labour costs	3 162	3 162	3 162	3 162	3 162	…	3 162	3 162
Workwear	216	342	221	342	216	…	342	216
Authorized equipment	282	185	245	109	246	…	109	246
Wolf hunting	54	54	54	54	54	…	54	54
Production management	220	220	220	220	220	…	220	220
Total costs	7 286	4 476	4 463	4 475	4 646	…	4 504	4 409
Benefits								
Revenue from reindeer sales	1 230	1 230	1 422	1 464	1 463	…	1 607	1 474
Net benefits	-6 056	-3 246	-3 041	-3 011	-3 184	…	-2 897	-2 935
Cumulative net benefits	-6 056	-9 302	-12 343	-15 354	-18 538	…	-33 985	*-36 920*

2. "With Project" scenario

The project involves the construction and installation of a "smart" fence with a total length of 180 km, with the phased commissioning of four sectors of 25,000 hectares each over the first four years. The reindeer herd will begin to be housed within the fence by the end of the first year following the commissioning of the first sector. The project assumes an increase in the reindeer population through both natural reproduction and the purchase of breeding animals (females and males) during the first four years. This will enable the herd to reach the planned size of 1,000 head, corresponding to the fence's carrying capacity (see Fig. 2). The calculation of the target population size is based on the standard grazing load in the forest-tundra zone, which is 100 hectares per animal.

When calculating population growth and dynamics, it is assumed that females begin reproducing on average at the age of three and maintain reproductive function for eight years. The transition to fenced grazing will increase the survival rate of reindeer to 95%, compared to 80% with traditional grazing (Yuzhakov, Zuyev, Elsakov et al., 2023). Until the project reaches full capacity — namely, until the completion of the fence construction, the achievement of the planned herd size of 1,000 head, and the commissioning of processing facilities — no industrial slaughter of reindeer will take place.

[4] Source: compiled by the authors based on annual reports and primary documentation from reindeer husbandry enterprises.

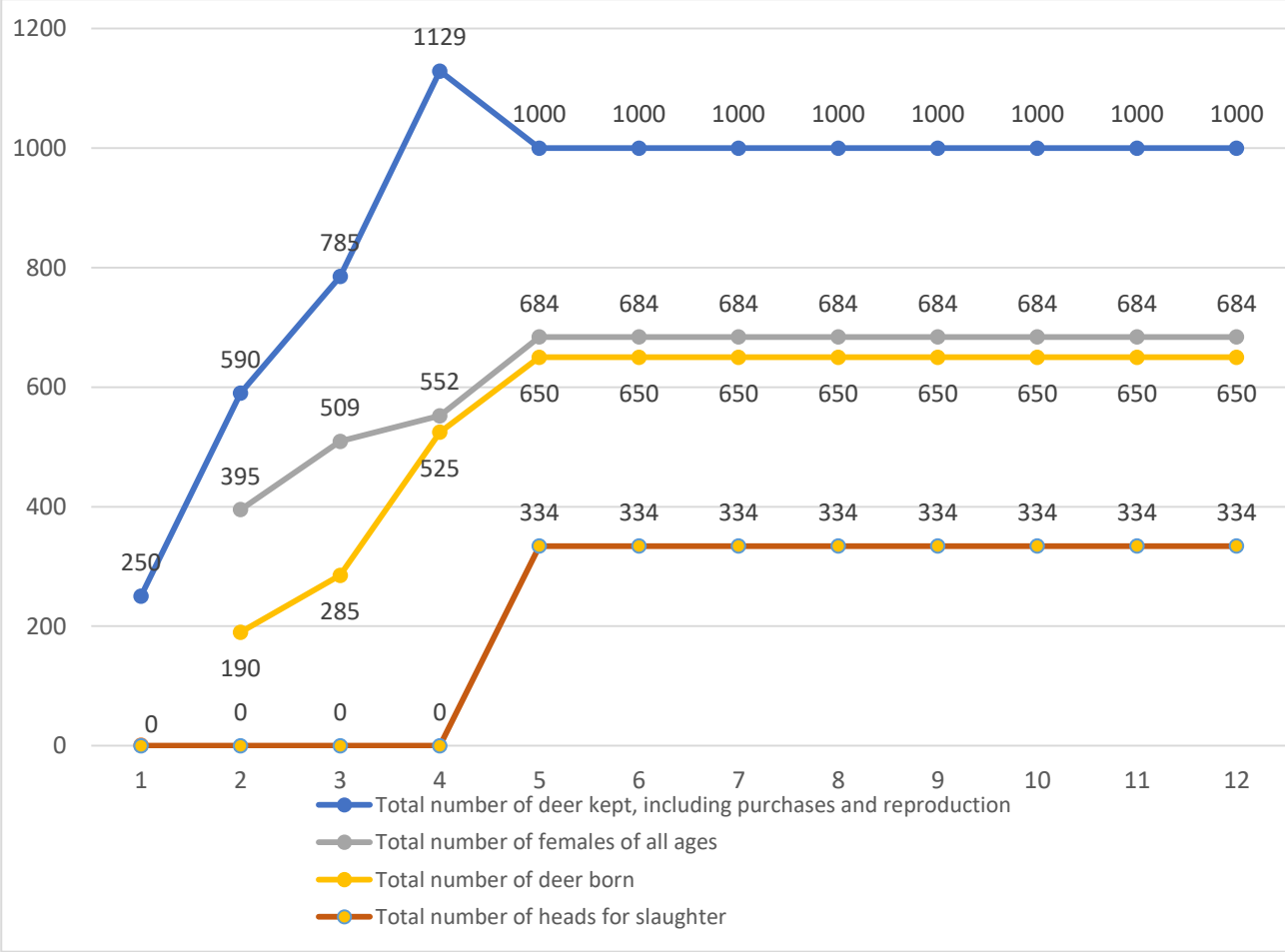


Fig. 2. Reindeer population dynamics in "With Project" scenario[5], heads

All major investments are planned for the first four years of the project. While investments for fence construction and breeding herd formation are allocated for all four years, the slaughterhouse and deep processing plant should be built and equipped before the herd is fully formed and slaughtering begins, i.e., in the third year of the project (Table 2). Therefore, the greatest investment burden falls on the third year of the project.

Table 2

Investment costs in "With Project" scenario[6], thousands rubles

	Years of the calculation period			
	1	2	3	4
A. Reindeer husbandry				
Fence construction	27 000	21 000	21 000	12 000
Equipment (including delivery)	12 600	10 000	15 000	20 000
Installation work	4 500			
Software development	9 535			
Transport vehicles	2 400			
Purchase of breeding stock	5 000	7 857	9 429	11 000
Total investment in reindeer husbandry	61 035	38 857	45 429	43 000
B. Slaughterhouse				
Mini-slaughterhouse			23 590	
By-products processing plant			22 580	

[5] Source: compiled by the authors.
[6] Source: compiled by the authors according to commercial proposals from companies — potential suppliers and contractors.

Transportation to the project site			7 200	
Total investment in slaughtering			53 370	
C. Deep-processing plant				
Turnkey plant			30 000	
Transportation to the project site			3 600	
Total investment in deep processing			33 600	
Total investment	61 035	38 857	132 399	43 000

The total volume of capital investment amounts to 275.3 million rubles, of which 132.4 million rubles, or almost half of the total project investment, are allocated to the third year. The structure of investment costs by project components (Fig. 3) indicates that expenditure on the introduction of fenced grazing technology dominates — 188.3 million rubles, or 68.4%.

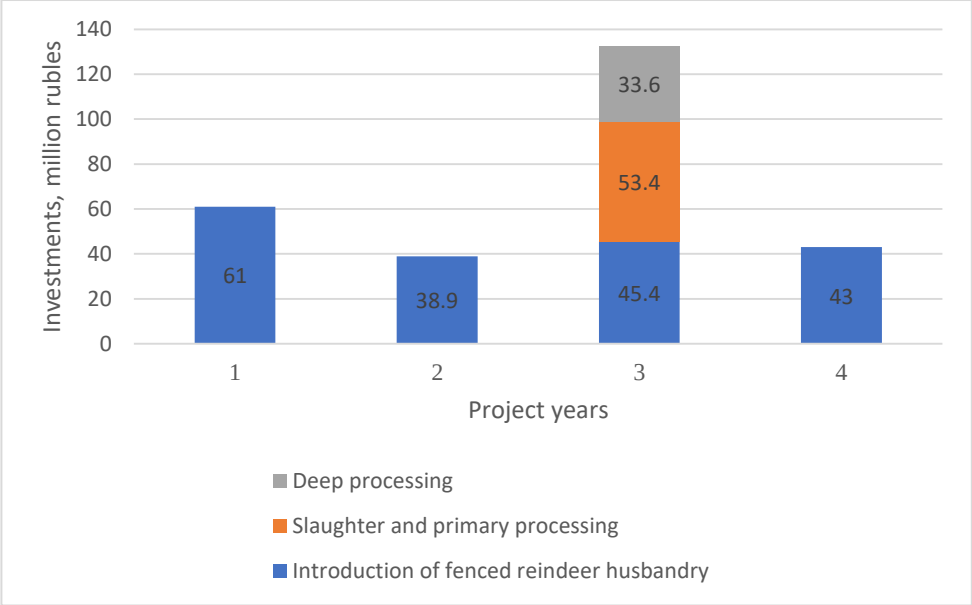


Fig. 3. Structure of investments[7], million rubles

The transition to the new fenced grazing technology will result in some changes in operational costs for the reindeer herding component, including increased herd size within the fence, reduced labor costs for grazing, and the absence of the need to shoot wolves within the fence (Table 3). Operating costs for fenced husbandry were estimated on the basis of a standard process flow chart (Dayanova, Egorova, Protopopova et al., 2017), taking into account the specific characteristics and differences in the technological processes involved in fenced and traditional husbandry. From the fourth year onwards, the total project operational costs include expenses associated with the operation of the slaughterhouse and the deep-processing plant after their commissioning.

[7] Source: compiled by the authors.

Table 3

Operational costs in "With Project" scenario[8], thousands rubles

	Years of the calculation period						
	1	2	3	4	5	…	11
A. Operational costs in reindeer husbandry							
Protective equipment	454	793	1240	770	770	770	770
Transport costs	218	218	218	218	218	218	218
Labour costs	2 428	2 428	2 428	2 428	2 428	2 428	2 428
Workwear	216	342	221	342	216	347	216
Authorized equipment	149	152	147	92	146	148	146
Wolf hunting	54	54	0	0	0	0	0
Production management	220	220	220	220	220	220	220
Total	3 739	4 207	4 475	4 070	3 998	4 132	3 998
B. Operational costs in the slaughterhouse							
Labour costs	0	0	0	3 744	3 744	3 744	3 744
Electricity and water supply	0	0	0	237	237	237	237
Total	0	0	0	3 981	3 981	3 981	3 981
C. Operational costs for deep processing							
Labour costs	0	0	0	389	389	389	389
Electricity and water supply	0	0	0	341	341	341	341
Raw materials and supplies	0	0	0	181	181	181	181
Total	0	0	0	911	911	911	911
Total operational costs	3 739	4 207	4 475	8 963	8 891	9 025	8 891

The most popular and in-demand types of finished products on the market have been selected as the project's end products (Table 4). To avoid double-counting, the cost of the main raw material — meat — was excluded from the production cost, as meat production costs are already included in the costs of reindeer rearing, slaughtering, and primary processing. Constant (average actual prices for 2024) small-scale wholesale prices were used to determine revenue from product sales. The products with the highest profit margins are loin, ham and dry-cured sausage. They account for over 93% of all revenue from the sale of deep-processed products. Revenues from the sale of by-products (tongue, heart, liver, head, blood) and other products (skins, horns) are added to the revenue from the sale of finished meat products (Dayanova, Egorova, Protopopova et al., 2017; Mukhachev, Kolpashchikov, Layshev, 2001).

Table 4

Calculation of production costs and revenue by product type[9]

Types of finished products	Total raw material consumption, t	Production output, t	Cost price per ton (excl. meat costs), thous. rub	Total costs (excl. meat costs), thous. rub	Selling price, thous. rub/t	Revenue, thous. rub
Neck cut	0.33	0.33	8.5	3.7	1200	391.2
Loin	7.68	5.76	33.2	253.9	1 620	9 328.9
Ham	6.95	5.22	34.0	235.0	1 260	6 571.4
Dry-cured sausage	2.66	3.55	77.0	362.8	1 700	6 032.2
Shoulder	1.41	0.92	40.3	49.1	900	826.2
Shank	0.27	0.27	8.5	3.0	500	132.6
Knuckle	0.34	0.34	8.5	3.8	500	170.8
Total	X	16.37	X	911.3	X	23 453.3

[8] Source: compiled by the authors according to data provided by the project initiator, standard process flow charts and regulations (Dayanova, Egorova, Protopopova et al., 2017; Mukhachev, Kolpashchikov, Layshev, 2001; Donchenko, Shelepov, Neustroev, 2008).

[9] Source: compiled by the authors according to the results of a study of the meat products market and regulatory standards (Donchenko, Shelepov, Neustroev, 2008).

The resulting flows of benefits, as well as investment and operational costs, make it possible to calculate the net benefits and construct the cash flows for the "With Project" scenario (Table 5). As in the "Without Project" scenario, traditional state support was not taken into account when calculating cash flows for the "With Project" scenario to ensure comparability. Meanwhile, by the fifth year, the project generates substantial positive cash flows (+17.8 million rubles) per year, compared to the "Without Project" scenario, where cash flows are deeply negative (see Table 1). Obviously, achieving such a result requires significant investment, which will not be quickly repaid. A simple calculation shows that, if the projected trends continue, the capital costs of the project will be fully recovered by the 20th year of the project without any state or other support. Thus, the overall situation suggests good prospects for the revival of the reindeer herding industry through technological transformation.

Table 5

Cash flows in "With Project" scenario without state support[10], thousands rubles

	Years of the calculation period						
	1	2	3	4	5	…	11
Total investment	61 035	38 857	132 399	43 000	0	…	0
Total operational costs	3 739	4 207	4 475	8 963	8 891	…	8 891
Total benefits, including from the sale of:	0	0	0	26 680	26 680	…	26 680
meat products	0	0	0	23 453	23 453	…	23 453
by-products (categories 1, 2)	0	0	0	1 055	1 055	…	1 055
other products (skins, horns)	0	0	0	2 171	2 171	…	2 171
Net benefits	-64 774	-43 064	-13 6873	-25 283	17 789	…	17 789
Cumulative net benefits	-64 774	-107 838	-244 711	-26 9995	-252 206	…	-145 820

3. Assessment of the project's financial viability

Financial viability is achieved, as is well known, when the cash flows do not show negative net benefits in the "With Project" scenario. Due to the sector's inefficiency and high dependence on subsidies, the project initiator, like other reindeer herders, lacks available funds to invest in the project. Given the shortage of own resources and the inability to attract external funding, the project is deemed financially unfeasible.

The project's financial viability is possible only with external financial support, specifically, direct state investment in capital expenditures (Table 6) and full compensation of operational costs totaling 12.4 million rubles over at least the first three years, when net benefits remain negative.

Table 6

Cash flows in "With Project" scenario with full compensation of capital expenditures[11], thousands rubles

	Years of the calculation period						
	1	2	3	4	5	…	11
Compensation of capital costs	61 035	38 857	132 399	43 000	0	…	0
Net benefits after compensation of capital costs	-3 739	-4 207	-4 475	17 717	17 789	…	17 789

[10] Source: compiled by the authors.
[11] Source: compiled by the authors.

Cumulative net benefits	-3 739	-7 946	-12 421	5 296	23 085	…	129 471
Compensation of operatinonal costs	-3 739	-4 207	-4 475				
Net benefits after compensation of capital and operational costs	0	0	0	17 717	17 789	…	17 789
Cumulative net benefits	0	0	0	17 717	35 506	…	141 891

4. Assessment of the project's economic efficiency

If the project's feasibility can be achieved through external funding, it is worth assessing its efficiency. As already noted, according to the methodology used, the efficiency assessment is based on a comparison of the cash flows in the "With Project" and "Without Project" scenarios (Fig. 4). In fact, if a decision is made to implement a project, that is, to introduce new technologies for animal husbandry, slaughter, and product processing ("With Project" scenario), the initiator has to cease production using the old, traditional technology ("Without Project" scenario). This means that, by switching to the new technologies, the initiator forgoes the negative cash flows generated by the old technology (Table 1). In this case, the project itself (without support) is valued higher than the result, which the initiator achieves without taking into account the "Without Project" scenario: -108.9 million rubles (Fig. 4) > -145.8 million rubles (Table 5). It is clear that this is not actual cash that the project will generate, but merely its "advantage" over abandoning it. The result remains negative (albeit not as significant), and this confirms that the project requires external financial support.



Fig. 4. Incremental cash flows without support[12], million rubles

If external support is received in amounts sufficient to cover capital expenditure and operational costs during the critical period (the first three years), the project can be assessed as highly efficient (Fig. 5). All cash flows are strongly positive, ensuring financial stability throughout the entire projection period.

The project’s safety margin is so significant that external support measures can include not only grant-based and interest-free government funding, but also borrowing on preferential loan terms and/or flexible debt servicing schemes, such as project financing with a deferral of several years before the start of principal and interest repayments. Some of these financing instruments have been discussed by the authors in previous publications, for example: (Koshelev, Romanyuk, Sukharnikova et al., 2024).

[12] Source: compiled by the authors.

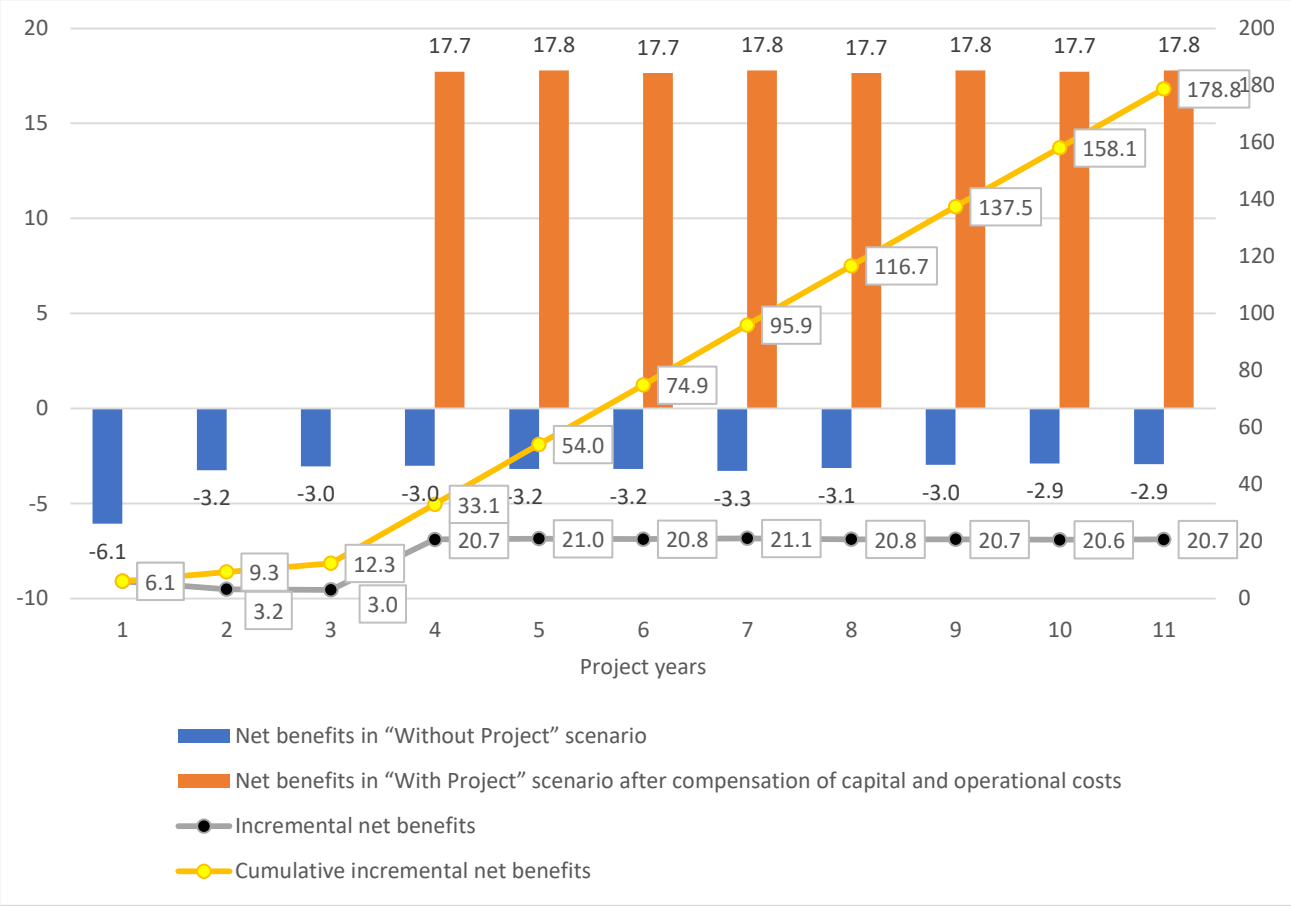


Fig. 5. Incremental cash flows with full support[13], million rubles

Therefore, the calculations have shown that the project under assessment lacks the necessary financial resilience to begin its implementation unless external support measures are applied. Over the 11-year calculation period, determined by the depreciation periods of the main acquired equipment, the project does not pay back the funds invested in it. However, if the conditions assumed for the calculation period are maintained in the longer term, the project has a realistic chance of demonstrating a positive net effect by the 20th year.

Conclusion

The results of the study suggest that the decline in the northern reindeer herding industry, observed over the past 30–40 years, can be halted. However, this requires a change in the concept of state policy support for the industry. Traditional assistance to reindeer herders in the form of subsidies to cover operational costs and partially restore fixed assets does not allow them to engage in expanded reproduction or even achieve self-sufficiency. Under the current circumstances, a radical shift is required from traditional extensive grazing methods to new, innovative closed-cycle technologies — fenced grazing, slaughtering, processing, production, and sale of finished products with high added value. The analysis has shown that substantial, albeit short-term, financial support during the technological modernization phase (usually within the investment phase)

[13] Source: compiled by the authors.

ensures the financial feasibility of the project and creates favorable conditions for the sector's transition to full self-financing in the long term (Koshelev, Romanyuk, Sukharnikova et al., 2024).

The financial viability of the project is achieved through support that ensures exclusively positive net benefits in the "With Project" scenario at each step of the calculation period. However, viability alone is not sufficient for a project to be approved. It is also necessary to assess its economic efficiency, which, in turn, is determined by positive integral indicators, in particular, the cumulative positive value of incremental net benefits, calculated as the difference between the net benefits of the "With Project" and "Without Project" scenarios. As research has shown, a positive effect is also impossible throughout the projection period without state support. However, in more distant future (estimated at 20 years), this becomes a completely achievable goal.

Therefore, if the state and society as a whole are interested in resolving the sector's crisis and creating conditions for its sustainable development, the state should review its economic policy, shifting its priority from current financial support for reindeer herding enterprises to investments in fundamental technological transformations of the industry.

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Scientific, Technological and Economic Potential of the Arkhangelsk Oblast. Part I

Igor G. Muraev [1], Cand. Sci. (Econ.)
Olga P. Sushko [2]✉, Dr. Sci. (Econ.), Professor

[1] Government of the Arkhangelsk Oblast, pr. Troitskiy, 49, Arkhangelsk, Russia
[2] Plekhanov Russian University of Economics, Stremyanny per., 36, Moscow, Russia
[2] Moscow State Technical University of Civil Aviation, Kronshtadtskiy Blv., 20, Moscow, Russia
[1] igmuraev@gmail.com, ORCID: https://orcid.org/0009-0002-0935-0704
[2] osushko@mail.ru ✉, ORCID: https://orcid.org/0000-0003-0865-6621

Abstract. The relevance of the research of the scientific, technological and economic potential of the Arkhangelsk Oblast is determined by a number of factors. Firstly, the Arkhangelsk Oblast plays a key role in ensuring Russia's national security in the Arctic zone. Secondly, the region has significant potential for the development of mining, forestry, shipbuilding, fisheries and tourism. At present, the Arkhangelsk Oblast is characterized by substantial reserves of natural resources, including forests, minerals and water resources. However, their use requires a rational approach to prevent environmental problems. Thirdly, the presence of scientific and educational centers creates favorable conditions for the generation and implementation of new technologies. The region's scientific institutions are actively involved in developing innovative projects, but their integration into the region's economy requires increased interaction between the scientific community and the business sector. Innovative projects and start-ups in the fields of technology and ecology demonstrate the potential for further development. Over the past decade, the dynamics of the gross regional product and gross value added of the Arkhangelsk Oblast have shown positive trends, reflecting changes in key sectors of the region's economy. Industrial production is an important part of the Arkhangelsk Oblast's economy, accounting for more than 40% of the region's total gross regional product. The main industrial areas are timber production, shipbuilding, and energy sector. The development of these industries contributes to strengthening economic stability and creating jobs. The financial performance of enterprises in the Arkhangelsk Oblast over the past decade reflects complex and contradictory trends in the economic development of the region. In recent years, the Arkhangelsk Oblast has experienced positive growth in investment in fixed assets. A key project in the field of scientific and technological development is the construction of a world-class scientific and educational campus "Arctic Star". The implementation of this project will strengthen the cooperation chains between science, education and business, as well as increase the contribution of science to the economy of the agglomeration.

Keywords: *potential, gross regional product, gross value added, sectoral structure of the economy, investment activity, scientific and educational base of the Arkhangelsk Oblast*

Introduction

The relevance of this topic is driven by rapid technological advances and global competition, making it particularly important to identify and effectively utilize the scientific, technological, and economic potential of regions.

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It is evident that each region possesses unique, historically established areas of competence, sector-specific characteristics, resource bases, and, consequently, its own competitive advantages. The Arkhangelsk Oblast, with its rich natural resources and strategic geographic location, demonstrates complex development dynamics in its economic sectors. In recent years, both stable trends and new challenges have emerged, requiring adaptation and innovative solutions. The Arkhangelsk Oblast is increasingly demonstrating progress in the development of Russia's Arctic region, it possesses high investment potential. A sustainable model of socio-economic development has been formed in the region, offering a number of competitive advantages: a convenient geographical location, a well-developed railway network and a seaport operating all year round. Arkhangelsk plays a key role in transport services for the Northern Sea Route and in supplying the Arctic territories, as it provides the shortest route to the center of the country. Severodvinsk is a leader in shipbuilding and production of marine equipment for the Arctic. One of the largest diamond-bearing provinces in Europe is situated within the region. Arkhangelsk is a university center that trains qualified personnel for work in the region. The Arkhangelsk Oblast also demonstrates strong positions in science and polar medicine. Currently, three clusters operate in the region: shipbuilding, forestry, and social services. Two additional clusters — biotechnology and fishing — are at the development stage.

The Ministry of Economic Development of the Russian Federation has proposed an initiative to create eight regional "support zones" as the basis for the reindustrialization of the Arctic[1]. This could become a new model for developing the region's potential and focusing efforts on growth areas, taking into account the rational use of both human and financial resources. In this context, it is important to outline the region's scientific and technical potential, which, based on a comprehensive assessment of interrelated resources and capabilities, will determine the territory's ability to develop, implement, and utilize new technologies for achieving socio-economic development.

Research object and methods

The research object is the potential of the Arkhangelsk Oblast. The aim of this work is to provide a comprehensive assessment of the current state of the Arkhangelsk Oblast and to identify areas for developing its potential and key competencies for the reindustrialization of the Arctic. To achieve this aim, the following objectives were set: to study the region's natural resources and their impact on the economy; to assess the role of scientific institutions in innovative development; to analyze existing and prospective projects; and to propose recommendations for improving the investment climate and stimulating growth.

Methodological approaches based on economic theory, regional economics, economic geography, theories of territorial-production complexes and related disciplines are applied to pro-

[1] A legal framework is being drawn up for the Arctic. The Ministry of Economy has revised the draft bill on support zones. URL: https://rspp.ru/events/news/arktike-podbirayut-pravovuyu-osnovu-minekonomiki-perepisalo-zakonoproekt-ob-opornykh-zonakh--31240/ (accessed 20 April 2025).

vide a theoretical and conceptual basis for the transformation of the region. The economic potential of a region can be assessed using various methods, each of which has its own characteristics and advantages. Traditionally, the economic potential of regions has been estimated by analyzing a range of indicators (Fig. 1).

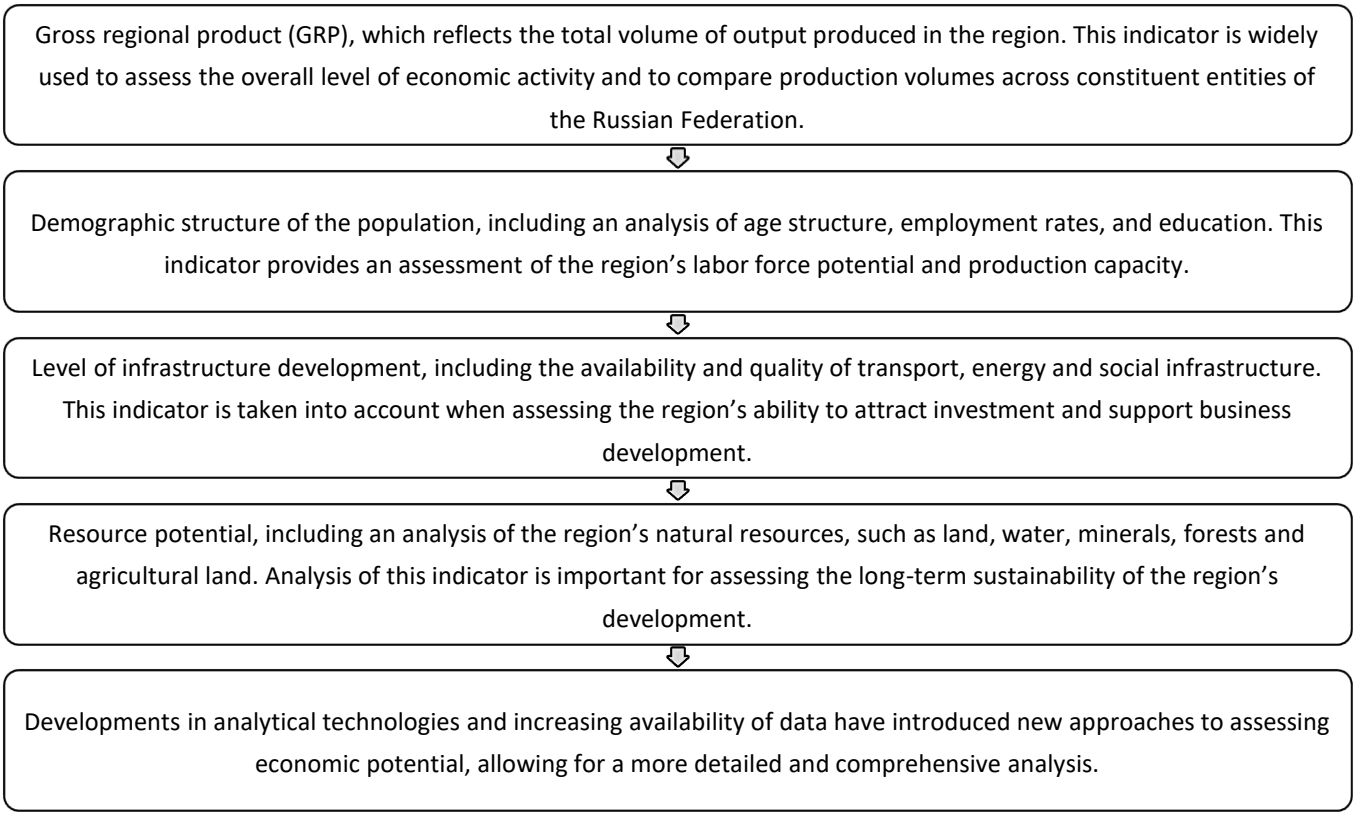


Fig. 1. Assessment of the economic potential of regions.

One of the most common approaches is the analysis of the gross regional product and its dynamics, which reflects the total value of goods and services produced in a region over a given period and enables an assessment of the overall level of economic development. Another important method is the analysis of the regional economic structure, including the distribution of employment by industry and the degree of production diversification. Regions with more diversified economies tend to be more resilient to economic shocks. It is also necessary to take into account the region's investment climate, including the level of investment in fixed capital, infrastructure and innovation. High levels of investment indicate favorable business conditions and potential for further economic growth. Finally, assessing the region's human capital, including the level of education, skills, and health of the population, is a significant factor determining its economic potential. Regions with a highly skilled workforce are generally more attractive to investors and have greater opportunities for the development of high-tech industries. Economic assessment is also an important component. A wide variety of methods can be used to analyze economic potential (Fig. 2).

Method of aggregate regional resources	• is based on an analysis of all available resources of the region: natural, human, financial and industrial
Multiplier method	• is used to assess the impact of changes in individual sectors on the region's economy. It takes into account how changes in one industry may affect other sectors of the economy.
Method of comparative analysis	• involves comparing the region's development indicators with similar indicators in other regions, which makes it possible to identify competitive advantages and weaknesses
Method of analysis of production factors	• assessment of the use of production factors (land, labor, capital, entrepreneurship) to determine their efficiency
Method of assessment based on production factors	• analysis of the use of land, labor, capital and entrepreneurial activity in the region
Method of analysis of the region's economic structure	• analysis of the structure of the region's economy, that is, the share of various sectors in the economy

Fig. 2. Methods for analyzing the economic potential of regions.

Modern methods include: method of integrated assessment, method of indicator systems, analytical methods involving the use of GIS, development scenario modelling, and others.

Various methods were used to study the scientific, technological, and economic potential of the Arkhangelsk Oblast and to identify its development areas. Their comprehensive application provided an overview of the region's potential and identified opportunities for its further development.

Review of scientific research

Many researchers have studied the potential of the Arkhangelsk Oblast, beginning with M.V. Lomonosov, who saw the future of Russia in the development of the northern territories. In particular, Professor M.K. Sidorov examined the potential for the development of maritime transport and fisheries in the region, emphasizing the need to modernize port infrastructure and introduce new technologies into the fishing industry. His works served as the basis for several strategic development plans for the region during the Soviet period. Another researcher, A.I. Ivanov, focused on the study of the forest resources of the Arkhangelsk Oblast and their sustainable use. He proposed a set of measures for reforestation and wood processing aimed at minimizing the negative impact on the environment and increasing the efficiency of the forest industry. Professor

A.V. Plastinin actively researched the development of the forestry sector (Plastinin, Skvortsov, Sushko, 2022; Skvortsov, Plastinin, Sushko, 2022).

V.F. Bogachev and N.P. Veretennikov (Bogachev, Veretennikov, 2020) presented the integrated aspects of economic management in Russia's Arctic regions. The characteristics of the competitiveness of the economies of the Arkhangelsk and Murmansk Oblasts are analyzed in the works of M.N. Bogdanova (Bogdanova, 2019). T.I. Barasheva (Barasheva, 2022) proposed a "methodological approach to studying budget potential using the example of northern regions". The methodological approach developed by the author comprises groups of indicators characterizing the financial security of regions and reflecting the quality of budgetary management. During the testing of this methodology, calculations were made of an aggregate integral index assessing the level of budget potential utilization in the regions, as well as its components — the individual integral indices (Barasheva, 2022). P.V. Druzhinin and M.V. Moroshkina (Druzhinin, Moroshkina, 2018) described the economic development of the European North in their research article, subsequently assessing its impact on the environment. N.G. Duplenko and E.A. Golushko (Duplenko, Golushko, 2020) analyzed regional asymmetries in the development of the digital economy in Russia's North-Western Federal District. Researcher R.V. Badylevich (Badylevich, 2020) presented an analysis of the level of economic security in the regions of the Arctic zone of the Russian Federation, based on economic security indicators.

A.G. Koryakov, S.G. Basalov and D.N. Baranov (Koryakov, Basalov, Baranov, 2017) demonstrated in their study that the Arkhangelsk Oblast, despite its rich natural resources and strategic geographic location, experiences complex dynamics in the development of its economic sectors. In recent years, both stable trends and new challenges have been observed, requiring adaptation and innovative solutions.

Scientists K.S. Zaikov, A.A. Spiridonov, A.M. Fadeev (Zaikov, Spiridonov, Fadeev, 2024), and V.N. Lazhentsev (Lazentsev, 2024) explored opportunities for developing the potential of the Arctic and the North. A.S. Vasilyeva (Vasilyeva, 2021) examined the key macroeconomic indicators of the Arkhangelsk Oblast.

Researchers A.A. Mustafaev, N.D. Naydenov, and T.A. Naydenova (Mustafaev, Naydenov, Naydenova, 2023) in their article, published in the journal "Arctic and North", investigated the ways, methods and approaches for developing the full economic potential (production and consumer) of the agro-industrial complex in the northern regions. The authors identified trends and prospects for socio-economic, environmental, infrastructural, demographic, and market transformations in the agro-industrial complex of the northern regions.

A.M. Onyakova (Onyakova, 2019) analyzed the prospects for developing the mineral resources of the Arkhangelsk Oblast, including the further development of the diamond mining industry, the launch of titanium deposit development, and the opening up of new deposits of bauxite, manganese, and other minerals. The implementation of these projects will create new jobs,

increase tax revenues, and ensure sustainable socio-economic development of the region. Particular attention is paid to environmental safety during mineral resource exploitation.

The works of O.V. Tolstoguzov (Tolstoguzov, 2022) demonstrate that the structural transformations of the economy of north-western Russia, particularly in the context of recent decades, are inextricably linked to the evolution of the institutional environment. Institutions, by setting the "rules of the game", determine incentives for economic behavior, innovation, and investment. Imperfections in the institutional structure, whether due to ineffective regulation, corruption, or weak property rights protection, inevitably hinder the development of promising sectors and exacerbate structural imbalances.

I.I. Tuchina (Tuchina, 2017) justified that innovation development in the region is primarily linked to the modernization of traditional sectors: forestry, shipbuilding, and mining. The introduction of new technologies in wood harvesting and processing improves production efficiency and reduces the negative impact on the environment. In shipbuilding, the focus is on the development and construction of ice-class vessels, which are in demand for Arctic exploration. Mining stimulates innovation in geological exploration and mineral processing. In addition to traditional sectors, the development of new industries, such as information technology, biotechnology and renewable energy, represents a promising area. Creating a favorable climate for innovation, supporting small and medium-sized innovative enterprises, and developing scientific and educational infrastructure are essential conditions for the successful development of an innovative economy in the Arkhangelsk Oblast.

The study by V.A. Tsukerman and E.S. Goryachevskaya (Tsukerman, Goryachevskaya, 2022; Tsukerman, 2013) in the journal "Arctic and North" presented the results of an analysis of the innovation potential of Russia's Arctic regions. The researchers concluded that foreign potential assessment methods are not suitable for determining the innovation potential of Russia's Arctic regions. In turn, Russian methodologies do not provide an objective assessment of the Arctic regions' innovation potential. Therefore, the researchers developed a potential assessment methodology based on the calculation of specific indicators rather than absolute ones. Using this methodology, the potential was calculated and Russian regions were ranked over a ten-year period (2011, 2013, 2017 and 2020). In our view, this methodology, combined with other methods, can be applied to the assessment of regional potential.

K.I. Sergeeva and O.S. Zakoretskaya (Sergeeva, Zakoretskaya, 2016) consider that small businesses play a critically important role in the economy of the Arkhangelsk Oblast, acting as a catalyst for innovation, a creator of jobs and a driver of economic growth. Entrepreneurship in the region contributes to economic diversification, reducing dependence on large industrial enterprises.

According to E.A. Guzenko (Guzenko, Chirkov, 2023), a region's level of development is determined by the standard of living of its population. An assessment of public health, using the Arkhangelsk Oblast as a case study, is presented in the work of researchers D.O. Dushkova, V.S.

Tikunov and O.Yu. Chereshnya (Dushkova, Tikunov, Chereshnya, 2019). An analysis of the region's labor force has also been carried out in other studies (Sushko, 2014; Sushko, Telegin, 2015; Muraev, Sushko, 2024).

Other researchers have also studied the potential of the Arkhangelsk Oblast (Orlov, Zakateev, 2023; Pavlenko, Podoplekin, 2015). Their works cover a wide range of areas: from the study of natural resources such as forests, minerals, and waterways to an analysis of the region's socio-economic development and its cultural heritage. Particular attention has been paid to exploring the potential of forest resources as a renewable source of raw materials for the pulp and paper industry and wood processing (Serova, 2016; Litovchenko, 2016). Mineral reserves, including diamonds, oil, and gas, are also being studied to assess their industrial potential and to develop strategies for efficient extraction and processing.

In recent years, many scientific studies have focused on innovative technologies and alternative energy sources, which will become promising areas for the region's economic growth. Issues relating to the conservation of the unique Arctic environment and the sustainable development of the northern territories are also being actively studied. Scientists of the Northern (Arctic) Federal University named after M.V. Lomonosov (NArFU) are conducting research in the fields of Arctic technologies, renewable energy, and the development of new materials, which opens up prospects for diversifying the region's economy and attracting investment (Sushko, Kaznin, Babkin, 2017).

Research results

Set of elements of scientific, technological, and economic potential of the Arkhangelsk Oblast

Despite external socio-economic and political challenges and fluctuations, the economy of the Arkhangelsk Oblast is demonstrating steady growth. The growth of the gross regional product (GRP) in the Arkhangelsk Oblast is driven by a number of factors, including the implementation of major investment projects, the development of forestry industry, shipbuilding, and transport infrastructure. An important part of the region's scientific and technical potential is the work of the Northern (Arctic) Federal University named after M.V. Lomonosov, which trains specialists in 96 fields of study, serving not only the Arkhangelsk Oblast, but also neighboring regions. Scientific research is carried out by the Federal Center for Integrated Arctic Research of the Ural Branch of the Russian Academy of Sciences.

A key component of the Arkhangelsk Oblast's economic potential is the development of natural resources, in particular deposits of diamonds and other minerals. The Arkhangelsk Oblast has the only diamond-bearing province in Europe, which demonstrates that science and technology can ensure efficient production. The development of the scientific and technological potential of the region is also linked to the activities of the Plesetsk Cosmodrome, which is important for both national security and the socio-economic development of the Arkhangelsk Oblast. The cosmodrome's activities support the development of related industries (mechanical engineering, electronics, telecommunications), and contribute to the advancement of science and education in

the region. A key factor is the significant scientific potential concentrated in universities and research institutes. They are engaged in advanced research in fields such as shipbuilding, forestry, medicine, and biotechnology. These developments, supported by qualified specialists, form the basis for the introduction of innovative technologies into all sectors of the economy.

The region's economic potential is determined by a diverse structure including shipbuilding, logging and wood processing, fisheries, and a service sector specializing in logistics and tourism. This contributes to the creation of new jobs, increased tax revenue for the budget, and an improved quality of life for the region's population.

The interrelationship between scientific and technological progress and the region's economic potential creates a synergistic effect that facilitates the effective resolution of socio-economic challenges in the Arkhangelsk Oblast and strengthens its position within the Russian economy. "Investing in the development of science and technology, supporting innovative enterprises, and creating a favorable investment climate are fundamental conditions for realizing this potential and ensuring the region's sustainable long-term growth" (Vasilyeva, 2021).

The set of elements comprising the region's scientific, technological and economic potential covers a wide range of aspects: from its rich natural resources, such as forests and minerals, to its well-developed infrastructure, including facilities and transport links that connect the region with the rest of the country and the world.

Economic performance of the Arkhangelsk Oblast

The economy of the Arkhangelsk Oblast makes a significant contribution to the overall economic potential of the North-Western Federal District. The region's core industries are the forestry complex, shipbuilding, and mineral extraction, including oil and gas. These sectors account for a significant share of the gross regional product (GRP), emphasizing their key role in the region's economic structure.

Over the past ten years, the GRP of the Arkhangelsk Oblast has more than doubled (Fig. 3). In 2021, the GRP of the Arkhangelsk Oblast exceeded 700 billion rubles, indicating positive economic growth trends in the region. This growth in the region's GRP is driven by increased productivity in key sectors, such as manufacturing and mining. A.S. Vasilyeva notes that "in recent years, there has been a trend toward growth in all key socio-economic indicators. One of the most important is the gross regional product (GRP). From 2008 to 2018, this indicator for the Arkhangelsk Oblast increased by 2.8 times" (Vasilyeva, 2021).

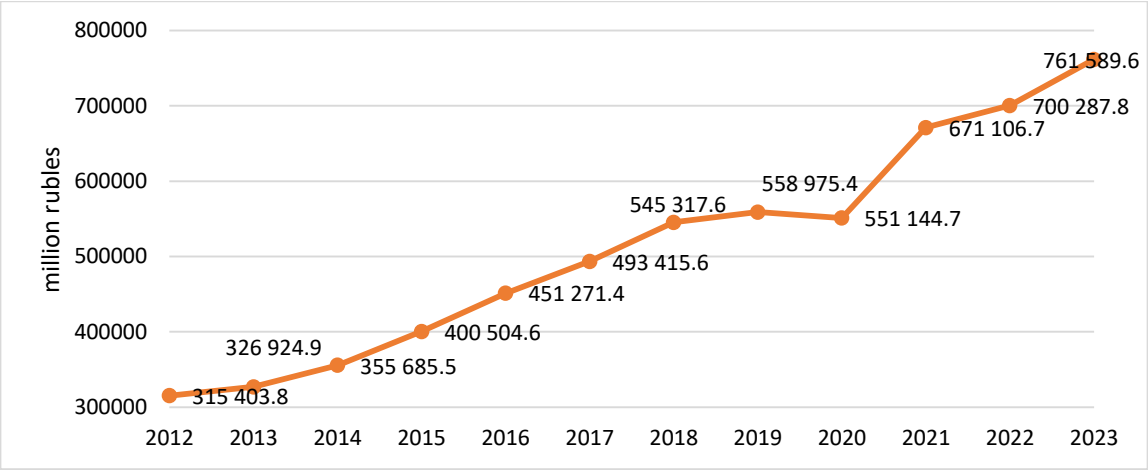


Fig. 3. Gross regional product (at current basic prices)[2].

During the decade under review, fluctuations in GRP were observed, reflecting changes in key economic sectors such as forestry, shipbuilding, and energy. In particular, the period 2014–2016 was characterized by a decline in the Arkhangelsk Oblast's GRP growth rate, which was linked to the deterioration of the macroeconomic situation in the country and a fall in prices for export goods. A second decline in the region's GRP development occurred in 2020 due to the pandemic. The pandemic primarily affected the service sector and subsequently impacted manufacturing sectors. The shutdown of enterprises, as well as disruptions in the supply of raw materials and components, led to a decrease in production volumes in the Arkhangelsk Oblast and an increase in production costs. Furthermore, declining consumer demand also had a negative impact on manufacturing sectors. The Arkhangelsk Oblast's gross regional product (GRP) growth rate over the past five years has averaged 5–8% per year, confirming positive trends in the region's economic development.

Thus, the growth of the Arkhangelsk Oblast's GRP demonstrates sustainable economic development and increasing competitiveness. Future prospects are linked to the implementation of new investment projects, the development of innovative industries, and the efficient use of its natural resources.

An analysis of gross value added (GVA) in the Arkhangelsk Oblast for the period from 2013 to 2024 (Fig. 4) reveals the key trends and factors influencing the region's economic development. During the period under review, there were phases of both growth and decline, driven by changes in the structure of the economy, external shocks and the implementation of regional development programs. At the beginning of the period, from 2013 to 2016, GVA demonstrated moderate growth due to the development of the forestry complex, shipbuilding, and mining. However, economic sanctions and the fall in oil prices in 2014–2015 had a negative impact on growth rates, leading to a slowdown in economic activity. Between 2017 and 2020, the region's economy stabilized and gradually recovered. This was facilitated by the implementation of major investment projects in the timber processing sector and the development of transport infrastructure. The COVID-

[2] Rosstat. URL: https://29.rosstat.gov.ru/ (accessed 11 April 2025).

19 pandemic in 2020 disrupted economic dynamics, causing a decline in activity in several sectors, particularly in services and tourism. In recent years, from 2021 to 2024, the economy of the Arkhangelsk Oblast has shown signs of recovery and adaptation to the new conditions. Despite this, there are still risks associated with geopolitical instability and the need for technological modernization in key sectors. The region's further development will depend on the effective implementation of the socio-economic development strategy and on attracting investment into innovative sectors of the economy.

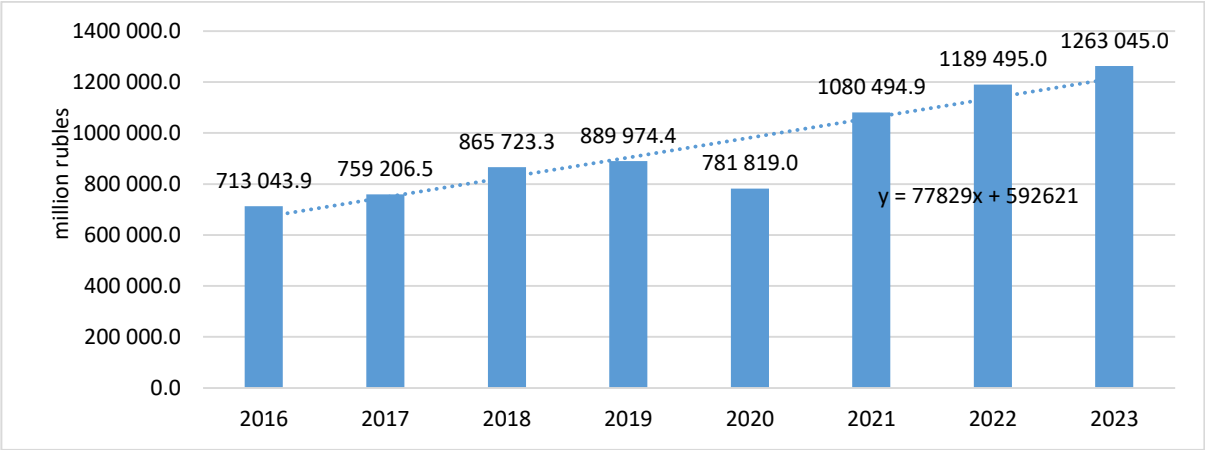


Fig. 4. Dynamics of gross value added (at basic prices) in the Arkhangelsk Oblast[3].

The structure of the gross regional value added (GRVA) of the Arkhangelsk Oblast reflects the complex interaction of various sectors of the economy, each of which contributes to the region's overall economic performance. Traditionally, industrial sectors primarily linked to the use of natural resources, namely the forestry industry (Fig. 5), play a key role in shaping GRVA. Industrial production plays a significant role in the economy of the Arkhangelsk Oblast, accounting for over 40% of the region's total GRP. The main industrial sectors include the production of forest products, shipbuilding and the energy sector. The development of these industries contributes to economic stability and job creation.

[3] Rosstat. URL: https://29.rosstat.gov.ru/ (accessed 11 April 2025).

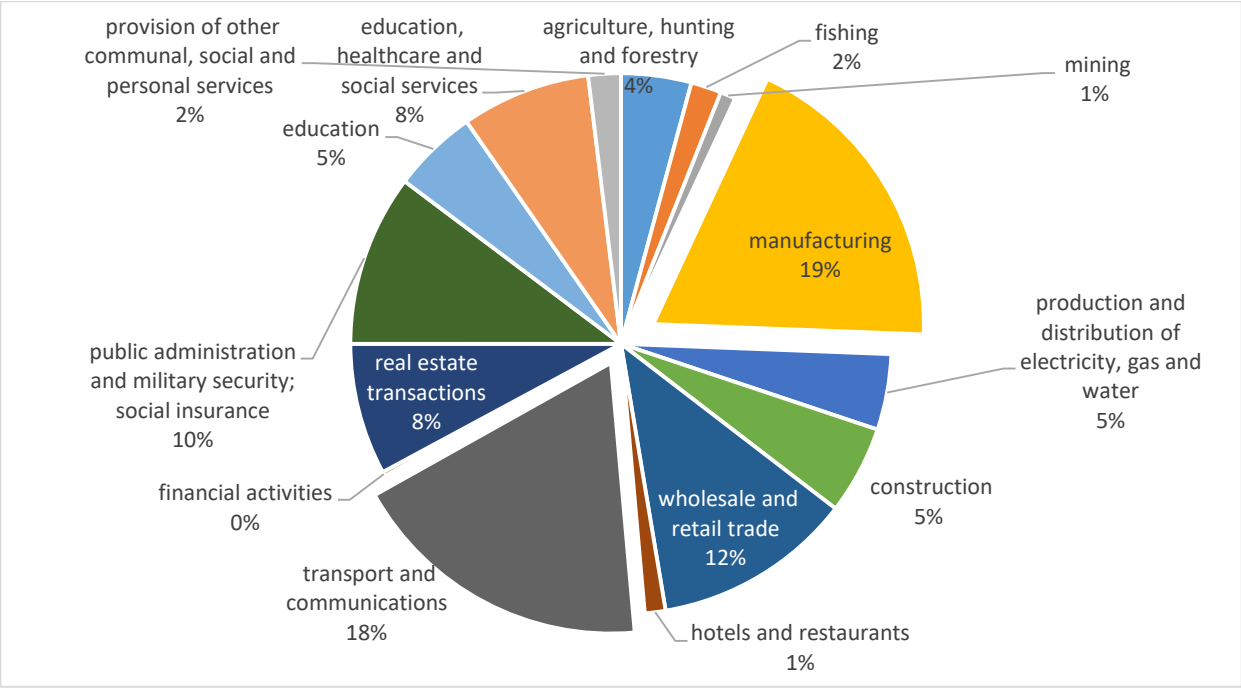


Fig. 5. Structure of gross regional value added in the Arkhangelsk Oblast (at current basic prices) in 2013[4].

However, in recent years, there has been a trend toward economic diversification and an increasing share of other sectors in the structure of the Arkhangelsk Oblast's GRVA. In particular, the share of mining (from 1% to 5%), construction, transportation and communications, and the service sector is growing, driven by investment projects, infrastructure development, and increased consumer demand. The extraction of minerals, particularly diamonds and bauxite, will remain an important source of revenue for the region in the long term. Nevertheless, dependence on global commodity prices makes the region's economy vulnerable to external shocks. Consequently, economic diversification and the development of other sectors are becoming priority objectives for ensuring the region's sustainable development.

The share of certain sectors in the Arkhangelsk Oblast has declined more significantly by 2024–2025 (construction — from 5% to 3%, trade — from 8% to 5%), due to a number of factors, including reduced investment in modernizing production facilities, increased competition from other regions and countries, and changes in the demand structure (Fig. 6). An increase in the share of the manufacturing sector has a positive impact on the region's economic development, as this sector is one of the main sources of jobs and tax revenue. This trend is driven by a number of factors, including the introduction of modern technologies and innovative solutions.

[4] Rosstat. URL: https://29.rosstat.gov.ru/ (accessed 11 April 2025).

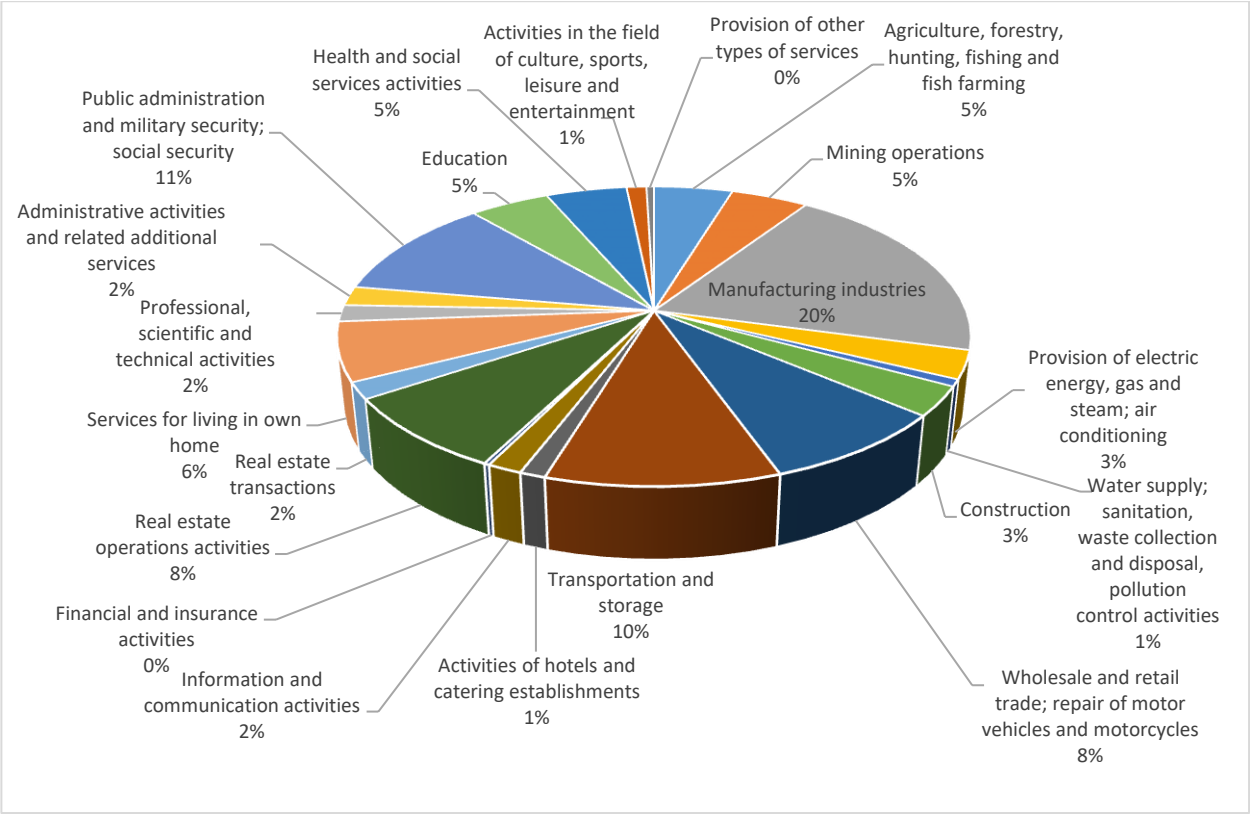


Fig. 6. Gross regional product (at current basic prices) of the Arkhangelsk Oblast in 2024[5].

Thus, the dynamics and structure of the Arkhangelsk Oblast's GVA are constantly changing, reflecting shifts in the economic environment, technological progress, and the investment activity of enterprises. The region's further development will depend on its ability to adapt to new challenges and make effective use of its competitive advantages.

When examining the dynamics of the Arkhangelsk Oblast's financial indicators for the period from 2013 to 2024, it is important to note the heterogeneity of the region's economic development, determined by both national trends and specific factors influencing the region's economy. The Arkhangelsk Oblast is experiencing a downward trend in the number of registered organizations (Fig. 7). This negative trend reflects changes in the region's economic structure. One of the key factors contributing to the reduction in the number of organizations is the trend towards optimizing business processes and consolidating assets. In an effort to improve efficiency and competitiveness, enterprises are undergoing restructuring, which often takes the form of mergers or acquisitions. This process, although leading to a reduction in the number of legal entities, can strengthen the position of large and stable enterprises. Negative economic factors, such as market volatility, fluctuations in demand, and changes in the regulatory framework, can lead to the closure of small and medium-sized businesses experiencing difficulties adapting to new conditions. Furthermore, competition from large companies creates additional pressure on small businesses, often forcing them to exit the market.

From 2013 to 2024, the share of SMEs in the Arkhangelsk Oblast remained unchanged, at 5% of the total number of entities in the region (Fig. 7). Despite the implementation of various

[5] Rosstat. URL: https://29.rosstat.gov.ru/ (accessed 11 April 2025).

support programs and initiatives aimed at developing small and medium-sized businesses in the region, the stagnation of this percentage indicates the presence of problems. Probably, the current measures are not sufficiently effective or do not meet the current requirements of the business sector.

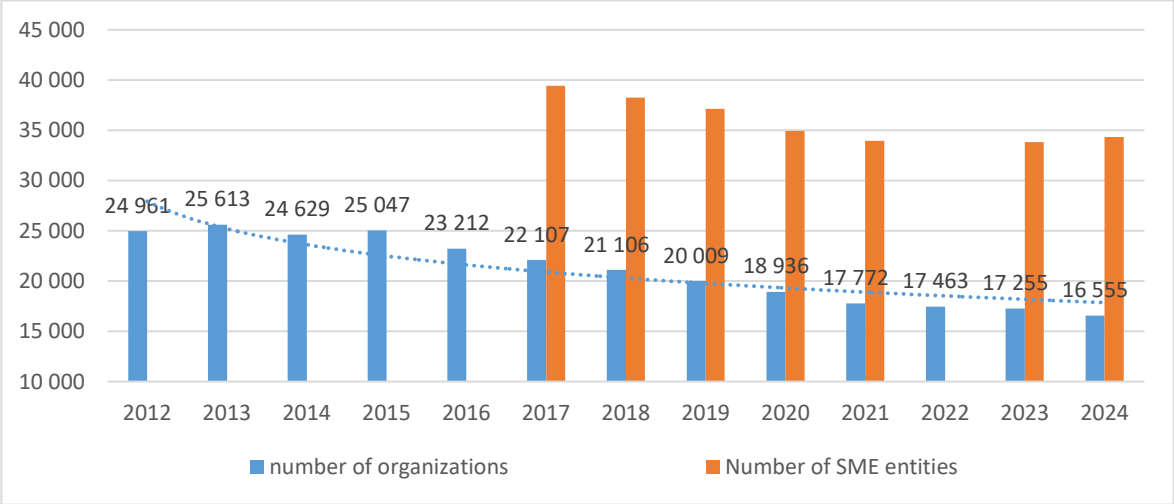


Fig. 7. Dynamics of the number of organizations in the Arkhangelsk Oblast[6].

Against the backdrop of a declining number of registered organizations in the Arkhangelsk Oblast, an analysis of enterprises' financial indicators reveals positive trends. The financial performance showed constant fluctuations between 2013 and 2024, indicating the challenging situation faced by enterprises in the Arkhangelsk Oblast (Fig. 8). An analysis of the financial results of enterprises in the region allows identifying trends in the development of the Arkhangelsk Oblast's economy (Fig. 8).

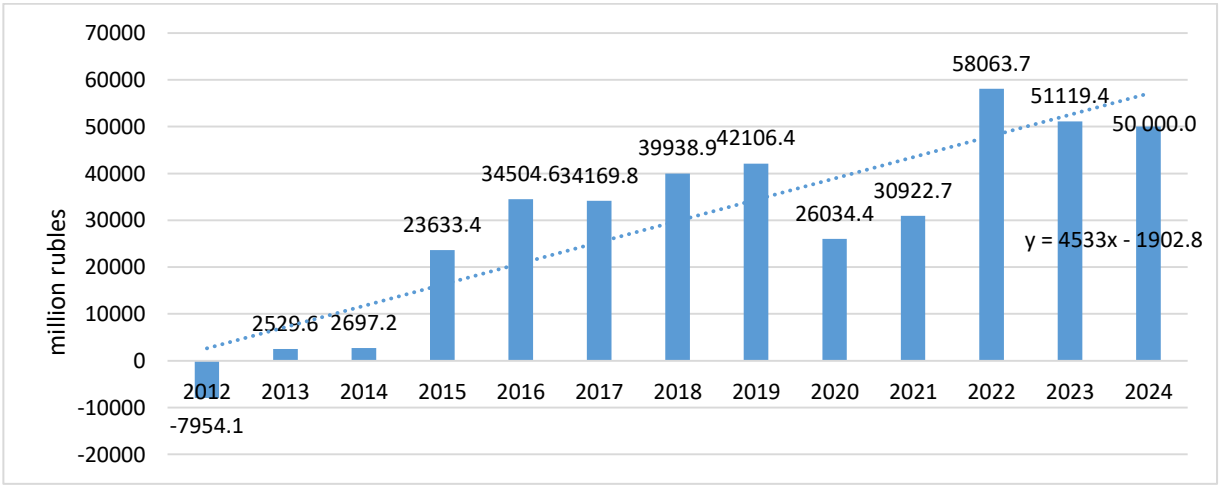


Fig. 8. Net financial results of organizations in the Arkhangelsk Oblast (excluding small businesses)[7].

An analysis of return on assets, product profitability, current liquidity ratio, equity ratios, and working capital ratios shows more noticeable fluctuations than the financial result (Fig. 9). Examining the trends in financial performance across each sector makes it possible to identify more

[6] Rosstat. URL: https://29.rosstat.gov.ru/ (accessed 11 April 2025).
[7] Ibid.

precisely the factors influencing the region's economic development and to develop targeted support measures for enterprises facing difficulties.

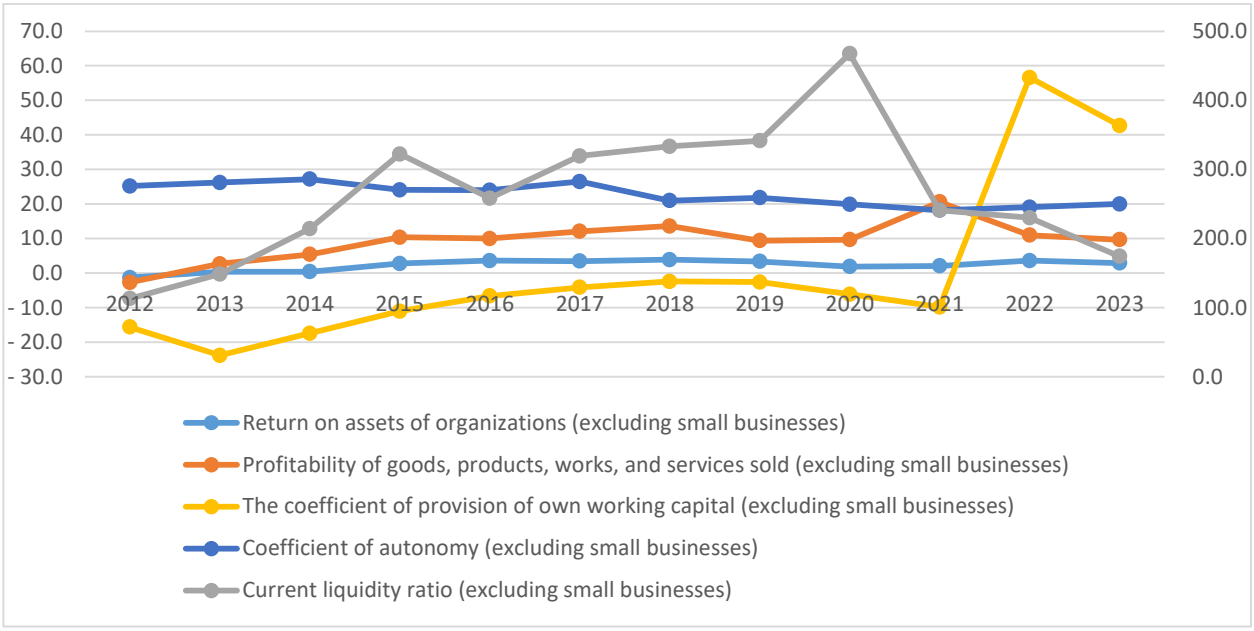


Fig. 9. Key financial indicators of the Arkhangelsk Oblast (excluding small businesses)[8].

Overall, the financial performance of enterprises in the Arkhangelsk Oblast over the ten-year period reflects complex and contradictory trends in the region's economic development, which is confirmed by a comparison with other regions of the North-Western Federal District. Consequently, the analysis of enterprise performance confirms the need for further development of the innovation infrastructure.

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[8] Rosstat. URL: https://29.rosstat.gov.ru/ (accessed 11 April 2025).

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Key Features of Decarbonization in Russia's Oil and Gas Companies in the Context of Northern and Arctic Resource Development

Natalya V. Romasheva [1]✉, Cand. Sci. (Econ.), Researcher
Diana M. Dmitrieva [2], Cand. Sci. (Econ.), Associate Professor, Researcher
Alexey M. Fadeev [3], Dr. Sci. (Econ.), Chief Researcher, Professor
Angelica A. Ordina [4]
Antonina A. Tsvetkova [5], PhD in Business Management, Associate Professor

[1, 3] Luzin Institute for Economic Studies – Subdivision of the Federal Research Centre "Kola Science Centre of the Russian Academy of Sciences", ul. Fersmana, 24a, Apatity, Russia
[2] Saint Petersburg State University, Universitetskaya naberezhnaya, 7/9, Saint Petersburg, Russia
[3] Peter the Great St. Petersburg Polytechnic University, ul. Polytechnicheskaya, 29, Saint Petersburg, Russia
[4] Gazprom Flot LLC, Moskovsky pr., 139, Bld. 1, Saint Petersburg, Russia
[5] Molde University College – Specialized University in Logistics, Britvegen 2, NO- 6410, Molde, Norway
[1] natasmir84@mail.ru ✉, ORCID: https://orcid.org/0000-0003-3074-5137
[2] d.dmitrieva@gsom.spbu.ru, ORCID: https://orcid.org/0000-0002-4208-4842
[3] FadeevTeam@yandex.ru, ORCID: https://orcid.org/0000-0002-3833-3316
[4] lapina24@mail.ru
[5] antonina.tsvetkova@himolde.no, ORCID: https://orcid.org/0000-0002-6048-8162

Abstract. The current economic and environmental agenda presents complex challenges for enterprises in the energy sector. In the context of simultaneous growth in global energy consumption, the continued dominance of fossil fuels in the energy mix, and increasingly demanding international climate policy requirements, oil and gas companies are compelled to transition toward more sustainable operational models. One of the key directions of such transformation is decarbonization. This study aims to conceptualize decarbonization in relation to the specific characteristics of the Russian oil and gas sector. Four dominant approaches to interpreting this phenomenon are identified, and a refined definition is proposed, adapted to the operational conditions of oil and gas companies. Particular attention is paid to the specific features of the Russian oil and gas industry, including the concentration of production capacity in the Arctic region, which is highly sensitive to the consequences of climate changes. Based on empirical data from major Russian companies, current trends in greenhouse gas emissions reduction are analyzed, including instances of decreased decarbonization efficiency and, conversely, emission growth. The study systematizes the key internal and external factors influencing the choice of decarbonization strategies: the political and legal conditions, the structure and quality of the resource base, the degree of state participation, the geographical distribution of assets, and emission dynamics. It is revealed that there is a lack of unified targets or regulatory guidelines for emission reductions in the oil and gas industry, which leads to fragmentation in the strategies and variability in the selection of instruments for achieving carbon neutrality. As a result of the study, a conceptual vision of decarbonization for Russian oil and gas companies is developed, encompassing promising development directions and the specific nature of industry transformation under the conditions of Northern and Arctic resource development.
Keywords: *decarbonization, greenhouse gases, climate agenda, CO_2 emissions, oil and gas companies, concept, fields, North, Arctic*

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Introduction

The new, turbulent world poses numerous external challenges for industry and business. Environmental and social issues are forcing companies to restructure their business models and redefine their understanding of key operating principles. Issues concerning the impact of raw-material-based companies on the environment in general, and on air pollution in particular, are currently of critical importance. Meanwhile, modern technological development is driving rising energy consumption, with traditional energy sources dominating the energy balance. A complete transition to non-traditional energy sources is not feasible in the foreseeable future.

Oil and gas companies are reviewing their roles and transforming their existing business models in order to adapt to external challenges (Saitova, Ilyinskiy, Fadeev, 2022). The current climate agenda in the context of energy development, and the issue of reducing greenhouse gas (GHG) emissions by industry, have led to the emergence of the concept of decarbonization in the business environment (Rissman, Bataille, Masanet et al., 2020).

Oil and gas companies around the world have already begun taking active steps to reduce their carbon footprint. However, there are some differences both in the approaches and methods used and in the results achieved (Cherepovitsyna, Sheveleva, Riadinskaia, 2023). It is important to note that Russian oil and gas companies are also making efforts to adapt to the climate agenda. In particular, they are setting climate targets based on SMART criteria; some of these targets have already been achieved by companies such as Rosneft, Tatneft, Gazprom, and Novatek. Researchers note that Russian oil and gas companies are responsibly undertaking a wide range of goals that are realistic and, consequently, achievable in the foreseeable future (Cherepovitsyna, Titova, Guseva, 2025).

When studying Russian oil and gas companies and their impact on the environment, it is crucial to note that a significant proportion of extraction takes place in the North and the Arctic. The active development of mineral resources in the Arctic has a number of distinctive features (Gritsenko, Efimova, 2020). First and foremost, the region is of strategic importance as a source of vital resources (including oil and gas). However, despite significant reserves, production in the region is complicated by challenging natural, climatic, and geological conditions, which dictate specific operating procedures for industrial facilities; underdeveloped logistics and infrastructure; vulnerability of ecosystems and indigenous populations; and other factors. Arctic projects are characterized by low investment attractiveness due to substantial capital expenditure and additional costs associated with the subsequent operation of deposits. Furthermore, the Arctic

region is a focus of attention not only for Russia but for the global community as a whole[1] (Crépin, Karcher, Gascard, 2017). The environmental situation in the region is driving global changes; the issue of greenhouse gas emissions, caused by both the development of deposits and the melting of ice, is particularly pressing (Boldyreva, Reshetnikova, Zherebyatyeva et al., 2024; Usman, Jahanger, Makhdum et al., 2022; Yamanouchi, Takata, 2020). Due to their fragile ecosystems, the North and the Arctic are highly vulnerable to environmental disasters (Shijin, Wenli, Qiaoxia, 2023).

While decarbonization opportunities in the Arctic region are being actively investigated (Skufina, Samarina, Samarin, 2022; Salygin, Krivorotov, 2022), there is a lack of research focusing on the processes and nature of decarbonization within Russian oil and gas companies operating in the Far North; this makes the topic highly relevant.

The unique logistical and infrastructural conditions of the Arctic necessitate a rethinking of approaches to decarbonizing the oil and gas sector. Recent studies indicate that the resilience of Arctic supply ecosystems is ensured by a high degree of interdependence between human, technical, and natural components, requiring an adaptive and systemic approach (Tsvetkova, Gammelgaard, 2025). At the same time, examples of carbon capture, utilisation, and storage (CCS) projects on the Norwegian shelf demonstrate the close link between new green technologies and the infrastructure, logistics, and management practices inherited from previous generations (Tsvetkova, Middleton, 2023). These features underscore the need for a comprehensive assessment of both technological and socio-ecological factors in Arctic decarbonization processes.

Although decarbonization is currently one of the key aspects of companies' efforts to reduce their environmental impact, various approaches to understanding its nature are emerging in the literature.

Table 1

Approaches to defining the concept of "decarbonization"[2]

Author	Definition / approach to the concept
Decarbonization as the process of reducing carbon intensity	
American environmental scientist J.H. Ausubel, 1995	Technological trajectory of decreasing carbon intensity of primary energy, measured in metric tons of carbon produced per kilowatt of electricity per year
IPCC, 1996	Decarbonization of flue gases and fuel, CO_2 storage
Professor at the University of Central Florida N. Muradov, 2014	Evolutionary trend of decreasing carbon intensity of primary energy
IPCC, 2018	The process by which countries or other entities seek to create a low-carbon economy or to reduce carbon consumption

[1] Middleton A. Security and Economic Development: the US National Strategy for the Arctic Region 2022. URL: https://www.highnorthnews.com/en/security-and-economic-development-us-national-strategy-arctic-region-2022 (accessed 26 January 2025).

[2] Source: compiled by the author based on (Dmitrieva, Skobelev, 2023; Lebedeva, 2022; Daneeva, Glebova, Daneev et al., 2020; Biber, Kelsey, Meckling, 2017; Fay, Hallegatte, Vogt-Schilb et al., 2015; Watson, Zinyowera, Moss et al., 1996; Ausubel, 1995).

Transport Strategy of the Russian Federation, 2022[3]	Reduction of carbon intensity
Decarbonization as the final state of a system	
M. Fay, S. Hallegatte, A. Vogt-Schilb et al., 2015	Zero greenhouse gas (GHG) emissions
E. Biber, N. Kelsey, J.O. Meckling, 2016	Potential elimination of anthropogenic carbon dioxide emissions
Decarbonization as a stage in the energy transition	
International Renewable Energy Agency (IRENA), 2016	A stage of the energy transition through the deployment of advanced renewable energy technologies and electrification
Y. Daneeva, A. Glebov, O. Daneev et al., 2020	The process of energy sector transformation by transitioning to renewable energy and replacing traditional energy sources to significantly reduce CO_2 emissions and potentially eliminate them entirely in the long term
Bank of Russia, 2021	Technological transition of the energy sector from hydrocarbon-based power generation and other fuel types to zero-carbon and low-GHG-emission energy resources
Decarbonization as a system of methods and approaches for reducing GHG emissions	
M.A. Lebedeva, 2022	A system of technical and economic relations that ensures the reduction of the carbon footprint without slowing down the pace of socio-economic development
Bank of Russia, 2023	Measures to reduce the volume of GHG emissions into the atmosphere (transition to alternative energy sources, energy efficiency improvement, carbon capture and storage, and other methods of reducing the mass of emissions)

An analysis of definitions of the concept of "decarbonization" identified four most frequently encountered approaches, presented in Table 1:

- decarbonization as a process of reducing carbon intensity;
- decarbonization as the final state of a system;
- decarbonization as a stage in the energy transition;
- decarbonization as a system of methods and approaches for reducing GHG emissions.

This study proposes a more precise definition of the concept of decarbonization as a set of measures aimed at achieving and subsequently maintaining carbon neutrality without slowing the pace of social and economic development, as well as leading to structural changes in production processes and models of operational and strategic management of economic activity through the application of available technologies and methods to reduce carbon intensity and absorb GHG emissions. In this context, decarbonization for oil and gas companies involves implementing measures to reduce GHG emissions (including through sequestration) at Russian oil and gas enterprises through the application of available technologies and models of operational and strategic management, without slowing the pace of socio-economic development.

Research indicates that current key decarbonization options include[4,5] increasing the share

[3] Transport Strategy of the Russian Federation until 2030 with a Forecast until 2035. Order of the Government of the Russian Federation No. 3363-r dated November 27, 2021. URL: https://docs.cntd.ru/document/727294161 (accessed 07 April 2024).

[4] de Pee A., Pinner D., Roelofsen O., Somers K., Speelman E., Witteveen M. Decarbonization of Industrial Sectors: The next Frontier. McKinsey&Company, 2018. URL: https://www.mckinsey.com/industries/oil-and-gas/our-insights/decarbonization-of-industrial-sectors-the-next-frontier (accessed 23 March 2025).

of gas in the production portfolio, reducing oil production, transitioning to renewable energy sources (RES) and low-carbon fuels, improving energy efficiency, ensuring the rational use of associated petroleum gas (APG), and implementing carbon capture, utilization, and storage (CC(U)S) systems (Kuznetsova, Ryadinskaya, Cherepovitsyna, 2023). However, the scale and diversity of options, as well as the pace and extent of decarbonization decisions, vary across companies and depend on several factors (Ilyinskiy, Kalinina, Khasanov, Afanasyev, Saitova, 2022). Government regulators, investors, financial institutions, environmental organizations, and society as a whole are exerting significant pressure on oil and gas companies, demanding them to cease investment in traditional operations and reduce their carbon footprint both in the production process and in the use of their products. As sustainability factors have the greatest influence on companies' strategic choices, some authors suggest that legislation and climate policy are decisive.

As previously noted, Russian oil and gas companies are striving to reduce their overall environmental impact and atmospheric CO_2 emissions; consequently, the aim of this study is to identify key trends and define a conceptual vision for the decarbonization of Russian oil and gas companies in the context of developing fields in the North and the Arctic, taking into account the influence of internal and external factors. The main objectives are to address the following questions: how do internal and external factors shape the decarbonization agenda of Russian oil and gas companies today, and in what direction should decarbonization efforts proceed in the future?

Materials and methods

The study is based on data regarding Russian oil and gas companies obtained from open sources, including annual reports, sustainability reports, climate reports, and information from analytical agencies and official government sources. An in-depth content analysis was carried out as part of the study.

In the first stage of the research, the specific characteristics of the Russian oil and gas industry were identified. Data from the independent organization Climate TRACE, Rosstat's Russian Statistical Yearbook, the Ministry of Energy and official online news sources were used for this purpose. The results are presented in the form of a summary of the information and in Figure 1.

In the next stage of the study, based on a content analysis of official websites, annual reports and sustainability reports of Russian oil and gas companies, the key decarbonization strategies adopted by the companies were identified using the model presented in Table 2.

[5] Beck C., Rashidbeigi S., Roelofsen O., Speelman E. The Future Is Now: How Oil and Gas Companies Can Decarbonize. McKinsey&Company, 2020. URL: https://www.mckinsey.com/industries/oil-and-gas/our-insights/the-future-is-now-how-oil-and-gas-companies-can-decarbonize#/ (accessed 23 March 2025).

Table 2

Model for analyzing decarbonization strategies

Company / Decarbonization priorities	Energy saving and energy efficiency	Beneficial use of APG*	Reduction of methane emissions	Use of RES**	Application of CC(U)S technologies***	Use / production of low-carbon fuels
Company						
…..						
Company						

* associated petroleum gas
** renewable energy sources
*** carbon capture, utilization, and storage

In the next stage of the study, the external and internal factors shaping the key decarbonization trends of Russian oil and gas companies were identified.

In order to determine these factors, the authors drew upon the results of previous studies, as well as a content analysis of academic articles. The following phrases were used as search queries: “decarbonization directions”, “decarbonization pathways”, and “decarbonization methods”. Methods of analysis, synthesis, decomposition, and grouping were applied to systematize and interpret the data.

The PEST analysis model was used to examine the impact of external factors. The identified factors were analyzed across four categories: political-legal, economic, technological, and socio-cultural.

The research materials used to analyze external factors included:

- regulatory and legal acts setting out indicative targets for reducing emissions in Russia, tax and environmental legislation, as well as other relevant regulatory documents;
- scientific articles by Russian and international researchers published in high-ranking journals.

The authors applied content analysis to the official websites, annual reports and sustainability reports of Russian oil and gas companies to examine internal factors, using the model presented in Table 3.

Table 3

Model for analyzing internal environment factors

Company / Indicator	Hydrocarbon reserve volume	Hydrocarbon reserve composition	Prevalence of hard-to-recover reserves	Asset geography	State participation	Dynamics of GHG emissions
Company						
…..						
Company						

Selection of companies

For the purposes of this study, Russian companies operating in the oil and gas sector were selected in accordance with the following criteria (Table 4):

1. Inclusion in the ranking of Russia's 100 largest companies by net profit — 2023, 2024 (Forbes ranking)[6,7] and a legal status of public joint-stock company (PJSC). The authors assume that the scale of operations and the generation of significant net profits enable companies to implement various decarbonization initiatives.

2. Availability of publicly accessible reports (on companies' official websites), such as annual reports, sustainability reports (social activity reports), ESG reports, etc., containing information on organizational structure, emissions by scope, decarbonization measures taken, and other relevant data.

3. Location of production and/or processing assets in the North and the Arctic.

A summary of the preliminary comparison of the companies is presented in Table 4.

Table 4

Selection of oil and gas companies[8]

	Company	Net profit (billion rub.)		Availability of reports	Large number of assets located in the northern and Arctic regions
		2022	2023		
1	PJSC Gazprom	1 311.6	-*	Yes	Yes
2	JSC Yamal LNG	840.2	-*	No	Yes
3	PJSC Rosneft Oil Company	813	1 529	Yes	Yes
4	PJSC Surgutneftegaz	320.6	1 322.1	No	Yes
5	PJSC Lukoil	790.1	1 160.3	Yes	Yes
6	PJSC Novatek	640.4	469.5	Yes	Yes
7	LLC Sakhalin Energy	283.9	315.3	Yes	Yes
8	PJSC Tatneft	284.9	286.3	Yes	No
9	LLC Irkutsk Oil Company	100.7	139.1	No	Yes
10	JSC Arcticgas	102	104.3	No (no official website)	Yes

* no data or loss

Thus, the following four companies were selected for the final study sample: PJSC Gazprom, PJSC Rosneft Oil Company, PJSC Lukoil, and PJSC Novatek.

[6] 100 Largest Companies in Russia by Net Profit — 2024. Forbes Ranking. URL: https://www.forbes.ru/biznes/497814-100-krupnejsih-kompanij-rossii-po-cistoj-pribyli-2023-rejting-forbes (accessed 21 January 2025).

[7] 100 Largest Companies in Russia by Net Profit — 2023. Forbes Ranking. URL: https://www.forbes.ru/biznes/497814-100-krupnejsih-kompanij-rossii-po-cistoj-pribyli-2023-rejting-forbes (accessed 21 January 2025).

[8] Source: compiled by the authors based on: 100 Largest Companies in Russia by Net Profit — 2024. Forbes Ranking. URL: https://www.forbes.ru/biznes/497814-100-krupnejsih-kompanij-rossii-po-cistoj-pribyli-2023-rejting-forbes (accessed 21 January 2025); 100 Largest Companies in Russia by Net Profit — 2023. Forbes Ranking. URL: https://www.forbes.ru/biznes/497814-100-krupnejsih-kompanij-rossii-po-cistoj-pribyli-2023-rejting-forbes (accessed 21 January 2025); Official website of PJSC Gazprom. URL: https://www.gazprom.ru/ (accessed 20 February 2025); Official website of OJSC Yamal LNG. URL: http://yamallng.ru/ (accessed 20 February 2025); Official website of PJSC Rosneft Oil Company. URL: https://www.rosneft.ru/ (accessed 20 February 2025); Official website of PJSC Surgutneftegas. URL: https://www.surgutneftegas.ru/ (accessed 20 February 2025); Official website of PJSC Lukoil. URL: https://lukoil.ru/ (accessed 20 February 2025); Official website of PJSC Novatek. URL: https://www.novatek.ru/ (accessed 20 February 2025); Official website of LLC Sakhalin Energy. URL: https://www.sakhalinenergy.ru/ru/ (accessed 20 February 2025); Official website of PJSC Tatneft. URL: https://www.tatneft.ru/ (accessed 20 February 2025); Official website of LLC Irkutsk Oil Company. URL: https://irkutskoil.ru/ (accessed 20 February 2025).

The final stage of the study presents a conceptual vision of the decarbonization process for Russian oil and gas companies.

Results

Characteristics of the Russian oil and gas industry

The oil and gas industry is a key sector of the Russian economy, accounting for at least 35% of the federal budget and representing at least 15% of GDP (gross domestic product). In 2023, greenhouse gas (GHG) emissions from the energy sector accounted for 79.2% of Russia's total GHG emissions, with the oil and gas sector responsible for over 70% of that figure (Fig. 1)[9,10,11,12,13,14].

Emission trends by fuel type in the Russian Federation for 1990–2023 confirm both the absence of a significant reduction in GHG emissions since 1997 and the lack of structural changes in emissions across different fuel sources (Fig. 1).

According to data from the independent organization Climate TRACE[15], which has been tracking global GHG emissions since 2021 using artificial intelligence and satellite data, the main facilities within the oil and gas sector in Russia responsible for the majority of GHG emissions are oil and gas transport and production facilities (more than 42 facilities with total GHG emissions of 1,129.9 million tons in 2024) and oil refining facilities (38 facilities with total GHG emissions of 64.3 million tons in 2024). Based on ongoing monitoring and analysis of emissions data in the oil and gas sector, the researchers at Climate TRACE concluded that oil and gas companies are underreporting their actual GHG emissions in their annual reports by approximately 70% across the industry.

[9] National Inventory Report on Anthropogenic Greenhouse Gas Emissions by Sources and Removals by Sinks for 1990–2023, 2025 (422 p.) URL: https://unfccc.int/sites/default/files/resource/RUS_NIR_2025_v1_rev_2025-04-18.pdf (accessed 10 February 2025).
[10] Enerdata: statistics on the global energy transition. URL: https://energystats.enerdata.net/ (accessed 10 October 2024).
[11] Federal State Statistics Service (Rosstat). URL: https://rosstat.gov.ru/ (accessed 09 April 2024).
[12] International Energy Agency. URL: https://www.iea.org/ (accessed 09 April 2024).
[13] Climate Trace: Greenhouse Gas Emissions Map. URL: https://climatetrace.org/ (accessed 25 April 2024).
[14] Carbon Unit Registry. URL: https://carbonreg.ru/ru/projects/ (accessed 25 April 2024).
[15] Climate Trace: Greenhouse Gas Emissions Map. URL: https://climatetrace.org/ (accessed 25 April 2024).

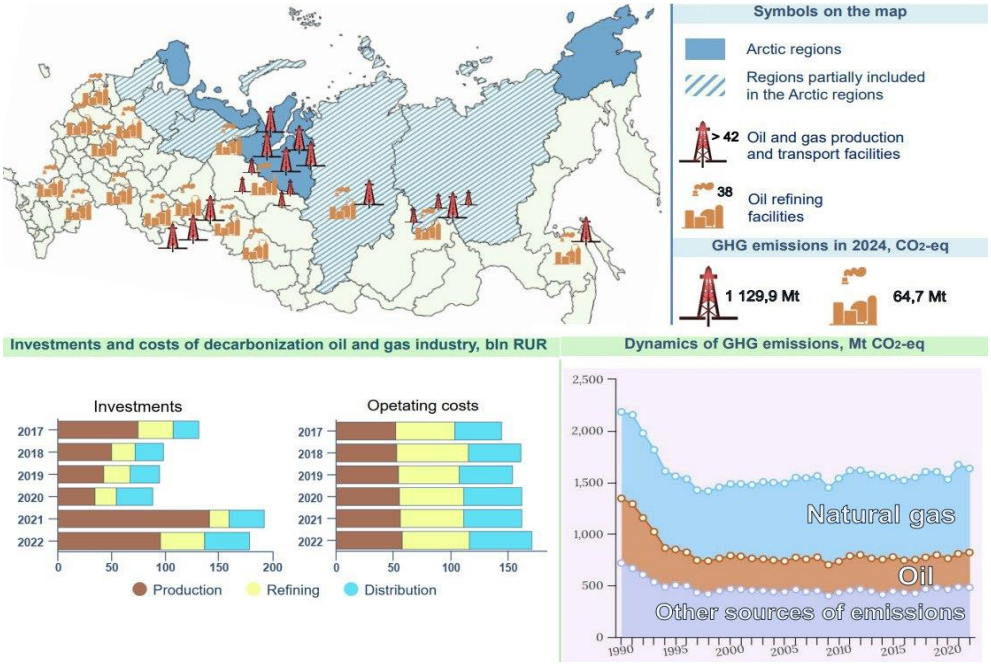


Fig. 1. Trends, emission sources, and decarbonization costs in Russia's oil and gas sector[16].

The majority of oil and gas extraction and transport facilities, identified by Climate TRACE as the largest sources of emissions, are concentrated in Russia's Arctic region, which is the most vulnerable to climate change. The map in Figure 1 shows that the largest number of oil and gas industry facilities is located in the Siberian, Ural, and Volga Federal Districts, which account for the largest share of GHG emissions in Russia[17].

Figure 1 illustrates the trends in investment and operating costs related to decarbonization in the oil and gas sector, based on data from Rosstat's Russian Statistical Yearbook for 2018–2023. In 2022, the investment structure was dominated by measures for environmental protection and efficient resource use (47.5%), followed by measures for air protection (27.7%) and for the rational use of water resources (15.2%). Within the structure of operating costs, measures for environmental protection, wastewater collection and treatment accounted for 80.3%, while measures for air protection and climate change mitigation accounted for 12.2%. Thus, approximately 250 billion rubles are allocated annually to decarbonization measures in the oil and gas industry. Although no positive trend is observed in operating costs, there has been a marked increase in investment levels in the oil and gas production sector since 2021; this may be linked to the rise in emissions during 2021–2022 compared to previous years, necessitating appropriate measures to reduce emissions and address the resulting environmental damage[18].

Research carried out in the study (Sheveleva, Cherepovitsyna, Danilin, 2024) showed that the majority of Russian oil and gas companies set specific targets for reducing GHG emissions in

[16] Source: compiled by the authors based on: Federal State Statistics Service (Rosstat). URL: https://rosstat.gov.ru/ (accessed 09 April 2024); Climate Trace: Greenhouse Gas Emissions Map. URL: https://climatetrace.org/ (accessed 25 April 2024); Carbon Unit Registry. URL: https://carbonreg.ru/ru/projects/ (accessed 25 April 2024); International Energy Agency. URL: https://www.iea.org/ (accessed 09 April 2024); Global CCS Institute. URL: https://co2re.co/FacilityData (accessed 25 April 2024).
[17] Federal State Statistics Service (Rosstat). URL: https://rosstat.gov.ru/ (accessed 09 April 2024).
[18] Ibid.

the medium and long term and are progressing towards them at the planned rate. However, an analysis of GHG emission trends for the companies examined in this study (Table 5) reveals fluctuations, a slowdown in the rate of emission reductions, and, in some cases, an increase in GHG emissions.

Table 5

Greenhouse gas emission trends in Russian oil and gas companies[19]

Indicator	Total GHG emissions (Scopes 1 and 2) million tons of CO_2 equivalent			Total GHG emissions (Scope 2) million tons of CO_2 equivalent		
	2021	2022	2023	2021	2022	2023
Gazprom Group	243.28	213.53	209.55	13.80	11.11	11.33
PJSC Gazprom	119.87	91.02	85.06	6.08	4.02	4.17
Production	17.95	15.63	14.12	0.35	0.31	0.34
Transportation	93.09	66.03	60.10	3.33	1.84	1.90
PJSC Rosneft	54.20	55.80	62.47	18.50	16.10	14.68
PJSC Lukoil	36.38	41.22	36.89	5.10	5.68	4.92
PJSC Novatek	9.90	9.76	8.50	0.27	0.31	0.30

In this regard, it is of interest to examine the specific decarbonization strategies that Russian oil and gas companies are implementing under current conditions. The main ones are set out in Table 6. The research is based on information from the official websites, annual reports, and sustainability reports of Russian oil and gas companies.

Table 6

Main areas of decarbonization of Russian oil and gas companies[20]

Decarbonization priorities/company	PJSC Gazprom	PJSC Rosneft	PJSC Lukoil	PJSC Novatek
Energy saving and energy efficiency	Long-term strategy and program for energy saving and energy efficiency improvement	Energy saving and energy efficiency improvement program	Energy saving and energy efficiency improvement program	Comprehensive program of energy saving measures
Beneficial use of APG	At least 95% Processing, generation of heat and electricity for internal needs, injection of APG into the gas cap	By 2030 — 100% Reinjection of APG into the reservoir, storage	By 2030 — 100% Construction and reconstruction of facilities for gas treatment, transportation, and processing	By 2030 — 99% Delivery of APG to the main pipeline network and injection into the reservoir
Reduction of methane	8% reduction in methane	Reduction to a level below 0.2%.	Achieving near-zero methane	Reduction of methane

[19] Source: compiled by the authors based on: Social Activity Report 2023. PJSC Gazprom. URL: https://www.gazprom.ru/sustainability/ (accessed 10 February 2025); Sustainability Report 2023. PJSC Rosneft Oil Company PJSC. URL: https://www.rosneft.ru/Development/reports/ (accessed 10 February 2025); Lukoil Group Sustainability Report 2023. PJSC Lukoil. URL: https://lukoil.ru/Sustainability/SustainabilityReport (accessed 10 February 2025); Sustainability Report 2023. PJSC Novatek. URL: https://www.novatek.ru/ru/esg/ (accessed 10 February 2025).

[20] Source: compiled by the authors based on: Official website of PJSC Gazprom. URL: https://www.gazprom.ru/ (accessed 10 February 2025); Official website of PJSC Rosneft Oil Company. URL: https://www.rosneft.ru/ (accessed 10 February 2025); Official website of PJSC Lukoil. URL: https://lukoil.ru/ (accessed 10 February 2025); Official website of PJSC Novatek. URL: https://www.novatek.ru/ (accessed 10 February 2025); Social Activity Report 2023. PJSC Gazprom. URL: https://www.gazprom.ru/sustainability/ (accessed 10 February 2025); Sustainable Development Report 2023. PJSC Rosneft Oil Company. URL: https://www.rosneft.ru/Development/reports/ (accessed 10 February 2025); Lukoil Group Sustainable Development Report 2023. PJSC Lukoil. URL: https://lukoil.ru/Sustainability/SustainabilityReport (accessed 10 February 2025); Sustainable Development Report 2023. PJSC Novatek. URL: https://www.novatek.ru/ru/esg/ (accessed 10 February 2025).

emissions	emissions through resource-saving measures	Participant in the global oil and gas sector initiative "Guiding Principles on Methane Emissions"	emissions from oil and gas production by 2030	emissions by 4% by 2030. Participant in the global oil and gas sector initiative "Guiding Principles on Methane Emissions"
Use of RES	Construction of several wind farms. Implementation of solar power plant construction projects, including those designed to supply electricity to the company's own facilities. There is experience in working with geothermal resources; the possibility of developing this area is being considered.	Operation of wind-solar power plants. Possibility of constructing wind farms to meet the company's own electricity needs is being considered. Prospects for using solar power plants to supply energy to company facilities are being explored. Participation in projects to convert biomass into energy.	Construction of small-scale solar power plants for the company's own consumption at industrial facilities (petrol stations and oil depots, on unused land at oil refineries and power stations). The main assets in the wind power sector in Russia are the Kola and Azov wind farms. In total, there are 4 WPPs, 1 small HPP, and 22 SPPs.	Installation of RES at telemechanics sites in areas remote from the main infrastructure. Implementation of a range of works under the WPP project on the Yamal Peninsula. Development of a wind farm construction project on the Gydan Peninsula. Procurement of RES energy for internal consumption. RES accounts for 2% of total energy consumption.
Application of CC(U)S technologies	The possibility of applying CC(U)S technologies is being studied	The possibility of applying CC(U)S technologies is being studied	Development and implementation of "Huff and Puff" CO_2 injection technology. The project aims to intensify production and increase oil recovery from the reservoirs.	Projects for the long-term underground storage of CO_2 on the Yamal and Gydan peninsulas have been developed.
Use / production of low-carbon fuels	Implementation of projects to develop competitive technologies in the hydrogen energy sector. Transition of the company's own transport fleet to gas-engine fuel.	Improving the development and production of high-tech petroleum products and fuels. Gradual transition of the company's own transport fleet to low-carbon alternatives.	Implementation of various projects for the production of low-carbon fuels (biodiesel; Teboil Green+). Development of projects for producing neutral hydrogen.	Russian patents are obtained for large-scale low-carbon ammonia production technologies, including a patent for ammonia cracking to produce pure hydrogen.
Others (gas engine fuel (GEF) — compressed natural gas, liquefied natural gas (LNG), low-sulphur marine fuel, engine oils, lubricants)	Expanding the use of natural gas as GEF. Implementation of projects for the accelerated development of the gas refueling network.	Retail sales of compressed natural gas; expansion of the refuelling network for environmentally friendly natural gas vehicle fuel. Production of highly environmentally	Development of LPG (liquefied petroleum gas) production. Expansion of LPG retail sales as motor fuel (127 filling stations). Production of low-sulfur fuel	Increasing LNG sales volumes on the domestic market, 14 LNG filling stations, expansion of the cryogenic filling station network.

		friendly marine fuel with a sulphur content of no more than 0.1%. Production of engine oils with low sulphate ash content.	with a sulfur content of no more than 0.5%. Development of energy-efficient lubricants production.	

Decarbonization of Russian oil and gas companies in the current context: the impact of external and internal factors

The decarbonization of Russian oil and gas companies is driven by external and internal factors. Despite the escalating geopolitical situation, there have been no radical changes in decarbonization policy, as the vast majority of countries, including Russia, have already ratified the Paris Agreement and enshrined their climate goals in legislation. These commitments have become part of a long-term economic strategy: governments have incorporated emission reduction targets into national development plans, energy programs, and investment priorities.

Based on a content analysis of academic literature and the study (Romasheva, Cherepovitsyna, 2023), the key factors shaping the decarbonization strategies of Russian oil and gas companies have been identified and analyzed.

The authors classify external decarbonization factors as conditions beyond the control of individual companies that nonetheless significantly impact their efforts to reduce GHG emissions. The PEST analysis model was used to present the results of this analysis of external factors (Table 7).

The political and legal factors influencing decarbonization in Russia comprise a set of government decisions, regulatory acts, and policy guidelines that affect the process of reducing GHG emissions and the transition to a low-carbon economy. These factors create incentives and constraints for businesses, the public, and other stakeholders, determining the pace and direction of decarbonization, and are considered by the authors to be fundamental.

In Russia, the framework for regulatory and carbon-based regulation of GHG emissions is just emerging; while this presents a challenge, it also offers an opportunity to adopt and adapt best practices from countries that already possess established regulatory frameworks in this area. The foundational document for the regulatory framework governing GHG emissions is the 2021 Law “On Limiting Greenhouse Gas Emissions”. State accounting of GHG emissions is conducted through a GHG inventory and a GHG emissions registry. Constituent entities of the Russian Federation may implement experimental GHG emission regulation systems under the 2022 Law “On Conducting an Experiment to Limit Greenhouse Gas Emissions in Certain Constituent Entities of the Russian Federation”.

Table 7

External factors contributing to the decarbonization of Russian oil and gas companies[21]

Factor	Essence of the factor	Interpretation of the factors for Russian oil and gas companies
1. Political and legal factors		
1.1 International treaties and agreements, including the Paris Agreement on Climate Change	Regulate cooperation among countries on climate change and adaptation to its impacts, serve as a common prerequisite for decarbonization	Russia ratified the Paris Agreement on Climate Change on October 4, 2019. As part of its commitments, Russia announced its intention to reduce greenhouse gas emissions by 30% by 2030 compared to 1990 levels. However, the implementation of these commitments and the specific measures to achieve the goals remain a subject of discussion
1.2 Comprehensive climate policy	Reflects the government's position and serves as a guideline for industrial companies in developing decarbonization strategies	Russia's climate policy is based on the Climate Doctrine, with the priority goal of achieving a balance between greenhouse gas (GHG) emissions and their absorption by 2060. Key areas of focus include developing and implementing measures to adapt to a changing climate, as well as establishing regulatory and economic mechanisms to prevent GHG emissions. Russia's climate policy has been criticised for the lack of clarity regarding its chosen priorities
1.3 Comprehensive and coherent regulatory framework in the field of achieving carbon neutrality (strategic documents and legislation)	Encompasses laws, subordinate acts, strategies, and standards aimed at reducing GHG emissions, establishes the institutional framework for decarbonization activities	The regulatory framework in the field of achieving carbon neutrality in Russia continues to develop, the contents of some documents contradict each other in terms of fragmentation of goals and instruments, many aspects of regulation are still under development. It is expected that a large number of new regulatory acts will be adopted in the coming years
1.4 Use of various fiscal instruments	Includes a carbon tax, carbon markets/emissions trading systems (ETS), and taxes on conventional energy sources; provides incentives to reduce GHG emissions	Energy taxes are not used in Russia as a means of reducing emissions. There is no carbon tax in Russia, although discussions are underway regarding its introduction. ETS pilot project is currently being implemented on Sakhalin. The system incentivizes companies to reduce emissions and seek innovative solutions. It is envisaged that the ETS will be implemented in other regions of Russia in the future
1.5 Introduction of a cross-border carbon regulation (CBCR)	Takes the form of additional charges on imported products based on their carbon intensity; influences corporate decarbonization efforts	Imposition of CBCR on Russia by various states is under discussion and could have a significant impact on the economy; various response measures are being considered
1.6 Tax, tariff, and penalty-based incentives	Includes corporate tax reductions, accelerated depreciation, investment tax credits, property tax reductions or exemptions, tax subsidies, preferential rates, and penalties for exceeding permissible limits, thereby incentivizing companies	Russia has introduced a set of measures primarily aimed at incentivizing the reduction of GHG emissions through the use of RES, the implementation of energy efficiency initiatives and increased use of APG. These measures: • tax credits and subsidies for entities utilizing RES;

[21] Source: compiled by the authors based on (Mastepanov, 2022; Romasheva, Cherepovitsyna, 2023; Reshetnikov, 2023; Veselova, 2021).

	to implement specific decarbonization measures	• reductions in or exemptions from vehicle tax, preferential electricity tariffs, and tax deductions for electric vehicle; • tax deductions for energy audits; incentives, subsidies, and grants for the purchase of energy-efficient equipment; • penalties for APG flaring; • state support for the development of the green bond market, other measures. The scope of these measures is expanding alongside the evolution of legislation
1.7 Provision of state support	Involves provision of subsidies and grants, promotion of green bond issuance, facilitating decision-making regarding decarbonization strategies	
2. Economic factors		
2.1 Rise in CO_2 prices	Determines the extent of a company's interest in decarbonization activities (the higher the price, the more beneficial it is for the company)	The impact of rising carbon prices on Russia will depend on a multitude of factors, including the pace and scale of global carbon regulation, as well as development of adaptation and climate policies by the Russian government and business sector
2.2 Implementation of preferential lending programs for decarbonization projects	Determines the feasibility of obtaining loans on more favorable terms (low interest rates, long repayment periods, grace periods, partial risk coverage) and enhances the effectiveness of decarbonization efforts	In Russia, preferential lending programs aimed at reducing GHG emissions are currently under development. A number of major banks offer specialized loan products to finance environmental projects
2.3 Refusal by financial institutions to lend to carbon-intensive companies	Manifests itself in the complete cessation of funding for companies' carbon-intensive projects; encourages the implementation of various decarbonization initiatives	In Russia, there are no restrictions on the financing of carbon-intensive companies and projects
3. Technological factors		
3.1 Maturity of a range of decarbonization technologies	Determines the level of readiness of technologies aimed at reducing GHG emissions for widespread adoption by various companies; shapes the scale of development for specific decarbonization pathways across different countries	Russia's focus on developing traditional emission-reduction technologies, such as energy saving, improved energy efficiency, and the reduction of APG flaring, drives Russian companies to adopt these measures on a large scale
4. Socio-cultural factors		
4.1 Greening of the oil and gas sector	Involves stakeholders exerting pressure on companies to reduce GHG emissions, leading to a review of the company's current strategy towards decarbonization	The environmental movement in Russia is gaining momentum, with many people expressing concerns about environmental issues linked to the oil and gas industry. There is active public debate on the need to diversify the economy and reduce dependence on oil and gas exports. The environmental movement is expected to be stronger in the future
4.2 Public interest and positive attitude towards various decarbonization initiatives	Involves public support and understanding of the need to adopt new technologies and change the usual way of life; plays a critical role in the success of various decarbonization initiatives	Growing interest in renewable energy and energy-efficient technologies in Russia indicates a desire to reduce dependence on fossil fuels
4.3 Support from non-profit organizations (NPOs)	involves participation in initiatives aimed at reducing GHG emissions; has a positive impact on decision-making on	Support for decarbonization in Russia from NGOs is an important but still emerging area. Rising awareness of climate change, increasing international

	decarbonization	pressure, and the advancement of low-carbon technologies are creating favorable conditions for increased NGO activity in this field

Carbon regulation is implemented through mandatory reporting by companies which, from the start of 2023, produce more than 150,000 tons of GHG emissions in CO_2-eq. per year (from 2025, more than 50,000 tons of CO_2-eq.). An administrative fine ranging from 10,000 to 500,000 rubles may be imposed for late submission of a report or for providing inaccurate data, depending on the legal form of the business entity.

In 2022, a pilot project for GHG emission quotas was launched in the Sakhalin Oblast: exceeding the emissions quota set individually for each organization results in a fine proportional to the excess emissions. The quota level remains fixed from year to year until the end of the experiment (in 2028).

Since 2022, a carbon unit registry has been in operation in Russia, which is an important step towards establishing a system for regulating and trading GHG emissions. This registry is crucial and has been created to account for carbon units generated as a result of climate projects in Russia. The registry contains data on climate projects that facilitate the absorption or reduction of GHG emissions, for the implementation of which carbon units can be obtained. The company may utilize the issued units itself or sell them to third parties.

There is also a set of government incentives for decarbonization in Russia, aimed at utilizing renewable energy sources, improving energy efficiency and increasing the utilization of associated petroleum gas; this makes these decarbonization measures a priority for industrial companies.

However, an analysis of political and legal factors has revealed a lack of unified guidelines and GHG emission reduction targets for companies, including those in the oil and gas sector; this leads to a lack of consistency in GHG reduction targets and in the selection of priority methods for achieving carbon neutrality.

Economic and social factors do not yet have a significant impact on the decarbonization process in Russia, but the influence of society, financial institutions, and NGOs on this process is expected to grow in the future. Technological factors play a significant role in the decarbonization of Russian oil and gas companies. These factors have their own specific characteristics, determined by the level of technological development in a particular area of decarbonization, geographical location, and the structure of the economy. In the fields of renewable energy, carbon capture, utilization and storage (CCUS), energy efficiency and energy storage, there is a certain lag behind global leaders; however, it is already becoming economically viable for Russian oil and gas companies to utilize solar and wind energy to meet their own operational needs.

Internal factors driving decarbonization are those that operate within specific companies and determine the trend towards decarbonization and the implementation of certain strategies. The authors identify the following factors: volume, structure, and quality of reserves (the

predominance of hard-to-recover reserves); state participation; geographical distribution of assets; and GHG emissions dynamics (Table 8).

Table 8

Internal factors contributing to the decarbonization of Russian oil and gas companies[22]

Indicator	PJSC Gazprom	PJSC Rosneft	PJSC Lukoil	PJSC Novatek
Hydrocarbon reserve volume	Very significant	Very significant	Significant	Significant
Hydrocarbon reserve composition	Predominance of natural gas reserves	Predominance of oil reserves	Predominance of oil reserves	Predominance of natural gas reserves
Prevalence of hard-to-recover reserves	Yes	Yes	Yes	Yes
Asset geography	Very extensive The Yamalo-Nenets Autonomous Okrug (YNAO) is a key region for gas production	Extensive The majority of assets are concentrated in Russia (KhMAO, YNAO). New regions, such as the Arctic and Eastern Siberia, are being actively developed	Extensive Main activities are carried out across four federal districts of the Russian Federation	Concentrated The main deposits and licence areas are located in the Far North, in the Yamalo-Nenets Autonomous Okrug and the Krasnoyarsk Krai
State participation	Predominant	Predominant	None	Insignificant
Dynamics of GHG emissions (Table 5)	There has been a decline; however, the rate of decline has slowed, due in part to a reduction in the volume of hydrocarbon production and transport	Increase in Scope 1, decrease in Scope 2	Fluctuations in both Scope 1 and Scope 2 (increase in 2022 compared to 2021, decrease in 2023 compared to 2022)	Reduction in Scope 1, fluctuations in Scope 2 (increase in 2022 compared to 2021, decrease in 2023 compared to 2022)

The study reveals that all the companies under consideration aim to significantly reduce emissions in the medium and long term; however, each company has its own focus in terms of decarbonization, which is driven by internal factors. Based on an analysis of these factors, the authors suggest that:

- increases, fluctuations, and decreases in the rate of reduction of absolute emissions stimulate companies to intensify various decarbonization measures within their operations;
- significant hydrocarbon reserves encourage companies to implement decarbonization measures aimed at reducing Scope 1 and 2 emissions and to utilize traditional decarbonization methods (such as the beneficial use of APG and the reduction of methane leaks). At the same time, low reserves are driving the faster and more extensive implementation of projects involving alternative energy, low-carbon fuels, and

[22] Source: compiled by the authors based on: Social Activity Report 2023. PJSC Gazprom. URL: https://www.gazprom.ru/sustainability/ (accessed 15 April 2025); Sustainability Report 2023. PJSC Rosneft Oil Company. URL: https://www.rosneft.ru/Development/reports/ (accessed 15 April 2025); Lukoil Group Sustainability Report 2023. PJSC Lukoil. URL: https://lukoil.ru/Sustainability/SustainabilityReport (accessed 15 April 2025); Sustainability Report 2023. PJSC Novatek. URL: https://www.novatek.ru/ru/esg/ (accessed 15 April 2025).

Scope 3 emission reductions;

- predominance of gas within the hydrocarbon reserve's structure determines measures to reduce methane leaks and projects for producing natural gas-based fuels, whereas a predominance of oil and hard-to-recover reserves results in a reduction in the flaring of associated gas and the introduction of energy efficiency and energy-saving measures;
- broad geographical spread of assets enables the use of alternative energy sources to meet internal energy needs;
- significant state shareholding results in a dependence on political factors, as well as the opportunity to trial new technologies not previously used in the sector.

Furthermore, the most important internal factor in decarbonization is the company's financial position and economic performance, which either create favorable conditions for decarbonization or limit its scale. At the same time, research into the financial aspects of decarbonization, specifically regarding the stimulation of domestic investment sources, reveals that the traditional capital-raising model, based predominantly on debt financing and budgetary subsidies, faces constraints in the context of high base rates and sanctions in external markets. Consequently, the mobilization of domestic investment resources, funds from institutional investors, and public-private partnership instruments are becoming particularly relevant. An analysis of decarbonization project implementation and external factors affecting the oil and gas sector indicates that mechanisms for tax incentives to encourage the reinvestment of profits into low-carbon technologies are insufficiently developed, as are the markets for green bonds and carbon credits in Russia.

Thus, both external and internal factors shape the specific characteristics of decarbonization in Russia's oil and gas companies.

Conceptual framework for decarbonization of Russian oil and gas companies

Decarbonization of Russian oil and gas companies is a complex and unique challenge driven by both global trends (the Paris Agreement, the international community's concern over rising GHG emissions) and the specific characteristics of the Russian economy, such as dependence on fossil fuels, infrastructure geared towards the extraction, transport, and processing of hydrocarbons, the absence of clear decarbonization targets, and the underdevelopment of a number of decarbonization technologies. Nevertheless, despite current geopolitical instability, decarbonization remains critical for Russian oil and gas companies for several reasons. Firstly, the global trend toward reducing carbon footprints is intensifying, directly impacting access to international markets and investors, for example in Asia, where environmental regulations are becoming stricter. Secondly, domestic regulation in Russia, including the low-carbon development strategy until 2050, incentivizes companies to modernize in order to avoid penalties and maintain competitiveness. Thirdly, the implementation of decarbonization measures improves energy efficiency and reduces operating costs, while also opening up new business opportunities, such as

the production and sale of hydrogen.

Leading Russian oil and gas companies are actively implementing measures aimed at reducing methane emissions, improving energy efficiency, utilizing associated petroleum gas, and producing and using low-carbon fuels. In line with their strategic objectives, all these companies are exploring opportunities to produce various types of hydrogen and ammonia, and are forecasting market trends for low-carbon and zero-carbon fuels.

A number of companies (such as PJSC Lukoil) are actively participating in renewable energy projects and utilizing renewable energy to meet their own power needs. The other oil and gas companies examined in the study show limited activity regarding renewable energy use: they are implementing small-scale projects to develop renewable energy for internal consumption and are assessing the potential for applying renewable energy at production facilities.

As previously noted, the majority of Russian oil and gas extraction and transportation facilities are located in the North and the Arctic; considering that reducing greenhouse gas emissions is an ongoing challenge, a key objective for these companies is the further and more active implementation of various decarbonization measures, taking into account both external and internal factors.

Key principles underlying the decarbonization of oil and gas companies include a phased and realistic approach, technological neutrality, economic feasibility, and a well-developed regulatory framework.

Specific decarbonization strategies and technologies will vary depending on the geographic location, available resources, and specific operational characteristics of each company.

Conclusion

Against a backdrop of rising energy consumption, oil and gas companies need to adapt to the growing pressure of climate trends by enhancing their environmental responsibility. In this context, the decarbonization of oil and gas companies' operations, both globally and specifically in Russia, is currently a subject of active discussion within academic and business spheres.

Despite the relevance of the issue, a vision for decarbonization is only taking shape within the academic community; consequently, there are some differences in the interpretation of this concept, the most common of which include: a process of reducing carbon intensity; a target state of a system with no GHG emissions; a stage in the energy transition; a comprehensive system of methods and approaches for reducing emissions.

The Russian oil and gas sector is characterized by significant potential due to large reserves and fields; however, the exploitation of these fields is complicated by their location in the Arctic — a region with a highly sensitive ecosystem. Russian oil and gas companies are already actively implementing decarbonization measures, but analysis revealed a lack of standardized guidelines and targets for GHG emission reductions, resulting in a fragmented approach to setting such goals across the industry.

A study of the influence of external and internal factors shaping the main trends in the decarbonization of Russian oil and gas companies has shown that, despite facing similar external conditions, their priority strategies for achieving carbon neutrality vary. The research identified the influence of internal factors (such as reserve volume, structure, and quality; state ownership; asset geography; and GHG emission trends) on the formulation and implementation of specific decarbonization strategies by Russian oil and gas companies. The authors recognize that this list of factors is not exhaustive and that the influence of other variables, as well as the interdependence of the factors examined, cannot be ruled out; furthermore, the study is subject to limitations regarding the sample size and data availability.

Future research could focus on a more detailed analysis of how individual factors influence the choice of decarbonization strategies and on developing decarbonization mechanisms for Russian oil and gas companies, taking into account their specific characteristics.

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Resource and Logistics Opportunities for the Development of Industrial Tourism in the Russian Arctic

Aleksandr Yu. Tsvetkov [1]✉, Cand. Sci. (Econ.), Associate Professor
Elena E. Osipova [2], Cand. Sci. (Econ.), Associate Professor

[1, 2] Northern (Arctic) Federal University named after M.V. Lomonosov, Naberezhnaya Severnoy Dviny, 17, Arkhangelsk, Russia
[1] a.cvetkov@narfu.ru ✉, ORCID: https://orcid.org/0000-0003-1092-1295
[2] e.e.osipova@narfu.ru, ORCID: https://orcid.org/0000-0001-7960-1607

Abstract. Over the years of industrial development in the regions of the Russian Arctic, a significant potential of industrial heritage has been accumulated, with industrial sites serving as attractions for potential tourists. This provides an opportunity to develop industrial tourism, which is a promising sector of the modern tourism industry. The geographical features of the Arctic and its uneven transport infrastructure complicate the development of tourism in the region, including industrial one. To address this issue, it is necessary to identify the most accessible areas for tourists and to determine the types of industrial tourism that may be in demand. In this study, using content analysis of specialized tourism websites, we assessed the current state of industrial tourism development in each region of the Russian Arctic and identified what types of it are presented in tour programs. We analyzed the logistics capabilities of the Arctic regions for tourism development by determining the financial and time costs for potential tourists and comparing the results for each selected Arctic transport center. In terms of the availability of necessary resources and the lowest financial and time costs, the development of industrial tourism shows the greatest potential in the Murmansk Oblast, the Republic of Karelia, the Arkhangelsk Oblast, the Komi Republic and the Yamalo-Nenets Autonomous Okrug. For each region of the Russian Arctic, we have identified the sectors that form the resource base for the development of industrial tourism, and recommended enterprises that should be used to develop career-oriented tours designed to attract labor resources.

Keywords: *Arctic, industrial tourism, financial and time costs, transport center, industrial heritage*

Introduction

Industrial tours first appeared in the 17th century. In the second half of the 20th century, industrial tourism acquired its modern form. The Strategy for the Development of Tourism in the Russian Federation until 2035, approved by government decree in 2019, identifies industrial enterprises as attractions for both domestic and international tourists. Each region is characterized by the presence of industrial enterprises, but not all regions possess significant natural, climatic, cultural, and historical resources capable of attracting tourists. Using the resources of certain enterprises as a basis for creating sightseeing programs allows for the development of tourism even in regions with limited recreational potential. This is particularly relevant for towns and settle-

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ments with higher and secondary vocational educational institutions training personnel for regional enterprises. Such enterprises usually have museums and specialists capable of conducting industrial tours. Consequently, the necessary foundation for the development of industrial tourism exists. Industrial tourism is defined as visits and activities at a site that enable visitors to understand the processes and secrets of production relating to the past, present or future[1]. Arctic tourism is mainly associated with the use of the natural component of recreational resources. However, the history of human settlement in the Arctic regions cannot be ignored. Industrial heritage is also a potential attraction for tourists. As Z.Yu. Zhelnina notes, the interpretation of industrial resources and their inclusion in Arctic tourism is a pressing issue (Zhelnina, 2021). At the same time, the development of industrial tourism in the Arctic has its own specific characteristics, relating to the selection of sites to be visited and the organization of logistics. In Russia, the main sites used in industrial tourism are enterprises in food industry, mechanical engineering, timber industry, metallurgy, energy, mining, and agriculture[2]. The main activity of an industrial tour is the demonstration of the production process (Chkhotua, Vlasyuk, Zadorozhnaya, 2021). One of the challenges in attracting tourists to factory tours is the lack of diversity in the sectoral composition of enterprises in certain regions (including the Arctic zone). The distant location of potential tourists from attractions, combined with poor transport links, is another significant challenge for organizing industrial tourism. The aim of our study is to identify the most promising industrial tourism destinations and regions in the Russian Arctic where they could be developed.

Research materials and methods

According to the Association of Tour Operators of Russia (ATOR), the regions of the Russian Arctic were visited by 1.3 million tourists in 2024, an increase of 8.3% compared to 2023[3]. According to Rosstat, among the regions that are fully located in the Arctic zone, the Murmansk Oblast (674,151 arrivals) and the Yamalo-Nenets Autonomous Okrug (460,451 arrivals) were the leaders in terms of tourist visits in 2024. The Chukotka Autonomous Okrug (48,109 arrivals) ranked first among the other two regions that are entirely within the Arctic, despite its remoteness and inaccessibility. Meanwhile, the Nenets Autonomous Okrug, located closer to tourist flow centers than Chukotka, recorded 39,756 arrivals in 2024. In other regions, partially located within the Arctic zone, it is difficult to distinguish tourists visiting the Arctic from the general tourist flow, but experts identify the Arkhangelsk Oblast as a leader[4].

The development of industrial tourism in the Russian Arctic regions is currently understudied. This can be explained by the fact that the Arctic attracts tourists primarily due to its unique

[1] National Standard of the Russian Federation. Tourism Services. Industrial Tourism. Provision of Services. URL: https://docs.cntd.ru/document/1200142466 (accessed 15 October 2025).
[2] Methodology for the development of industrial tourism in the Russian Federation. URL: https://asi.ru/library/promtourism/184110/ (accessed 15 October 2025).
[3] URL: https://arctic-russia.ru/news/minvostokrazvitiya-turpotok-v-arktiku-v-2025-godu-sostavit-1-5-mln-chelovek/ (accessed 15 October 2025).
[4] URL: https://www.rosstat.gov.ru/statistics/turizm (accessed 15 October 2025).

natural environment. However, academic works focusing on specific aspects of Arctic industrial tourism have recently begun to appear. For example, Z.Yu. Zhelnina examines the industrial image of the Arctic, which is often contrasted with its natural potential. She notes that organizing trips to visit industrial sites in the Arctic differs from organizing similar tours in old industrial regions (Zhelnina, 2021). E.L. Panchenko suggests paying attention to the possibility of attracting labor to the Arctic regions through the organization of career-oriented industrial tourism tours (Panchenko, 2024). O. Podshuveit expresses a similar expert opinion, believing that industrial tourism in the Arctic should be viewed not as a means of profit-making, but as a career guidance activity for young people aimed at addressing the Arctic's labor force challenges[5]. Authors studying industrial tourism highlight its marketing, human resources and image-building effects, as well as its impact on economic diversification (Chkhotua, Vlasyuk, Zadorozhnaya, 2021). Due to its marketing and image-building effects, industrial tourism contributes to increasing the region's investment attractiveness, the creation of regional brands, and the development of export potential and the tourism industry[6].

Across Russia as a whole, without specific reference to the Arctic, the framework for industrial tourism is better developed. The Agency for Strategic Initiatives for the Promotion of New Projects has compiled a practical guide and step-by-step instructions for developing a regional strategy for industrial tourism in the Russian Federation[7]. There is no consensus amongst scholars from different countries on the definition of industrial tourism (Chkhotua, Vlasyuk, Zadorozhnaya, 2021). Industrial tourism includes visits to industrial heritage sites (tangible and intangible assets used in the past), tours to operating enterprises attended by both tourists and entrepreneurs, career-oriented excursions for schoolchildren and students, and industrial exhibitions (Chkhotua, Vlasyuk, Zadorozhnaya, 2021). A significant resource base for industrial tourism is old industrial enterprises that have ceased operation. If the production facilities, equipment and technologies used at a given factory are preserved, such an enterprise can be transformed into a cultural heritage site that is popular with tourists. For example, the Verla Factory Museum (Finland), which produced paper and cardboard from 1892 to 1964, was converted into Finland's first industrial museum after its closure, and UNESCO designated it a World Heritage Site (Potapov, 2020). Industrial tourism accounts for 10 to 15% of global tourism. In the USA, industrial tourism began in single-industry towns; nowadays, almost all industrial sites are open to tourists. In European countries, industrial tours for visitors were organized at food industry sites. In China, the 20 largest enterprises across various sectors (food, pharmaceutical and light industry) have been selected as the main destinations for industrial tourism (Ivanova, Matyunin, 2022).

[5] Interview with O. Podshuveit. URL: https://goarctic.ru/opinions/olga-podshuveyt-o-potentsiale-promyshlennogo-turizma-dlya-sotsialno-ekonomicheskogo-razvitiya-arktik/ (accessed 15 October 2025).
[6] URL: https://promtourism.online/ (accessed 15 October 2025).
[7] Methodology for the development of industrial tourism in the Russian Federation. URL: https://asi.ru/library/promtourism/184110/ (accessed 15 October 2025).

The research by E.E. Ibragimov, S.S. Skaranik and V.V. Verna presents a classification of industrial tourism types based on the number of sites visited simultaneously (a single enterprise or several enterprises in the same sector), the composition of the excursion group, the influence of economic and business factors (paid and free tourism), the organization of tours, the internal and external characteristics (local, national, international tourism), and the objectives of the impact on the target audience (educational, career-oriented, business, scientific, image-building tourism) (Verna, Ibragimov, Skaranik, 2023). In our study, we have categorized industrial tourism according to the primary purpose of the trip into the following types: industrial heritage tourism, career guidance tourism, educational tourism at operational enterprises, and business tourism. This classification is useful for selecting priority areas in the planning of industrial tourism at a regional level.

In the work by I.Z. Chkhotua, L.I. Vlasyuk and G.V. Zadorozhnaya, all constituent entities of the Russian Federation are divided into clusters in terms of the level and strategic potential for the development of industrial tourism. Transport accessibility was also taken into account. Russia's Arctic regions were grouped into three clusters. The authors classified the Nenets, Yamalo-Nenets, and Chukotka Autonomous Okrugs (cluster 1) as lagging behind in industrial tourism development; the Republic of Karelia, Komi Republic, Arkhangelsk Oblast, and Krasnoyarsk Krai (cluster 2) as moderately developed; and the Murmansk Oblast and Sakha Republic (Yakutia) as leading in industrial tourism development (Chkhotua, Vlasyuk, Zadorozhnaya, 2021). However, it should be noted that the composite indicator in this work was calculated for the entire territory of the regions, without taking into account the Arctic zone status of individual districts. Furthermore, the level of industrial tourism development in some of them has changed since the publication of this work. Barriers hindering the development of industrial tourism are highlighted in the work by M.V. Ivanova and V.M. Matyunin. They include inaccessibility and remoteness of industrial tourism sites from tourist flow areas; high cost of travel to tourist sites; significant time expenditures; unequal competition with popular tourist destinations; lack of safety at industrial sites for visitors; and the restricted status of certain sites (Ivanova, Matyunin, 2022). There are also infrastructure-related constraints, which result in difficulties in organizing tourist routes within industrial sites. Consequently, the potential of industrial tourism is not fully utilized, although it could contribute to the sustainable development of the region (Chkhotua, Vlasyuk, Zadorozhnaya, 2021). The specific characteristics of the Arctic influence the development of all sectors of the economy. Therefore, the feasibility of industrial tourism development for each specific region is an important issue in regional planning.

We analyzed the resource and logistical potential for industrial tourism development, taking into account the specific characteristics of the territories of the Russian Arctic. Resource potential refers to the availability of recreational resources in these territories that enable the development of industrial tourism, logistical potential — to the availability of regular transport links connecting these territories with the areas where tourist flows are generated. Furthermore, logistical

potential for tourists is also linked to ticket prices, travel time, and flight frequency; in other words, to the financial and time costs.

In our study of the current state of industrial tourism in the Arctic regions of the Russian Federation, we used both non-quantitative and quantitative content analysis of their official tourism information portals and the websites of selected tour operators, as well as the portal on industrial tourism in Russia and the website of the Agency for Strategic Initiatives. We counted the number of industrial tourism offers from tour operators in each region and analyzed their content to determine the type of tourism offered. We studied the geographical distribution of economic sectors in the Arctic territories to identify their resource potential for the development of industrial tourism, and identified the most unique potential sites of interest representing the most valuable recreational resources. We assessed the transport accessibility and logistical capabilities of the regions based on the financial and time costs for tourists (Tsvetkov, 2022). We also examined how the financial and time costs for tourists travelling to specific destinations in the Russian Arctic have changed since 2022. Analysis and synthesis of the information obtained have enabled us to identify the Arctic regions of the Russian Federation that offer the greatest potential for the development of industrial tourism, as well as the types of tourism best suited to this purpose. Geographically, our study covers those constituent entities of the Russian Federation and their parts that are defined as the Arctic in Federal Law No. 193 of July 13, 2020 (as amended on April 21, 2025 – No. 97) "On State Support for Entrepreneurial Activity in the Arctic Zone of the Russian Federation"[8]. These are the territories of the Murmansk Oblast, the Nenets, Yamalo-Nenets and Chukotka Autonomous Okrugs, parts of the Arkhangelsk Oblast classified as the Arctic territories (the city of Arkhangelsk, the city of Novodvinsk, the urban okrugs of Severodvinsk and Novaya Zemlya, Onega, Primorskiy, Leshukonskiy, Pinezhskiy districts), the Republic of Karelia (Belomorskiy, Kemskiy, Loukhskiy, Kalevalskiy, Segezhskiy districts, Kostomuksha urban okrug), the Komi Republic (the urban okrugs of Vorkuta, Inta, Usinsk, Ust-Tsilemskiy district), the Republic of Sakha (Yakutia) (13 northern municipalities), the Khanty-Mansi Autonomous Okrug (Berezovskiy, Beloyarskiy districts), and Krasnoyarsk Krai (Taimyrskiy district, the city of Norilsk, Turukhanskiy district, part of the Evenki district).

Results and discussion

In the USSR, industrial tourism was primarily aimed at career guidance and involved schoolchildren visiting manufacturing sites. In the post-Soviet period, industrial heritage has become a focus of tourism planning in Russia. At the end of the 20th century, the Nizhny Tagil Museum-Reserve of Mining and Metallurgy of the Middle Urals was established, comprising a previous-

[8] Federal Law of July 13, 2020 No. 193-FZ (as amended on April 21, 2025) "On State Support for Entrepreneurial Activity in the Arctic Zone of the Russian Federation". URL: https://www.consultant.ru/document/cons_doc_LAW_357078/b819c620a8c698de35861ad4c9d9696ee0c3ee7a/ (accessed 15 October 2025).

ly closed metallurgical plant and the house of the manager of the mining and metallurgical district[9].

In order to highlight the tourism potential of industrial enterprises and engage regional administrations in the development of industrial tourism, the Agency for Strategic Initiatives, together with the Ministry of Industry and Trade of the Russian Federation, launched the Industrial Tourism Development Accelerator in 2021. This resulted in the development and implementation of industrial tours in the regions participating in the project. Among the Arctic regions, teams from the Murmansk and Arkhangelsk Oblasts, the Republic of Karelia, the Yamalo-Nenets Autonomous Okrug, the Krasnoyarsk Krai, and the Republic of Sakha (Yakutia) participated in the Accelerator. However, the Volga Federal District was the leader in terms of the number of enterprises involved in organizing industrial tours (Chkhotua, Vlasyuk, Zadorozhnaya, 2021).

Using content analysis of official tourism portals and specialized industrial tourism websites, we have identified the Arctic regions where industrial tours are organized (Table 1).

Table 1

Industrial tours in the Arctic regions of Russia[10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20]

Region	Tour	Type	Industry	Location
Murmansk Oblast	"Shpil-555" – an ecological and industrial route on the territory of a closed nickel-copper quarry	industrial heritage tourism	mining, non-ferrous metallurgy	Nikel urban-type settlement
	Kola Nuclear Power Plant and trout farm	career-oriented, educational tourism	electricity generation, agriculture	Polyarnye Zori
	Kola Wind Farm	career-oriented, educational tourism	electricity generation	Tumanny settlement
	Kola Superdeep Borehole	industrial heritage tourism, career-oriented, educational tourism	scientific research	Zapolyarny settlement
Republic of Karelia	Segezha Pulp and Paper Mill	career-oriented, educational tourism	pulp and paper industry	Segezha
Arkhangelsk Oblast	"Pomorskiy Koch" shipyard	educational tourism	shipbuilding	Arkhangelsk
Komi Republic	"Vorkuta means coal". VorkutaUgol Company	career-oriented, educational tourism	coal industry	Vorkuta, Yunyaginskiy open-pit mine
Yamalo-	Vyngapurovskiy Gas Pro-	career-oriented,	gas industry	Noyabrsk

[9] Methodology for the development of industrial tourism in the Russian Federation. URL: https://asi.ru/library/promtourism/184110/ (accessed 15 October 2025).
[10] Selection of an industrial tour. URL: https://promtourism.ru/katalog/ (accessed 15 October 2025).
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[12] Legendary Karelia. URL: https://legendary-karelia.ru/ (accessed 15 October 2025).
[13] Tours and excursions in the Komi Republic. URL: https://tourism.rkomi.ru/adventures/tours-and-excursions (accessed 15 October 2025).
[14] Tourist guide to Yamal. URL: https://yamal.travel/ (accessed 15 October 2025).
[15] URL: https://www.visitnao.ru/ (accessed 15 October 2025).
[16] Tourist information center of the Krasnoyarsk Krai. URL: https://visitsiberia.info/ (accessed 15 October 2025).
[17] Yakutia tourism portal. URL: https://travel-ykt.ru/ (accessed 15 October 2025).
[18] Chukotka tourism portal. URL: https://chukotka.travel/ (accessed 15 October 2025).
[19] URL: https://tours.pomorland.travel/ (accessed 16 October 2025).
[20] Tourism in Yugra, Khanty-Mansi Autonomous Okrug – Yugra. URL: https://tourism.admhmao.ru/ (accessed 16 October 2025).

Nenets AO	cessing Plant JSC SiburTyumengaz	educational tourism		
Nenets AO	Introduction to ethnic traditions	educational tourism	traditional crafts	Naryan-Mar
Khanty-Mansi AO	-	-	-	-
Krasnoyarsk Krai	Norilsk Nickel	career-oriented, educational tourism	non-ferrous metallurgy	Norilsk
	Gigawatt, BitCluster Mining Company	career-oriented, educational tourism	IT	Norilsk
Republic of Sakha (Yakutia)	-	-	-	-
Chukotka AO	Tour to reindeer herders	educational tourism	agriculture	Tundra

As shown in Table 1, the largest number of industrial tours is offered on the official tourism websites of the Murmansk Oblast, which confirms the findings of I.Z. Chkhutua, L.I. Vlasyuk and G.V. Zadorozhnaya regarding the level of its development (Chkhotua, Vlasyuk, Zadorozhnaya, 2021). Similar tours were not found on the websites of the Republic of Sakha (Yakutia) and the Khanty-Mansi Autonomous Okrug. It should be noted that not all the websites we examined marked their tours as industrial, and some websites did not provide any information at all. These included websites of the Arkhangelsk Oblast, the Nenets Autonomous Okrug, the Khanty-Mansi Autonomous Okrug, the Republic of Sakha (Yakutia), and the Chukotka Autonomous Okrug. Table 1 contains data only on tours for which information was publicly available and which were clearly identified as industrial. Educational industrial tours accounted for 92% of the offerings, 66% of programs could be classified as career-oriented, and only 17% were industrial heritage tours. Business tours were not found among the regional tourism industry offerings. Most frequently, tours focused on agriculture (crop production, reindeer herding, and fish farming), non-ferrous metallurgy (mining, copper-nickel industry), and the fuel and energy complex (gas, coal, and electricity sectors). The forestry and shipbuilding sectors, which are important to the economies of some Arctic territories, are represented to a lesser extent. No tours to oil industry facilities were identified. Industrial tours do not always reflect the economic specialization of regions. Some programs focus on cultural and educational tourism, using local attractions associated with specific economic activities or local traditions. It is worth noting the geographical dispersion of Arctic industrial tour routes and their significant distance from the cities where the majority of potential tourists reside. Consequently, from a logistical and economic perspective, it is difficult to combine several regional sites into a single industrial tour.

We analyzed economic distances based on the potential financial and time costs for tourists to reach industrial tourism centers in the Arctic regions via direct flights, assuming that the departure points for tourist flows would be Moscow and St. Petersburg, the country's main transport and distribution hubs, and the destinations would be regional transport centers, following the methodology proposed by I.A. Potapov (Potapov, 2016). The indicators used for the assessment were travel time (minimum), cost of travel (minimum), and the number and frequency of direct flights and train services operating between industrial tourism centers, Moscow and St.

Petersburg. The results were expressed as points (the maximum is 10). Thus, if the travel time between the given locations is up to 2 hours, this corresponds to 1 point, up to 3 hours — 2 points, etc. If the minimum travel cost is less than 1,000 rubles, this corresponds to 1 point, less than 2,000 rubles — 2 points, etc. If the frequency of flights on a given route by a given mode of transport is equal to 1 or more times per day, this corresponds to 1 point, 6 times a week — 2 points, 5 times a week — 3 points, 1 time a week — 7 points. If the number of modes of transport available to reach a given destination is 1, this is expressed as 7 points, 2 or more — 1 point. The sum of all indicators, expressed in points, is a generalized indicator of tourists' financial and time costs (Tsvetkov, 2022) (Table 2).

Table 2

Assessment of tourists' financial and time costs when travelling to Arctic industrial tourism centers[21] (7)

Region	Industrial tourism center	Transport center	Cities connected by regular air and rail services to transport centers				
			All cities	Moscow		Saint Petersburg	
				air	railway	air	railway
Murmansk Oblast	Nikel urban-type settlement, Polyarnye Zori, Tumanny settlement, Zapolyarny settlement	Murmansk	Anapa, Arkhangelsk, Ekaterinburg, Kazan, Kaliningrad, Krasnodar, Moscow, Petrozavodsk, Pskov, St. Petersburg, Sevastopol, Smolensk, Sochi, Veliky Novgorod, Cherepovets	7	17	7	16
		Apatity	Anapa, Pskov, Moscow, Veliky Novgorod, St. Petersburg, Smolensk, Kaliningrad	10	18	11	16
Karelia	Segezha	Segezha	Anapa, Pskov, Moscow, Veliky Novgorod, St. Petersburg, Smolensk	-	22	-	21
Arkhangelsk Oblast	Arkhangelsk	Arkhangelsk	Adler, Vologda, Kaliningrad, Kislovodsk, Mikun, Moscow, Murmansk, Naryan-Mar, Novorossiysk, St. Petersburg, Smolensk, Cherepovets	8	16	7	20
Komi	Vorkuta	Vorkuta	Adler, Syktyvkar, Kotlas, Labytnangi, Moscow, Nizhny Novgorod, Novorossiysk, St. Petersburg	21	17	-	29
	Usinsk	Usinsk	Bugulma, Kazan, Kirov, Mineralnye Vody, Moscow, Perm, Pechora, Samara, Syktyvkar, Ufa	17	17	-	-
Nenets AO	Naryan-Mar	Naryan-Mar	Arkhangelsk, Ekaterinburg, Kazan, Kirov,	22	-	22	-

[21] Suburban and intercity transport schedules. URL: https://rasp.yandex.ru/ (accessed 18 October 2025).

			Moscow, St. Petersburg, Syktyvkar, Ufa				
Yamalo-Nenets AO	Salekhard, Kharp settlement, Noyabrsk	Salekhard (air) and Labytnangi (railway)	Vorkuta, Ekaterinburg, Kazan, Moscow, Mineralnye Vody, Nizhny Novgorod, Novosibirsk, Omsk, St. Petersburg, Sochi, Tyumen, Ufa	14	22	16	24
		Noyabrsk	Ekaterinburg, Kazan, Krasnodar, Mineralnye Vody, Moscow, Novosibirsk, Novy Urengoy, Omsk, Orenburg, St. Petersburg, Sochi, Tyumen, Ufa	17	23	20	24
Khanty-Mansi AO	Berezovo urban-type settlement, Beloyarskiy	Beloyarskiy	Moscow, Ekaterinburg, Tyumen, Surgut, Khanty-Mansiysk, Nyagan	26	-	-	-
Krasnoyarsk Krai	Norilsk	Norilsk	Abakan, Ekaterinburg, Krasnodar, Krasnoyarsk, Mineralnye Vody, Moscow, St. Petersburg, Novosibirsk, Sochi, Ufa, Chelyabinsk	22	-	27	-
Sakha (Yakutia)		Tiksi settlement	Yakutsk	-	-	-	-
Chukotka AO		Anadyr	Vladivostok, Krasnoyarsk, Moscow, Khabarovsk	31	-	-	-
		Pevek	Novosibirsk, Magadan, Moscow, Yakutsk	34	-	-	-

According to the data in Table 2, tourists travelling to the Murmansk Oblast and the Arctic areas of the Arkhangelsk Oblast have the lowest financial and time costs. Travelers can choose from two modes of transport, depending on the individual priority: travel time or cost. The transport hubs of these regions are connected by regular flights to a large number of cities, and the number of destinations has increased since 2022 (Tsvetkov, 2022). High financial and time costs associated with travelling to Segezha (Karelia) are due to the fact that it can only be reached by one mode of transport (by train). Travelling eastward, tourists' financial and time costs will increase because of the lack of alternatives to air travel, the infrequency of flights and the high cost of tickets. The financial and time costs of visiting destinations in the Yamalo-Nenets Autonomous Okrug are slightly lower than in neighboring regions, as there are more regular connections to Moscow and St. Petersburg via two modes of transport. The regions located further east have no rail links, making air travel expensive. There are no direct flights to St. Petersburg from airports in the Chukotka Autonomous Okrug, and there are no direct flights to Moscow from the Arctic part of the Republic of Sakha (Yakutia). The cost of a "Moscow – Pevek" flight ticket starts at 49,000 rubles[22].

Overall, compared to 2022, travel costs to these centers of the Russian Arctic have increased. In the Murmansk and Arkhangelsk Oblasts, the increase was 1-2 points; in the Nenets Autonomous Okrug — 10-16 points; in the northern Krasnoyarsk Krai (Norilsk) — 5 points; in the

[22] Yakutia Airlines. URL: https://www.yakutia.aero/wx/booking/#/results/9261486373 (accessed 17 October 2025).

Chukotka Autonomous Okrug (Anadyr) — 8 points. The financial and time costs of travelling to Vorkuta, Labytnangi and Salekhard have changed in varying ways. Transport links between Vorkuta and St. Petersburg have deteriorated, resulting in a 7-point increase in costs; meanwhile, the financial and time costs of travelling from Moscow have remained almost unchanged. Air travel costs from Moscow to Salekhard remained unchanged, while train travel costs increased by 6 points. Air travel costs from St. Petersburg to Salekhard increased by 3 points; however, a rail service was introduced, providing an alternative for tourists from that city. The increase in financial and time costs is linked to rising ticket prices and a reduction in the frequency of flights. The exceptions are the Yamalo-Nenets Autonomous Okrug and, to some extent, the Komi Republic, where the number of services has increased slightly on certain routes and for certain modes of transport. Consequently, the development of tourism in the European sector of the Russian Arctic is the most promising in terms of financial and time costs. This applies to the Murmansk and Arkhangelsk Oblasts. The Yamalo-Nenets Autonomous Okrug also has significant potential for attracting tourists (Tsvetkov, 2022). Industrial tours created there could be more popular with tourists from other regions of the country travelling through Moscow, St. Petersburg, or directly from their home regions. For regions in the Asian sector of the Arctic, particularly the north of the Krasnoyarsk Krai, the Republic of Sakha and the Chukotka Autonomous Okrug, it is preferable to target industrial tours at the local population or to incorporate them into other types of travel programs.

The potential locations for developing industrial tours were identified on the basis of knowledge of the sectoral composition of the economy in Russia's Arctic regions and the geographical distribution of enterprises. The main industry in most regions of the Russian Arctic is mining, particularly in its Asian sector. The main enterprises include mining and processing plants, open-cast mines and underground mines. After the collapse of the USSR, more than 12,000 industrial sites were abandoned in the Russian Arctic[23]. The use of depleted mineral deposits as tourist attractions is widespread in international practice. For example, the "Carpathian Oil Route" was created on the site of former oil fields in the Polish Carpathians (Kruczek, Kruczek, 2016). In Sweden, industrial tourism is developing at a depleted copper ore deposit. This location (the "Great Copper Mountain" in Falun) is a UNESCO World Heritage Site; it includes a mine closed in 1992, a copper smelter, and a number of associated facilities (Della Lucia, Pashkevich, 2023). In our view, using such sites as attractions could be a promising approach to developing industrial tourism routes in the Arctic. Some of them are mothballed, as their resources have not yet been fully exhausted, and it is possible to resume mineral extraction at these sites. Using them for tourism would help to prevent their complete abandonment, preserve the infrastructure of enterprises, and maintain a number of jobs. A particularly large number of mining and processing plants were closed in the Chukotka Autonomous Okrug during the 1990s and 2000s. These mines primarily produced non-ferrous and precious metals (tin, tungsten, mercury, gold, silver, etc.) (Vashchuk,

[23] Scientists have compiled a list of abandoned industrial sites in the Arctic. URL: https://rough-polished.expert/ru/arctica/136619.html (accessed 13 October 2025).

Kovalenko, 2022). According to the investment portal of the Arctic Zone of Russia, the Chukotka Autonomous Okrug contains many unique industrial sites that are not used for their intended purpose, but could attract tourists due to their historical and cultural value[24]. For example, the military town of Gudym with its airfield (closed in 2002); the settlement of Apapelgino, which housed employees of the Pevek airport (liquidated in 2003); the settlement of Komsomolskiy in the Chaunskiy District, which had a gold mine; the settlement of Valkumey with its tin mine; the settlement of Iultin, which had a tin, tungsten, gold, and silver mine; and other sites. Their use is complicated by their inaccessibility, which is why they were initially unable to compete with other mining enterprises with more advantageous transport and geographical locations. However, some of them are located near cities with airports (Anadyr, Pevek, Bilibino) and could potentially be used as tourist attractions. The main visitors to these sites may be local residents and prospective university applicants, with career guidance as the primary purpose of the visit. Furthermore, these sites could be included in educational and adventure tourism for visitors from other regions. A similar approach is possible for old Arctic weather stations, mines, and sawmills. During the Soviet era, there were 13 coal mines operating in Vorkuta; currently, only 4 remain, scheduled for closure by 2037. It may be possible to establish a museum complex based on one of these sites, similar to the Museum-Reserve of Mining and Metallurgy of the Middle Urals. Such a facility could be used both for career guidance and for educational tourism, for both local residents and visiting guests. Vorkuta's convenient transportation and geographical location facilitate this, along with the existing experience in industrial tourism offered by the VorkutaUgol Company.

In 1928, approximately 30 sawmills operated in Arkhangelsk, most of which were founded before 1917. By 2024, only 4 remained (Potapov, Erokhin, 2025). After the closure of most enterprises in Arkhangelsk's timber industry, many vacant industrial sites and production buildings remained; one of these could be used to create a museum of sawmilling and woodworking, using modern visualization techniques.

If we follow the idea that industrial tourism in the Arctic primarily involves career-guided tours to address staffing issues, then each Arctic region should create museums at enterprises in their respective industries, and leading companies in these sectors should develop excursion programs and establish cooperation with the region's tourism industry. Such successful experience has already been acquired by enterprises in the Murmansk Oblast (Kola Nuclear Power Plant), Karelia (Segezha Pulp and Paper Mill), the Yamalo-Nenets Autonomous Okrug (Vyngapurovskiy Gas Processing Plant of SiburTyumengaz), and Krasnoyarsk Krai (Norilsk Nickel Mining and Metallurgical Company). We have examined which enterprises and companies could use their potential to develop industrial tours, as well as possible transport hubs through which tourists could arrive (Table 3).

[24] Abandoned sites in Chukotka: nuclear missiles, mines, and settlements. URL: https://arctic-russia.ru/article/zabroshennye-obekty-chukotki-yadernye-rakety-rudniki-i-poselki/ (accessed 14 October 2025).

Table 3

Potential industrial tourism sites in the Russian Arctic and their nearest transport centers[25]

Region	Industry	Enterprise or company	Transport center
Murmansk Oblast	shipbuilding	OJSC Murmansk Ship Repair Plant of the Marine Fleet, JSC 10th Ship Repair Plant	Murmansk
	fishing industry	PJSC Murmansk Fish Plant, PJSC Inarktika	Murmansk
	non-ferrous metallurgy	JSC Kola Mining and Metallurgical Plant, JSC Kandalaksha Aluminum Plant, LLC Lovozerskiy MPP	Apatity
	ferrous metallurgy	JSC Olenegorskiy MPP, JSC Kovdorskiy MPP	Apatity
	mining and chemical industry	JSC Apatit	Apatity
Republic of Karelia	ferrous metallurgy	JSC Karelskiy Okatysh	Segezha, Kostomuksha
	non-ferrous metallurgy	OJSC Nadvoitskiy Aluminum Plant	Nadvoitsy
	pulp and paper industry	JSC Segezha PPM	Segezha
Arkhangelsk Oblast	forestry and timber industry	JSC Arkhangelsk Plywood Plant , CJSC Lesozavod 25 , OJSC Arkhangelsk PPM	Arkhangelsk
	extractive industries	JSC Severoalmaz, JSC AGD Diamond	
	shipbuilding	JSC SRC Zvezdochka SRY Krasnaya Kuznitsa	
	food industry	LLC Arkhangelsk Seaweed Factory	
Nenets AO	fuel and energy complex	JSC Pechoraneft	Naryan-Mar
	food industry	JSC Myasoprodukty	
Komi Republic	fuel and energy complex	JSC Vorkutaugol, LLC LUKOIL-Komi	Vorkuta, Usinsk
Yamalo-Nenets AO	fuel and energy complex	JSC Gazpromneft-Noyabrskneftegaz, LLC Gazprom Dobycha Nadym	Noyabrsk, Salekhard, Labytnangi, Nadym
Khanty-Mansi AO	fuel and energy complex, extractive industries	Beloyarskneftegaz, LLC LUKOIL-Western Siberia, JSC Polar Quartz	Beloyarskiy
Krasnoyarsk Krai	non-ferrous metallurgy	PJSC MMC Norilsk Nickel	Norilsk
	transport	sea port of Dudinka	
Republic of Sakha (Yakutia)	extractive industries	PJSC ALROSA	Tiksi, Mirny
	transport	sea port of Tiksi	
Chukotka AO	extractive industries	LLC Gold Mining Artel “Chukotka” (Komsomolskiy settlement), LLC Gold Mining Artel “Shakhter” (Leningradskiy settlement), LLC Gold Mining Artel “Polyarnaya” (Polyarny settlement)	Pevek, Anadyr

Industrial enterprises are typically located on or near transportation routes. Therefore, tourists can reach their destinations by using the towns we have suggested as transport centers. “This is especially convenient in the Murmansk Oblast, the Arkhangelsk Oblast, Karelia, and the

[25] Source: compiled by the author.

Komi Republic" (Tsvetkov, 2022). Oil and gas enterprises, which are usually located far from transportation hubs, are less accessible. The financial and time costs associated with reaching them increase due to the need for additional travel from the transport centers discussed. This applies to the Nenets and Yamalo-Nenets Autonomous Okrugs. In the Arctic part of the Sakha Republic (Yakutia) and the Chukotka Autonomous Okrug, there are almost no enterprises left that could accommodate industrial tourists. In Yakutia, this role could be taken on by ALROSA, which is developing new deposits, including in the northern regions of the republic. In the Chukotka Autonomous Okrug, gold mining cooperatives could theoretically accommodate tourists, but this function would have to be assumed by the administration. The remote areas of the Republic of Sakha (Yakutia) and the Chukotka Autonomous Okrug are sparsely populated and have significant transport problems. Industrial tourism there can rely primarily on local residents, as the conditions for organizing industrial tours are complex, the financial and time costs are high, and there would not be much demand for such tours.

The creation of industrial museums at enterprises is of great importance. Such museums will provide a foundation for industrial career-oriented tourism in the Arctic regions. This will further attract tourists interested in the history of the region's industrial development. Their work, combined with the efforts of the tourism industry, will help to make Arctic tourism more meaningful and enhance the effectiveness of the initiative to attract labor to the Arctic. Promoting such programs at the federal level will attract the attention of potential tourists.

Conclusion

Industrial tourism in the regions of the Russian Arctic is currently in its early stages of development. It is more successful in the most developed and easily accessible regions — the Murmansk Oblast, Karelia, the Komi Republic, and the Yamalo-Nenets Autonomous Okrug. The types of industrial tourism being promoted include educational, career-oriented and industrial heritage tourism. The regions of the Russian Arctic possess a rich industrial heritage, comprising numerous sites from the industrial era: mines, quarries, factories, and closed settlements, which are currently out of use, but have the potential to attract tourists. Using them to develop industrial heritage tourism will preserve infrastructure and create jobs.

Currently, there is great potential for the development of industrial tourism in regions where travel involves the lowest financial and time costs (the Murmansk Oblast, the Arkhangelsk Oblast, the Republic of Karelia, the Republic of Komi and the Yamalo-Nenets Autonomous Okrug). Other regions of the Arctic can expect to attract mainly local residents as tourists. It can be assumed that the development of industrial tourism programs will increase the number of tourist arrivals in the Yamalo-Nenets Autonomous Okrug, the Komi Republic, the Murmansk Oblast, the Arkhangelsk Oblast, the Nenets Autonomous Okrug and the Republic of Karelia. Furthermore, these programs may increase the length of tourists' stays in the Arctic regions. It is expected that career-oriented tourism will become the main type of industrial tourism in the Arctic. It is in demand

primarily among local schoolchildren and students. The difficult transport accessibility of most Arctic regions makes industrial tours highly expensive, which is why they cannot compete with nature-based Arctic tours. To address this situation, leading enterprises in each Arctic region should create modern industrial museums, develop tours, and engage with tourists. Companies interested in attracting skilled workers should sponsor such career-oriented tours.

The inclusion of industrial tourism programs in integrated tours, where tourists visit natural, cultural, historical, and industrial sites, opens up new prospects for the sector. Such tours are available in every region of the Arctic.

A challenge for promoting industrial tourism is its insufficient advertising on local tour operator websites. Some of these sites either lack information on industrial tours or do not provide clear details. Therefore, to develop industrial tourism, it is necessary to create targeted programs, attract leading companies, and provide accessible tour information to potential tourists.

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The Svalbard Archipelago as an Object of Geopolitical Competition in the Arctic. On the Treaty's Centenary

Valery P. Zhuravel [1]✉, Cand. Sci. (Ped.), Leading Researcher
Sergey N. Grinyaev [2], Dr. Sci. (Tech.), Chief Researcher

[1, 2] Institute of Europe, Russian Academy of Sciences, ul. Mokhovaya, 11, bld. 3, Moscow, Russia
[1] zhvalery@mail.ru ✉, ORCID: https://orcid.org/0000-0002-1786-6754
[2] sgreen@csef.ru, ORCID: https://orcid.org/0000-0001-6511-9553

Abstract. The study is devoted to analyzing the current geopolitical dynamics surrounding the Svalbard archipelago in the context of the centennial anniversary of the 1925 Svalbard Treaty. The paper examines the key trends in the transformation of the archipelago's legal, political, and strategic status amid the profound reshaping of the Arctic's international environment. Based on an analysis of official documents, expert assessments and practical steps taken by key participating states, the paper identifies growing contradictions between Norway, which seeks to consolidate national control and expand its sovereign powers, and Russia, which aims to maintain its historically established presence and safeguard its economic and scientific interests. Special attention is given to the processes of regional militarization under the framework of NATO expansion, the suspension of the Arctic Council's activities, and the intensifying competition among leading Arctic powers. Special emphasis is placed on the role of China as a new near-Arctic actor expanding its research footprint on Svalbard as part of a wider polar strategy. It is demonstrated that Svalbard is gradually losing its status as a zone of peaceful cooperation, transforming into an arena of strategic competition where the interests of Norway, Russia, China and the NATO alliance intersect. The paper further outlines Russia's adaptive measures aimed at preserving its influence through diversification of the Arcticugol enterprise, development of tourism projects, creation of an international research hub in Pyramiden, and cooperation with the BRICS+ countries. The conclusion emphasizes that there is a need for a comprehensive update of Russia's Arctic strategy, aimed at protecting national interests and strengthening its scientific, economic and humanitarian presence amid growing geopolitical pressure from Western states.
Keywords: *Svalbard, geopolitics, Arctic, Svalbard Treaty, Russian presence, militarization, NATO, international law, fisheries zone, continental shelf*

Introduction

August 2025 marked the centenary of the entry into force of the Svalbard Treaty[1], which formed the basis of the archipelago's current legal regime. The treaty was signed in Paris on February 9, 1920, by the United States, the United Kingdom, Denmark, Japan, Norway, the Netherlands,

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[1] Svalbard Treaty. Ministry of Foreign Affairs of the Russian Federation. URL: https://www.mid.ru/ru/foreign_policy/international_contracts/international_contracts/multilateral_contract/51519/ (accessed 19 October 2025).

and Sweden, and entered into force on August 14, 1920, following its ratification by the Norwegian Parliament. The USSR acceded to the treaty on May 7, 1935.

Against the backdrop of a radically changed geopolitical situation in the Arctic region, this anniversary takes on particular significance, as it coincides with a period of acute international confrontation and a re-evaluation of established principles of Arctic cooperation. The Russian Federation, as one of the key Arctic powers and a party to the Treaty since 1935, faces serious challenges in maintaining its positions in the Svalbard archipelago.

The current situation is characterized by a qualitatively new level of geopolitical tension in the Arctic. The accession of Finland and Sweden to NATO in 2023–2024 has fundamentally altered the military-strategic balance in the northern latitudes. The suspension of the Arctic Council's activities in March 2022 brought to an end the era of "Arctic exceptionalism" (Bennett, Dodds, 2025) and peaceful cooperation in the region. In these circumstances, the Svalbard archipelago, located at a strategic point between Greenland, mainland Norway, and the Russian coast, has acquired critical importance for ensuring the national security of the leading Arctic powers.

Currently, Norway, which exercises sovereignty over the archipelago, is taking a number of active steps to strengthen national control and effectively revise the international nature of the 1920 Treaty. The new White Paper on Svalbard[2], presented by the Norwegian government in 2024, contains a number of measures aimed at limiting the activities of other states and strengthening Norway's presence[3]. At the same time, a gradual militarization of the archipelago is underway, despite the direct prohibitions of Article 9 of the Svalbard Treaty.

Russia, in turn, seeks to maintain and strengthen its presence on the archipelago through diversifying the activities of the state-owned company Arktikugol, developing tourism, and establishing an international scientific center in Pyramiden. Cooperation with BRICS+ countries and friendly states plays a special role in Russia's strategy, helping to offset the restrictions imposed by Western countries following the start of the special military operation.

China has also intensified its activities on Svalbard, expanding its research program and sending a record number of icebreakers to the Arctic region in 2024. Beijing views the archipelago as an important element of its Arctic strategy and a means of legitimizing its status as an Arctic state.

Main positions of Russian and foreign scientists on issues relating to the Svalbard archipelago

The academic discourse on Svalbard over the past five years has revealed significant differences in the approaches taken by Russian and foreign researchers to interpreting the archipelago's legal status and its role in Arctic security.

[2] Svalbard. Meld. St. 26 (2023–2024) Report to the Storting (white paper). Norwegian Ministry of Justice and Public Security. 31.05.2024. URL: https://www.regjeringen.no/contentassets/f8407df1f6a641fbae2ca00f4509a64e/en-gb/pdfs/stm202320240026000engpdfs.pdf (accessed 19 October 2025).
[3] Middleton A., Sovereignty, Governance, and Infrastructure: Analysis of Svalbard's White Paper 2023-2024. URL: https://www.highnorthnews.com/en/sovereignty-governance-and-infrastructure-analysis-svalbards-white-paper-2023-2024 (accessed 19 October 2025).

Russian scientists V.P. Zhuravel and D.S. Timoshenko (Zhuravel, Timoshenko, 2022), A.A. Todorov (Todorov, 2020), and S.N. Grinyaev (Grinyaev, 2025) consistently defend the principle of equality enshrined in the 1920 Treaty. V.P. Zhuravel and D.S. Timoshenko argue that Russia's presence is motivated by strategic interests and the protection of historical rights. A.A. Todorov points to violations of the archipelago's demilitarized status through Norway's unilateral actions. S. N. Grinyaev takes a critical view of Norway's new Arctic strategy, emphasizing the increasing pressure on Russian positions and the strengthening of NATO's military presence.

Western researchers offer a different perspective. A. Østhagen (Østhagen, 2024), in his work "The Myths of Svalbard Geopolitics", criticizes common misconceptions, emphasizing the indisputability of Norwegian sovereignty. A. Moe and A.-K. Jørgensen (Moe, Jørgensen, 2025) conclude that Russia's policy of maintaining a presence is not strategic and is aimed at preserving a minimal presence within financial constraints. T. Henriksen (Henriksen, 2024) examines the 2023 Norwegian Supreme Court decision, which confirmed that the Treaty does not apply beyond the 12-mile zone.

S. Paukkunen and J. Black (Paukkunen, Black, 2024) analyze Russia's attempts to use the Arctic Council as a tool of pressure following its invasion of Ukraine. T. Branka (Branka, 2022) demonstrates the transformation of Arctic cooperation as a result of Russian aggression.

Thus, the academic literature reveals a deep division: Russian scientists insist on defending the principle of equal rights and criticize Norwegian policy, while Western researchers emphasize the legitimacy of Norwegian sovereignty.

Geopolitical and geostrategic situation in the Arctic region on the centenary of the entry into force of the Svalbard Treaty

The centenary of the Svalbard Treaty coincides with a period of fundamental transformation of the international legal foundations of Arctic cooperation. Signed on February 9, 1920, and entered into force on August 14, 1925, the Treaty created a unique legal framework granting Norway sovereignty over the archipelago while maintaining equal rights for all contracting parties to economic activity [4]. By 2025, 46 states had become parties to the Treaty, making it one of the most representative international agreements in the Arctic.

However, the modern interpretation of the Treaty's provisions differs significantly from the original intentions of its creators. The adoption of the 1982 UN Convention on the Law of the Sea [5] led to the emergence of new legal concepts, including 200-mile exclusive economic zones and expanded rights of coastal states over the continental shelf. These changes have created legal uncertainty regarding the applicability of the Treaty's principles to the maritime spaces around the archipelago.

[4] About Svalbard and around it. Ministry of Foreign Affairs of the Russian Federation. URL: https://mid.ru/ru/about/social_organizations/association/1428089/ (accessed 19 October 2025).
[5] United Nations Convention on the Law of the Sea (UNCLOS) 1982. Montego Bay: UN. 1982.

Particularly acute disputes have arisen over the fisheries protection zone established by Norway in 1977 [6]. Russia has consistently contested Norway's right to unilaterally establish jurisdiction in these waters, insisting that fisheries management should be carried out on a bilateral basis or through international organizations. Between 1998 and 2011, there were several serious incidents between Russian fishing vessels and the Norwegian Coast Guard, which could have escalated into diplomatic crises [7].

The geostrategic significance of the Svalbard archipelago has increased dramatically with the changing military-political balance in the Arctic. The archipelago, situated approximately 990 km from the main base of Russia's Northern Fleet in Severomorsk, is an important facility for monitoring the transit routes of Russian submarines to the Atlantic. In case of a large-scale conflict between Russia and NATO, control of Svalbard could enable the Alliance to block the passage of Russian strategic submarines through the strait between the archipelago and the northern tip of Norway.

The accession of Finland and Sweden to NATO in 2023–2024 has fundamentally changed the strategic context. Seven of the eight Arctic states are now members of the North Atlantic Alliance, creating a situation of virtually complete encirclement for Russia in the northern latitudes. The large-scale NATO exercises, including Nordic Response 2024 [8], involving 20,000 military personnel, demonstrate the Alliance's growing focus on the Arctic theatre of operations.

China also views Svalbard through the prism of its strategic interests in the Arctic. The deployment of three Chinese icebreakers to Arctic waters in 2024, including the flagship *Xue Long 2* [9], testifies to Beijing's growing ambitions in the region. China's presence on the archipelago through the Huanghe research station in Ny-Ålesund and plans to expand scientific activities are causing concern for both Norway and its NATO allies.

Along with geopolitical and military-strategic factors, climate change in the Arctic is playing a significant role in the transformation of the situation around Svalbard, creating new economic opportunities while simultaneously intensifying geopolitical competition. The Svalbard archipelago, where average annual temperatures are rising several times faster than the global average, is becoming more accessible to various types of economic activity. This situation opens new prospects for mineral extraction, tourism, and shipping, creating the ground for international disputes over resource rights.

In 2024, Norway opened up sections of the continental shelf to industrial seabed mining (Grinyaev, 2025), approximately a third of which overlaps with the area around Svalbard. This decision was criticized by the EU and environmental organizations, and created new legal precedents

[6] Groenning R. The Norwegian Svalbard Policy — Respected or Contested? 22.11.2017. URL: https://www.thearcticinstitute.org/norwegian-svalbard-policy-respected-contested/ (accessed 19 October 2025).
[7] Ibid.
[8] Nordic Response 2024. Norwegian Armed Forces. 20.12.2024. URL: https://www.forsvaret.no/en/exercises-and-operations/exercises/nr24 (accessed 19 October 2025).
[9] MV Xue Long 2. URL: https://alphapedia.ru/w/MV_Xue_Long_2 (accessed 19 October 2025).

that could influence the interpretation of the Svalbard Treaty[10]. Russia expressed concern that Norway's unilateral actions violate the principle of equal access enshrined in the Treaty.

The tourism industry is also becoming a subject of geopolitical competition (Zhuravel, Timoshenko, 2022). Russia, through the company Arktikugol, is developing tourist routes that include "nostalgic tourism" using Soviet symbols. However, the raising of Soviet flags in Barentsburg and Pyramiden in 2024 is not only a tourist attraction, but also a means of demonstrating Russia's presence.

The role of the Svalbard archipelago in the new geopolitical context

The Svalbard archipelago has historically been a symbol of successful international cooperation in the Arctic; however, in the new geopolitical context, it is becoming an arena of intense confrontation. The concept of "Arctic exceptionalism", under which the region remained relatively isolated from global conflicts, was finally shattered following the start of Russia's special military operation in Ukraine (Paukkunen, Black, 2024; Branka, 2022).

The suspension of the Arctic Council's activities in March 2022 marked a turning point in the history of Arctic cooperation (Gricius, Fitz, 2022). The seven Western Arctic states decided to temporarily suspend Russia's participation in the organization's work, which affected 128 scientific and environmental cooperation projects. Although an attempt was made in June 2022 to partially resume activities without Russia's participation, the Council's full functioning remains in question.

In these circumstances, Svalbard takes on particular significance as one of the few remaining formats for Russian-Western cooperation in the Arctic. The 1920 Treaty obliges Norway to ensure equal rights for all contracting parties, creating a legal basis for maintaining Russia's presence even under the pressure of sanctions. However, in practice, Norway is taking an increasing number of measures to restrict Russian activities under the pretext of environmental requirements and security concerns[11].

Thus, despite the explicit prohibition of military fortifications and bases in Article 9 of the Svalbard Treaty, the archipelago is gradually being drawn into the process of the militarization of the Arctic. Norway officially denies accusations of militarization[12], but the regular presence of coast guard and naval vessels on the archipelago raises legitimate questions about compliance with international obligations.

[10] Leading Scientists Urge Moratorium on Deep-Sea Mining: Explore Recycling and Terrestrial Resources First. EASAC. 08.06.2023. URL: https://easac.eu/news/details/deep-sea-mining-press-release (accessed 19 October 2025).
[11] Lokeren F.V. What a militarized Svalbard would mean for Russia. *Naval News*. 17.04.2025. URL: https://www.navalnews.com/naval-news/2025/04/what-a-militarized-svalbard-would-mean-for-russia/ (accessed 19 October 2025).
[12] Norway denies Russian accusation of militarising Svalbard Arctic islands. *Reuters*. 14.03.2025. URL: https://www.reuters.com/world/europe/russia-accuses-norway-militarising-svalbard-arctic-islands-2025-03-14/ (accessed 19 October 2025).

Russia has repeatedly protested against Norway's use of the KSAT satellite station on Platåberget near Longyearbyen for purposes that may have military applications[13]. Russia claims that the data collected by the station could be used by NATO for reconnaissance purposes, which contradicts the archipelago's demilitarized status. Norway denies that the station is used for military purposes, but refuses to provide detailed information on the nature of the data collected.

Particular concern is caused by the possibility of NATO air and missile defense systems being deployed on the archipelago. Svalbard's strategic location makes it an attractive site for radar stations and missile systems that could monitor vast areas of the Barents Sea and the routes of Russian strategic submarines.

Given the limited opportunities for official diplomatic interaction, scientific cooperation on Svalbard is particularly important as a tool of "soft power". Russia is actively developing the concept of an International Arctic Research Center in Pyramiden, which is intended to become an alternative to the Western-oriented scientific community in Ny-Ålesund[14].

The planned scientific center in Pyramiden is focused on cooperation with BRICS+ countries and friendly states, including China, Brazil, India, Turkey, and Thailand. This will enable Russia to establish a parallel system of scientific cooperation in the Arctic, independent of Western institutions. The signing of an agreement between MGIMO (Moscow State Institute of International Relations) and Arktikugol in 2024 demonstrates the seriousness of Russia's plans to develop its scientific presence on the archipelago[15].

China regards its scientific presence on Svalbard as a means of legitimizing its status in the Arctic. The Huanghe station in Ny-Ålesund has been operating since 2004, but in 2024, Chinese representatives visited Russia's Barentsburg for the first time to discuss possible cooperation. This signals Beijing's willingness to diversify its Arctic partnerships amid growing pressure from Western countries.

Steps taken by key players to review the status of the archipelago

In recent years, Norway has significantly intensified its efforts to strengthen its sovereignty over the Svalbard archipelago, seeking to revise the international nature of the 1920 Treaty. The new White Paper on Svalbard, presented in 2024, contains a set of measures aimed at strengthening "national control" over the archipelago. The introduction of controls on personal data and the movement of goods in 2022 was the first practical step in this direction[16].

[13] Jonassen T. Russia Accuses Norway of Increased Military Presence on Svalbard. HNN. 07.10.2022. URL: https://www.highnorthnews.com/en/russia-accuses-norway-increased-military-presence-svalbard (accessed 19 October 2025).

[14] "Pyramiden is the Pearl of Svalbard" Ildar Neverov, CEO of Arktikugol, on international cooperation and tourism development in the Arctic. URL: https://iz.ru/1529650/video/neverov-o-mezhdunarodnom-sotrudnichestve-i-razvitii-turizma-v-arktike (accessed 19 October 2025).

[15] MGIMO and Arktikugol begin cooperation. URL: https://mgimo.ru/about/news/main/arcticugol/ (accessed 19 October 2025).

[16] Norwegian Customs in Svalbard. *Tolletaten*. 25.11.2024. URL: https://www.toll.no/en/corporate/import/norwegian-customs-in-svalbard (accessed 19 October 2025).

The decision to introduce a tourist tax for visitors to Longyearbyen, which will be used to develop infrastructure and public services, is particularly significant[17]. This sets a precedent for a discriminatory approach towards citizens of different countries, which contradicts the principle of equal rights enshrined in the Treaty. Russia has expressed concern that such measures are aimed at creating financial barriers for Russian citizens.

Norway is also reviewing ownership issues relating to the archipelago's critical infrastructure. The decision to transfer responsibility for Longyearbyen's energy supply from the municipal council to the state-owned company "Store Norske" demonstrates the central government's desire to strengthen control over strategic facilities[18]. The allocation of 175 million Norwegian kroner for the energy transition and 42 million Norwegian kroner for strengthening infrastructure demonstrates a willingness to make significant financial investments to achieve this goal[19].

Restrictions on the number of passengers on cruise ships and plans to introduce limits on the total number of vessels in the archipelago's territorial waters also serve to strengthen Norwegian control[20]. Although these measures are officially justified by environmental concerns, they provide additional tools for selectively regulating various countries' access to the archipelago.

The accession of Finland (April 4, 2023) and Sweden (March 7, 2024) to NATO has fundamentally changed the military-strategic situation in the Arctic. All Scandinavian countries are now members of the alliance, creating a unified military-political bloc in the northern latitudes. This undoubtedly increases pressure on Russia and enhances the strategic importance of Svalbard as a potential location for a NATO military presence.

Conducting large-scale NATO military exercises in the Arctic region has become a regular practice (Todorov, 2020). In particular, the Nordic Response 2024 exercise, involving military personnel from Norway, Sweden, and Finland, demonstrated the Alliance's increased military capabilities in the northern latitudes. Although these exercises did not formally involve Svalbard, their proximity to the archipelago sends a clear sign of NATO's intentions.

The signing of a supplementary agreement on defense cooperation between the US and Norway[21] expands the US armed forces' access to Norwegian military infrastructure. Although the Svalbard archipelago is not specifically mentioned in the agreement, the growing US military pres-

[17] Norway's tourist tax: New source of revenue for municipalities. *Nordic Marketing*. 29.11.2024. URL: https://www.nordicmarketing.de/en/blog/norways-tourist-tax-new-source-of-revenue-for-municipalities (accessed 19 October 2025).
[18] Jonassen T., Norway Wants Greater State Ownership of the Energy Supply on Svalbard. *HNN*. 10.05.2024. URL: https://www.highnorthnews.com/en/norway-wants-greater-state-ownership-energy-supply-svalbard (accessed 19 October 2025).
[19] Ibid.
[20] Hager J. New Svalbard report: Stronger national control by Norway and fewer ships. *Polar Journal*. 06.06.2024. URL: https://polarjournal.net/new-svalbard-report-stronger-national-control-by-norway-and-fewer-ships/ (accessed 19 October 2025).
[21] U.S.-Norway Supplementary Defense Cooperation Agreement (SDCA). The U.S. Department of State. 20.01.2025. URL: https://www.state.gov/u-s-norway-supplementary-defense-cooperation-agreement-sdca/ (accessed 19 October 2025).

ence in northern Norway creates the preconditions for a potential expansion of the use of the archipelago's resources for military purposes.

The development of space surveillance and communication systems on the archipelago also raises concerns about compliance with the demilitarized status. The modernization of the KSAT satellite station and plans to develop communications infrastructure could serve both civilian and military purposes (Grinyaev, 2024). The lack of transparency regarding the use of the collected data creates grounds for Russian suspicions of a violation of Article 9 of the Svalbard Treaty.

The new aerial monitoring station in the Ny-Ålesund area of Svalbard, which began operating on October 1, 2025, under the management of the Norwegian Radiation and Nuclear Safety Authority, is a technically advanced instrument for detecting artificial isotopes. Such unilateral actions to strengthen monitoring should undoubtedly be interpreted as a violation of the principle of equal rights enshrined in the Svalbard Treaty, given that the monitoring data is being used for NATO's military and strategic purposes[22].

The positions of other Arctic states on the status of Svalbard are largely determined by their relations with Russia and the degree of their integration into Western security institutions. Thus, Iceland, despite its NATO membership, has traditionally pursued a more balanced Arctic policy, seeking to maintain dialogue with all Arctic states. Reykjavík continues to support the concept of peaceful cooperation in the Arctic through the Arctic Circle, a forum serving as an alternative to the suspended Arctic Council.

Denmark, which exercises sovereignty over Greenland, is under increasing pressure from the United States to expand its military presence in the Arctic regions. President Trump's statements regarding the US's intentions to gain control over Greenland are creating further tension in Arctic relations and may influence approaches to the interpretation of international law in the region, including the Svalbard Treaty.

Canada, which has traditionally supported the principles of multilateral cooperation in the Arctic, is now forced to balance its alliance obligations to the United States with its desire to maintain its role as a significant player in the region's geopolitical processes.

Norway's actions to limit international presence on the archipelago

Norway systematically uses administrative and legal mechanisms to restrict the activities of other states on the Svalbard archipelago. The introduction of stricter environmental regulations has become the main means of exerting pressure on Russian enterprises. Arktikugol has repeatedly faced new regulatory requirements that significantly increase the costs of conducting business.

The introduction of controls on personal data and the movement of goods in 2022 created additional barriers for Russian citizens and enterprises. Although these measures are officially justified by national security concerns, in practice they create selective barriers for certain categories

[22] Norway opens world's northernmost permanent radiation monitoring. *Arctic Today*. 27.09.2025. URL: https://www.arctictoday.com/norway-opens-worlds-northernmost-permanent-radiation-monitoring/ (accessed 19 October 2025).

of visitors. Russia regards these actions as an attempt by Norway to circumvent its obligations under international law to ensure equal access to the archipelago.

The refusal to grant permission for direct charter flights for Russian tourists from Moscow or Murmansk demonstrates the use of transport restrictions as a means of exerting pressure. The Norwegian authorities have permitted only one business flight for Arktikugol employees, rejecting plans to develop tourist transportation[23]. This decision contradicts the principle of free access enshrined in the Svalbard Treaty.

The introduction of a tourist tax for visitors to Longyearbyen sets a precedent of financial discrimination, which could be used to selectively regulate tourist flows. The revenue from these taxes is planned to be used for infrastructure development, meaning that foreign visitors will finance the strengthening of Norwegian control over the archipelago.

Furthermore, Norway actively uses environmental arguments to justify restrictions on the activities of other states in the archipelago. The creation of new protected natural areas and the tightening of rules regarding visits to these zones disproportionately affect Russian interests, as the main sites of the Russian presence — Barentsburg and Pyramiden — are located in areas of increased environmental sensitivity.

Restrictions on the use of helicopters are particularly pressing for Russian operations. The company Arktikugol has traditionally used helicopters to transport personnel and cargo between Russian settlements, but new environmental requirements prohibit such flights outside narrowly defined zones. This creates serious logistical problems and increases operating costs for Russian companies.

The prohibition on the use of heavy fuel oil by vessels in Svalbard's territorial waters, although dictated by objective environmental considerations, imposes additional costs on Russian logistics. The need to use more expensive diesel fuel increases the cost of delivering cargo to Russian settlements.

Restrictions on the number of passengers on cruise ships and plans to limit the total number of vessels in territorial waters also affect Russian interests in the tourism sector. As Russian tour operators are just beginning to develop maritime routes to Svalbard, such restrictions could block promising development opportunities.

It is also worth noting that Norway is conducting an active information campaign aimed at creating a negative image of Russia's presence on the archipelago. Norwegian media regularly publish reports about the "Russian threat" and "violations" of the Svalbard Treaty, shaping public opinion to strengthen restrictive measures. Particular attention is paid to criticism of Russian symbolic actions, such as raising Soviet flags or holding a Victory Day parade in Barentsburg.

[23] Wiersen S.Å. Får fly fra Russland til Norge. *Ddagbladet.* 12.09.2023. URL: https://www.dagbladet.no/nyheter/far-fly-fra-russland-til-norge/80187785 (accessed 19 October 2025).

The emphasis on the "Putinization" of the Russian presence and the intensification of "authoritarian tendencies" in Russian settlements serves as a justification for further strengthening Norwegian control over the archipelago.

Criticism of Russia's plans to establish an international research center in Pyramiden is also systemic. Norwegian officials and experts question the scientific nature of this project, claiming that it may serve geopolitical aims[24,25]. This creates a pretext for imposing additional restrictions on Russian research activities.

Russia's actions to strengthen its position on Svalbard

The Russian Federation is pursuing a policy of diversifying its presence on the Svalbard archipelago, seeking to reduce its dependence on coal mining and create a sustainable basis for a long-term presence. In 2024, the state-owned company Arktikugol completed a large-scale modernization of port infrastructure in Barentsburg[26], increasing the berth depth to 13 meters and creating the capacity to service several vessels simultaneously.

The development of the tourism sector is becoming one of the key areas of diversification. The Russian side is actively promoting the concept of "nostalgic tourism", based on the archipelago's Soviet heritage (Valkova, Shumkov, 2022). The restorations of Soviet symbols, including the slogan "Peace to the World!" over Barentsburg and Pyramiden, as well as the raising of Soviet flags, serve not only as a tourist attraction, but also as a way to demonstrate Russia's historical rights to a presence on the archipelago.

Particular attention is being paid to developing cruise tourism with direct routes from Russian ports. Although Norwegian authorities have rejected applications for regular tourist cruises from Russia, Arktikugol continues to work on creating alternative routes. The first direct voyage of the vessel "Professor Molchanov" from Murmansk to Barentsburg in 2025 was a symbolic breakthrough in overcoming transport restrictions[27].

The modernization of the coal-fired power plant in Barentsburg[28] to improve its environmental performance demonstrates Russia's willingness to meet contemporary environmental requirements. The purchase of the first electric vehicle for use in Barentsburg and plans to expand the use of environmentally friendly transport show an adaptation to Norwegian environmental standards.

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[24] Solberg K. Vil etablere forskningssenter i «spøkelsesby». *Dagbladet*. 05.02.2024. URL: https://www.dagbladet.no/nyheter/vil-etablere-forskningssenter-i-spokelsesby/81335828 (accessed 19 October 2025).

[25] Pyramiden — et viktig russisk fotfeste i norsk Arktis. *Dagsavisen*. 02.10.2022. URL: https://www.dagsavisen.no/nyheter/pyramiden-et-viktig-russisk-fotfeste-i-norsk-arktis/5702348 (accessed 19 October 2025).

[26] Arktikugol modernized port infrastructure on Svalbard. URL: https://tass.ru/ekonomika/19462519 (accessed 19 October 2025).

[27] The first visa-free flight carrying tourists departed from Murmansk to Svalbard. Ministry of Information Policy of the Murmansk Oblast. URL: https://mininform.gov-murman.ru/info/news/547782/ (accessed 19 October 2025).

[28] Arktikugol modernized port infrastructure on Svalbard. URL: https://tass.ru/ekonomika/19462519 (accessed 19 October 2025).

The establishment of the International Arctic Research Center in Pyramiden is an ambitious project aimed at strengthening Russia's position in Arctic research. The project has received the support of Alexey Chekunkov[29], Minister of the Russian Federation for the Development of the Far East and Arctic, which demonstrates the government's prioritization of this initiative. The center is expected to attract researchers from BRICS+ countries, including China, Brazil, India, Turkey, and Thailand.

The agreement between MGIMO and Arktikugol will attract leading scientists to work on the archipelago and create sustainable educational programs at several Russian educational institutions (Northern (Arctic) Federal University named after M.V. Lomonosov, Murmansk Arctic University, and others). The thematic focus of the center covers a wide range of research areas, including climatology, biology, geology, geophysics, space research, meteorology, ecology and historical and cultural studies. This interdisciplinary approach will maximize the Arctic region's unique potential for scientific research. As part of the Agreement of Mutual Understanding and Cooperation signed between MGIMO and the Arktikugol trust, a public lecture was given by the trust's General Director, I.A. Neverov, entitled "The Svalbard Archipelago: Contemporary Challenges", in March 2024. To address practical and organizational issues, the Arctic and Antarctic Research Institute of Roshydromet has established a special unit — the Russian Scientific Arctic Expedition to the Svalbard Archipelago.

Cooperation with Chinese research institutes is particularly important given the limited contacts with Western scientific centers. The visit of a Chinese delegation to Barentsburg in 2024[30] and the agreements reached on joint Arctic projects create an alternative system of scientific cooperation. Planned consultations between Russian and Chinese scientific organizations were scheduled to begin in the autumn of 2025.

Russia actively uses symbolic politics to demonstrate its historical rights and cultural ties to the archipelago. The Victory Day parade in Barentsburg on May 9, 2023[31], featuring 50 vehicles, snowmobiles, and a low-flying helicopter, was a striking demonstration of Russia's presence. Although the Governor of Svalbard was invited to the event, his refusal to participate highlighted political disagreements.

The restoration and renewal of Soviet symbols in Russian settlements serves several purposes. The restoration of the slogan "Peace to the World!" in large white letters in Pyramiden and in red letters in Barentsburg creates visual markers of Russia's presence, visible from a great dis-

[29] Shchetinina A. Svalbard is no longer a coal miner, but a future center of tourism, film production, ship repair, and scientific cooperation. URL: https://goarctic.ru (accessed 19 October 2025).
[30] A delegation of scientists from China will visit the Russian Scientific Center on Svalbard. URL: https://www.aari.ru/press-center/news/novosti-aari/delegatsiya-uchenykh-iz-kitaya-posetit-rossiyskiy-nauchnyy-tsentr-na-shpitsbergene (accessed 19 October 2025).
[31] The world's northernmost Victory Day parade took place in Svalbard. URL: https://ria.ru/20230509/parad-1870638708.html (accessed 19 October 2025).

tance. The raising of Soviet flags on a coal crane in Barentsburg and at the top of Pyramiden in 2024 was a symbolic act of affirmation of Russia's position[32].

The installation of a large Orthodox cross in Pyramiden demonstrated Russia's willingness to defend its cultural and religious rights. Although the cross was subsequently moved following the governor's intervention[33], the fact of its installation sent a clear signal about Russia's intentions.

The development of a Russian-language cultural space in Russian settlements includes support for the Russian school in Barentsburg, organization of cultural events, and preservation of the Russian language as the primary means of communication. This creates a stable cultural foundation for Russia's presence and attracts Russian-speaking tourists.

Russia is actively using diplomatic channels to defend its rights over the archipelago and to oppose Norway's restrictive measures. The Russian Ministry of Foreign Affairs has repeatedly protested Norway's actions, which are considered violations of the Svalbard Treaty. Accusations against Norway of militarizing the archipelago and violating its demilitarized status have become a regular element of Russia's diplomatic strategy[34].

Moscow's proposals to hold consultations on the interpretation of the provisions of the Svalbard Treaty with the participation of all contracting parties are aimed at creating a multilateral dispute resolution mechanism. Russia insists on the need to take into account current international legal realities while maintaining the fundamental principles of equal access and non-discrimination.

The work of the Russian Consulate General in Barentsburg is particularly important given the limited diplomatic contacts with Norway. Today, the Russian consul in Barentsburg not only performs traditional consular functions, but also plays an important role in coordinating Russian policy on the archipelago.

Conclusion

On the centenary of the entry into force of the Svalbard Treaty, the archipelago has transformed from a symbol of peaceful international cooperation into an arena of intense geopolitical confrontation. Fundamental changes in the international system, associated with the end of the era of "Arctic exceptionalism" and the beginning of a new period of great-power rivalry in the Arctic, require a re-evaluation of the archipelago's role and status in contemporary international relations.

[32] Vene riigifirma heiskas Teravmägedele Nõukogude Liidu lipu. *Ppostimees*. 02.07.2024. URL: https://maailm.postimees.ee/8051686/vene-riigifirma-heiskas-teravmagedele-noukogude-liidu-lipu (accessed 19 October 2025).

[33] Arktikugol announced negotiations to move the cross on Svalbard. URL: https://www.rbc.ru/rbcfreenews/65321ee79a7947ffddb9f043 (accessed 19 October 2025).

[34] The Russian Foreign Ministry expressed concern about the growing militarization of Svalbard. URL: https://ria.ru/20250314/mid-2004989177.html (accessed 19 October 2025).

An analysis of the actions of key players reveals a qualitatively new level of geopolitical competition on Svalbard. Norway is pursuing a consistent policy of strengthening national control, using administrative, legal, environmental, and information tools to limit international presence. NATO's expansion through the accession of Finland and Sweden has created new opportunities for the potential militarization of the archipelago, despite the formal prohibitions of the Svalbard Treaty.

The Russian Federation is adapting its strategy to the changed conditions, emphasizing the diversification of its presence and the development of alternative formats for international cooperation. The establishment of an international scientific center in Pyramiden and cooperation with BRICS+ countries demonstrates Russia's ability to find new partners in the face of Western restrictions. Symbolic politics and cultural diplomacy now serve as tools for asserting Russia's historical rights and maintaining a visible presence.

In these circumstances, China is becoming an important player in Arctic geopolitics, using its scientific presence on Svalbard to advance its strategic interests in the region. The intensification of Sino-Russian cooperation in Arctic research is creating an alternative system of international relations, independent of Western institutions.

Meanwhile, legal disputes surrounding the interpretation of the Svalbard Treaty, particularly regarding the application of its provisions to maritime space, remain unresolved and may become more acute with the start of industrial seabed mining. The lack of an international dispute resolution mechanism creates the preconditions for further escalation of these contradictions.

For the Russian Federation, maintaining its position on the Svalbard archipelago is critical in terms of national security and protecting its interests in the Arctic region. The archipelago's strategic location makes it an important element in the system of controlling Arctic maritime routes and ensuring the Northern Fleet's freedom of action. Against a backdrop of increasing pressure from NATO, Russia's presence on Svalbard takes on an additional military-strategic dimension.

The need to respond appropriately to the challenges associated with the revision of the archipelago's status requires Russia to develop a comprehensive long-term strategy. This strategy should include strengthening its legal position through international mechanisms, developing its economic presence by diversifying its activities, expanding scientific cooperation with friendly countries, and maintaining a symbolic presence to demonstrate its historical rights.

The prospects for resolving the disputes surrounding Svalbard depend largely on the overall state of Russian-Western relations and the willingness of the parties to return to the principles of international law and peaceful cooperation. In the context of ongoing geopolitical confrontation, the archipelago is likely to remain an arena of competition, requiring Russia to be prepared for a prolonged period of tension and the need to defend its legitimate interests by all available means.

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200 Years of Guarding the Neighborship. The Russian-Norwegian Border: From Frontier to National Boundary

Konstantin S. Zaikov [1]✉, Dr. Sci. (Hist.), Associate Professor
Alexey A. Komarov [2], Cand. Sci. (Hist.), Leading Researcher

[1] Northern (Arctic) Federal University named after M.V. Lomonosov, Naberezhnaya Severnoy Dviny, 17, Arkhangelsk, Russia
[2] Institute of World History of the Russian Academy of Sciences, Leninskiy pr., 32A, Moscow, Russia
[1] k.zaikov@narfu.ru ✉, ORCID: https://orcid.org/0000-0001-6479-416X
[2] alexeykomarov@yandex.ru, ORCID: https://orcid.org/0000-0001-5247-5866

Abstract. This work, based on archival materials from Russia, Norway and Sweden, as well as a historiographical analysis, reconstructs the evolution of the Russian-Norwegian border from the medieval "common districts" with their dual taxation and frontier status, through the border delimitation negotiations of 1825–1826, when Lieutenant-Colonel Galyamin and Colonel Spørck established a boundary that survived the collapse of empires, the territorial changes introduced by the 1920 Treaty of Tartu, and its restoration in 1947 on the basis of the same legal documents of 1826 and 1896. Particular attention is paid to the asymmetry of perception: the border, which was advantageous to Sweden and Norway, fostered fear amongst the Norwegian elite of a Russian revision, while in Russia, particularly in the Arkhangelsk Governorate, it was perceived as a territorial loss, giving rise to a persistent myth about Galyamin's betrayal. It is demonstrated that the stability of the border was determined not so much by geography or military strength as by the ability of the parties — even during periods of ideological confrontation — to restrain the conflict within institutional frameworks and resist the temptation of territorial revisionism. This study offers a renewed perspective on the history of bilateral relations, identifies the domestic and foreign policy interests underlying particular perceptions of Russia and Norway, and highlights insights for the contemporary geopolitical situation, in which two centuries of neighborly experience may serve not as a source of dispute, but as a resource for mutual understanding.
Keywords: *Far North, Russian-Norwegian border, frontier, asymmetric neighborhood, Treaty of 1826, "Russian threat", Saami, 1947 border delimitation*

Introduction

The Russian-Norwegian border represents a unique phenomenon within the system of international relations in Europe. As the oldest border of modern Russia with neighboring countries in the European North[1], it has demonstrated remarkable resilience over two centuries, having survived the collapse of empires, two world wars, radical political transformations, and even the temporary loss of its demarcation line in 1920. However, this resilience is not the result

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[1] Johanson Bodil B. OVERENSKOMSTEN mellom den Kongelige Norske Regjering og Regjeringen for Samveldet av Sovjetiske Sosialistiske Republikker om forskjellige forhold ved den norsk-sovjetiske grense og om fremgangsmåten ved ordningen av konflikter og hendinger på grensen. 50 år 1949–1999. Kirkenes: Norges Grensekommissariat, 1999. 70 s.

of geographical inevitability or military parity. It is, rather, the consequence of a complex interweaving of asymmetrical perceptions, institutional compromises and mutual fears, which, paradoxically, created the conditions for long-term stability even during periods of acute confrontation.

A distinctive feature of the Russian-Norwegian neighborhood in the High North was that these countries differed not merely in territorial size but fundamentally in their internal development dynamics and their attitudes toward the border as a political institution (Zaikov, Kuprikov, Kuprikov, 2020; Zaikov, 2019). On one side was a vast, multi-ethnic empire, for which open border zones were an asset rather than a liability (Johnsen, 1923; Nielsen, 2014). On the other side was a small state that was steadily moving towards the construction of a nation-state and, consequently, striving for hermetic, clearly defined frontiers (Niemi, 2005; Kristiansen, 2010). This structural asymmetry, as our research will show, shaped not only the course of the border demarcation negotiations in the 1820s, but also all subsequent perceptions of the neighbor — both in Norway and in Russia (Palmstierna, 1932; Roginsky, 2005).

The focus of our attention is the demarcation process itself — not as a technical act of drawing a line on a map, but as a complex political and diplomatic construct in which the interests of central authorities, regional elites, and local communities were intertwined (Goldin, Zaikov, Tamitskiy, 2015; Ishizuka, 2005). In our view, this interweaving provides the key to understanding the phenomenon of the 1826 border: it was established not so much on the principle of “natural boundaries” or ethnic lines, but rather as the result of a series of compromises between the imperial logic of open frontiers and the national drive for certainty (Andresen, 1989; Wikan, 1995). This compromise, albeit imperfect and perceived differently by both sides, proved to be unexpectedly resilient.

Returning to this topic today, on the eve of the 200th anniversary of the 1826 treaty, takes on special significance. The current geopolitical landscape, marked by the resurgence of “Russian threat” rhetoric in Northern Europe (Åselius, 1994; Neumann, 2004), the accession of Sweden and Finland to NATO, and the gradual scaling back of cross-border cooperation, creates a need to rethink the historical experience of neighborly relations. The situation is paradoxical: the institutional border remains unchanged (a unique case in modern Europe), but “images of the neighbor” — very “flexible boundaries” of perception — are undergoing rapid transformation, reverting to stereotypes and fears that seemed to have been overcome in the 1990s. In this context, the historical experience of the Russian-Norwegian borderlands, encompassing both periods of acute mistrust and the mechanisms for containing it, assumes not only academic but also practical political significance.

In the historiography of this issue, represented by the works of O.A. Johnsen (Johnsen, 1923), K.F. Palmstierna (Palmstierna, 1932), A. Andresen (Andresen, 1989), M. Lähteenmäki (Lähteenmäki, 2006), J.P. Nielsen (Nielsen, 2014), G. Åselius (Åselius, 1994), as well as Russian researchers such as V.V. Pokhlebkin (Pokhlebkin, 1995), R.A. Davydov (Davydov, 2009; Popov,

Davydov, 1999), B.V. Kristoman (Kristoman, 2003), V.V. Efimova (Efimova, 2010), specific aspects of border demarcation, diplomatic history and the adaptation of the indigenous population to the new border has been examined. However, the existing historiography, unfortunately, lacks studies that comprehensively reconstruct the Russian-Norwegian border region in the context of an asymmetrical neighborhood throughout its entire history, from the frontier era to the present day[2]. This article is intended to fill this gap by proposing a reconstruction of the key stages and mechanisms of the transformation of the image of the border and the neighbor.

The aim of this article is to re-examine the evolution of the Russian-Norwegian border as a political and socio-cultural construct in the context of its bicentennial, demonstrating that its stability was ensured not so much by geography or force as by the parties' ability to contain conflict within institutional frameworks and resist the temptation to revise the border even during periods of acute confrontation.

The chronological scope of the study spans the period from medieval treaties to the mid-20th century, with a retrospective look at the contemporary significance of historical experience, since the 1826 border, remaining not only a geographical fact but also a symbolic resource today, is capable of both dividing and, provided that historical grievances are not politicized, serving as a basis for mutual understanding.

Materials and methods

This article is based on a set of historical documents from the archives of Russia, Norway and Sweden, as well as a historiographical analysis of works by Russian and Scandinavian scholars. In order to examine the evolution of the Russian-Norwegian border from a frontier to a national boundary and the subsequent re-establishment of the border in the mid-20th century, the study utilized collections from the State Archive of the Arkhangelsk Oblast (SAAO), the Archive of the Foreign Policy of the Russian Empire (AFPRE), the Russian State Historical Archive (RSHA), the Russian State Military Historical Archive (RSMHA), the State Archive of the Russian Federation (SARF), and the Archive of the Foreign Policy of the Russian Federation (AFPRF), as well as the National Archives of Norway (Riksarkivet) in Oslo and the Hoover Institution Archives (USA)[3]. Published collections of documents were used extensively[4], as were the memoirs of Norwegian diplomats, in particular those of Rolf Andvord (Andvord, 1964).

Periodicals proved to be an important group of sources, as the press is of particular interest for studying the formation and development of myths regarding the "Russian" and "Norwegian" threats within an ideological framework. The study used materials from Russian newspapers, such

[2] For a detailed analysis of the historiography, see (Zaikov, Tamitskiy, 2016; Goldin, Zaikov, Tamitskiy, 2015a).
[3] List of archives: SAAO (F. 1, F. 4, F. 1367), AFPRE (F. 1, F. 53, F. 133, F. 155), RSHA (F. 1286, F. 560), RSMHA (F. 38, F. 442), SARF (F. 48, F. 109), AFPRF (F. 06, F. 0116), National Archives of Norway (RA/UD, RA/PA, the Prebensen collections), Hoover Institution Archives (HIA, "Russia. Missiia").
[4] Collections of documents: Chubaryan A.O. ed. Soviet–Norwegian Relations 1917–1955. Moscow; 1997. 683 p.; The Foreign Policy of the Soviet Union during the Great Patriotic War. Vol. 2. Moscow; 1946. 688 p.; Pokhlebkin V.V., ed. Russia's Recognition of the Independent State of Norway. Moscow; 1958. 106 p.

as “Arkhangelskie Gubernskie Vedomosti”, “Moskovskie Vedomosti”, “Izvestia”, “Pravda”, and “Novoe Vremya”, as well as Norwegian and Swedish publications, including “Aftenposten”, “Svenska Dagbladet”, “Verdens Gang”, and “Tidens Tegn”. This approach made it possible to reconstruct not only the official positions of the authorities but also the public perceptions of the eastern neighbor.

The reconstruction of the 1826 delimitation of the Russian-Norwegian border — a pivotal event around which the article’s narrative is structured — was based on a wide range of sources from the collections of the SAAO (F. 4, F. 1367), the AFPRE (F. 1 “Administrative Files”, F. 53, F. 133), and the RSMHA (F. 38, F. 442), as well as Norwegian collections, such as the papers of Nikolay Gruve Prebensen and the archives of the Norwegian Ministry of Foreign Affairs. The reports by Commissioners Galyamin and Spørck are of particular value, containing not only topographical data but also statistical descriptions of the population of the general districts, including information on the number of families and religious affiliation, as well as minutes of negotiations recording the course of the discussion and the arguments put forward by the parties[5]. These documents, which enable us to reconstruct the local knowledge of the Sámi and the perception of the region by regional officials, are supplemented by diplomatic correspondence between St. Petersburg and Stockholm, reflecting the asymmetry in the understanding of the border issue at the level of central authorities.

In order to study the later period relating to the loss and restoration of the border, materials from the AFPRF archives were used (F. 06 — the Molotov collection, and F. 0116 — the Norway Referentura funds), which contain correspondence on border demarcation issues from 1944 to 1947, including notes by A.N. Abramov, head of the 5th European Department of the People’s Commissariat for Foreign Affairs, diary entries by Soviet diplomats and political reports from the Soviet Embassy in Norway[6]. These materials reveal how, amidst the onset of the Cold War and Norway’s accession to NATO, the decision to restore the “old” border took on not only technical but also symbolic significance.

The scope of this research extends beyond the boundaries of historical science as such; therefore, methodologies from related disciplines — political anthropology, the sociology of international relations, cultural geography — were taken into account. This approach made it possible to view the border not as a static line on a map, but as a dynamic political and socio-cultural construct in which the interests of states and local communities are intertwined, and the image of the neighbor is not merely a reflection of reality, but rather a projection of one’s own fears and ambitions. In our view, this perspective allows for the most comprehensive reconstruction of the history of the Russian-Norwegian border region and offers lessons for the contemporary geopolitical situation, in which two hundred years of experience as neighbors can

[5] For further details on the work of the commissioners: RSMHA. F. 442. Invt. 1. Arch. 26; AFPRE. F. 1: Administrative files II-6. Arch. 75, part 1; RA, UD3C/18, pk. 5213 (Prebensen Archive).
[6] AFPRF. F. 06. Invt. 27. Sh. 127. Arch. 6; AFPRF. F. 0116. Invt. 27. Sh. 127. Arch. 5; AFPRF. F. 0116. Invt. 39. Sh. 156. Arch. 10.

become not a point of contention, but a resource for mutual understanding, provided that the parties are able to separate facts from speculation and reality from expectations.

Discussion

The majority of studies related to the subject of this publication focus on specific aspects of the history of Russian-Norwegian relations. A collective monograph edited by Professor J.P. Nielsen, published in 2014, is dedicated to the history of the asymmetric neighborly relationship between Russia and Sweden-Norway; this work served, in part, as the methodological foundation for the present article (Nielsen, 2014). Covering the period from 1814 to 1917, this fundamental study represented the first attempt to describe the history of the rapprochement between Russia and Norway as an interconnected process; however, the emphasis was placed primarily on diplomatic and economic history, while the issue of perceptions of the neighbor and the transformation of images remained on the periphery of scholarly attention.

Works by O.A. Johnsen, A. Podvysotskiy[7], and N. Golubtsov are devoted to specific aspects of the history of the Russian-Swedish-Norwegian border region and its political dimensions (Johnsen, 1923; Golubtsov, 1910). O.A. Johnsen's work "Finmarkens politiske historie" (1923) remains the most important source on the early history of the border region; however, it is written in the tradition of conventional political history and does not take into account contemporary approaches to the study of borders as socio-cultural constructs. Publications by Russian authors of the late 19th and early 20th centuries, such as A. Podvysotskiy and N. Golubtsov, are valuable as sources reflecting the public sentiment of the time, but suffer from an excessive journalistic style and a lack of objectivity. This is particularly evident in their assessment of the role played by Lieutenant Colonel Galyamin, who, in the Russian historiographical tradition, was regarded as the primary target of blame for the territorial concessions of 1826 (Nikolskiy, 1914; Nielsen, 2014).

Among Norwegian authors examining the perception of Russia and Russian-Norwegian relations in the High North, E. Niemi and T. Christiansen stand out; their works are devoted, respectively, to the ethnic history of Finnmark and the early stage of Russian-Norwegian contacts prior to 1820 (Niemi, 1983; Christiansen, 2010). E. Niemi, in particular, convincingly demonstrated that the roots of the "Russian threat" idea date back to the 1810s and 1820s and are linked to the expansion of the Pomors' economic activities in northern Norway, rather than solely to Swedish or British influence, thereby challenging the historiographical thesis that this myth originated from foreign sources (Niemi, 1992).

In Russian historiography, the issue of Russia's image in Norway and Sweden has long remained on the periphery of scholarly attention. Certain aspects of this topic were touched upon in the works of R.A. Davydov and O.V. Chernysheva; however, these studies are generally either fragmentary or journalistic in nature (Davydov, 2009; Chernysheva, 2003). An exception is V.V. Pokhlebkin's work "Russia's Recognition of the Independent State of Norway" (1958), which, being

[7] Podvysotskiy A. The Russian-Norwegian Borderlands. *Arkhangelskie Gubernskie Vedomosti*. 1877; 96: 6–7.

a collection of documents, contains valuable information on Russian-Norwegian relations in 1905 and allows us to trace how the "image of a threat" was utilized in diplomatic struggles on the eve of the dissolution of the union between Sweden and Norway[8]. The studies by A.I. Rupasov and A.N. Chistikov on the history of the Soviet-Finnish border also represent an important contribution to historiography; these works examine, among other things, the northern section of the border, thereby contributing to understanding of the context surrounding the loss and restoration of the 1826 border line during the 1920s–1940s (Rupasov, Chistikov, 2016).

Contemporary Russian historiography, by the works of V.I. Goldin, K.S. Zaikov and A.M. Tamitskiy, addresses issues concerning the Russian-Norwegian border region in the context of an asymmetrical neighborly relationship and the role of the Sámi people as a "third force" between an empire and a nation-state (Goldin, Zaikov, Tamitskiy, 2015a; Goldin, Zaikov, Tamitskiy, 2015b; Zaikov, Tamitskiy, 2016). Although these studies focus on specific aspects, such as the role of maps in the construction of borders, the Finnish factor in the history of the Northern Frontier, they consistently advance the idea that understanding the border as a socio-cultural construct is a prerequisite for an adequate reconstruction of the history of bilateral relations.

It should be noted that the existing historiography on this subject, unfortunately, lacks studies that comprehensively reconstruct Russian-Norwegian relations in the Far North within the context of the asymmetrical neighborly relationship between an empire and a small nation throughout the entire period, from the frontier to the re-establishment of the border in 1947. Most studies are either limited to the chronological framework of the 19th century, focus exclusively on diplomatic history, or examine individual aspects in isolation from the overall dynamics of perceptions of the neighbor. This article aims to fill this gap by offering a reconstruction of the key stages and mechanisms of the transformation of the image of the border and the neighbor — from the medieval "common districts" to the re-establishment of the 1826 line in 1947 and its symbolic significance for the present day.

Results

"Common districts": frontier logic and dual taxation

The history of the Russian-Norwegian borderlands prior to 1826 offers a unique example of the coexistence of three distinct paradigms of spatial imagination within the same physical territory. In terms of our conceptual framework, this was a period dominated by "flexible borders" — imagined boundaries that existed in the minds of the actors but were not institutionally enshrined. The absence of a "fixed border" did not imply an absence of territoriality; it was organized according to different, pre-state principles, where fiscal jurisdiction took precedence over political sovereignty.

The Eastern Sámi (Skolts), with their semi-nomadic way of life based on seasonal migrations between summer pastures and winter grazing grounds, did not recognize state borders. Their

[8] Pokhlebkin V.V. ed. Russia's Recognition of the Independent Norwegian State (Collection of Documents). Moscow: Sotsekgiz, 1958. 106 p.

spatial imagination was defined by the boundaries of the hereditary lands of the pogosts, which, as Commissioners Galyamin and Spørck demonstrated in 1825, were well known to the local population, but had never been recorded on maps as inter-state boundaries. For the Skolts, who had adopted Orthodoxy in the 17th century, this territory was continuous and functional: it was divided into areas that were used, depending on the season, for fishing, hunting, and grazing reindeer and sheep[9]. This archaic paradigm of territoriality did not recognize "fixed" political boundaries — only "flexible" boundaries of collective ownership.

The Russian Empire, the presence of which in the Far North was secured by the loyalty of the Sámi communities possessing broad autonomy, was more interested in preserving the Skolts' extraterritorial economic practices than in establishing a clearly defined border. This was a classic example of imperial tolerance towards "flexible borders": for a vast multi-ethnic empire, open border zones were an advantage rather than a problem, and it continued to think in terms of a frontier. As an analysis of the correspondence between Arkhangelsk Governor-General S.I. Minitskiy and the central authorities revealed, the Russian regional administration considered all three pogosts — Nyavdemskiy, Pazretskiy, and Pechengskiy — to be an indisputable part of the Russian Empire, despite the lack of documentary evidence for this status. In 1823, Governor Minitskiy reported to St. Petersburg that there was no need for demarcation, as there were strong grounds to believe that the entire so-called "common district" actually belonged to Russia[10]. He presented four sets of arguments to the Ministry of Foreign Affairs: cartographic evidence (old 18th-century French maps depicting the territory as part of Russia), the Charter granted by Ivan the Terrible to the St. Tryphon Monastery, evidence of ecclesiastical jurisdiction (the Church of Sts. Boris and Gleb on the Paz River, Orthodox chapels in the Nyavdemskiy pogost and the Peschany settlement), and the testimony of the Skolts themselves, who asserted that the border ran along the western edge of the Nyavdemskiy pogost[11]. As it turned out later, the Skolts were referring to a customs boundary, rather than a state border, established in 1784–1785 by the Kola ispravnik (chief official of the district) Shestakov and the land surveyor Kiselev; however, no cartographic records of this demarcation have survived (Palmstierna, 1932). This episode illustrates how the "flexible border" of local perception (a customs line) was mistakenly interpreted as a "fixed" state border.

The Norwegian side, by contrast, had been striving for a clear demarcation since the 18th century — a transformation of "flexible boundaries" into "fixed borders". The absence of "fixed borders" created the conditions for future conflict, as the emerging Norwegian nation-state began to demand certainty. In 1775, the local official T. Fjellstedt warned the Danish Chancellor in Copenhagen that Finnmark could easily be taken over by Russia, and described the situation as "a matter of the utmost importance currently of concern to the government, since it has already

[9] For information on the Orthodox Skolts and their way of life, see: SAAO. F. 1. Invt. 1. Vol. 8. Arch. 44; SAAO. F. 4. Invt. 1. Arch. 147. Sh. 17-18.
[10] SAAO. F. 4. Invt. 4. Arch. 3; SAAO. F. 1367. Invt. 1. Arch. 87, part I.
[11] SAAO. F. 1367. Invt. 3. Arch. 87, part I.

reached the point where an active and enterprising neighboring nation alone is utilizing and controlling the common districts"[12]. The negotiations of 1789, 1793 and 1797 failed to produce a result: Russia, which was at war with Turkey and Sweden, avoided drawing a boundary, citing the wartime situation and the high costs involved. As Alexander Bezborodko, Catherine II's foreign minister, noted, Norway's claims to the Kola Peninsula were merely nominal, given Russia's long-standing development of the region[13]. Nevertheless, these negotiations marked a significant milestone: the subject of discussion was geographically defined as "three districts", and the Kola Peninsula ceased to be used as a bargaining chip in subsequent diplomatic maneuvers.

Thus, by the beginning of the 19th century, a paradoxical situation had emerged: three groups of actors — the Skolts, Russian regional authorities, and the Norwegian administration — held fundamentally different views regarding the status of the shared territory. This asymmetry of perception was to become a fundamental feature of bilateral relations throughout the 19th century. However, after 1809, when Russia annexed Finland and Norway entered into a union with Sweden, the preconditions for a revision of this status quo had already begun to emerge. The annexation of Finland significantly extended the shared border, increasing its length almost threefold, and Finland and Finnish immigrants on Norwegian territory were symbolizing the Russian presence; consequently, the perception of the border amongst the Norwegian elite began to take on ever greater military and political significance. The "**flexible boundary**" (the image of the eastern neighbor) began to transform into a demand for a "**fixed border**" (demarcation) at the level of the political elite.

1826: diplomatic drama of the border's creation

Official negotiations regarding the demarcation of the northern frontier began in 1823; one year before, in May–June 1822, the Ministry of Foreign Affairs of Sweden-Norway had received diplomatic notes from the Russian envoy Pyotr Sukhtelen. These notes conveyed complaints from Russian residents, specifically the Skolts, indigenous inhabitants of the shared districts, regarding the activities of Swedish-Norwegian residents on the territory of their pogosts[14].

During 1823–1824, several demarcation proposals were drafted in Norway and Russia, revealing the asymmetrical perceptions of the border issue. A proposal from the Swedish-Norwegian Department of Finance, prepared at the request of the State Council in 1824, was based on the assumption that, as there were few Skolts, Russia would not object to the transfer of the smaller portion of the shared territory to Norway; the border was intended to follow the Paz River from its mouth to its source (Johnsen, 1923;[15]). However, this proposal was criticized by members of the Storting, who established the "Committee for the Development of Finnmark" in

[12] Fieldsted, PM av 06.05.1775 til Det Kgl. Danske Cancelli. Riksarkivet (RA). UD, boks 5405, Prebensens avskriftsamling.
[13] AFPRE. F. 53. Invt. 3. Arch. 661, 662.
[14] AFPRE. F. 1: Adm. files, II-b, part I.
[15] RA, UD 3C/18, pk. 5213, Prebensens avskriftsamling.

May 1824, chaired by the former Amtmann of Finnmark, H.M. Krog. Krog's proposal, submitted on July 31, 1824, suggested drawing the border from the mouth of the Voryema River to its source, then to Lake Salmijärvi on the Paz River, and onwards along the river southwards to the border post at Gelzomio[16]. The argument was that the Norwegian settlements of Vardø and Vadsø would become threatened with extinction if the border were to run along the Paz River, as they would lose access to the resources between the Paz and Voryema rivers. On August 6, 1824, Krogh's proposal was submitted to the King, and on December 11, it was approved by the government as a guideline for the demarcation. This proposal represented an attempt to translate local knowledge into a political program: Krogh, who was well acquainted with the conditions in Finnmark, sought to balance the interests of the settlers and the central authorities.

However, the Swedish-Norwegian Minister for Foreign Affairs, Count Vetterstedt, fearing that Russia might remain passive, decided to take the initiative. On December 6, 1824, when the Storting was presenting Krog's border plan to Karl Johan, the Swedish Chargé d'Affaires in St. Petersburg, Baron N.F. Palmstierna, delivered a note to the Russian Ministry of Foreign Affairs based on the Finance Department's proposal, suggesting the Paz River as the border line[17]. At the same time, the Governor-General of Arkhangelsk, Minitskiy, who was in St. Petersburg at the time, was attempting to persuade Nesselrode and the Tsar to adopt the border line proposed by the Arkhangelsk administration — along the western boundary of the Nyavdemskiy pogost. He succeeded in July 1824, and the Russian Ministry of Foreign Affairs was already preparing a corresponding draft; however, a subsequent note from Palmstierna, containing new facts, disrupted the Russian authorities' plans: the central government realised that it could not fully rely on information from Arkhangelsk[18]. This is a classic case of information distortion during its transmission from the local level to the center: regional officials, being limited by their local knowledge, conveyed perceptions to the capital that did not correspond to reality.

On March 24, 1825, Alexander I decided to appoint a special authorized officer to the common districts to work with a Swedish counterpart on a unified demarcation plan. The Tsar proposed the following principles: to prevent the cession of territories that had previously belonged to Russia; to transfer to Norway the settled territories to which it had indisputable rights; to take into account the religious beliefs of the local population; to allow residents of the common district, who after the demarcation would become subjects of one of the states, to move into the territory of the other to engage in livelihood activities; to show courtesy and tact towards their Norwegian counterparts[19]. On the Russian side, Lieutenant Colonel Valerian Emelyanovich Galyamin was chosen — an experienced thirty-year-old topographer from the Russian General Staff who served as deputy director of Russia's first Topographical School. The Norwegian side appointed 47-year-old Colonel Johan Henrik Spørck, a combat veteran who had served in the wars

[16] Stortingskomiteens foredrag av 31.07.1824 // D-RA/S-1076/F/Fb/L0001.
[17] AFPRE. F. 1: Adm. files, II-b, part I; SAAO. F. 1367. Invt. 3. Arch. 37.
[18] Draft note Nesselrode - Wetterstedt, 07.1824; Nesselrode's report to Alexander I, 07.26.1824 // RA/PA-409, VI-1B.
[19] Presentation to Alexander I regarding the borders in Lapland, 24.03.1825 // RA/PA-1409, VII.

against Sweden in 1808–1809 and 1814[20].

On July 4, 1825, the commissioners met in the town of Kola; on July 13, they arrived at the fishing village of Peschanoe and split into groups to conduct a topographical survey. Nine days later, on July 22, the commissioners met in the fishing village of Shapkino and began negotiations[21].

During the negotiations, Galyamin had no intention of contesting the region's status as a common territory; instead, he sought to establish a border line that aligned with the economic activities and religious affiliations of the various groups involved. He proposed drawing the border from the Paz River directly to Gelzomio, thereby ceding the Nyavdemskiy pogost and part of the Pazretskiy pogost, including the coastal area inhabited primarily by Lutherans, to Norway. Spørck rejected this proposal, insisting instead on a boundary running from the mouth of the Voryema River to its source, then to Salmijärvi, and finally along the Paz River to Gelzomio[22]. Spørck's arguments were as follows: the existing temporary right to harvest wood for the Vardøhus garrison offered no guarantee that the Russian authorities would not revoke it in future; conversely, transferring the territory between the Paz and Voryema rivers to Norway would allow the Mountain Sami, who had lost access to reindeer grazing grounds on the Rybachiy Peninsula, to continue their economic activities on the Norwegian side. Galyamin accepted the main provisions of Spørck's plan, but put forward a counter-proposal: to draw the border not at Salmijärvi, but at the Church of Saints Boris and Gleb on the left bank of the Paz River, and from there along the riverbed to Gelzomio, regarding this as compensation to the Sámi for the loss of a vast tract of land between the Paz and Voryema rivers. Spørck initially objected, proposing to move the church to the Russian bank, but Galyamin insisted on its preservation, stating that the Sami opposed relocation because the land where the church stood, having been consecrated by the Venerable Tryphon, was sacred. Ultimately, Spørck agreed to shift the border northward to the church, ceding the surrounding one-square-kilometer territory to Russia, and the parties reached a full agreement (Johnsen, 1923;[23]). This decision was an act of symbolic objectification: preserving the church as a sacred site served as a marker of the Russian presence along the new border.

By the end of the negotiations, Galyamin supported Spørck's proposal. Both commissioners envisaged granting the Eastern Sami the right to fish and hunt within the neighboring state's territory, though both sides were deprived of the right to graze reindeer across the border. The commissioners gave the inhabitants a three-year period to make a final choice regarding their country of residence — an idea proposed by Galyamin, who was confident that the Pazretsk and Nyavdem Sami would choose to become Russian subjects[24]. On September 25, 1825, the Norwegian government submitted its demarcation proposal to King Karl Johan, while in St.

[20] AFPRE. F. 133. Invt. 468. Arch. 2983; AFPRE. F. 1: Adm. files, II-b, part 3.
[21] AFPRE. F. 1: Adm. files, II-b, part 1; RA, UD3C/18, pk. 5213 (Prebensen Archive).
[22] RSMHA. F. 442. Invt. 1. Arch. 26; AFPRE. F. 1: Adm. files, II-b, part 1.
[23] AFPRE. F. 1: Adm. files, II-b, part 1.
[24] AFPRE. F. 1: Adm. files, II-b, part 1; RSMHA. F. 442. Invt. 1. Arch. 26.

Petersburg, the plan was presented to Alexander I, who instructed to inform the Swedish-Norwegian king of Russia's readiness to sign the convention (Palmstierna, 1932).

However, a few weeks after the draft had been approved, Alexander I died suddenly at the age of 48 while travelling to the Black Sea for a rest; consequently, the Norwegian-Russian border treaty coincided with the height of the Decembrist Revolt. The situation was complicated by Galyamin's own involvement in the events: his friend and colleague A. Kornilovich had participated in the uprising and visited Galyamin on the evening of December 14 with a letter, which Galyamin burned upon learning of his friend's arrest. Two fellow officers gave false testimony against Galyamin, and he was placed under house arrest for two and a half months. The investigative commission found no evidence of his participation in the uprising apart from the destruction of evidence; consequently, Galyamin escaped Kornilovich's fate, but was transferred to the Finland Regiment and remained under the secret police's covert surveillance until 1832 (Palmstierna, 1932;[25]).

After the uprising, Nicholas I, deeply disillusioned with the officer corps, was initially skeptical about the new treaty, possibly under the influence of Baron Diebitsch, the Chief of the General Staff, who opposed the Galyamin-Spørck proposal. The Tsar insisted that the border should run along the Paz River for its entire length and even considered relinquishing the Church of Saints Boris and Gleb (Palmstierna, 1932;[26]). In March 1826, Palmstierna was informed of Nicholas I's stance; however, Karl Johan, eager for rapid progress, was prepared to accept the proposal. However, Palmstierna, having no intention of following the royal court's instructions, bided his time, and on April 24, 1826, he received an unexpected reply: Nicholas I, wishing to maintain a policy of "good neighborliness" toward Sweden-Norway, decided to approve the Galyamin-Spørck draft (Palmstierna, 1932). In early May 1826, Palmstierna and F.V. von Osten-Sacken drafted the border convention, which was signed on May 27 in Stockholm and on June 11 in St. Petersburg. The final version of the treaty contained only a few modifications: the right to cross the border for fishing and hunting was granted to all border residents, but only for six years, and the garrison of Vardøhus Fortress was prohibited from harvesting wood on the eastern bank of the Voryema River[27].

The new border was demarcated on the ground in the summer of 1826 by commissioners Meyländer, Wiebe, and Tønder on the Norwegian side, and Galyamin and Weickardt on the Russian side. However, during the demarcation process, the Nyavdemskiy pogost was mistakenly divided almost exactly in half. How could this have happened when the commission had members of the local population assisting them? The most obvious explanation is that the commissioners were using old Swedish maps of Lapland by Wallenberg (1804), in which the boundary of the pogost was depicted too far to the north. Thus, local knowledge gave way to academic, albeit

[25] State Archive of the Russian Federation (SARF). F. 109: 1. Expedition. Arch. 61, part 189; SARF. F. 48. Invt. 1. Arch. 107.
[26] RSMHA. F. 38. Invt. 1. Arch. 62.
[27] Ibid.

erroneous, views (Johnsen, 1923). This episode illustrates the conflict between the "flexible boundaries" of local knowledge and the "fixed borders" of cartographic abstraction: the commissioners preferred the academic map to the oral statements of local residents.

The border convention proved to be quite advantageous for Norway: it gained the most economically important coastal regions. However, dissatisfaction with the convention was more pronounced in Russia. The fact that the Tsar had rejected the position of the Arkhangelsk authorities led to persistent discontent regarding the new border throughout the 19th century, right up to the Revolution of 1917. Galyamin became a "blamed scapegoat"; in popular tradition, he was portrayed as a traitor. Rumors circulated that he had received a gold snuffbox with diamonds from the Norwegians, or even a sack of speciedalers that turned out to contain copper coins beneath a thin layer of silver, whereupon, realizing his betrayal, he hanged himself (Nikolskiy, 1914). However, these rumors were unfounded: Galyamin lived a long life, was reinstated in the General Staff in 1829, and distinguished himself during the Russo-Turkish War of 1828–1829 and the suppression of the Polish Uprising of 1830–1831; in 1832, he became director of the Imperial Porcelain Factory in St. Petersburg, ending his career in 1848 with the rank of Actual State Councilor (Johnsen, 1923;[28]). The myth of Galyamin's betrayal fitted into the concept of Russian popular monarchism, which was always ready to forgive and exonerate the Tsar while placing the blame on an official. In reality, the decision to accede to Swedish-Norwegian demands was made at the highest level in St. Petersburg, and Galyamin was following the instructions he had received.

Escalation of the "Lapp issue" and myths about the threat (1830–1905)

The main point of contention in the 1826 convention was the issue of harvesting rights for some of the border settlements of the Skolts, specifically the lands of the Pazretsk Sami on the territory of Sweden-Norway. Traditional conceptions of space and boundaries within the semi-nomadic Skolt culture did not correspond to the political understanding of space of the young Norwegian state, which was focused on achieving full independence and therefore sought to delineate the borders of its own territory as rapidly as possible[29]. A partial solution to the problem was the so-called "Supplementary Protocol of 1834", under which the Pazretsk Sami retained the right to salmon fishing in their former grounds — at fishing sites located within the territory ceded to Sweden-Norway. All other forms of resource exploitation within Norwegian territory were prohibited. This limited concession did not make the 1826 treaty seem any less unjust to the Skolts; conversely, the easement sanctioned by the protocol burdened the Norwegian side and was perceived as evidence of Russia's willingness to violate the sovereignty of its neighbor[30]. In terms of our conceptual framework, this easement became a zone where "flexible boundaries" (traditional Sami rights) intersected with "fixed borders" (state sovereignty), creating a constant

[28] SARF. F. 109: 1. Expedition. Arch. 61, part 189.
[29] AFPRE. F. II Dep. I-3 Invt. 446. Arch. 104 – Sh. 238-243; RA/UD, Prebensen samling, G05/10/boks 5213.
[30] For information on the servitude and the issue of "Lopars' livelihoods", see.: RA/UD, Prebensen samling; SAAO. F. 1367. Invt. 1. Arch. 87 (p. 2) – Sh. 232-233; RSHA. F. 1286. Invt. 4. Arch. 910 – Sh. 1-2, 107.

source of tension.

During the 1840s and 1850s, the claims of the Finnish side continued to expand. The Senate of the Grand Duchy of Finland persistently demanded a revision of the border line established in 1826 or, alternatively, a territorial exchange. Stockholm interpreted Russian claims as a potential desire on Russia's part to extend its sovereignty and annex ice-free harbors in the Norwegian region of Finnmark (Zaikov, Tamitskiy, 2016). The "Russian threat", first outlined by the British Consul John Rice Crowe in the late 1830s, found fertile ground. In 1836, Crowe, the British vice-consul in Hammerfest, reported to Lord Palmerston that "the Norwegian Finnmark would soon be seized by Russia" (Davydov, 2009). This doctrine became a classic example of the objectification of a "flexible boundary": local fears regarding Russian commercial expansion were transformed, at the level of central policy, into a doctrine of military threat. Consequently, Stockholm opted to close the Norwegian-Finnish border section to cross-border commercial activities, which was done in 1852 (Palmstierna, 1932). This marked the greatest defeat for Russian diplomacy in the Far North during the first half of the 19th century and demonstrated how an asymmetry of perception — where local conflicts are interpreted as imperial ambitions — leads to the hardening of "fixed borders" and the restriction of "flexible" ones.

The definitive shift towards a policy of containing Russia in the Far North took place in 1855 with the signing of the "November Treaty" between Sweden-Norway on the one hand, and Great Britain and France on the other. Sweden-Norway pledged not to enter into an alliance with Russia, while Great Britain and France guaranteed the inviolability of the Kingdom's borders[31]. This treaty marked a turning point in the way a small nation-state and a great empire perceived their neighborly relationship, with far-reaching consequences: it reinforced the asymmetry of perception as a structural feature of bilateral relations.

In the second half of the 19th century, the image of the "Russian threat" became a factor in shaping Norway's internal borderland policy. The predominance of a non-Norwegian population in Eastern Finnmark, particularly near the Russian-Norwegian border, was perceived as a foreign invasion — Russia's encroachment onto Norwegian soil (Niemi, 2008). This is a process of symbolic objectification: cultural dominance is interpreted as a political threat, and the "flexible boundary" of ethnic space is transformed into a demand for a "fixed border" of state sovereignty. The active construction of the nation-state and the fear of the vast, multi-ethnic Russian Empire led to the perception of the Skolt Sami's modest fishing activities on Norwegian territory as a symbol of a Russian presence.

In Russia, this issue was also re-examined, albeit several decades later. At the turn of the 19th and 20th centuries, the ideology of Russian ethnic nationalism began to take shape across the empire, gradually spreading to the Arkhangelsk Governorate as well (Tolz, 2001; Hosking, 1998). Many officials and journalists travelling along the Russian-Norwegian border noted a peculiar "salient" that did not conform to the principle of natural boundaries; in their view, the "artificial

[31] Ibid.

nature" of the border in the section stretching from the Church of Saints Boris and Gleb to the Voryema River had resulted in the loss of salmon fishing grounds belonging to the Pazretsk Sami[32].

Growing mutual mistrust and accusations of expansionist plans led to negotiations between Russian and Norwegian diplomats in 1896–1903. The Russian Ministry of Foreign Affairs supported the position of the Arkhangelsk public, which had formulated a program of redress for the "territorial concession" of 1826: to formalize the Skolt Sami's fishing grounds on Norwegian territory as private property, including a ban on fishing in those grounds by Norwegian subjects. The Norwegian side, seeking to eliminate these servitudes, attempted to explore the possibility of unilaterally withdrawing from the 1834 protocol or severely restricting the fishing activities of the Russian Sami. The negotiations were unsuccessful: the idea of securing extraterritorial status for fishing grounds on the territory of a neighboring sovereign state found no support[33]. This episode demonstrated the limits of political objectification: even amidst strong public sentiment, revising the established "fixed border" turned out to be impossible without the risk of large-scale conflict.

Thus, by the beginning of the 20th century, a paradoxical situation had emerged: while the "fixed border" established in 1826 remained unchanged, the "flexible boundaries" of perception — myths regarding "Russian" and "Norwegian" threats — continued to evolve. This dual function of "flexible boundaries", both as tools for mobilization and as mechanisms of restraint, became a defining feature of the Russian-Norwegian borderlands. On the one hand, the myths about the threat served to foster internal consolidation: for Norway — the formation of a national identity as a counterweight to "Eastern barbarism"; for Russia — the consolidation of imperial territory around the idea of defending "ancestral Russian lands". On the other hand, mutual fear prevented radical actions and kept the parties within the framework of institutional agreements: each side was afraid that a border revision would lead to even greater losses. The "fixed border" turned out to be protected by the "flexible boundaries" of mutual fear.

The ordeal of catastrophes: loss and restoration of the border (1920–1949)

In accordance with the provisions of the Tartu (Yuryev) Peace Treaty between the RSFSR and Finland, signed on 14 October 1920, Soviet Russia voluntarily ceded the Petsamo region to Finland, thereby granting Finland access to the ice-free Barents Sea. Thus, the border between Norway and the Russian Empire, which had existed since 1826, ceased to exist. As the Russian historians A.I. Rupasov and A.N. Chistikov described this change, "the state border defined by the Treaty of Tartu, figuratively speaking, drew a line under one stage in the development of relations between the RSFSR and Finland. A new stage was beginning, which, as it later turned out, was no less complex and difficult than the previous one" (Rupasov, Chistikov, 2016). In terms of our conceptual framework, the "fixed border" of 1826 was de-institutionalized, but the "flexible boundary" — the image of the "old" line held in the minds of the local population and political

[32] RSHA. F. 1286. Invt. 31. Arch. 452; RSHA. F. 560. Invt. 28. Arch. 520 – Sh. 1-13; SAAO. F. 4. Invt. 16 Vol. 1. Arch. 988 – Sh. 4–14.
[33] Hoover Institution Archives (HIA). HI/Russian Missia; Norway/Missia; Sweden/Lapps/box127/14; box127/15.

elites — persisted. This image would prove to be an important factor in 1944–1947, when the question of restoring the border arose.

The two neighboring states were to go through two more wars: the Soviet–Finnish War of 1939–1940 and the Soviet–Finnish War of 1941–1944. On March 12, 1940, the Moscow Peace Treaty was signed between the USSR and Finland, altering the Soviet-Finnish border in the Far North as well: the western parts of the Rybachiy and Sredniy peninsulas, which had been ceded in 1920, were returned to the USSR. However, despite the fact that the Petsamo region had been occupied by Soviet troops, the USSR withdrew them, allowing Finland to retain both its access to the Barents Sea and the ice-free port of Liinakhamari.

The issue of Petsamo soon took on an international dimension involving the interests of both Germany and the Soviet Union. Germany's economic need for the nickel mined in Petsamo became a significant factor in Finnish-German relations. Negotiations between Finland, Germany, and the Soviet Union regarding the Petsamo nickel deposits in 1940–1941 demonstrated how the question of resources was intertwined with geopolitical interests (Paasikivi, 2021; Crosby, 2025). During this period, the concession to develop the Petsamo nickel deposits was held by the British-Canadian company Mond Nickel. Following Germany's occupation of Norway, the Soviet Union began to regard Petsamo as a strategically important area. On June 23, 1940, Molotov met with Paasikivi, the Finnish envoy to the USSR, and stated that "the Soviet government is interested in the nickel mines of the Petsamo region and would like to obtain a concession for them"[34]. Soviet-Finnish negotiations on this issue continued until the outbreak of the Great Patriotic War but did not lead to a successful outcome.

This multilateral diplomatic game surrounding Petsamo demonstrated how the issue of resources could serve as a catalyst for geopolitical shifts. In terms of our framework, Germany's economic interests and the Soviet Union's strategic interests created competing "fixed borders" of influence, while Finland attempted to maneuver between them by utilizing the "flexible boundaries" of diplomatic pledges and agreements.

Following Nazi Germany's attack on the Soviet Union, Finland sided with Germany, and on June 29, 1941, Finnish troops crossed the Soviet border. The Petsamo region became a key staging ground for the offensive launched by German and Finnish forces in the direction of Murmansk. This subsequent Soviet-Finnish conflict (known in Finnish historiography as the "Continuation War") ended on September 19, 1944, with the signing of the Armistice Agreement between the USSR and the United Kingdom on the one hand, and Finland on the other. Under the terms of this agreement, the Petsamo region was returned to the USSR. Article 2 of the agreement stated: "Finland confirms the return to the Soviet Union of the province of Petsamo (Pechenga) voluntarily ceded to Finland by the Soviet State under the Peace Treaties of October 14, 1920, and March 12,

[34] Foreign Policy Documents. 1940–June 22, 1941. Vol. 23: In 2 books. Book 1. January 1 – October 31, 1940. Moscow: Mezhdunarodnye Otnosheniya; 1995: 363–364.

1940...”[35] Following the return of the Petsamo (Pechenga) region to the Soviet Union, the Soviet government paid compensation of 20 million US dollars to the British-Canadian owners of the Mond Nickel Company.

The Petsamo region and Eastern Finnmark were liberated from German forces during the Petsamo-Kirkenes Operation, which began on October 7, 1944. The Red Army crossed the border with Norway on October 18, and the port city of Kirkenes was captured on October 25. The legal basis for crossing the Norwegian state border was the “Agreement Concerning Civil Administration and Jurisdiction in Norwegian Territory after Its Liberation by Allied Expeditionary Forces”, signed in London on May 16, 1944, by Trygve Lie, Foreign Minister of the Norwegian government-in-exile, and V.Z. Lebedev, Ambassador of the Soviet Union[36]. On the same day, Norway concluded similar agreements with Great Britain and the United States; Trygve Lie emphasized that under these agreements, “Norwegian sovereignty is fully recognized, and the country’s integrity is assured”[37]. This was a significant diplomatic signal: even despite the presence of Allied troops on Norwegian territory, Norway’s sovereignty remained inviolate.

On November 7, 1944, a Norwegian delegation led by Trygve Lie arrived in Moscow. The purpose of the visit was to discuss Norwegian-Soviet military cooperation in the North and to request assistance in arranging a visit by Minister of Justice Terje Wold to the liberated areas of Finnmark for inspection and information-gathering purposes (Komarov, 2020). On March 27, 1945, Soviet diplomat P.D. Orlov proposed to Norwegian Ambassador Rolf Andvord the creation of a Norwegian-Soviet commission to demarcate the border. Andvord considered the proposal premature, but Orlov noted that an official statement regarding the restoration of the “old border” would be of great significance as a counterweight to German propaganda[38]. This is an example of how the “flexible boundary” — the memory of the 1826 line — was deliberately used by Soviet diplomacy to politically objectify and legitimize the new status quo.

The Norwegian Government raised the issue of demarcation following the liberation of the entire country from German occupation. This proposal was put forward in a memorandum dated August 6, 1945[39]; however, as early as August 16, Chargé d'Affaires Krogh-Hansen indicated that it would be advisable to postpone demarcation until 1946[40]. On October 24, 1945, Deputy People’s Commissar V.G. Dekanozov met with Norwegian Ambassador Andvord, who presented a memorandum on demarcation and handed over seven documents regarding the border regime that had previously existed between Norway and Finland. The Norwegian side was interested in

[35] Maiorov S. ed. Foreign Policy of the Soviet Union During the Patriotic War. Vol. 2. January 1 – December 31, 1944: Documents and Materials. Moscow: Gospolitizdat; 1946: 214–229.
[36] Soviet-Norwegian Relations, 1917–1955: A Collection of Documents. Moscow, 1997: 344–347; Pravda, May 18, 1944.
[37] Ibid.
[38] Soviet-Norwegian Relations, 1917–1955. Op. cit., p. 377.
[39] AFPRF. F. 06. Invt. 27. Shelf 127. Arch. 6. Sh. 12.
[40] AFPRF. F. 0116. Invt. 27. Shelf 127. Arch. 5. Sh. 43; from the diary of V.G. Dekanozov. Reception for Norwegian Ambassador Andvord, October 24, 1945. AFPRF. F. 06. Invt. 27. Shelf 127. Arch. 6. Sh. 21.

ensuring that the agreements on border arrangements previously in force between Norway and Finland were recognized as valid in relations between the USSR and Norway. As explained in a telegram from the Norwegian Foreign Ministry to Ambassador Andvord, the Norwegian government preferred to reaffirm the validity of treaties originally signed with Finland, rather than resolve border issues "through new agreements": "In support of the Norwegian view, the Embassy is requested to refer to the desire of both parties to be good neighbors, and to emphasize what an unfavorable impression it would make if the position of the Norwegian population in the frontier districts should become worse now that the Soviet Union has become a neighbor than it was when Norway was a neighbor of Finland"[41]. This position reflected a desire to preserve the existing "flexible boundaries" (sectoral agreements with Finland) and to minimize changes to the daily lives of the border population.

For its part, the People's Commissariat for Foreign Affairs considered that some of these agreements required consultation with the relevant authorities, and proposed concluding a single, comprehensive convention on border regime, containing sector-specific sections[42]. This is a process of political objectification unfolding at two levels: Norway sought to preserve the existing "flexible boundaries" (sector-specific agreements), while the USSR insisted on a new, systematic "fixed border" (a unified convention).

On July 2, 1946, the USSR Ministry of Foreign Affairs notified the Norwegian side of its readiness to proceed with demarcation. On August 1, a Norwegian government delegation arrived in Moscow to take part in the Joint Commission on the Demarcation of the State Border between the USSR and Norway; the Norwegian delegation was chaired by H. Gabrielsen, Governor of Finnmark Province, while the Soviet delegation was chaired by I.V. Maevskiy, an advisor at the Ministry of Foreign Affairs[43]. The Commission, which met in Moscow from August 2 to August 16, 1946, approved the work plan and decided to carry out the operations during the summer of 1947. It was decided that the demarcation work would be based on the 1826 Russian-Norwegian border demarcation documents and the revised map of that border from 1896[44]. This decision carried profound symbolic significance: the "fixed border", which had been abolished a quarter of a century earlier, was being restored in its original form. The "flexible boundary" preserved in memory proved stronger than the "fixed border" imposed by political changes. The demarcation itself was carried out between June 1 and September 4, 1947, and the descriptive protocol, maps, and other documents were signed in Moscow on December 18, 1947. Soviet newspapers published a report stating: "All works on the demarcation of the Soviet-Norwegian border took place in a spirit of complete mutual understanding and agreement between both sides"[45].

[41] Telegram from the Norwegian Ministry of Foreign Affairs to the Norwegian Ambassador in the USSR, R.O. Andvord, regarding the maintenance of the traditional border regime on the new Soviet-Norwegian border. Soviet-Norwegian Relations, 1917–1955. Op. cit., pp. 392–393.
[42] AFPRF. F. 0116. Invt. 27. Shelf 127. Arch. 5. Sh. 43–44.
[43] Pravda. August 2, 1946; Izvestia. August 2, 1946.
[44] Izvestia. August 30, 1946.
[45] Pravda. December 23, 1947; Izvestia. December 23, 1947.

However, the post-war perception of the border in Norway was complicated by long-standing fears associated with the "Finnish threat". As research by Norwegian historians K.E. Eriksen and S. Bones has shown, in the post-war years the Norwegian authorities maintained a suspicious attitude towards the Finnish population of Northern Norway (the Kvens). A special list of suspected individuals — the "Finnish list" — containing approximately 2,000 names (primarily Finns and people of Finnish origin), was maintained from 1955 through the 1970s. The Norwegian military and police authorities feared that Soviet influence might be exerted via Finland, and that the Finnish population of Northern Norway might be exploited in the interests of the USSR. As the head of the Police Surveillance Service noted, Finns could be more easily recruited by Soviet intelligence due to their proximity to the Soviet-Finnish border (Eriksen, 2017; Bones, 2017). Consequently, passport controls for Finnish citizens in Troms and Finnmark were significantly tightened during the 1950s, and a special regulatory regime for Finnish citizens remained in effect in these two counties until 1975 (ibid.). This was a striking example of how the "flexible boundaries" of perception — the fear of an external threat — were transformed into discriminatory policies at the level of the "fixed borders" of state control. These discriminatory measures were abolished only in the mid-1970s, following public statements by Sverre Nielsen, editor of the newspaper Finnmarken, and Inger Louise Valle, Minister of Justice (ibid.). This case illustrates how old fears can be projected onto new geopolitical realities, and how the "flexible boundaries" of ethnic perception can persist even after "fixed" political borders have been redrawn. It also demonstrates that overcoming "threat perceptions" requires not only political but also cultural efforts, specifically, public condemnation of discriminatory policies and the political will to repeal them.

Following the demarcation of the border, the parties began drafting a Soviet-Norwegian document regarding the border regime. The treaty between the Government of the USSR and the Royal Norwegian Government on the Soviet-Norwegian border regime was signed in Oslo on December 29, 1949[46]. However, Soviet-Norwegian relations in 1949 were undergoing a period of sharp cooling, caused by Norway's accession to the NATO military-political bloc in April 1949. A report by the Soviet Embassy in Norway for 1949 emphasized that the Gerhardsen government had launched "provocative anti-Soviet propaganda, spreading slanderous fabrications about the aggressiveness of the Soviet Union, the threat posed by the USSR to Northern Norway, and about Soviet imperialism"[47]. According to Ambassador S.A. Afanasyev, the Norwegian government, fearing that it had adopted too confrontational course in relations with the USSR, began looking for an opportunity to secure confirmation from the Soviet government of its friendly attitude toward Norway. The Norwegian Foreign Ministry proposed that the communiqué on the signing of the

[46] Johanson Bodil B. Overenskomsten mellom den Kongelige Norske Regjering og Regjeringen for Samveldet av Sovjetiske Sosialistiske Republikker om forskjellige forhold ved den norsk-sovjetiske grense og om fremgangsmåten ved ordningen av konflikter og hendinger på grensen. 50 år 1949–1999. Kirkenes: Norges Grensekommissariat; 1999. 70 s.

[47] Political Report of the USSR Embassy in Norway for 1949; AFPRF. F. 0116. Invt. 39. Shelf 156. Arch. 10. Sh. 8.

treaty should specifically highlight the "friendly atmosphere" in which the negotiations had taken place. The Soviet side rejected this proposal so as not to "give the Norwegian authorities a pretext to reassure the Norwegian public that everything in Soviet-Norwegian relations was supposedly still going well"[48]. In the report published by Izvestia on December 31, 1949, unlike the report published in 1947, there was no mention of a "spirit of mutual understanding and harmony" — a sign that the Cold War had begun. Applying the concept of asymmetric perception, we can observe how an objective technical agreement on a "fixed border" becomes hostage to political confrontation: both sides reject the symbolic objectification of good-neighbourliness, and "flexible boundaries" (images of threat) once again begin to dominate institutional agreements.

The treaty was ratified by a decree of the Presidium of the Supreme Soviet of the USSR on October 23, 1950, and entered into force in Norway on November 7, in accordance with a royal decree (Heger, 2015;[49]).

Conclusion

The history of the Russian-Norwegian borderlands, examined in the context of the bicentennial of the 1826 treaty, offers a unique example of how a line drawn on a map almost by chance (amidst incomplete information, the commissioners' time constraints, and the dominance of imperial logic over local expediency) proved to be unexpectedly stable and viable. As our study have demonstrated, this stability was determined not so much by geographical logic or military might as by a complex interweaving of asymmetric perceptions, mutual fears, and institutional compromises; these factors paradoxically created the conditions for long-term stability, even during periods of acute confrontation.

In analyzing the evolution of the Russian-Norwegian border, we identified four key stages, each characterized by a specific balance between "flexible" (imagined) and "fixed" (institutional) boundaries.

The first stage — from the Middle Ages to the early 19th century — was dominated by a frontier mentality. During this time, the "common districts" served as a space where three paradigms of territorial imagination coexisted: the Sami paradigm (archaic, based on seasonal migrations and collective ownership), the imperial paradigm (Russian, tolerant of open zones and requiring no clear boundaries), and the modern paradigm (Norwegian, striving for hermetic national borders). This period demonstrated that the absence of a "fixed border" did not imply an absence of territoriality; it was, rather, organized according to different, pre-state principles, where fiscal jurisdiction took precedence over political sovereignty. However, the lack of "fixed borders" created the conditions for future conflict, as the emerging Norwegian nation-state began to

[48] Covering letter to the 1949 report of the USSR Embassy in Norway. February 21, 1950. AFPRF. F. 0116. Invt. 39. Shelf 156. Arch. 10. Sh. 3-4.

[49] Johanson Bodil B. Overenskomsten mellom den Kongelige Norske Regjering og Regjeringen for Samveldet av Sovjetiske Sosialistiske Republikker om forskjellige forhold ved den norsk-sovjetiske grense og om fremgangsmåten ved ordningen av konflikter og hendinger på grensen. 50 år 1949–1999. Kirkenes: Norges Grensekommissariat; 1999. 70 s.

demand certainty, whereas imperial Russia continued to think in terms of the frontier. This asymmetry of perception became a fundamental characteristic of bilateral relations.

The second stage — the establishment of the border in 1826 — was the outcome of diplomatic negotiations in which regional conflicts (complaints by the Skolt Saami, disputes over hunting and fishing grounds), personal ambitions (Minitskiy vs. Palmstierna, Galyamin vs. Spørck), and macro-political considerations (Alexander I's alliance with Karl Johan, Nicholas I's desire to maintain "good neighborly relations") were inextricably intertwined. The study has shown that the Convention of 1826, which was advantageous to Norway, was perceived in Russia as a "territorial loss". This gave rise to a persistent myth about Galyamin's betrayal — a myth that had no factual basis, but which served an important socio-psychological function, allowing the image of the "benevolent tsar" to be preserved and the blame to be shifted onto a "corrupt official". Acting as a "flexible boundary" (a symbol of injustice), this myth became objectified within the political sphere, influencing Russian border policy throughout the 19th century.

The third stage — the evolution of the "Lapp question" and the escalation of myths regarding the threat between 1830 and 1905 — demonstrated how local conflicts over resource use gradually became politicized, transforming into symbols of a neighbor's expansionist ambitions. On one hand, the 1834 easement granted to the Pazretsk Sami served as proof for Norway of Russia's readiness to violate sovereignty, while for Russia, it was a tool for protecting the traditional rights of the indigenous population. On the other hand, Crowe's doctrine regarding the seizure of ice-free harbors, embraced by Swedish and Norwegian elites, created a persistent image of the "Russian threat". Analysis reveals this image to have been less a reflection of Russia's actual policy than a projection of the small nation-state's own fears. Conversely, in Russia, particularly in the Arkhangelsk Governorate, an image of the "Norwegian threat" took shape — the result of a "cunning" diplomatic maneuver and the "complacency" of the central authorities. This dual asymmetry of perception became a structural feature of bilateral relations: while both sides viewed each other as a threat, this mutual suspicion also deterred them from taking radical action, as each feared that revising the border would result in even greater losses. The "fixed border" turned out to be protected by the "flexible boundaries" of mutual fear.

The fourth stage — the loss and restoration of the border between 1920 and 1949 — became a unique historical precedent. The 1920 Treaty of Tartu annulled the 1826 border, ceding the Petsamo region to Finland. However, after World War II, when Soviet troops liberated Eastern Finnmark and Pechenga was returned to the USSR, the parties made a conscious decision to restore the "old" border: the one established over a century earlier. As we have demonstrated, this choice was not merely mechanical; it reflected not only technical expediency (the availability of documents and maps from 1826 and 1896) but also symbolic significance. The 1826 line was perceived as "historical" and "natural", even though its "artificial nature" had been criticized in Russia throughout the 19th century. The 1947 demarcation and the signing of the agreement on border regime in 1949 completed this process; however, against the backdrop of the onset of the

Cold War and Norway's accession to NATO, the symbolic rhetoric of "friendship and harmony" receded into the background, marking the beginning of a new era of confrontation.

Summarizing the findings of this study, we can draw several key conclusions that are of significance not only historically but also in the present day.

The first conclusion concerns the nature of the border's stability. The stability of the 1826 line was determined not so much by its geographical "fairness" or "naturalness" — on the contrary, influential forces in both Russia and Norway considered it unfair. Instead, its stability was ensured by institutional inertia and mutual caution, as both sides feared that a revision of the border would lead to unpredictable consequences: for Norway, the loss of ice-free harbors; for Russia, a weakening of its position in the north and the loss of control over a strategically important region. This asymmetrical mutual restraint, underpinned by international treaties (the November Treaty of 1855 and the Integrity Treaty of 1907), created conditions under which the border became a "frozen" compromise that no one dared to challenge.

The second conclusion concerns the role of local communities. The Sami, specifically the Skolts, the Pomors, and Norwegian colonists were not merely passive objects of state policy, but active agents of "spatial socialization". Their everyday practices (subsistence activities, migration, trade) created "flexible boundaries" that influenced perceptions of the neighbor and, ultimately, the formation of "fixed" institutional boundaries. In this sense, the history of the Russian-Norwegian borderlands refutes the classic top-down model in which the "center defines the periphery". Regional conflicts and local initiatives repeatedly shaped the agenda of bilateral relations, while central authorities were forced to respond to challenges "from below": complaints of the Skolts in 1822, fishing disputes in the 1860s, or pressure from the Arkhangelsk press in the early 20th century. At the same time, as the analysis of the Galyamin myth demonstrated, local memory regarding an "unjust" border could persist for decades without escalating into political demands until a favorable foreign policy climate emerged.

The third conclusion relates to the dynamics of "threat perceptions". We have shown that myths concerning the "Russian" and "Norwegian" threats were not simply the product of propaganda, but complex socio-cultural constructs in which economic and military concerns, cultural stereotypes, and political manipulations were intertwined. These myths served a crucial function of internal consolidation: for Norway, it was the shaping of a national identity in contrast to "Eastern barbarism"; for Russia, it was the consolidation of imperial territory around the idea of defending "ancestral Russian lands" against encroachment. However, the evolution of these myths demonstrated that they could both exacerbate tensions and, paradoxically, foster stability: mutual fear prevented radical actions and kept both parties within the framework of institutional agreements.

The fourth conclusion concerns the unique nature of the border's restoration in 1947. This precedent, in which an annulled border was re-established in exactly the same form a quarter of a century later, is unparalleled in European history. It illustrates that a border can possess not only

political but also symbolic significance, becoming part of a collective memory and identity that even radical political changes cannot completely erase. For both Russia and Norway, the 1826 line became a “shared historical heritage”, although each side interpreted it in its own way: Norway viewed it as the result of skillful diplomacy, while Russia regarded it as a “forced concession” which, however, it did not dare to renegotiate.

Finally, turning to the contemporary context — the bicentenary of the border and the new geopolitical confrontation that has placed Russia and Norway on opposite sides — we can draw several lessons from this historical experience.

Firstly, even the most “unjust” border can be stable if the parties recognize its institutional legitimacy and resist the temptation of revanchism. Historical experience has shown that attempts to revise the status quo (such as the territorial exchange of the 1840s or the demands made by the Arkhangelsk public in the 1890s) were unsuccessful and merely exacerbated mutual distrust. On the contrary, acceptance of the status quo, even if it was perceived as advantageous to one side, created the conditions for long-term stability.

Secondly, “threat perceptions” are not merely propaganda clichés, but real factors influencing policy. Ignoring the asymmetry of perception, whereby one side views the other’s actions as a threat while the other remains unaware of this, leads to misguided decisions and the escalation of conflict. In the 19th century, Russian authorities frequently found themselves in situations where their actions (such as the 1851 ultimatum or support for revisionist sentiments) were perceived by Norway as confirmation of a “Russian threat”, even though they were reactions to local issues. Conversely, Norway’s policy of Norwegianisation and colonization, which was perceived in Russia as expansion, was for Norway merely a means of internal consolidation.

Thirdly, local knowledge and local initiatives remain a vital resource for maintaining good neighbourly relations. In the 19th century, the commercial interactions among Pomors, the Sami, and Norwegian colonists created “flexible boundaries” of mutual understanding, thereby softening the edge of political confrontation. In the modern context, where official channels of communication are limited, cross-border cooperation at the level of regions, universities and cultural institutions can fulfil the same function: maintaining channels of interaction that remain independent of the prevailing political climate.

Fourthly, the anniversary of the border is not only an occasion for historical reflection, but also an opportunity to rethink the symbolic resource of shared history. The 1826 border is not a line of division, but a “shared heritage” that can be understood as a joint project of spatial management. The lessons of the 19th and 20th centuries demonstrate that even neighbors with asymmetrical power dynamics can find a modus vivendi, provided they do not substitute ideological constructs for reality and maintain institutional channels of dialogue.

The 200-year history of the Russian-Norwegian border is a story not only of conflict and tension, but also of institutional ingenuity and the ability of the parties to keep their differences within the framework of agreements and prevent escalation. We believe that this experience may

be of interest not only to historians, but also to politicians seeking to understand how, even in conditions of geopolitical confrontation, it is possible to preserve elements of cooperation and mutual respect for historically established boundaries. The 1826 border, mapped by Galyamin and Spørck under arduous field conditions and with scant data, proved to be more than just a line; it was an "architectural project" that outlasted empires, wars, and ideologies. In this sense, it stands not merely as a historical fact, but as a reminder that even accidental compromises can form a solid foundation for long-term coexistence, provided the parties are willing to view a "fixed border" not as a line of separation, but as a line of shared responsibility.

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Barents Euro-Arctic Cooperation: Results and Consequences for Russia

Flera H. Sokolova [1]✉, Dr. Sci. (Hist.), Professor
Elizaveta A. Trufanova [2], Research Assistant

[1, 2] Northern (Arctic) Federal University named after M.V. Lomonosov, Naberezhnaya Severnoy Dviny, 17, Arkhangelsk, Russia
[1] f.sokolova@narfu.ru ✉, ORCID: https://orcid.org/0000-0002-3063-6128
[2] e.trufanova@narfu.ru, ORCID: https://orcid.org/0009-0007-9460-1497

Abstract. This article examines the outcomes of the Barents Euro-Arctic cooperation, particularly its cross-border dimension, analyzing both the declared and the actual interests of the participating actors and their consequences in the context of Russia's national interests. The study is based on the concept of neoclassical realism. This approach allows for the examination of the formation and development of this multilateral format as the result of a combination of external conditions in the post-bipolar world and domestic political and economic transformations in Russia during the 1990s, and through the prism of the national interests of the member states. The study is based on official documents of the Barents Euro-Arctic Council, statistical materials from relevant institutions, and foreign policy documents of Nordic countries, primarily Norway as the initiator of the cooperation format. It is established that all participating states had an interest in developing the Barents Euro-Arctic cooperation. However, the officially declared goals and the actual objectives of the members of this framework differed significantly. The cooperation de facto narrowed to the humanitarian sphere. Alongside the positive results, there were obvious negative consequences for Russia's national interests. This cooperation reduced international tensions in the region for several decades and made it possible to sustain the socio-cultural, scientific, and educational sectors in Russia's northern regions during the country's deepest crisis of the 1990s and early 2000s. However, the issue of ensuring Russia's military security in the region was only postponed. The outcomes of this "soft power" influence manifested in the public consciousness of residents in Russia's northern territories. The prestige and political influence of Russia globally and in the region declined substantially. Due to low solvency and a lack of capacity for proportional co-financing, Russia played a subordinate role in this format of multilateral international cooperation.

Keywords: *Barents Euro-Arctic region, Barents cooperation, Russia, cross-border cooperation, neoclassical realism, national interests of the Barents Euro-Arctic cooperation states*

Introduction

The radical transformation of international relations, the escalation of political confrontation, and the stance adopted by Western states towards Russia are necessitating a re-evaluation of the forms, mechanisms and outcomes of multilateral international cooperation with Western countries in the North and the Arctic, in which our country has been involved. In this context, Barents Euro-Arctic cooperation is of particular interest, having long been regarded as one of the most successful examples of dialogue between Russia and the countries of Northern Europe. However, international processes in the Arctic over the past decade, the deterioration of relations

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with the Nordic countries, and the accession of Sweden and Finland to NATO make it essential to examine this format of international cooperation through the prism of its relationship with the national interests of the member states. Review of this experience will allow for a balanced assessment of the results of this cooperation and the limits of acceptable humanitarian engagement in the sphere of foreign policy.

The formation and development of the Barents Euro-Arctic Region has been analyzed in considerable detail by a number of experts, including V.I. Goldin (Goldin, 2019; Goldin, 2015; Goldin, Zaykov, Nielsen, 2015), K. Zimmerbauer (Zimmerbauer, 2013), Yu.F. Lukin (Lukin, 2010), K. Hossain and D. Cambou (Hossain, Cambou, 2018), G. Hønneland (Hønneland, 2017; Hønneland, 1998), J. Eriksson (Eriksson, 1995). Many of the authors mentioned were at the origins of the Barents cooperation and contributed to its development, which allows considering their works as evidence of direct participants in the process of the region's formation and reconstructing the logic of its creation. At the same time, a significant portion of these studies was conducted during a period when the neoliberal paradigm dominated Russian foreign policy, which largely determined the emphasis on the positive aspects of cooperation and its interpretation as an equal partnership.

Studies by Yu.P. Okunev (Okunev, 2012), E.Yu. Tereshchenko (Tereshchenko, 2018), I.A. Medby (Medby, 2022) and E. Korteniemi[1] are devoted to cooperation in various spheres within the Barents Region. In these works, Barents cooperation is generally considered outside the context of competing national interests and is interpreted primarily as an instrument for stabilization and trust building in the Nordic region. Interpreting the BEAR as a predominantly depoliticized and value-neutral space of interaction neglects the relationship between humanitarian practices and the foreign policy interests of the participating states. This necessitates further analysis of Barents cooperation and its outcomes in the context of its impact on Russia's national interests.

The aim of this article is to analyze the results of cooperation within the BEAR, which has predominantly covered the humanitarian sphere, and to identify their implications for Russia's national interests in the region.

Methods and materials

For many years, the Barents Euro-Arctic cooperation has been viewed by researchers through the prism of neoliberalism, which was consistent with Russia's foreign policy paradigm of the 1990s and early 2000s. The authors of this article will attempt to present the results of this interaction from the perspective of neoclassical realism, according to which states on the global stage are guided primarily by national interests, while foreign policy activities are shaped, on the one hand, by external systemic factors of the international environment (the nature of international relations, the balance of power on the global stage), and, on the other hand, by internal political, institutional, and personal variables (the elites' perceptions of external threats and oppor-

[1] Korteniemi E. Nordic Cooperation with Russia in Education and Research. Copenhagen: Nordic Council of Ministers. 2011; 109. URL: http://www.diva-portal.org/smash/get/diva2:701620/FULLTEXT01.pdf (accessed 29 November 2025).

tunities, the state's internal socio-economic condition, and the nature of the political decisions taken) (Konyshev, 2020).

With regard to the formation and development of the Barents Euro-Arctic Region, neoclassical realism makes it possible to explain the strategy of the Nordic countries, primarily Norway, as a rational response to the transformation of the international system. The end of the Cold War and the weakening of Russia in the early 1990s created a new structural configuration of global and Northern European security, which was perceived by the Norwegian political elite as a window of opportunity to expand their political influence over Russia by non-violent means, as reflected in the initiative to establish the Barents Euro-Arctic Region. In the context of declining military risks and the absence of a direct threat from Russia, Norway relied on the institutionalization of humanitarian and regional cooperation as a tool for long-term influence and stabilization of the peripheral space.

In turn, Russia of the 1990s also demonstrated a willingness to embrace external value systems and institutional models, as it sought to integrate into the European space and its system of political and economic values, albeit on an equal partnership basis, as reflected in the 1993 Russian Foreign Policy Concept[2]. Thus, the concept chosen for this study allows for a realistic assessment of the results of cooperation within the BEAR and their implications for Russia.

The aim was achieved through the use of general scientific research methods. In particular, the analytical method allowed for a dynamic presentation of the results of cooperation in key areas of interaction and the correlation of the declared goals of the association's participants with their foreign policy priorities. The synthesis method enabled the authors to formulate generalized conclusions and to present their own findings.

The source base for the study consisted of official documents of the Barents Euro-Arctic cooperation (the 1993 Kirkenes Declaration and the "anniversary" declarations of 2003, 2013, and 2023, chairmanship programs, and other documents), as well as official statistics from the Norwegian Barents Secretariat*. Particular attention was paid to sources from Norway, the initiator of the cooperation: Norwegian foreign policy documents were used (the 2008–2009 White Paper, which outlines the goals and reasoning for the country's foreign policy initiatives since the 1990s, and a report from the Norwegian Defence Research Establishment). These documents generally facilitate the achievement of the stated aims and objectives of the study.

Historical and political context of the creation of the Barents Euro-Arctic Region

In the context of the bipolar confrontation, the Arctic was viewed as a space of high politics and strategic competition, which led to its intensive militarization. Significant armed forces and

[2] Foreign Policy Concepts of the Russian Federation, 1993–2023. 2023; 122. URL: https://www.elibrary.ru/item.asp?id=50481108 (accessed 15 December 2025).

* The Norwegian non-governmental organization "Norwegian Barents Secretariat" (Barentssekretariatet IKS) was added to the list of "undesirable organizations" in Russia on February 25, 2026 (by decision of the Prosecutor General's Office of the Russian Federation; officially published/formalized via Ministry of Justice Order No. 293-r dated March 6, 2026). URL: https://gogov.ru/articles/unwanted-orgs; https://tass.ru/politika/26731765

elements of nuclear infrastructure were deployed in the region, including strategic nuclear submarines (Heininen, Lomagin, 2016). At the same time, the logic of the Cold War stimulated the development of economic activity and infrastructure, particularly in the Barents Sea region, which became an area of strategic security and was included in the sphere of national interests of the leading powers (Hossain, Cambou, 2018).

The preconditions for a shift in the architecture of international relations in the region were determined by comprehensive changes within the Soviet Union. In particular, Mikhail Gorbachev's reforms were launched. The state's foreign policy underwent significant changes aimed at abandoning the confrontational logic of the Cold War. The policy of "new thinking", put forward by M.S. Gorbachev, envisaged the democratization of public life, the reduction in ideological tensions, and the recognition of interdependence in international relations.

One of the key factors in the intensification of contacts between the USSR and the countries of Northern Europe was Mikhail Gorbachev's "Murmansk speech" of October 1, 1987. In an address to the international community, primarily the Northern European states, the Soviet leadership outlined the need to reduce military tensions in the Arctic and to move towards cooperative forms of interaction. The so-called "Murmansk Initiatives" proposed six areas of multilateral cooperation, including the creation of a nuclear-free zone in northern Europe, the restrictions on naval activity, the joint development of Arctic resources, the development of scientific cooperation and an environmental agenda, and the opening of the Northern Sea Route to foreign vessels (Panikar, Sokolova, 2026). These proposals set a new vector for the USSR's policy in the northern latitudes and became an important step toward institutionalizing multilateral cooperation in the region.

The initiative to establish the Barents Euro-Arctic Region (BEAR) belonged to Norway. In particular, the Norwegian Minister for Foreign Affairs, Thorvald Stoltenberg (who served as Minister of Defense from 1979 to 1981), proposed the term "Barents Region" at a conference in Tromsø on April 24, 1992, putting forward an initiative to institutionalize interaction between the northern territories of the Nordic states and Russia (Hønneland, 1998). Thorvald Stoltenberg played a decisive role in shaping this concept, which secured his status in historiography as a key architect and "founding father" of the Barents cooperation. However, other countries in the region also expressed interest in developing contacts. Finland considered the possibility of expanding the Northern Calotte framework to include Russian territories; however, the Norwegian side surpassed Helsinki by proposing its own institutional model for cooperation (Hønneland, 2017).

The Barents Euro-Arctic cooperation was formally established on January 11, 1993, with the signing of the Kirkenes Declaration in Kirkenes, Norway. The document, signed by the foreign ministers of Norway, Russia, Sweden, Finland, Denmark, and Iceland, as well as a representative of the European Commission, laid the institutional foundation for cooperation in the region. The

adoption of the Declaration led to the establishment of the Barents Euro-Arctic Council and the Barents Regional Council, formalizing the multilateral cooperation format[3].

The Barents Euro-Arctic cooperation was initially positioned as a mechanism for ensuring the sustainable development of the region, based on the principles enshrined in the 1992 Rio Declaration on Environment and Development. Priority objectives included maintaining regional stability and strengthening international peace and security through the development of bilateral and multilateral cooperation in the areas of economy and trade, science and technology, tourism, ecology, infrastructure, education, and culture, as well as the implementation of special projects aimed at improving the situation of indigenous peoples of the North[4].

Cooperation at the sub-national level initially covered the province of Lapland (Finland), the counties of Nordland, Troms and Finnmark (Norway), the county of Norrbotten (Sweden), and the Arkhangelsk and Murmansk Oblasts (Russia). The possibility of expanding it to include other administrative units was considered. This level of cooperation was intended to strengthen the socio-economic development of the participating regions, including creating conditions for trade, attracting foreign investment, improving transport and communications infrastructure, promoting contacts between people, and developing cultural ties[5].

Overall, the participants regarded the Barents Region cooperation initiative as part of the process of expanding European partnership and integration, with Russia's inclusion in these processes, and expressed their full "support for the ongoing reform process aimed at strengthening democracy, the market economy and local institutions"[6].

However, based on an analysis of the works of foreign experts who were directly involved in the BEAR's creation, statements by Norwegian politicians, and official documents defining Norway's foreign policy priorities, we will attempt to identify the true reasons for Norway's interest in creating the BEAR.

L. Heininen and D. Cambou rightly note that, following the collapse of the Soviet Union, the Nordic states "had the opportunity to reconsider their foreign policies to cooperate with, rather than confront, Russia, with the goal of reducing Cold War military tensions and increasing political stability in the European North" (Hossain, Cambou, 2018). J. M. Kvistad points to another equally important objective for the Norwegian government: to ensure the economic development of Northern Norway by using Russia as a trading partner[7].

However, Norway's key interest in creating the BEAR was geopolitical in nature. After the end of the Cold War, Norway, a member of NATO but not of the European Union, risked being sidelined in European politics. It also played a secondary role in the Council of the Baltic Sea

[3] Declaration on the Cooperation in the Barents Euro-Arctic region conference of foreign ministers in Kirkenes. URL: http://library.arcticportal.org/2810/ (accessed 13 December 2025).
[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] Kvistad J.M. The Barents Spirit. A Bridge-Building Project in the Wake of the Cold War. Forsvarsstudier. 1995; 49. URL: https://www.diva-portal.org/smash/get/diva2:227493/FULLTEXT01.pdf (accessed 15 December 2025).

States, established in 1992 (Aalto, Aasland, Anker et al., 2008). The Barents Region was intended to serve as a link not only between Russia and the Nordic countries, but also with Europe as a whole, which would enable Norway to assume a new, more significant role in the evolving European system of international relations (Zimmerbauer, 2013). Thus, Norway's initial interest in developing cooperation in the region was driven by a desire to increase its influence in Europe as a transmitter of European values to Russia, despite Russia's foreign policy course being oriented towards cooperation with the West.

Attempts to strengthen political influence over Russia through "soft" methods were also evident. The founders of the BEAR sought to create a common identity among residents and transform it from a "region on paper" into a "region of living identity" (Brown-Leonardi, 2010), which was reflected in the 2003 Kirkenes Declaration, where the need to strengthen the "Barents cultural identity" was emphasized[8].

The concept of "Pomor trade", actively advanced by Norway and referring to traditional forms of exchange between residents of northern Norway and Russian Pomors in the 18th–20th centuries, made a significant contribution to the creation of the Barents Region's image and the promotion of a common identity[9]. Expert and analytical centers, whose activities supported the formation and development of the Barents Euro-Arctic Region, analyzed the history of the North and the Arctic in order to highlight "those aspects of Russia's good-neighborly relations with the Nordic countries that are of the greatest interest for the formation of a northern identity"[10]. Appealing to shared historical experience served as a symbolic basis for the "revival" of cross-border ties and emphasized the cultural affinity of the regions. The topic of Pomor trade and the Pomor people in general was actively promoted by politicians. For example, at the ceremony to award an honorary doctorate at the Northern (Arctic) Federal University in 2011, Thorvald Stoltenberg declared that he was a Pomor, highlighting the historical ties between Arkhangelsk and Norway[11]. The history of the Pomor trade contributed to the formation of Barents identity through various cultural initiatives: Pomor festivals were held in Norway, the Pomor Museum was opened in Vardø, etc. Although the fact of economic interaction between Norwegians and Russians cannot be denied, the Norwegian narratives about the "Pomors" and "Pomor trade" created the ground for the development of separatist and nationalist ideas in the regions (Kornilenko, 2023). For example, ideas of separation from Russia were discussed among the population of the Arkhangelsk Oblast[12]. The desire to form a common regional identity for people who had lived on opposite

[8] BEAC 10 Year Anniversary Declaration. 2003. URL: https://barents-council.org/document/462_doc_BarentsSummitDeclaration.pdf (accessed 13 December 2025).
[9] Russia in Norwegian memory politics. URL: https://russiancouncil.ru/analytics-and-comments/columns/arcticpolicy/rossiya-v-norvezhskoy-politike-pamyati (accessed 12 November 2025).
[10] Carrillo J.L.M. Regional security-building in Europe: the Barents Euro-Arctic region. Umeå: Umeå universitet. 1998; 55. URL: https://www.diva-portal.org/smash/get/diva2:227493/FULLTEXT01.pdf (accessed 12 November 2025).
[11] Thorvald Stoltenberg: «Ja — Pomor». URL: https://www.thebarentsobserver.com/news/thorvald-stoltenberg-ja-pomor/383152 (accessed 15 December 2025).
[12] Who are the Pomors and why do they want to separate. URL: https://www.kommersant.ru/doc/1947315 (accessed 02 January 2026).

sides of the border for centuries, with different political, cultural, and religious traditions, was a potential field for "soft power", especially on the part of Norway.

This is confirmed by Norway's official foreign policy documents, in particular the 2008–2009 White Paper, which provides a retrospective analysis of the country's foreign policy priorities in the 1990s[13]. An analysis of the document reveals that the formation of the BEAR became a tool for addressing specific national objectives within the new post-bipolar reality. According to Norwegian military experts, following the collapse of the Soviet Union, the direct military threat was replaced by a more complex and uncertain security environment, in which short-term risks were linked to internal instability in Russia, while long-term risks were associated with the possible restoration of its military capabilities[14]. Engaging Russia in cooperation was intended to minimize the threat of military confrontation. Moreover, such "soft stabilization" created a predictable environment necessary for protecting Norway's key national interest — sovereign control over maritime resources (oil, gas, and fisheries) on the basis of international law[15]. However, this agenda never replaced, but merely complemented, the hard security architecture; the key cornerstones of the Oslo policy remained NATO and the transatlantic alliance as a guarantee of deterrence[16]. Thus, the Barents Region was initially designed as a pragmatic element of Norway's foreign policy strategy, where "soft" security institutions were linked to entirely realistic goals of protecting sovereignty and national interests.

This is also confirmed by an analysis of the defense policies of the Nordic countries, which viewed Barents Euro-Arctic cooperation as part of a broader regional security architecture in which "hard" and "soft" instruments were institutionally separated. The positions of the Nordic countries demonstrate a clear orientation toward Euro-Atlantic mechanisms of collective defense and deterrence. Thus, after the end of the Cold War, Finland and Sweden gradually integrated their military strategies into the framework of cooperation with NATO and collective defense, abandoning their previous neutrality in favour of enhanced collaboration and joint operations under the auspices of the alliance (Friis, Tamnes, 2024; Mezhevich, Nogaev, 2024). The military-political dimension of the Nordic countries' strategies evolved significantly towards deeper integration with the North Atlantic Alliance, while the Barents Euro-Arctic cooperation became part of the Northern European policy framework as an element of "soft stabilization" of the bor-

[13] Report No. 15 to the Storting (2008-2009). Interests, Responsibilities and Opportunities. The main features of Norwegian foreign policy. Recommendation from the Ministry of Foreign Affairs. URL: https://www.regjeringen.no/en/documents/report-no.-15-to-the-storting-2008-2009/id548673/ (accessed 13 January 2026).

[14] Norwegian Defence Reforms of the 1990s, FFI rapport, 2002. URL: https://kudos.dfo.no/documents/50944/files/33391.pdf (accessed 13 January 2026).

[15] Report No. 15 to the Storting (2008-2009). Interests, Responsibilities and Opportunities. The main features of Norwegian foreign policy. Recommendation from the Ministry of Foreign Affairs. URL: https://www.regjeringen.no/en/documents/report-no.-15-to-the-storting-2008-2009/id548673/ (accessed 13 January 2026).

[16] Ibid.

der region, deliberately separated from the sphere of military security, but functionally complementing it.

Russia's active involvement in Nordic cooperation was driven by a number of factors that emerged in the country in the late 1980s and early 1990s. Firstly, the disintegration of the bipolar system of international relations and the collapse of the Soviet Union. Secondly, a belief that radical transformations within the country would allow Russia to integrate into the European space on the basis of equal partnership. Thirdly, a change in the political elite, whose actions were often guided not by the country's national interests, but by personal ambitions for power. Fourthly, the country's profound socio-economic crisis. Finally, the consequences of radical liberal reforms, which were implemented according to Western models without taking the country's specific circumstances into account. The focus on economic independence of the constituent entities of the Russian Federation and the weakening of state support had disastrous implications for subsidized regions. Territories, previously dependent on centralized supply and planned resource allocation, found themselves in an institutional vacuum and economic isolation. In particular, many regions of Northern Russia were forced to develop strategies for adapting to new conditions and seek ways to survive and develop independently. One of the solutions to this problem was to establish partnerships with neighboring countries, which often took the form of sponsorship. For example, in December 1991, Norway, as part of its "Neighbour Aid" campaign, allocated 20 million kroner for the development of Russia's north-western regions (Eriksson, 1995).

Thus, the establishment of Barents Euro-Arctic cooperation was driven, on the one hand, by a radical transformation of the international relations system and the disintegration of the bipolar system following the collapse of the Soviet Union, and, on the other hand, by processes taking place within Russia itself. Formally, the Barents Euro-Arctic Region was conceived as a neoliberal project; however, its creation was based on the national interests of European states, primarily Norway. It provided Russia with short-term benefits, but in the medium and long term, it undermined Russia's national interests and contributed to a decline in the country's prestige and political weight on the global stage. The project also left unresolved the pressing issue of ensuring national security in the military sphere, which Russia hoped to address when these initiatives were launched.

Results of the Barents cross-border cooperation[17]

Since its formal establishment in 1993, cooperation in the Barents Region developed across a broad range of areas. Officially, this cooperation covered economy, ecology, transport, humanitarian and cultural exchanges, and other areas, as set out in strategic documents (Fig. 1).

Kirkenes Declaration, 1993	Kirkenes Declaration, 2003	Kirkenes Declaration, 2013	The Barents Program, 2019-2023	Program of the Finnish chairmanship, 2021-2023
environment	sustainable development	economy	international competitiveness	sustainability
economic cooperation	economy	finance	climate and environment	environment
science and technology	science and technology	people-to-people contacts	culture	people-to-people contacts
infrastructure	infrastructure	knowledge	people-to-people contacts	transport and logistics
indigenous peoples	indigenous peoples	environment	youth	
human contacts	people-to-people contacts	culture	infrastructure	
cultural relations	culture	health	transport and communication	
tourism	tourism	tourism		

Fig. 1. Goals set out in the Barents cooperation documents[18].

However, even at the initial stage of interaction, despite the breadth of the officially stated areas, there was a tendency to prioritize humanitarian and socio-cultural initiatives, as they were the most flexible, seemingly less politicized, and best adapted to influencing the public consciousness of the region's residents. As Yu.F. Lukin rightly notes, in the Barents Euro-Arctic Region, "cultural ties, contacts in education and science developed most significantly" (Lukin, 2010).

Cultural cooperation underwent active growth within the Barents Region, with its agenda covering a wide range of initiatives. This area proved to be most receptive to cross-border forms of interaction, creating a space for regular exchanges, joint projects and direct dialogue between the inhabitants of Russia's northern territories and the countries of Northern Europe. The cultural sphere became one of the most effective tools for building a transnational regional community, where the emphasis on shared culture and history served as the foundation for further deepening cooperation and strengthening humanitarian ties.

[17] According to the Recommendation of the Committee of Ministers to member States of the Council of Europe on the development of trans-frontier co-operation between territorial communities or authorities in the cultural field, trans-frontier co-operation was understood as any joint action aimed at strengthening and developing good-neighborly relations between territorial communities or authorities within the jurisdiction of two or more contracting parties, and the conclusion of any treaty or agreement necessary for this purpose. Source: Recommendation No. R (2000) 1 of the Committee of Ministers to member States of the Council of Europe. URL: https://docs.cntd.ru/document/902012239 (accessed 03 February 2026).

[18] Compiled by the authors based on data: Declaration on the Cooperation in the Barents Euro-Arctic region conference of foreign ministers in Kirkenes. URL: http://library.arcticportal.org/2810/ (accessed 13 December 2025); BEAC 10 Year Anniversary Declaration, 2003. URL: https://barents-council.org/document/462_doc_BarentsSummitDeclaration.pdf (accessed 13 December 2025); Declaration on the 20th Anniversary of the Barents Euro-Arctic Cooperation, 2013. URL: https://barents-council.org/document/Barents_Summit_Declaration_2013.pdf (accessed 13 December 2025); The Barents Program 2019–2023. URL: https://barents-council.org/files/Barents-Programme/Barents_program_2019-2023_adopted_24_May_2018.pdf (accessed 13 December 2025); Program of the Finnish chairmanship. The Finnish Presidency of the Barents Euro-Arctic Council 2021–2023. URL: https://barents-council.org/document/Barents_esite_en_A4.pdf (accessed 13 December 2025).

One of the key areas of cooperation was large-scale cultural events and festivals. For example, the annual Barents Spektakel, held since 2004, brought together artists, musicians, and contemporary art figures from Russia, Norway, Finland, and Sweden, creating sustainable professional contacts. The event took place in Kirkenes, Norway, which provided the town with an opportunity for economic development after the closure of its main mines. The annual organization of various festivals (the Barents Spektakel, the Barents Bird Festival, the Pomor Festival, etc.) contributed to the development of cultural diversity and the formation of a perception of the northern region as a single cultural and historical area (Okunev, 2012).

The Norwegian Barents Secretariat served as a key institutional instrument for supporting humanitarian initiatives in the Barents Euro-Arctic Region, providing organizational and financial support for cross-border projects (Tevlina, 2012). At the same time, the Russian-Norwegian vector clearly predominated in the structure of the Barents cooperation (Bestuzheva, 2014), which determined the focus specifically on bilateral programs. Since its establishment in 1993, the Secretariat supported the implementation of over 60,000 projects, with total co-financing exceeding 300 million Norwegian kroner (Fig. 2).

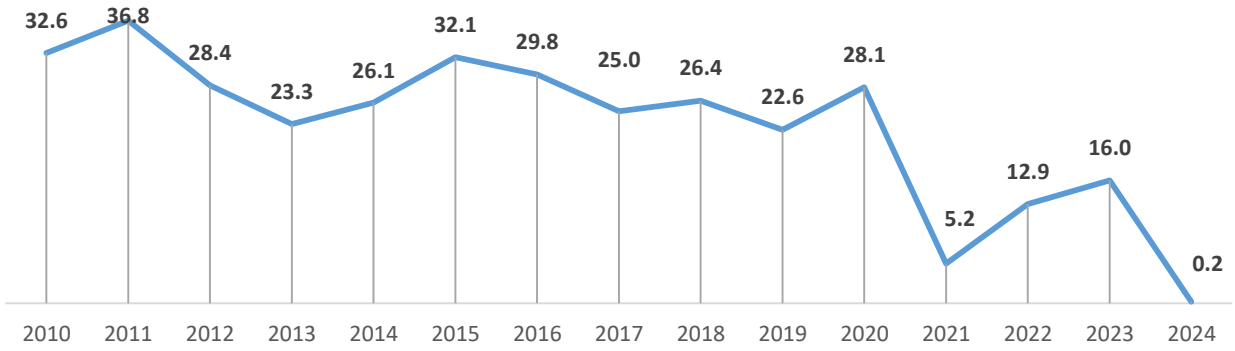


Fig. 2. Project funding volumes by the Norwegian Barents Secretariat*, 2010–2024, million kroner [19].

One of the earliest practical outcomes of the institutionalization of the Barents cooperation was the establishment of academic channels of interaction. Cooperation in education and science developed actively, involving student exchanges, the creation of language course programs, and the introduction of dual degree programs. For example, in April 1993, the Norwegian-Pomor Center began operating at the Pomor State University (PSU) in Arkhangelsk. It served as an information and coordination platform for students and lecturers, facilitating the implementation of academic mobility programs, joint research events, and the development of partnerships with

*The Norwegian non-governmental organization "Norwegian Barents Secretariat" (Barentssekretariatet IKS) was added to the list of "undesirable organizations" in Russia on February 25, 2026 (by decision of the Prosecutor General's Office of the Russian Federation; officially published/formalized via Ministry of Justice Order No. 293-r dated March 6, 2026). URL: https://gogov.ru/articles/unwanted-orgs; https://tass.ru/politika/26731765

[19] Compiled by the authors based on data: Statistics on Projects. URL: https://barents.no/en/prosjekt (accessed 13 December 2025).

Northern European universities[20]. Student and academic staff exchanges became the main forms of cooperation. Since 1995, the Barents Plus program was launched, aimed at developing student and academic staff exchanges between higher education institutions in the Russian and Norwegian parts of the Barents Region (Salo, Vasaliev, 2016). Approximately 80 exchanges of students and 15 exchanges of lecturers between Russia and the Nordic countries were financed annually (until the end of cooperation in 2022)[21]. The North2North program was also implemented between universities in north-western Russia and northern Norway. The formation of a pan-European higher education area following the signing of the Bologna Declaration in 1999 was also reflected in the Barents cooperation agenda. In this context, the relevant BEAR working group initiated discussions on the creation of a coordinated research and educational space for the region, and this proposal received support from universities in the Barents Region (Goldin, 2019).

The scale of cooperation in the Barents Region at later stages can be considered using the example of the Northern (Arctic) Federal University (NArFU), the largest Russian educational institution in the BEAR, which was joined by PSU in 2010. Data on the number of students who participated in academic mobility activities are presented in Fig. 3. As can be seen, the overwhelming majority of the university's students participating in academic exchange programs travelled to countries of the Barents Euro-Arctic Region.

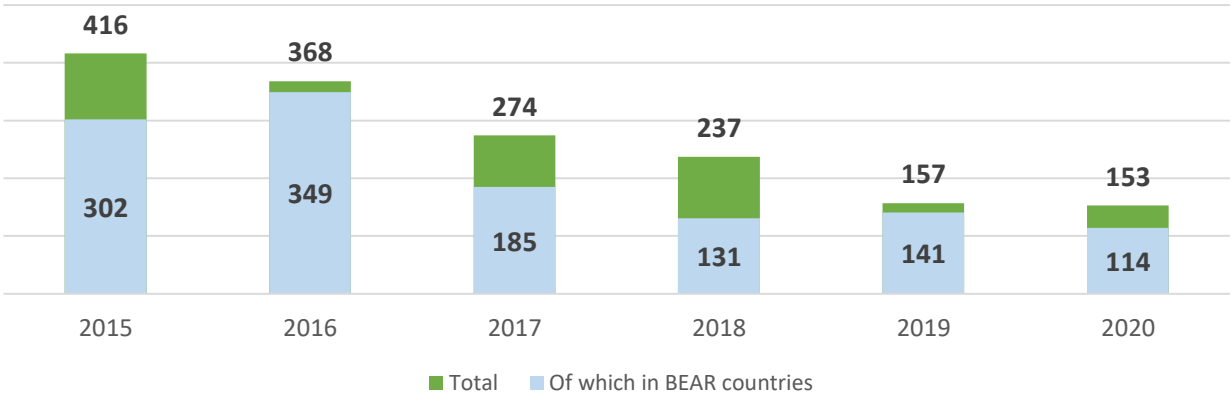


Fig. 3. Participation of NArFU students in academic mobility programs, 2015–2020, number of students[22].

[20] History of ASPI-PSU. URL: https://library.narfu.ru/index.php?option=com_content&view=article&id=562&Itemid=627&lang=ru (accessed 24 January 2026).

[21] Korteniemi E. Nordic Cooperation with Russia in Education and Research. Copenhagen: Nordic Council of Minister. 2011; 109. URL: http://www.diva-portal.org/smash/get/diva2:701620/FULLTEXT01.pdf (accessed 29 November 2025).

[22] Compiled by the authors based on data: Report on the implementation of the development program of the Northern (Arctic) Federal University named after M.V. Lomonosov in 2015. URL: https://narfu.ru/upload/medialibrary/884/safu-otchet-2015-rasshirennyy.pdf (accessed 12 December 2025); Report on the implementation of the development program of the Northern (Arctic) Federal University named after M.V. Lomonosov in 2016. URL: https://narfu.ru/upload/medialibrary/d46/safu-otchet-pr-2016.pdf (accessed 12 December 2025); Report on the implementation of the development program of the Northern (Arctic) Federal University named after M.V. Lomonosov in 2017. URL: https://narfu.ru/upload/medialibrary/f64/Programma-Otchet-Rasshirennyy-2017.pdf (accessed 12 December 2025); Report on the implementation of the development program of the Northern (Arctic) Federal University named after M.V. Lomonosov in 2018. URL: https://narfu.ru/upload/medialibrary/997/SAFU-Otchet-2018-dlya-sayta.pdf (accessed 12 December 2025); Report on the implementation of the development program of the Northern (Arctic) Federal University named after M.V. Lo-

Academic collaboration between researchers from north-western Russia and the northern regions of Norway, Sweden, and Finland (Nasonova, 2013) played an important role in the Barents Euro-Arctic cooperation, resulting in a number of joint academic works on the history and culture of the region. One of the most significant outcomes of this collaboration was the seminal work "The Barents Region: A Transnational History of Subarctic Northern Europe", published in 2015 (Elenius, 2015). The monograph was the result of sustained collective work by an international research team comprising 27 authors, including representatives from Russia, Norway, Finland and Sweden (Goldin, 2015).

Cooperation in the fields of science and higher education facilitated the formation of sustainable long-term ties between universities in the Barents Region, an important outcome of which was a series of large-scale joint research projects. In particular, in 2007, the University of Tromsø and the Pomor State University supported the Norwegian-Russian project "Neighbourly Asymmetry: Norway and Russia 1814–2014", which involved leading researchers from both countries (Goldin, Zaikov, Nielsen, 2015; Goldin, Sokolova, 2022). The work analyzed the shared historical experience, forms of contacts, and cooperation in the North over two centuries. Significant academic achievements include the publication of a two-volume encyclopedia of the Barents Region, including 415 articles devoted to the historical, socio-cultural, economic, and political aspects of the BEAR's development (Olsson M.-O., 2016a; Olsson M.-O., 2016b).

The financial contribution made by the countries of Northern Europe to the development of Russian higher education institutions became a significant element of cooperation. For a long time, the Secretariat of the Barents Euro-Arctic Region served as a key international partner of the Pomor State University. From 2000 to 2004, more than 70% of the funds obtained from international sources came from institutions and organizations of Nordic countries. PSU received 11.7 million rubles from the BEAR Secretariat for research projects[23], accounting for approximately 35% of all funds the university raised from international institutions. This example demonstrates that educational and scientific cooperation within the BEAR framework was clearly practical and mutually beneficial, simultaneously contributing to the strengthening of humanitarian ties and the development of Russian science, as well as expanding the influence of Nordic partners in the Russian academic space.

Youth cooperation became one of the most actively promoted areas of collaboration in the Barents Euro-Arctic Region. Youth exchange programs, joint educational projects, summer schools, and cultural and sporting events facilitated the development of contacts between young people of the region. The activities of the Barents Regional Youth Council, established in 2004 and functioning primarily as a forum for discussion and a representative body, played a special role.

monosov in 2019. URL: https://narfu.ru/upload/medialibrary/249/SAFU-Otchet-o-realizatsii-PR-za-2019-god.pdf (accessed 12 December 2025); Report on the implementation of the development program of the Northern (Arctic) Federal University named after M.V. Lomonosov in 2020. URL: https://narfu.ru/upload/medialibrary/2a4/SAFU-imeni-M.V.Lomonosova.-Otchet-o-realizatsii-Programmy-razvitiya-v-2020-godu.pdf (accessed 12 December 2025).

[23] PSU Archive. Research activities at Pomor State University named after M.V. Lomonosov in 2000–2004; 32.

One of the Council's goals was "to strengthen the Barents identity among the region's young people by establishing contacts across cultural and geographical boundaries"[24], reflecting a desire to create a symbolic space of community. In practice, this was achieved mainly through communication and expert collaboration, rather than through large-scale practical projects. Nevertheless, even in this format, youth cooperation served a specific purpose. Regular communication, participation in meetings, and involvement in the pan-European discussion space contributed to the expansion of the cultural and professional horizons of participants, the formation of sustainable cross-border contacts, and the reinforcement of a positive perception of the Nordic countries as an open and attractive space for self-fulfillment, stimulating educational and migration mobility. It is worth noting that the funding for youth cooperation within BEAR had an asymmetrical structure. The main contribution was provided by Norway: the Ministry of Foreign Affairs allocated more than 20 million kroner annually to the northern counties for cross-border projects (Averyanova, 2014).

An analysis of cultural, youth, and scientific-educational cooperation within the BEAR framework reveals the high intensity of humanitarian interactions. These forms of cooperation facilitated the establishment of sustainable cross-border contacts, the development of networking between sub-national and non-state actors, and the creation of a favorable environment for dialogue in the northern regions of Russia and Northern Europe.

Although the most intensive cooperation in the Barents Euro-Arctic Region took place in the socio-cultural, scientific, and educational spheres, interaction in other areas is also evident. The environmental dimension became one of the priority areas of Barents Euro-Arctic cooperation due to increasing environmental risks. Official documents, including the Kirkenes Declaration[25], emphasize the need to restore areas affected by the operation of nuclear facilities. Particular attention was paid to the Russian part of the Barents Euro-Arctic Region, where, in the middle of the 20th century, a significant level of radioactive contamination accumulated as a result of atmospheric nuclear tests, the sinking of nuclear submarines, and the burial of reactors in the Barents Sea and near the Novaya Zemlya archipelago (Heininen, 2016).

A practical tool for environmental cooperation in the Barents Euro-Arctic Region was the identification and elimination of so-called environmental "hot spots", defined as polluted industrial facilities and localized sources of environmental damage posing a threat to public health and ecosystems[26]. In 2003, a joint expert group presented a report on environmental problems in the Russian part of the Barents Region, identifying 42 "hot spots". The implementation of clean-up measures was funded by the owners of the enterprises, federal and regional authorities in Russia,

[24] The Barents Youth Program 2021–2024. URL: https://www.barentsyouth.org/the-barents-youth-program-2021-2024.6512651-575768.html (accessed 11 December 2025).
[25] Declaration on the Cooperation in the Barents Euro-Arctic region conference of foreign ministers in Kirkenes. URL: http://library.arcticportal.org/2810/ (accessed 13 December 2025).
[26] Hot Spots Tour. URL: https://storymaps.arcgis.com/stories/8a14b67ba90f4f06bb6b38f80488ded3 (accessed 24 January 2026).

and with additional support from a specialized subgroup on "hot spot" elimination[27]. As of 2020, 12 problematic sites had been completely removed from the list, 3 sites had been partially removed, while another 27 "hot spots" and 3 partial sites remained classified as environmentally unfavorable areas[28]. Overall, this format of interaction demonstrated the applied nature of the Barents cooperation and was limited to Russian territory. Work in this area was suspended in 2022.

Despite the significant natural resource potential of the Barents Euro-Arctic Region, economic cooperation never became its sustainable foundation. By the end of the 20th century, the focus of the participants gradually shifted from economic objectives to the "human dimension", while cross-border business partnerships, which had been the subject of high expectations in the 1990s, remained difficult to implement (Elenius, 2015). One of the reasons for this, according to Northern European researchers, was the economic structure of the regions involved in the Barents cooperation: the predominance of large-scale industrial production and the service sector reduced the demand for institutions of interregional economic cooperation[29]. Large enterprises generally did not require intermediaries when establishing foreign economic relations, while the service sector was significantly more developed in Northern European countries than in Russian regions, further limiting the potential for cooperation. Russian researchers attribute the underdeveloped nature of economic cooperation in the region to trade and administrative barriers: a complex visa regime for businesses, inefficient customs procedures, and complicated import regulations, which objectively necessitated a transition to a more liberalized and preferential trade regime between the countries of the region (Plastinin, Siluanova, 2012). The implementation of large-scale investment projects was also limited. In fact, the only example was an attempt to develop the Shtokman field, in which the Norwegian company StatoilHydro (now Equinor) owned 24% of the shares in the joint venture; however, the project was never launched[30]. Consequently, as Y.F. Lukin notes, economic and political relations in the region were characterized more by competition and the pursuit of unilateral benefits than by sustainable partnership (Lukin, 2010).

Cross-border tourism occupied a special place within the framework of economic cooperation in the Barents Euro-Arctic Region, being regarded as one of the few practical areas of collaboration. Since the mid-2010s, there was an increase in tourist trips by Russian citizens to the northern European countries of the BEAR, while tourist flow from Norway, Sweden, and Finland to Russia, conversely, showed a downward trend (Tereshchenko, 2018). At the same time, the develop-

[27] Work Programme. Sub-group on the Hotspots Elimination 2020. URL: https://barents-council.org/files/Working-Groups/SHE_Work_Programme_2020-23_RU.pdf (accessed 24 January 2026).
[28] Archive material: Environmental Hot Spots excluded from the Barents List. URL: https://barents-council.org/working-groups/environment/hot-spots/barents-environmental-hot-spots/check-out-environmental-hot-spots-excluded-from-the-barents-list (accessed 24 January 2026).
[29] Barents 2050 — Impacts, opportunities, and risks of climate change and climate change mitigation — presentation, 2017. URL: https://publications.vtt.fi/pdf/technology/2017/T316.pdf (accessed 05 January 2026).
[30] Shtokman has finally been shared. URL: https://www.vedomosti.ru/newspaper/article.shtml?2007/10/26/135051 (accessed 05 January 2026).

ment of tourism links continued to hold significant potential for the region, contributing to the modernization of transport infrastructure, the expansion of cultural contacts between residents of the northern territories, and the attraction of additional investment.

Discussions on the visa regime as a means of facilitating cross-border contacts became a key element of tourism cooperation in the Barents Euro-Arctic Region. In practical terms, a number of steps were taken to liberalize travelling. In 2008, the Pomor visa was introduced, simplifying the visa application process for residents of the Arkhangelsk and Murmansk Oblasts; in 2012, a visa-free regime was established for residents of a 30-kilometer border zone, which led to an increase in cross-border mobility (Zaretskaya, 2016). At the same time, a political discussion on the issue of further liberalization of the visa regime developed. The idea of easing the visa regime was first raised in 2008 at a meeting of the Minister of Foreign Affairs of Norway, J.G. Støre, and the Governor of the Murmansk Oblast, Y. Evdokimov; later, in 2018, the Norwegian province of Finnmark, during its chairmanship of the Barents Regional Council, put forward an initiative to introduce a visa-free regime in the BEAR[31]. Taking into account the restrictions arising from the Schengen Agreement, a compromise option of a 72-hour visa-free stay within the region was proposed[32]. Despite active discussions, these initiatives did not lead to the establishment of a fully-fledged visa-free regime in the Barents Euro-Arctic Region.

The development of inter-municipal contacts and partnerships between towns and municipalities was an important addition to inter-state and inter-regional cooperation in the Barents Euro-Arctic Region. Russian administrative units, together with Norwegian, Finnish, and Swedish regions, participated in project and dialogue-based initiatives aimed at strengthening practical ties, exchanging experiences, and developing regional infrastructure. Since 1993, the Arkhangelsk Oblast concluded 11 agreements with Northern European regions (8 with Norway, 2 with Finland, and 1 with Sweden)[33], while the Murmansk Oblast concluded 19 agreements (13 with Norway, 4 with Finland, and 2 with Sweden)[34]. Regional councils and working groups helped to coordinate joint projects and build trust at the local government level, while individual localities participated in partnership programs with cities abroad, opening up further opportunities for cultural, educational and social exchanges (Boldyreva, Boldyrev, Cherednikova, 2023). Activities at the municipal level complemented the formal framework of the Barents cooperation and reflected active international regional interaction that went beyond the scope of intergovernmental agreements. Initiatives were mainly focused on developing cultural and social ties, as well as on exchanging best

[31] The Barents cooperation aims for visa-free travel. Critics consider this a gamble. URL: https://thebarentsobserver.com/ru/granicy-obshchestvennost/2018/10/barencevo-sotrudnichestvo-stavit-celyu-bezvizovyy-rezhim-kritiki (accessed 24 January 2026).

[32] Norwegians propose introducing a visa-free regime throughout the Barents Region. URL: https://nao24.ru/obshestvo/9480-norvezhcy-predlagayut-vvesti-bezvizovyy-rezhim-na-vsey-territorii-barenc-regiona.html (accessed 24 January 2026).

[33] International and interregional relations of the Arkhangelsk Oblast. URL: https://dvinaland.ru/foreign/ (accessed 25 January 2026).

[34] Register of international cooperation agreements. URL: https://npa.gov-murman.ru/soglasheniya/reg_international_coop/ (accessed 25 January 2026).

practices in various fields. In practice, active cooperation was maintained primarily in regional capitals (Arkhangelsk, Murmansk, etc.), while in other municipalities it was limited to establishing contacts and exchanging information, and in a number of areas it was suspended for financial reasons[35]. Thus, within the Russian regions participating in the Barents cooperation, the development of partnership and inter-municipal ties was uneven, reflecting differences in financial capacity, administrative resources and the degree of involvement of individual municipalities in international cooperation.

The Barents Euro-Arctic cooperation was characterized by a predominantly humanitarian dimension, while economic interaction was limited and fragmented. The most sustainable and institutionalized forms of interaction emerged in the areas of culture, education, science, and youth exchanges, where cross-border projects facilitated the formation of close horizontal ties between the regions and populations of the Barents Region countries. For Russia, participation in the Barents cooperation during the 1990s and 2000s had significant social and economic effects, primarily at the regional level. The Arkhangelsk Oblast and other north-western regions gained access to educational programs, academic exchanges, grant funding, and infrastructure initiatives, which contributed to the development of human capital, increased youth mobility, and the regions' inclusion in international networks. For example, in 2010–2015, under the Kolarctic[36] cross-border cooperation program, project applications from the Arkhangelsk Oblast received funding totalling over 19 million euros, of which approximately 700,000 euros were allocated to the Northern (Arctic) Federal University (Kudryashova, Zarubina, 2018). Overall, the Barents Euro-Arctic cooperation was serving a compensatory and stabilizing function for Russia's northern regions for several decades, ensuring an influx of financial and expert resources and promoting the preservation of scientific, educational, and cultural potential. It supported the integration of Russian territories into international humanitarian and academic networks, particularly during periods when federal support declined.

A significant contribution was also made to improving the environmental situation, including through the implementation of projects to eliminate environmental "hot spots" and reduce transboundary environmental risks. Inter-municipal links and town-twinning arrangements played a considerable role in the formation of a dense network of interactions, enabling the Barents cooperation framework to be implemented into specific cultural, educational, and social initiatives at the local community level. Taken together, the mechanisms of Barents cooperation facilitated the development of the socio-cultural and scientific-educational spheres in Russia's northern regions

[35] On the role and significance of twinning between cities in the Arkhangelsk Oblast. URL: https://www.mid.ru/upload/archive/bd59164cfcf3a5d20486be8385214921.docx (accessed 25 January 2026).

[36] Although the Kolarctic program was not part of the institutional structure of the Barents Euro-Arctic cooperation and was implemented within the framework of the EU's cross-border cooperation policy, it was developed in close conjunction with the Barents cooperation. The participation of Russia's northern regions in the Kolarctic was possible due to the cross-border networks previously established within the BEAR, institutional trust, and accumulated experience in humanitarian, scientific, and educational interaction.

during the post-Soviet period, helped to build trust among residents of border areas, and strengthened the stability and predictability of cooperation in Northern Europe.

At the same time, an analysis of cooperation practices within the BEAR reveals its dual nature. Alongside the obvious mutually beneficial outcomes, a number of initiatives served as "soft power" instruments, primarily on the part of Northern European states (Sokolova, Trufanova, 2025). The asymmetry of financial and institutional resources, Norway's dominant role in shaping the agenda, and the priority given to the "human dimension" of cooperation have contributed to the formation of a favorable image of Northern Europe and the consolidation of normative and value-based orientations that did not always coincide with the interests of the Russian side. As a result, not all forms of interaction led to sustainable mutually beneficial effects, and some projects took the form of unilateral influence disguised as depoliticized regional cooperation.

It is worth noting the asymmetrical outbound mobility of students in the Barents Region (Fig. 3). Education (more specifically, academic exchanges and the provision of educational opportunities to international students) is an important mechanism for exercising "soft power". Students participating in exchange programs in another country "will gradually become familiar with the scientific and cultural achievements of the host country, along with learning the language, and will return with acquired knowledge and personal relationships" (Manukyan, 2023). They can become transmitters of the culture and values of the country where they studied. G. Hønneland also highlighted this potential within the BEAR, calling these students — young Russians who speak Northern European languages and are familiar with Western business practices — the "Barents generation" (Hønneland, 1998). It is noteworthy that the author includes only residents of Russia in this "generation", which points to a direct influence from Northern European states, rather than the other way round.

It is well known that "soft power" is aimed primarily at strengthening influence over another state by creating an attractive image of one's own culture, values, and political ideas to advance one's national interests. At the same time, it fosters in the population of the target country a sense of inconsistency between their own country and the proposed values. The extent to which Norway has succeeded in influencing the public consciousness of residents of Russia's northern regions, particularly young people and intellectual workers, is demonstrated by a series of studies by a professor at NArFU (a professor at the Pomor State University in the 1990s and early 2000s), based on an analysis of media publications (Repnevskiy, 2010; Repnevskiy, 2013). The author rightly asserts that "during the last one and a half decades of the 20th century and the beginning of this century... due to the active efforts of scientists and journalists, numerous personal, business, and friendly contacts... a sense of community and involvement between the two countries in everything happening in the Arctic has emerged" (Repnevsky, 2010). The author writes that residents of Russia's regions began to feel "admiration for the fact that Norway has been ensuring the well-being of its citizens for such a long historical period" (Repnevskiy, 2010), and that in the regional public consciousness, Norway was perceived as "a democratic country that helps to develop

democracy for all those who want it abroad" (Repnevskiy, 2013). However, the author himself rightly acknowledges the idealistic nature of this image (Repnevskiy, 2013).

Nevertheless, the effects of "soft power" were not one-sided. The attractive image of a "welfare society" attracted Russians and resulted in an increase in the number of migrants from Russia to Norway (Fig. 4). The rise in the number of people of Russian origin in the countries of Northern Europe contributed to the growth and institutionalization of Russian diasporas. The expansion of Russian-speaking communities, the implementation of cultural initiatives, educational projects, and the development of professional networks enabled Russian citizens to exert a certain influence on the socio-cultural and scientific-educational spheres of Northern Europe.

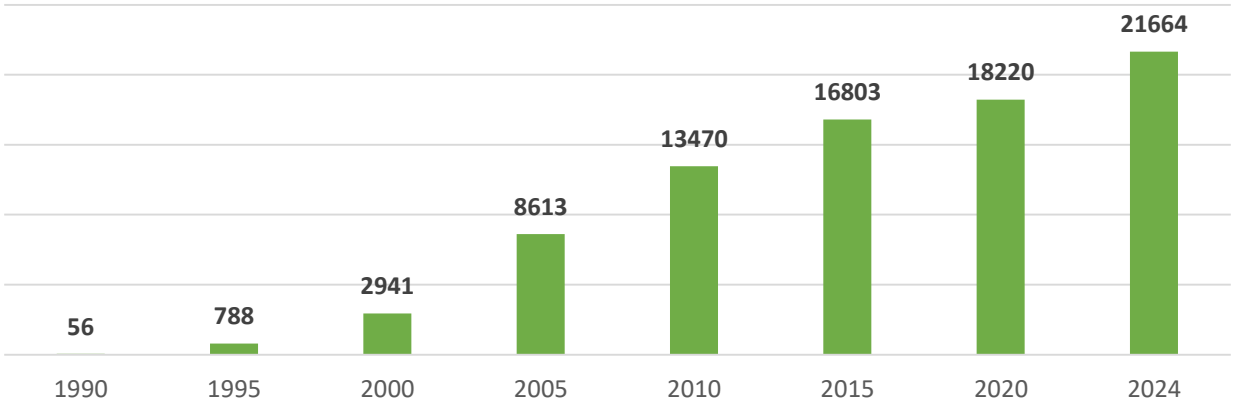


Fig. 4. Number of migrants from Russia to Norway, 1990–2024, people[37]

Overall, cooperation within the Barents Region, while contributing to the formation of a positive image of the countries of Northern Europe, has, to a greater extent, stimulated the outflow of human capital from Russia rather than facilitated its professional fulfilment or the establishment of a sustainable channel for "soft power" influence on Russia.

Furthermore, as Russians lived in Northern European countries for a long period of time, they began to perceive the values of their host communities more realistically and projected their vision of life in these countries onto Russia. Above all, their hopes for full integration into the professional spheres of these countries in the context of the Bologna Process remained unfulfilled. For example, the Russian-speaking community in Norway in the mid-2000s was characterized by a high level of education — 47% of migrants had higher education; however, only a small proportion found employment in their field of specialization (Bagreeva, 2014). The majority were employed in the service sector, the hotel and restaurant industry, and the social sector, often starting their careers in low-skilled positions or remaining outside the labor market for long periods (Bagreeva, 2014).

Gradually, a more realistic view of Barents Euro-Arctic cooperation and the true intentions of its founders was formed under the influence of the practical military activities of the Nordic countries. As noted earlier, Norway was one of the founding members of NATO and continued to

[37] Compiled by the authors based on data: Immigrants and Norwegian-born to immigrant parents. URL: https://www.ssb.no/en/statbank/table/05184/tableViewLayout1/ (accessed 19 December 2025).

rely on leading Atlantic powers in its security policy. Already in the early 1990s, Sweden and Finland were consistently integrated into Euro-Atlantic security structures. In 1992, they became observers in the North Atlantic Cooperation Council, and in 1994, they joined NATO's Partnership for Peace program, thereby opening the way to regular consultations and deeper military cooperation with the Alliance. Subsequently, both countries participated in operations and missions under the auspices of NATO, as well as in the Response Forces, which contributed to increasing their interoperability with NATO. In addition to institutional rapprochement with NATO, the Nordic countries actively developed practical military-political cooperation in the 1990s and 2000s, which was reflected in regular participation in joint exercises, increased interoperability, and the purchase of American military-industrial products[38]. Sweden, Finland, and Norway consistently participated in multinational exercises under the auspices of NATO and adapted their defense doctrines to the logic of collective security, demonstrating the priority of the Euro-Atlantic vector in the sphere of "hard" security (Friis, Tamnes, 2024). Against this backdrop, the Barents Euro-Arctic cooperation retained a distinctly humanitarian character and was deliberately taken beyond the military agenda.

In general, the Barents Euro-Arctic cooperation was characterized by ambiguous results for both Russia and the countries that initiated the project.

Conclusion

In summary, it should be noted that all participating countries were interested in the development of the Barents Euro-Arctic cooperation, but their common interest was limited to a single objective: to reduce international tensions in the region. As part of its neoliberal policy, Russia was committed to comprehensive integration into the European space on equal terms and to using this cooperation as a means of promoting the socio-economic development of the country and its northern regions by gaining access to the latest technologies. Meanwhile, the countries of Northern Europe, and above all Norway, as the initiator of the regional association, were interested in Russia's resource base, in strengthening their political influence in the region and over Russia, and in ensuring their own security through both hard and soft power. Consequently, issues relating to military cooperation were initially removed from the BEAR agenda, and cooperation was effectively limited to the humanitarian sphere, specifically matters of culture, ecology, science, education and youth.

When assessing the results of this cooperation, it should be acknowledged that the region received a stimulus for international multilateral and bilateral cooperation in the North and the Arctic, in which, along with states, sub-national and non-state actors in international relations were involved. International tension noticeably decreased. For almost 25 years, the North and the Arctic were associated with the territory of "dialogue and cooperation". The development of

[38] Sweden and Finland's positions on NATO accession. URL: https://russiancouncil.ru/blogs/v-gramolin/pozitsii-shvetsii-i-finlyandii-po-vstupleniyu-v-nato/ (accessed 05 January 2026).

cross-border cooperation provided a certain impetus to the development of the northern territories of the organization's member states through progress in the socio-cultural and scientific-educational spheres. At the level of regional communities, business and interpersonal contacts expanded, mutual understanding, interpenetration of cultures, and trust increased.

However, Russia's expectations for the development of economic cooperation and a definitive resolution to issues of military security remained unfulfilled. As a recipient of financial resources, Russia was forced to accept the rules of the game that were imposed upon it. For their part, the countries of Northern Europe, above all Norway, were able to exert a certain influence through "soft power" on the public consciousness of the inhabitants of Russia's northern regions, particularly among young people and those working in the cultural, scientific and educational sectors. The Nordic countries, mainly Norway, were often perceived as "welfare states". However, the Northern European states were unable to fully utilize "soft power" mechanisms to establish a stable base of supporters within Russia capable of actively promoting their values or political agendas. On the contrary, the opposite trend was observed: Russian citizens who migrated to Norway, Finland and Sweden, as well as Russian cultural and professional communities participating in cross-border projects, influenced the humanitarian agenda of Northern European countries, from the development of Russian-language cultural initiatives to the expansion of professional and educational exchanges.

Making a realistic assessment of the impact of this cooperation on Russia's national interests, a number of points should be highlighted. The problem of ensuring Russia's military security in the region was set aside only temporarily, until NATO's eastward expansion became evident. In the context of weakening connections between the federal center and its constituent entities, there were risks of growing separatist sentiments, especially among those ethnic groups that had relatives in the countries of Northern Europe (Sami, Karelians, Finns), as well as supporters of the common identity shared by Russian and Norwegian Pomors. These sentiments could potentially be fueled by a part of the regional intellectual community, which had a very positive and at the same time often idealistic perception of Northern European values. Furthermore, Russia mistakenly assumed that the Cold War ended by mutual consent, while Western countries initially believed that it had lost the war. Consequently, Russia's prestige and political influence in the world and the region declined significantly, which was further exacerbated by the country's financial and economic weakness.

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Germany's Cooperation with Norway, Sweden and Finland in the Field of Security and Defense in the Mid-2020s

Philipp O. Trunov [1]✉, Dr. Sci (Polit.), Leading Researcher

[1] Institute of Scientific Information on Social Sciences of the Russian Academy of Sciences, Nakhimovskiy pr., 51/21, Moscow, Russia
[1] 1trunov@mail.ru ✉, ORCID: https://orcid.org/0000-0001-7092-4864

Abstract. By the early 2020s, Germany had begun to significantly increase its military presence in the forward part of NATO's area of responsibility — primarily in Eastern and Northern Europe. This article examines the recent evolution of Germany's relations with Norway, Sweden and Finland in the field of security and defense. The methods of chronological and comparative analysis are used, along with the principles of neorealist theory. The author explores Germany's steps towards strategic penetration into the Arctic, based on cooperation with Norway in the mid-2010s to early 2020s, and Berlin's gradually developing support for Sweden and Finland's accession to NATO. All the decisions were considered in the context of a gradual yet consistent tightening of Germany's approach to "containing" Russia. The study analyzes three Germany's Arctic strategies (2013; 2019; 2024) and the increasing importance and share of security and defense issues within them. The paper discusses the specific features of the functioning of the *N5+1* format (five Nordic countries and Germany) at the highest level, and the securitization of the content of the negotiations. In developing bilateral political contacts in the mid-2020s, Berlin paid the greatest attention to Stockholm, viewing Sweden as a potential leader in Northern Europe. The main reason for the decline in the intensity of high-level contacts with Norway was the limited military resources of Germany. This was due to both the slow growth of the Bundeswehr's overall strength and the difficulty of intensifying the deployment of its forces simultaneously in the Baltic Sea region and the Arctic. The study analyzed a range of specific solutions involving the rational deployment, in terms of timing and location, of German corvettes, frigates, mountain infantry and fighter aircraft. The author concludes that Germany's bilateral cooperation with both Sweden and Norway as key regional partners will remain unchanged in the long term.

Keywords: *Germany, Norway, Sweden, Finland, NATO, Arctic, Baltic region, "containment", political cooperation, N5+1, Bundeswehr, military exercises*

Introduction

In the first half of the 2020s, Germany's strategic presence system was in a state of crisis in regions distant from the Euro-Atlantic Community[1], particularly in conflict-prone countries of the Global South. This process was symbolized by the forced evacuations of German contingents (as part of multinational missions) from Afghanistan (by July 2021) and Mali (by May 2024). While by the mid-2010s, the Bundeswehr was deploying approximately 7,000 personnel simultaneously

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[1] In this article, the Euro-Atlantic Community refers to the group comprising the member states of the EU and NATO, as well as these institutions themselves.

outside the NATO's area of responsibility[2] (sometimes up to 10,000) (Glatz, Hansen, Kaim et al., 2018), a decade later, this figure had fallen to 1,000 military personnel[3], i.e. almost a tenfold decrease.

A qualitatively different situation was observed in the forward, eastward-facing part of the North Atlantic Alliance's area of responsibility. Here, Germany was increasing the scale of the Bundeswehr's deployment. The most striking examples of this were Berlin's decisions, which set a precedent for European NATO member states, to gradually reorganize the multinational battalion tactical group (BTG) in Lithuania into a brigade (since June 2022), to staff it almost entirely with German military personnel, and to deploy it on a permanent rather than a rotational basis (from November 2023) (Trunov, 2024a). At the same time, Germany developed strategic activity on the other, external side of NATO's area of responsibility. Since February 2022, Berlin has been supplying weapons and military equipment to Ukraine, as well as participating in the training of its personnel (Schaller, 2023; Trunov, 2023a). This process of noticeable growth in Germany's military activity, both at the forefront of the Alliance's area of responsibility and in its vicinity from the outside, developed not only in Eastern Europe, but also in Northern Europe, particularly in the waters of the Baltic and Norwegian Seas (Trunov, 2025).

These trends reflected a shift in the key objectives of the German armed forces' deployment: instead of attempting to act as a guarantor of security for countries where armed conflict originates (particularly for a number of actors in the Global South), they were now engaging in "containment" of systemic opponents of "Western democracies", primarily, Russia.

In their efforts to weaken Russia, Germany and its NATO partners hope to equate the geostrategic concepts of the "collective West" and the "global North". An integral part of the latter, the geostrategic and economic value of which is significantly increasing in today's reality, is the Arctic. The ability to maintain a presence in the Arctic Ocean (both military-politically and in trade and economic terms) inevitably becomes one of the indicators of global influence for key international actors (Paul, 2023; Trunov, 2024b). Most interested states, especially those without access to the Arctic Ocean, will be able to acquire such capabilities only through close cooperation with states that have Arctic coastlines (Russia, as well as Denmark, Norway, Canada, and the United States). For Germany, as for a number of other NATO member states without direct access to the Arctic Ocean, the Kingdom of Norway is of particular value: primarily due to the fact that Oslo's Arctic possessions are located in continental Europe, and not at a significant distance from it.

Germany, whose industry is critically dependent on energy imports, is highly motivated to participate in oil and gas production and gain access to biological resources in the Arctic Ocean. It is equally important for Germany to ensure a regular naval presence of the Bundeswehr in the

[2] In this article, the NATO's area of responsibility is understood as the totality of territories and territorial waters of the member states of the North Atlantic Alliance.

[3] Anzahl der an internationalen Einsätzen beteiligten deutschen Soldaten der Bundeswehr. Statista.de. URL: https://de.statista.com/statistik/daten/studie/72703/umfrage/anzahl-der-soldaten-der-bundeswehr-im-ausland/ (accessed 10 June 2024).

Arctic Ocean, particularly in the Norwegian and Barents Seas, combined with the deployment of various branches of the German armed forces in subarctic regions (primarily on the Scandinavian Peninsula). In this way, both practically and in terms of image, Berlin is attempting to compensate for the significant loss of influence and presence in the Global South by demonstrating its growing role within the Global North.

It is logical that Berlin is interested in Norway maximizing its capabilities to strengthen its position in the Arctic Ocean jointly with its Western partners. Among NATO member states, Germany is carrying out its effective strategic penetration into the Arctic by declaring the need to "contain" Russia. In this regard, it is extremely important for Germany that Sweden and Finland partially "relieve" Norway in building a confrontation, taking on a significant practical burden, thereby allowing Oslo to focus entirely on resolving problems in the Arctic. Stockholm and Helsinki are also highly valuable to Berlin in another respect, especially after Sweden and Finland join the North Atlantic Alliance (April 4, 2023 and March 7, 2024, respectively). The contribution of these Nordic countries significantly increases the possibility of turning the Baltic Sea into an "internal lake" of NATO, thereby limiting Russia's capabilities in the region (see, for example (Smirnov, 2023)).

The aim of this article is to examine the characteristics and prospects of Germany's cooperation with Norway, Sweden and Finland in the political and military spheres as of the mid-2020s. Russian and international researchers have accumulated a wide range of studies on changes in the strategic situation in Northern Europe as a whole (Paul, 2023; Konychev, Sergunin, 2024), specifically on the foreign policy of Norway, as well as Finland and Sweden, especially the process and consequences of each of these two states joining NATO in 2023–2024 (Smirnov, 2023; Chekov, Vorotnikov, Chechevishnikov et al., 2023). Germany's cooperation has been studied either in relation to a specific country (Trunov, 2023b) or across all Northern European countries, but only up to the early 2020s (Trunov, 2021). This article represents an attempt to fill this research gap.

Methods of chronological and comparative analysis were applied in the article. Methodologically, the theory of neorealism (structural realism) was used. Its key thesis is that a state's foreign policy can only be successful when it meets the expectations of other actors (Waltz, 1979); this is illustrated by Germany's consideration of the concerns of the establishments in Norway, Sweden, Finland when implementing measures to strengthen and expand its strategic positions in Scandinavia and the Baltic region.

Evolution of relations between Germany and the three Nordic countries (2014–2022)

During the first decade since the outbreak of the confrontation between the Euro-Atlantic Community and Russia (March 2014), there was a noticeable increase in Germany's political cooperation both with Norway, a NATO member state, and with Sweden and Finland, which were EU members and were regarded as maintaining a form of neutrality. Cooperation within multilateral frameworks (in particular, the Council of the Baltic Sea States) was important, but bilateral inter-

state contacts, especially at the highest level, remained of the greatest significance. Their content reflected a significant number of areas of cooperation between Berlin and Oslo (Trunov, 2023b) and Stockholm, and a limited number — with Helsinki.

In November 2014, a new *N3+1* negotiation format was established, comprising three Northern European countries united by their EU membership (Denmark, Finland, Sweden) and Germany. Two years later, in November 2016, the second meeting took place[4]. Germany sought not only to demonstrate its consideration of Stockholm and Helsinki's security and defense concerns, but also its willingness to consider them in the context of fulfilling EU commitments. In this way, Berlin was indirectly showing the two nominally neutral countries that a change in their status to that of a bloc member — that is, accession to NATO — was not yet required. Furthermore, the N3+1 platform was used to discuss multilateral cooperation issues only in the Baltic region, but not in the Arctic. Neither of the two Northern European countries, both members of the Alliance — Iceland and Norway, were included in the format.

Since the late 2010s, the Bundeswehr has been actively participating in maneuvers on Norwegian territory and in its coastal waters. One of the first such instances — its involvement in the major Trident Juncture 18 exercises (October 2018) — proved to be a large-scale operation. Germany sent a joint-force contingent of 8,000 military personnel to Norway (the third-largest after the host nation and the US), with the ground component consisting of the "core" of a Bundeswehr military brigade (the 41st Motorized Infantry Brigade). Functionally, these units formed the backbone of a counter-attack group which, according to the exercise scenario, repelled an attack by an "enemy" invading through the northern provinces. For the first time since the end of the World War II, Germany practiced the transfer of large numbers of troops to Norway, and even considered temporarily redeploying the Bundeswehr's military logistics department there (Trunov, 2025). At the same time, a year earlier, in September 2017, Germany refrained from participating in the Aurora 17 maneuvers of the Swedish armed forces, which involved contingents from the United States and France.

What are the reasons for these differences? First and foremost, the fundamentals of Germany's approach to building a confrontation, "containing" the opponent: implementing practical steps, especially military ones, gradually and consistently. This was intended to prevent (or minimize) the risk of uncontrolled escalation, while the overall pressure on the opponent, on the contrary, would increase and become more effective. The longer the period of confrontation lasted (especially without a state of "détente"), the more hostile measures Germany was prepared to take against the opponent. Conversely, in the initial (in this case, up to and including the late 2010s), and especially the earliest (2014–2015), stages of "containment", Germany was extremely cautious in using its political and military capabilities. This approach was more pronounced in the Baltic region, where Germany initially possessed a strong position and the ability to increase its

[4] Außenminister Steinmeier lädt Außenminister Dänemarks, Finnlands und Schwedens nach Berlin ein. Auswärtiges Amt. URL: https://www.auswaertiges-amt.de/de/newsroom/161107-bm-dk-fin-swe-284942 (accessed 10 June 2024).

presence, and somewhat less noticeable in the Arctic, where Germany's strategic penetration was only just beginning.

In the **mid-2010s**, Germany practically did not use the Bundeswehr in either region, demonstrating its lack of interest at that time in Sweden and Finland joining NATO, particularly in the short term.

In **2017–2019**, Berlin began deploying the Bundeswehr in Norway during exercises on a large scale (e.g., the Trident Juncture 18 maneuvers) and repeatedly[5]. At the same time, the German contingent formed the basis for the Alliance's multinational BTG forward deployment force (FDF) in Lithuania, that is, in the southern Baltic region; Norway was one of the other contributors to this BTG[6]. It should be emphasized that Oslo and Vilnius were officially NATO members. In the case of Sweden and Finland, Berlin refrained from participating in exercises on their territory (a key example was Aurora 17). However, since 2017, meetings in the N3+1 format have no longer taken place, which indicated Germany's growing willingness to see the two still nominally neutral Northern European countries join NATO in the future. This was further evidenced by the launch of the *N5+1* format in August 2019, bringing together, for the first time, all five Northern European countries and Germany. The meeting, held in Iceland, focused mainly on issues outside the sphere of security and defense[7]; however, for Germany, this was significant precisely because of the fact that the platform had been launched.

In the **early 2020s**, Germany continued to expand the scope and number of measures it was implementing to "contain" Russia. In Norway, the Bundeswehr participated in NATO naval exercises (using the German Navy's first, newest Type 125 frigate)[8], as well as the Cold Response 2020 maneuvers, which involved mountain rifle units and military transport aviation (Trunov, 2025). On February 15, 2022, even before the start of the special military operation (SMO), Germany increased its contribution to the bloc's BTG FDF in Lithuania (from approximately 500 to almost 900 military personnel)[9].

In June 2021, a group of 10 fighter aircraft and approximately 200 aircrew and support personnel (from the 31st Luftwaffe Air Wing) participated in the Arctic Challenge 2021 air force exer-

[5] See, for example: „Sachsen" erhält Nikolaus-Preis in Sonderform. BMVg. URL: https://www.bundeswehr.de/de/organisation/marine/aktuelles/sachsen-erhaelt-nikolaus-preis-in-sonderform-5022470 (accessed 10 June 2024).

[6] NATO battlegroups in Baltic nations and Poland fully operational. NATO. URL: https://www.nato.int/cps/en/natohq/news_146557.htm?selectedLocale=en (accessed 10 June 2024).

[7] "Der Klimawandel ist inzwischen sichtbar". Bundeskanzleramt. URL: https://www.bundeskanzlerin.de/bkin-de/aktuelles/merkel-in-island-1661974 (accessed 10 June 2024).

[8] Manöver: Die „Sachsen-Anhalt" bei FLOTEX SILVER 2021. BMVg. URL: https://www.bundeswehr.de/de/organisation/marine/aktuelles/fregatte-sachsen-anhalt-manoever-flotex-silver-2021-5314338 (accessed 10 June 2024).

[9] NATO-Staaten verstärken Nordostflanke des Bündnisses. BMVg. URL: https://www.bundeswehr.de/de/organisation/heer/aktuelles/nato-staaten-verstaerken-nordostflanke-des-buendnisses-5364278 (accessed 10 June 2024).

cises near Rovaniemi in northern Finland[10]. The air component was supported by eight Bundeswehr electronic warfare systems (30 personnel), which were deployed to the Jokkmokk and Vidsel areas in northern Sweden[11]. Thus, various Luftwaffe components practiced their operations near the Arctic Circle during the summer. Theoretically, the Arctic Challenge 2021 exercise, involving the deployment of the Bundeswehr in Finland and Sweden, could be explained as cooperation between three EU member states. However, under the auspices of the European Union, unlike the North Atlantic Alliance, there was no practice of conducting air force maneuvers (Belinskiy, 2024). Moreover, on the website of the German Ministry of Defense, Arctic Challenge 2021 was clearly designated as maneuvers of NATO member and partner states. The exercises took place outside the Alliance's area of responsibility at that time — on the territory and in the airspace of two countries that were still, in a sense, neutral. Thus, almost a year before the start of the SMO, Germany demonstrated through its practical actions that it supported the further rapprochement of Sweden and Finland with NATO and, most importantly, their potential accession to the Alliance.

The start of the Russian Federation's special military operation (24 February 2022) became not only and not so much the reason, but above all a pretext, especially an informational one, for justifying further increase in Germany's cooperation with Norway, Sweden, and Finland in the context of "containing" Russia. Germany's consultations with the two nominally neutral countries regarding a review of their non-aligned status in the spring of 2022 consisted of the following phases. Already in the first month after the start of the SMO, Chancellor O. Scholz held bilateral talks with the Prime Ministers of Finland, S. Marin (March 16)[12], and Sweden, M. Andersson (March 28)[13]. In both cases, Germany hosted the meetings, with the guests visiting in order of their countries' distance from Russia. O. Scholz emphasized Germany's readiness to provide support through the EU and advocated for deeper cooperation with NATO. Germany was, in essence, promoting the accession of Sweden and Finland to the Alliance, but had so far formally avoided stating this openly.

The same pattern was repeated during O. Scholz's trilateral talks with M. Andersson and S. Marin on May 3, 2022. The meeting was again held in Germany, at the Chancellor's residence, Meseberg Castle, which was intended to reflect Germany's role as the senior partner in both interstate dialogues. Much of the lengthy press conference following the talks was devoted to charac-

[10] Kurze Wege, kilometerweise Kabel. BMVg. URL: https://www.bundeswehr.de/de/organisation/luftwaffe/aktuelles/kurze-wege-kilometerweise-kabel-5092258 (accessed 10 June 2024).

[11] Polygone in der Arktis. BMVg. URL: https://www.bundeswehr.de/de/organisation/luftwaffe/aktuelles/polygone-in-der-arktis-5090458 (accessed 10 June 2024).

[12] Pressekonferenz von Bundeskanzler Scholz und der Ministerpräsidentin der Republik Finnland Marin zu ihrem Besuch in Berlin am 16. März 2022. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressekonferenz-von-bundeskanzler-scholz-und-der-ministerpraesidentin-der-republik-finnland-marin-zu-ihrem-besuch-in-berlin-am-16-maerz-2022-2016788 (accessed 10 June 2024).

[13] Pressekonferenz von Bundeskanzler Scholz und der Ministerpräsidentin des Königreichs Schweden Andersson zu ihrem Besuch in Berlin am 28. März 2022. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressekonferenz-von-bundeskanzler-scholz-und-der-ministerpraesidentin-des-koenigreichs-schweden-andersson-zu-ihrem-besuch-in-berlin-am-28-maerz-2022-2021168 (accessed 10 June 2024).

terizing a certain "Russian threat"[14]. During the talks on May 3, 2022, Germany finally agreed with Sweden and Finland to support their accession to NATO, thereby acting as one of the key facilitators for Stockholm and Helsinki's entry into the Alliance. Two weeks later, on May 17, 2022, Berlin's official position was publicly announced in the form of a government statement[15].

On June 7, 2022, at a meeting with the heads of the Baltic states, the German Chancellor announced the decision to gradually reorganize the BTG FDF in Lithuania into a brigade, as part of Germany's plans to establish the largest conventional armed forces among all European NATO member states[16]. These statements by official Berlin signified that it had become one of the initiators of the Alliance's militarization of the Baltic Sea region, both its northern and southern parts.

At the same time, Germany significantly increased its activity in the Arctic, particularly its cooperation with Norway. In 2022, three rounds of bilateral talks at the personal level were held[17], despite changes in the top leadership in both countries. The Bundeswehr's contribution to the Cold Response 22 exercise was more than double that of the previous Cold Response 20. Moreover, during the maneuvers in March 2022, Germany deployed not only mountain infantry units (from the 23rd Mountain Infantry Brigade), but also marines (from a separate battalion), paratroopers (from the 1st Airborne Brigade), and ground-based robotics (Trunov, 2025).

Political cooperation: doctrinal priorities and practice

Germany adopted its first regional strategy for the Arctic Ocean — the "Guidelines of Germany's Arctic Policy" — back in 2013[18], before the confrontation with Russia. This fact indicated that Germany undoubtedly intended to secure strategic penetration into the Arctic Ocean in a modular (absolute) sense, that is, without reference to the need to "contain" Russia. Berlin used the transition to confrontation as a convenient framework for justifying its offensive goals.

At the conceptual level, Germany devoted exceptional attention to the Arctic vector. It should be noted that Germany lacked regional strategies in many areas, particularly for the Baltic

[14] Pressestatements von Bundeskanzler Scholz, der finnischen Ministerpräsidentin Marin und der schwedischen Ministerpräsidentin Andersson am 3. Mai 2022 in Schloss Meseberg. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressestatements-von-bundeskanzler-scholz-der-finnischen-ministerpraesidentin-marin-und-der-schwedischen-ministerpraesidentin-andersson-am-3-mai-2022-in-schloss-meseberg-2030188 (accessed 10 June 2024).

[15] Nationale Erklärung Deutschlands zum NATO-Beitrittsbegehren Finnlands und Schwedens. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/nationale-erklaerung-deutschlands-zum-nato-beitrittsbegehren-finnlands-und-schwedens-2040396 (accessed 10 June 2024).

[16] Pressekonferenz von Bundeskanzler Scholz, dem Präsidenten von Litauen Nausėda, der Ministerpräsidentin von Estland Kallas und dem Ministerpräsidenten von Lettland Kariņš. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/suche/pressekonferenz-von-bundeskanzler-scholz-dem-praesidenten-von-litauen-nausėda-der-ministerpraesidentin-von-estland-kallas-und-dem-ministerpraesidenten-von-lettland-kariņš-am-7-juni-2022-in-wilna-2048428 (accessed 10 June 2024).

[17] Pressekonferenz von Bundeskanzler Scholz und dem Ministerpräsidenten des Königreichs Norwegen Støre am 30. November 2022 in Berlin. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressekonferenz-von-bundeskanzler-scholz-und-dem-ministerpraesidenten-des-koenigreichs-norwegen-støre-am-30-november-2022-in-berlin-2147548 (accessed 10 June 2024).

[18] Leitlinien deutscher Arktispolitik. Verantwortung übernehmen, Chancen nutzen. Berlin, Auswärtiges Amt, 2013. 20 S.

Sea region. Regarding the Arctic Ocean, official Berlin adopted three such documents by 2025: in 2013, 2019, and 2024. One explanation for this is Germany's growing conceptual focus on the oceans as a whole. This was not only due to the German economy's dependence on imports of raw materials and exports of high-tech products by sea. The German establishment also saw the growing importance of a strategic presence in the oceans for its global position. Thus, in September 2020, despite the COVID-19 factor, official Berlin published the document "Policy Guidelines for the Indo-Pacific Region" (Arzamanova, 2024). However, by mid-2025, this regional strategy had not yet been updated, and it covered the areas of two oceans rather than just one.

This suggests that there is an increased attention to the Arctic Ocean at the doctrinal level of German foreign policy. This attention is even more pronounced in regard to security and defense issues. While the 2013 regional strategy focused on these topics in a single paragraph at the end of the text[19], the 2019 "Guidelines of Arctic Policy" placed the section in fourth place[20]. In the 2024 document, it was already in the second place, following the section on the importance of the Arctic for Germany[21]. The updating of the regional strategy, on average every five years, and the securitization of the agenda were combined with a change in the level of the government body on whose behalf the "Guidelines of Arctic Policy" were published. In 2013 and 2019, this was the German Foreign Ministry, in 2024 — the federal government.

In 2019, Germany, although not an Arctic state, expressed its readiness to become a guarantor of peace and security in the Arctic Ocean[22]. Official Berlin outlined this aspiration more clearly in its Arctic strategy (2024), explaining the need to deploy the Bundeswehr in the region to "contain" Russia, given the scale of its capabilities in the Arctic[23]. Germany thus positioned the military resources it was prepared to deploy in this area as a valuable complement to the capabilities of its Northern European NATO partners. Berlin attempted to present its offensive military activity as defensive.

In approving Finland and Sweden's accession to NATO, Berlin emphasized its readiness to cooperate with the Northern European states both within the Alliance (and, to a lesser extent, the EU) and through regional structures (primarily NORDEFCO). In each of these areas, Germany's interest in participating in military exercises was highlighted[24]. In its "Guidelines of Arctic Policy" (2024), Germany placed particular emphasis on the possibility of cooperation with all five Nordic countries, particularly through the N5+1 framework. The document noted the existence of meetings in this format at the level of heads of military departments[25].

[19] Leitlinien deutscher Arktispolitik. Verantwortung übernehmen, Chancen nutzen. Berlin, Auswärtiges Amt, 2013. 20S.
[20] Leitlinien deutscher Arktispolitik. Verantwortung übernehmen, Vertrauen schaffen, Zukunft gestalten. Berlin, Auswärtiges Amt, 2019. S. 22–25.
[21] Leitlinien deutscher Arktispolitik. Deutschland und die Arktis im Kontext von Klimakrise und Zeitenwende. Berlin, Bundesregierung, 2024. S. 14–18.
[22] Leitlinien deutscher Arktispolitik... Berlin, Auswärtiges Amt, 2019. S. 23–24.
[23] Leitlinien deutscher Arktispolitik… Berlin, Bundesregierung, 2024. S. 15–16.
[24] Ibid, S. 17.
[25] Ibid.

In practice, N5+1 meetings at the level of heads of government played a key role. In the mid-2020s, the intensity of these negotiations increased, reflecting growing mutual interest and strengthening of Germany's position in Northern Europe as a whole. The first meeting in Iceland on August 20, 2019, was followed by similar meetings in Norway (August 15, 2022), Sweden (May 13, 2024), and Finland (May 27, 2025). The negotiation agenda shifted towards security issues: while the first consultations (2019) were devoted almost entirely to environmental issues, the second (2022) focused on ensuring a Western-centric world order in the context of its transition, the accession of Finland and Sweden to NATO, and coordinating efforts to increase the volume and range of weapons and military equipment (WME) for Ukraine[26]. The third meeting (2024) focused on measures to strengthen cooperation in connection with the official accession of Helsinki and Stockholm to the Alliance, particularly in the Baltic Sea[27]. This issue, including the protection of underwater infrastructure in the Baltic Sea, initiated by NATO's specialized operation Baltic Sentry (since January 2025), became a priority at the N5+1 talks in 2025. In addition, the issue of illegal migration to Finland (from Russia) was discussed, as well as further coordination of measures to support Ukraine through the supply of military equipment and the training of its personnel[28]. In 2024 and 2025, the agenda for the talks was determined primarily by the concerns of the host countries, namely Sweden and Finland, respectively. At the N5+1 meetings, issues unrelated to the general development of the confrontation with Russia (primarily regarding Ukraine) and Northern Europe itself were rarely discussed. For example, the parties did not examine in detail the situation in the Middle East after the "thawing" of the Palestinian-Israeli conflict (since October 7, 2023). These particular features meant that the N5+1 meetings primarily served to address the concerns of the Northern European establishment, with Germany as the undisputed senior partner; this was also indicated by the format of the six-party talks, with Germany placed in a separate category. Berlin sought to position itself as the guarantor of regional security.

The Chancellor supplemented the N5+1 negotiations with bilateral consultations with the Prime Minister of the host country. In 2022, these took place not only with the head of the Norwegian government, but also with that of Sweden; indeed, O. Scholz flew to Stockholm specifically to meet with M. Andersson there[29]. This step is illustrative: in the mid-2020s, Germany assigned a crucial role to Sweden in its system of political contacts with the Nordic countries. In the first half of the 2020s, bilateral high-level talks with Sweden began to be held more than once a year. More-

[26] „Wir sind mehr als nur Nachbarn". Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/kanzler-in-norwegen-und-schweden-2071104 (accessed 10 June 2024).
[27] Mehr als nur Nachbarn. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/aktuelles/kanzler-nordischer-rat-stockholm-2281682 (accessed 10 June 2024).
[28] Partnerschaft zwischen Deutschland und „Nordic 5" richtungsweisend für EU. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/suche/pk-merz-finnland-2350434 (accessed 10 June 2024).
[29] Pressekonferenz von Bundeskanzler Scholz und Ministerpräsidentin Andersson zum Besuch des Bundeskanzlers im Königreich Schweden am 16. August 2022 in Stockholm. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressekonferenz-von-bundeskanzler-scholz-und-ministerpraesidentin-andersson-zum-besuch-des-bundeskanzlers-im-koenigreich-schweden-am-16-august-2022-2073552 (accessed 10 June 2024).

over, the change of government in the Kingdom had no impact on the development of the dialogue: on October 18, 2022, following the elections, the Social Democrat M. Andersson was replaced by the leader of the moderate liberal party, U. Kristersson.

Germany sought to expand the range of areas of cooperation with Sweden, including setting the political framework for a fundamentally new form of military collaboration in the context of the Kingdom's accession to NATO. Berlin positioned itself as one of Stockholm's main facilitators in joining the Alliance. This became particularly important and simultaneously difficult in the situation where Turkey blocked Sweden's accession to NATO in 2022–2023. Berlin attempted to influence Ankara, informing Stockholm of its efforts[30], but achieved no significant success. The final result was achieved due to the actions of the United States under the Biden administration.

The main reason for the increased focus on Sweden is seen to be that Berlin regarded it as a future military leader in Northern Europe, and the prerequisites for this — the Kingdom's accession to NATO and the long-term policy, adopted at the turn of the 2010s and 2020s, to significantly strengthen all existing aspects of its military power. While Germany had already been demonstrating a persistent desire to become the largest contributor to NATO forces since the second half of the 2010s (Glatz, Zapfe, 2017), Sweden will most likely strive for this role for the Northern European segment.

Germany and Sweden's central position within the European part of NATO's area of responsibility and in Northern Europe, respectively, facilitated this role. Due to this geographic position alone, the armed forces of each country represented a potentially powerful reserve for reinforcing troops in neighboring NATO member states. However, the realization of their national ambitions required Berlin and Stockholm to take practical steps: by the mid-2020s, NATO regarded measures to support the authorities in Kyiv as such actions.

By spring 2025, Germany was the largest supplier of military equipment to Ukraine among European NATO member states as a whole (second only to the US), and Sweden was the largest supplier among Northern European countries. In 2022–2024, Berlin provided military support to Kyiv in the amount of 13.7 billion euros[31] (about 14.8 billion dollars), Stockholm — 8.2 billion dollars[32]. Both sides actively supplied armored vehicles: Germany allocated 18 Leopard 2A6 tanks, 103 Leopard 1A5, 140 Marder infantry fighting vehicles to the Ukrainian Armed Forces; Sweden — 10 Strv 122 tanks (modernized Leopard 2 with enhanced protection) and 90 CV90 infantry fighting vehicles. In 2023, Berlin assumed the key burden of arming and training the 47th Mechanized Bri-

[30] Pressekonferenz von Bundeskanzler Scholz und dem Ministerpräsidenten des Königreichs Schweden Kristersson am 15. März 2023 in Berlin. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressekonferenz-von-bundeskanzler-scholz-und-dem-ministerpraesidenten-des-koenigreichs-schweden-kristersson-am-15-maerz-2023-2171296 (accessed 10 June 2024).

[31] Diese Waffen und militärische Ausrüstung liefert Deutschland an die Ukraine. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/waffenlieferungen-ukraine-2054514 (accessed 10 June 2024).

[32] The Russian Ambassador to Stockholm emphasized the seriousness of Sweden's support for Ukraine. URL: https://iz.ru/1894034/2025-05-28/posol-rf-v-stokgolme-ukazal-na-sereznost-shvedskoi-podderzhki-ukrainy (accessed 10 June 2024).

gade of the Ukrainian Armed Forces, Stockholm played a similar role for the 21st Mechanized Brigade. Both formations were considered elite; following significant losses suffered by both brigades during Ukraine's summer–autumn offensive (2023), the 21st MB received the 47th MB's tank fleet, while the latter received the Ukrainian Armed Forces' single battalion of US-made M1 Abrams tanks.

Germany held annual high-level bilateral talks with **Finland** between 2023 and 2025. The newly elected President A. Stubb (since March 1, 2024) took a very hard line on "containing" Russia, and here the similarity between his position and that of Chancellor F. Merz (in office since May 6, 2025) is evident. Helsinki's accession to NATO expanded the potential "window of opportunity" for practical cooperation; however, in reality, the scale of such cooperation remained limited[33]. For example, in the near future, the German side is unlikely to be able to provide its partner with effective assistance in strengthening its control system along the 1,271.8 km border with Russia.

Against the backdrop of the high frequency — at least on an annual basis — of bilateral high-level talks between Germany and Sweden and Finland, the dynamics of corresponding contacts with **Norway** are indicative: three rounds of negotiations took place in 2022, but none in 2023–2024 (only King Harald V visited Germany). What are the reasons for this?

The change of leadership, which took place almost simultaneously in Norway (October 2021) and Germany (December 2021), did not have any negative impact. During the meetings in 2022, Chancellor O. Scholz and Prime Minister J. Støre (both Social Democrats) demonstrated continuity in terms of the level of mutual trust and the scope of the negotiating agenda compared to A. Merkel and E. Solberg, respectively (Trunov, 2025).

The fact that Finland (since April 4, 2023) and Sweden (since March 7, 2024) were new members of NATO played a certain role; the established framework for cooperation with Norway within the Alliance remained essentially unchanged. It required only minor adjustments, which were carried out intensively in 2022 against the backdrop of the start of the Russian Federation's SMO and preparations for the accession of Oslo's two neighbors to the Alliance. During bilateral talks in Oslo on August 15, 2022 (on the sidelines of the N5+1 meeting) and at the Berlin Security Conference on November 30, 2022, O. Scholz and J. Støre specified their plans, particularly regarding military cooperation in northern Norway and the provision of assistance to Ukraine[34]. Symbolically, not only Prime Minister J. Støre, but also NATO Secretary General J. Stoltenberg, a Norwegian who previously served as Prime Minister of the Kingdom, were invited to the Berlin Security Conference on November 30, 2022, a landmark event for the German leadership, held during Berlin's

[33] See, for example: Pressestatements von Bundeskanzler Scholz und dem Präsidenten der Republik Finnland, Stubb, am 8. Mai 2024 in Berlin. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressestatements-von-bundeskanzler-scholz-und-dem-praesidenten-der-republik-finnland-stubb-am-8-mai-2024-in-berlin-2281396 (accessed 10 June 2024).

[34] Pressekonferenz von Bundeskanzler Scholz und dem Ministerpräsidenten des Königreichs Norwegen Støre am 30. November 2022 in Berlin. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/pressekonferenz-von-bundeskanzler-scholz-und-dem-ministerpraesidenten-des-koenigreichs-norwegen-støre-am-30-november-2022-in-berlin-2147548 (accessed 10 June 2024).

declared Zeitenwende. Thus, the Berlin Conference was "Norwegianized" in terms of representation at the highest level. This fact clearly indicated Germany's enormous interest in interstate cooperation and in using it as a basis to establish a strong position in the Arctic Ocean.

It has already been noted that Berlin began to perceive Stockholm as a strengthening leader in Northern Europe. At the same time, this did not diminish Norway's strategic value for Germany: only by relying on cooperation with Norway, rather than its Scandinavian neighbor, Germany could secure strategic penetration into the Arctic Ocean. The priority of this goal was confirmed by the content and publication of three Arctic concept documents (2013, 2019, and 2024). Furthermore, Germany, especially in the context of its rejection of cheap Russian hydrocarbons, urgently needed gas supplies from Norway[35].

A significant reason for the noted decrease in the frequency of German-Norwegian high-level negotiations is Berlin's lack of military capabilities. Consequently, Germany, which had begun to increase Bundeswehr activity in the Baltic Sea, found it difficult to simultaneously rapidly increase it in northern Norway and the adjacent waters. As a result, the actual growth rate of practical cooperation was lower than envisaged in the 2022 interstate plans.

Characteristics of military cooperation in Northern Europe

The rate at which the Bundeswehr increased its military personnel numbers and modernized its arsenal and equipment in the first half of the 2020s was slow (Table 1). Stockholm, which wanted to be the leading power in Northern Europe, built up its armed forces faster than Berlin, declaring in June 2022 its intention to create the largest conventional armed forces among European NATO member states as a whole.

Table 1

Armed forces of Germany and several Northern European countries (thousands of military personnel)[36]

Country / year	2014	2017	2019	2020	2021	2022	2023 [37]	2024
Germany	178.8	179.8	183.8	183.9	183.9	183.2	181.7	185.6
Norway	21.0	20.2	19.2	20.6	23.1	23.5	24.0	24.3
Finland	32.5	31.0	31.1	31.3	31.1	30.5	31.0	30.8
Sweden	14.7	15.9	19.1	20.1	21.1	20.9	21.5	23.1

Between 2014 and 2022, Sweden outpaced Germany in terms of military personnel growth, not only in relative terms (42% and about 3%, respectively), but also in absolute numbers (4,400 and 6,200 military personnel, respectively), as shown in Table 1. Contrary to plans from the late 2010s, no new formations had been created by mid-2025: for example, the ground forces did not

[35] Rede von Bundeskanzler Scholz anlässlich der Berlin Security Conference am 30. November 2022 in Berlin. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/rede-von-bundeskanzler-scholz-anlaesslich-der-berlin-security-conference-am-30-november-2022-2149770 (accessed 10 June 2024).

[36] Compiled by the author on the basis of: Defence Expenditure of NATO Countries (2014–2024). Brussels, NATO, 2024. P. 13.

[37] The data for 2023 and 2024 are preliminary.

receive any new brigades or divisions. At the same time, Germany declared very extensive commitments to staffing forward-deployed forces and, in general, to the transition to the New NATO Force Model (NNFM).

The NNFM required the transfer of large numbers of troops, totaling over 800,000 personnel, to the Alliance's command; almost all of them were provided by the participating European countries, meaning that the US contribution in terms of troop numbers was minimal (Biscop, 2022), but remained decisive in the command and control of these forces. Forces within the NNFM were divided into three categories. The first (significantly more than 100,000 military personnel) and the second (at least 200,000 personnel) were supposed to achieve full combat readiness within 10 and 30 days, respectively. Experts classified FDF units deployed in the endangered area as belonging to the first category (Deni, 2024). Germany was the first among NATO member states to set out the details of its contribution to the first two components of the NNFM, which turned out to be quite large. This amounts to almost 35 thousand military personnel, over 200 aircraft and ships since 2025[38], taken from the Bundeswehr's most combat-ready forces. In general, the NNFM troops, especially the Allied Response Force (established on July 1, 2024, on the basis of the NATO Response Force, NRF), were capable of deploying to any endangered area, including the Scandinavian Peninsula. The Trident Juncture 18 exercises (October 2018) were aimed at demonstrating this, particularly the deployment of the Bundeswehr as part of the NRF (Trunov, 2024c). However, by the mid-2020s, absolute priority in the deployment of NNFM, particularly its first two most combat-capable categories, was given specifically to the Eastern European part of NATO's area of responsibility (from the Baltic states to Romania), while support for Northern Europe was to be provided on a residual basis. This pattern of deploying contingents in the forward part of NATO's area of responsibility largely applied to Germany, particularly its general-purpose forces. Among the partner states, Berlin paid the greatest attention to Lithuania in terms of increasing its military presence, positioning this as an investment in the security and defense of both Eastern and Northern European countries (providing strategic support to the latter from the south) (Trunov, 2024a).

Therefore, in terms of deploying new formations, the Bundeswehr's top priority is the reorganization of the BTG FDF in Lithuania into the Bundeswehr's 45th Tank Brigade (4,800 personnel[39]), scheduled for completion in 2027. On the one hand, it is highly probable that Norwegian units will remain part of the multinational BTG as a component of the existing 2017 BTG (as of June 2022, the Royal Norwegian contingent consisted of nearly 190 soldiers and officers[40], equivalent to a reinforced battalion). In January 2025, Sweden deployed approximately 600 military personnel (a

[38] NATO als Grundlage für gemeinsame Sicherheit. Bundeskanzleramt. URL: https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/scholz-empfaengt-rutte-2318720 (accessed 10 June 2024).
[39] The Bundeswehr in Lithuania: Major steps towards the German manoeuvre brigade. BMVg. 2025. URL: https://www.bundeswehr.de/en/news/bundeswehr-lithuania (accessed 10 June 2024).
[40] NATO's Forward Presence. URL: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/2206-factsheet_efp_en.pdf (accessed 10 June 2024).

tank battalion)[41] as part of the NATO FDF multinational battlegroup in Latvia (with Canada as the leading contributor). Accordingly, the gradually expanding Bundeswehr formation in Lithuania will tactically interact with the Norwegian and Swedish contingents.

On the other hand, Germany has not indicated any plans to become one of the contributing nations to the FDF in Finnish Lapland at least until 2025. This formation will be deployed in 2026 to the south of the Norwegian county of Finnmark, which borders Russia, to closely cooperate with the troops stationed there and thereby cover the bases in Finnmark, Tromsø, and Nordland from the east. These facilities are the most valuable as strongholds for the multilateral strategic presence of NATO member countries in the Arctic, north of the Scandinavian Peninsula. It is planned that Sweden will assume the leading role in the functioning of the FDF battle group in Lapland (a cadre brigade capable of quickly deploying into a full-fledged formation), with Norway providing support (the participation of Anglo-Saxon powers is also possible)[42]. Taking into account that this formation is of great importance for the implementation of the multilateral plans of European NATO member states in the Arctic, including Germany itself, its absence from the list of contributing nations is noteworthy. The reason for this is a shortage of personnel, particularly in the ground forces, given the commitments already undertaken.

At the same time, Germany has overcome this fundamental difficulty in most areas of bilateral and multilateral military cooperation with Norway, Sweden, and Finland that are of particular importance to it.

In its interactions with these countries in the Baltic Sea, particularly with the two new NATO members, Germany in the mid-2020s began to shift the primary burden from frigates (the largest vessels in the German Navy, designed to ensure a presence at distant frontiers, especially in the ocean zone) to corvettes (smaller in size, used primarily in coastal waters). The naval composition of the German component at the BALTOPS naval maneuvers, which took place annually (usually in June) in the Baltic Sea, is indicative in this regard (Table 2). During these exercises, particularly from 2022 onwards, various measures were effectively being tested with a view to transforming the Baltic Sea into an "inland lake" of the North Atlantic Alliance. Operational coordination involved a large multinational naval force based on two NATO operational groups — the 1st Standing[43] NATO Maritime Group (SNMG 1) and the 1st Standing NATO Mine Countermeasures Group (SNMCMG 1).

[41] Sweden Deploys Mechanized Battalion in Latvia Near Russian Border in Historic First for NATO. URL: https://armyrecognition.com/news/army-news/2025/sweden-deploys-mechanized-battalion-in-latvia-near-russian-border-in-historic-first-for-nato (accessed 10 June 2024).

[42] Sweden Announces Ambition to Lead NATO Force in Finland. High North News. URL: https://www.highnorthnews.com/en/sweden-announces-ambition-lead-nato-force-finland (accessed 10 June 2024).

[43] The term "standing" refers to the fact of its existence, not its composition: it was updated on a rotating basis every six months.

Table 2

Some characteristics of the BALTOPS exercises (2021–2025)

Year / Forces deployed	Number of ships and vessels	Number of personnel	Number of NATO member states	Naval contribution of Germany
2021[44]	over 40	4 thousand	16	frigate, corvette
2022[45]	over 45	7 thousand	16	frigate, corvette
2023[46]	over 50	6 thousand	19	frigate
2024[47]	over 50	9 thousand	20	2 corvettes
2025[48]	over 50	9 thousand	17	2 corvettes

Germany played an active role in these maneuvers, contributing not only ships (usually two flagships), but also patrol boats, naval aircraft and sometimes marine units. In 2023, the Chancellor was aboard a German frigate, which at that time was serving as the flagship for SNMG 1. The exercises frequently finished in German ports (for example, in Kiel in 2023); in 2025, they began for the first time with the assembly of a combined task force of ships in Rostock.

Corvettes became the main class of surface ships that Germany deployed in the mid-2020s under the NATO flag in the Baltic Sea, not only during BALTOPS exercises, but also as part of SNMG 1 and SNMCMG 1. This decision should be considered rational: it allowed Germany to use frigates as long-range ships in the oceans, including in the seas of the Arctic Ocean, primarily in the Norwegian Sea; German submarines were also actively deployed in this area. At the same time, specifically in 2023–2024, the intensity of frigate use west and north of Norway temporarily declined. A limiting factor here was the increasing deployment of frigates in the waters bordering the Middle East, as well as the vast Indo-Pacific region (Trunov, 2024d).

This difficulty also limited the use of marine units from the only specialized battalion and paratroopers from the only airborne brigade in the Bundeswehr (1st Airborne Brigade) in northern Norway (Trunov, 2024d). The main burden of the Bundeswehr's deployment here was borne by the mountain riflemen of the 23rd Mountain Infantry Brigade, for whom, as of the mid-2020s, military training activities in the counties of Troms and Finnmark constituted their primary foreign service. The primary focus of the 23rd Mountain Infantry Brigade's deployment was participation in the Cold Response exercises, which since 2024 have become known as Nordic Response, taking place in the northern territories of not only Norway, but also Sweden and Finland. Cold Response/Nordic Response maneuvers were held every two years (2020, 2022, 2024). At the same

[44] BALTOPS 2021 hat begonnen. BMVg. URL: https://www.bundeswehr.de/de/organisation/marine/aktuelles/baltops-2021-begonnen-5091832 (accessed 10 June 2024).
[45] BALTOPS 2022: US und NATO-Großübung in der Ostsee. BMVg. URL: https://www.bundeswehr.de/de/organisation/marine/aktuelles/baltops-2022-us-nato-grossuebung-ostsee-5441864 (accessed 10 June 2024).
[46] BALTOPS 23: Fazit und wichtigste Teilübungen. BMVg. URL: https://www.bundeswehr.de/de/organisation/marine/aktuelles/baltops-23-fazit-5639390 (accessed 10 June 2024).
[47] Unter Nachbarn: Deutsche Korvetten üben in der Ostsee. BMVg. URL: https://www.bundeswehr.de/de/organisation/marine/aktuelles/baltops-2024-deutsche-korvetten-ostsee-5809050 (accessed 10 June 2024).
[48] Präsenz zeigen und abschrecken — das Marinemanöver BALTOPS hat begonnen. BMVg. URL: https://www.bundeswehr.de/de/organisation/marine/aktuelles/start-marinemanoever-baltops-5952850 (accessed 10 June 2024).

time, the Bundeswehr's involvement in the Viking exercises was rather limited[49]. Their scale and strategic value were less than in the case of Cold Response/Nordic Response. The fact that Germany deployed contingents (usually between 150 and 400 military personnel) (Trunov, 2025) to northern Norway every two years, rather than annually, once again reflected the limitations of its capabilities. Nevertheless, in 2020–2024, units from all military battalions of the 23rd Mountain Infantry Brigade gained operational experience in the subarctic part of the Scandinavian Mountains. In 2022, Germany and Norway practiced the deployment of a joint tactical group (including ground forces, air force, navy, and support forces) of 1,200 personnel in the northern Norway[50].

In Finland in the mid-2020s, Germany used ground-based air defense systems[51] and fighter aircraft during multilateral exercises. For example, in 2023, the Luftwaffe's 31st Air Wing once again deployed 10 Eurofighter aircraft to take part in the Arctic Challenge maneuvers[52].

Overall, in the mid-2020s, Germany sought to make effective use of a number of general-purpose force components (primarily corvettes in the Baltic Sea, submarines in the Norwegian Sea) in the three northern European countries and adjacent waters, primarily relying on contingents from the Crisis Response Forces (CRF). Unlike the general-purpose forces, the CRF were intended to operate at a considerable distance from Germany, autonomously, and usually in small detachments (up to several hundred personnel). The CRFs were generally not deployed as part of the NNFM, meaning they remained under German national command only. In Northern Europe, this was manifested in the use of ground units from the 23rd Mountain Infantry Brigade, fighters from the 31st Air Wing, and ships from the 2nd and 4th Frigate Squadrons. Geographically, they were deployed primarily in northern Norway and Finland, and in the Norwegian Sea; in other words, they served as the military components of Germany's strategic penetration into the Arctic.

In the short term, and particularly in the medium term, an increase in the deployment of these army, air force, and navy units is expected. The area of operation for the latter is highly likely to extend to the Barents Sea. From a functional perspective, a significant deepening of cooperation between the German and Norwegian armed forces in the field of submarine fleets is also to be expected. The preconditions for this have been created by the Kingdom's decision to purchase four German- built Type 212CD submarines (deliveries are scheduled to begin in 2029 and be completed in 2035). From 2032, advanced submarines of this type are expected to enter service with the Bundeswehr, meaning that the two countries' submarine fleets will be unified. This will enable

[49] Joint Viking 2025: 10,000 Soldiers From 9 Nations Exercise Defending Northern Norway. High North News. URL: https://www.highnorthnews.com/en/joint-viking-2025-10000-soldiers-9-nations-exercise-defending-northern-norway (accessed 10 June 2024).
[50] Rede von Bundeskanzler Scholz anlässlich der Berlin Security Conference.
[51] Binationale Luftverteidigungsübung bei NATONorth Atlantic Treaty Organization-Mitglied Finnland. BMVg. URL: https://www.bundeswehr.de/de/organisation/luftwaffe/aktuelles/binationale-luftverteidigungsuebung-nato-mitglied-finnland-5785650 (accessed 10 June 2024).
[52] Arctic Challenge Exercise 2023 — Im Norden wird gemeinsam trainiert. BMVg. URL: https://www.bundeswehr.de/de/organisation/luftwaffe/aktuelles/arctic-challenge-exercise-2023-im-norden-wird-trainiert-5630136 (accessed 10 June 2024).

them to consider the creation of a joint submarine group for deployment in the Norwegian Sea or, more likely, the Barents Sea (Trunov, 2025).

The development of cooperation, including in the military-technical sphere, is facilitated by a significant increase in relevant budgets (Table 3). According to data for 2024, Germany's annual military expenditure amounted to nearly 100 billion dollars, placing Berlin second only to the White House and ahead of London. Norway and Sweden are each estimated to have exceeded the 10 billion dollars mark by 2024.

Table 3

Military expenditures of Germany and several Northern European countries (million dollars)[53]

Country / Year	2019	2020	2021	2022	2023 [54]	2024
Germany	52 549	58 652	62 054	61 405	73 138	97 686
Norway	7 536	7 228	8 438	8 694	8 799	10 606
Finland	3 900	4 156	4 145	4 726	6 266	7 308
Sweden	5 560	5 984	9 071	8 562	9 848	13 428

Conclusion

Germany's foreign policy towards the three Northern European states discussed above is essentially guided by the principles of neo-realism (structural realism): expanding or extending its strategic influence and presence while demonstrating consistent consideration for the concerns and interests of its partners' political establishments. Thus, the views of the official authorities in Helsinki and Stockholm were reflected in Germany's gradually emerging de facto, and since 2022, formal, support for Sweden and Finland's accession to NATO. Taking advantage of this success, in 2023–2025, Berlin attempted to increase the scope of its cooperation with Sweden and to reach a qualitatively new level of trust with Finland. In order to achieve these goals, Germany considered it possible to temporarily reduce the intensity of its contacts with Norway, assessing relations with that country as well-established, given the effectiveness of the mechanisms for inter-state cooperation within NATO.

In the mid-2020s, the N5+1 format became the most important negotiating platform for Germany in its system of contacts with its Northern European partners. The name of the format, as well as the content of the agenda, indicated significant support for Germany's plans to increase its strategic influence and presence in various parts of the region.

Germany's long-term focus in the region will remain binary, centered on cooperation with two key partners simultaneously — Stockholm and Oslo; cooperation with Finland will be significantly less extensive.

Cooperation with Sweden, which Berlin de facto regards as an emerging leading power in Northern Europe, is valuable for Germany in the following respects: joint efforts to transform the Baltic Sea into a NATO "inland lake" and the deployment of Swedish military forces in northern Fin-

[53] Compiled by the author on the basis of: Defence Expenditure of NATO Countries (2014–2024). Brussels, NATO, 2024. P. 9.
[54] The data for 2023 and 2024 are preliminary.

land to provide ground support for the system of bases in northern Norway (in Finnmark and Tromsø), from which strategic penetration into the Arctic is being carried out. Germany and Sweden will strive to ensure interoperability between the Bundeswehr brigade in Lithuania, the Swedish contingents in Latvia and Finland (as components of the Alliance's unified chain of FDF formations), the naval contingents within the standing groups (SNMG 1, SNMCMG 1), and special missions (primarily Baltic Sentry) in the Baltic Sea. German-Swedish cooperation will be significant, given that each side is expected to have approximately 5,000–7,000 military personnel in these advanced NATO member states and in the Baltic by the end of the 2020s.

However, cooperation with Norway is even more valuable for Germany, as it enables the Bundeswehr to establish a strategic presence in the Arctic Ocean that extends northwards (towards the Barents Sea). Publication of Germany's three Arctic strategies (2013; 2019; 2024) and their content highlight the particular importance of this task.

Overall, Bundeswehr contingents deployed in the Arctic region (in particular) and in the Baltic Sea area (to a lesser extent) significantly enhance the capabilities of the armed forces of Norway, Sweden, and Finland. It should also be taken into account that the value (and complexity) of deploying the same formation in the Far North is much greater than in any other region with milder natural and climatic conditions. Furthermore, the strength of the integrated potential exceeds the sum of the capabilities of its individual components. For example, in terms of frigates, submarines, mountain infantry, and support units, the Bundeswehr significantly increases the capabilities of Norwegian forces in the north of the country and in the Norwegian and Barents Seas.

By deploying the Bundeswehr geographically broadly and in various forms, in cooperation with Norway, Sweden, and Finland, Germany is thereby establishing the framework for a significant increase in trade and economic activity in the Arctic. This objective has consistently been a particular priority for Berlin, as set out in its Arctic strategies (2013; 2019; 2024). Another factor is no less important: Germany presents its military activity as a valuable practical addition to the resources of the two Scandinavian countries (primarily) and Finland, which should improve the effectiveness of "containment" of Russia in the Arctic and the Baltic Sea, contributing to winning the "race for capabilities" with the Russian Federation in both these areas.

Therefore, the factor of the Bundeswehr's growing presence in terms of both scale and forms of deployment in Scandinavia and the Baltic region should be taken into account in the organizational and staffing structure of the Leningrad Military District and Russia's Northern and Baltic Fleets. At the same time, the corresponding changes to their organizational and staffing structures may not be necessarily symmetrical; they could also be asymmetrical, linked to the technical and technological capabilities of advanced weapons systems. The only way to achieve security in the regions under consideration is through such an approach, particularly in the Arctic, where Germany, a non-Arctic state, is demonstrating offensive activity.

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Federal and Regional Development Strategies and Programs of the Russian Arctic in the Context of Protecting the Rights of Indigenous Peoples of the North to Their Traditional Economic Activities: Update for the Beginning of 2026

Maksim Yu. Zadorin [1]✉, Cand. Sci. (Law), Associate Professor
Konstantin S. Zaikov [2], Dr. Sci. (Hist.), Associate Professor

[1, 2] Northern (Arctic) Federal University named after M.V. Lomonosov, Naberezhnaya Severnoy Dviny, 17, Arkhangelsk, Russia
[1] m.y.zadorin@yandex.ru ✉, ORCID: https://orcid.org/0000-0002-2080-6752
[2] k.zaikov@narfu.ru, ORCID: https://orcid.org/0000-0001-6479-416X

Abstract. The article is devoted to a systematic analysis of policy documents in the field of strategic planning at the federal and regional levels concerning the protection of constitutional guarantees of the rights of Indigenous Minorities of the North (IMN) to engage in traditional economic activities. At the federal level, the study evaluates the Arctic Strategy 2035 and the Program for Socio-Economic Development of the Arctic Zone of the Russian Federation (AZRF). These documents are consistent with the Concept for Sustainable Development of Indigenous Small-Numbered Peoples of the North until 2036. At the regional level, strategic and program documents of nine Arctic constituent entities were examined. Based on this assessment, the following conclusions were drawn: 1. At the federal level, support for Indigenous Minorities focuses on the following areas: social, healthcare and construction services for members of indigenous communities; support for traditional economic activities through state programs; special emphasis on the provision of mobile power supplies. 2. At the regional level, the main priorities, directly or indirectly related to traditional economic activities, are as follows: Murmansk Oblast: premium-quality reindeer products; Republic of Karelia: ethnographic tourism (Vepsian community); Arkhangelsk Oblast: ethnographic tourism focused on northern rural heritage (“Northern Village”); Nenets Autonomous Okrug (NAO): comprehensive support for traditional economic activities of the Nenets people; Republic of Komi: reindeer herding in the Vorkuta Urban District; Khanty-Mansi Autonomous Okrug (KhMAO): integration of reindeer herding and traditional crafts of IMN into a unified agro-industrial complex; Yamalo-Nenets Autonomous Okrug (YaNAO): promotion of IMN traditional economic activities as a contribution to non-energy exports; development of reindeer herding and fishing within the agro-industrial complex; Krasnoyarsk Krai: reindeer herding and construction of “ethno-villages” in areas of traditional residence and economic activity of Indigenous Small-Numbered Peoples of the North; Republic of Sakha (Yakutia): comprehensive support for IMN, Northern Yakuts, and Russian Arctic old-timers; promotion of traditional economic activities, including through projects and grants such as “Young Reindeer Herder” and “Arctic Innovative Biotechnologies”; Chukotka Autonomous Okrug (ChAO): reindeer herding and marine mammal hunting.

Keywords: *Russian Arctic, AZRF, indigenous small-numbered peoples, traditional economic activities, Federation, regions, development strategies*

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Introduction

Strategic planning plays a crucial role in shaping prospective scenarios for the country's development, stabilizing the domestic political and legislative system and preventing unjustified risks in the sphere of administrative decision-making, which may lead to an imbalance in social relations. According to Part 3 of Article 80 of the Constitution of the Russian Federation, the Head of State, who defines the key directions of the country's foreign and domestic policy, plays the leading role in strategic planning. The "verticalization" of public administration is a natural prerequisite for the effective functioning of state and municipal government institutions within the framework of the historically established "centralized federation". Accordingly, the Arctic Zone of the Russian Federation (hereinafter referred to as the AZRF) adheres to a similar hierarchical decision-making structure, providing broad autonomy to the nine Arctic regions while remaining within the framework of established federal standards. This principle is most clearly reflected in Part 1 of Article 1 of Federal Law No. 414-FZ "On Regional Public Authorities"[1], which states: "State authorities, other state bodies, and local self-government bodies constitute a unified system of public authority in the Russian Federation and interact to most effectively address tasks in the interests of the population residing in the respective territory." In this regard, the AZRF is a unique "macro-region", as Part 4 of Article 60 of the aforementioned law stipulates that the specific aspects of the exercise of certain powers by the state authorities of a constituent entity of the Russian Federation within the AZRF are to be determined by federal law. Currently, the governing statute is Federal Law No. 193-FZ "On State Support for Arctic Business"[2]. In accordance with Paragraph 3 of Part 1 of Article 2 of Federal Law No. 193-FZ, an authorized federal executive body is designated to formulate state policy and regulatory frameworks for the development of the Russian Arctic Zone. Furthermore, Part 2 of Article 35 of Federal Law No. 473-FZ "On Advanced Development Territories"[3] stipulates that the Ministry for the Development of the Far East and the Arctic is the authorized federal body for advanced development territories located within the Far Eastern Federal District and the AZRF.

Therefore, it is crucial to form a comprehensive understanding of the direction in which federal and regional development strategies and programs for one of the country's most important strategic regions are proceeding. Particular attention should be paid to the

[1] Federal Law No. 414-FZ of December 21, 2021, "On General Principles of the Organization of Public Authority in the Constituent Entities of the Russian Federation" (as amended on December 28, 2025). URL: https://docs.cntd.ru/document/727632736 (accessed 19 February 2026).
[2] Federal Law No. 193-FZ of July 13, 2020, "On State Support for Entrepreneurial Activity in the Arctic Zone of the Russian Federation". URL: https://docs.cntd.ru/document/565285996 (accessed 19 February 2026).
[3] Federal Law No. 473-FZ of December 29, 2014 "On Advanced Development Territories in the Russian Federation" (as amended as of July 31, 2025). URL: https://docs.cntd.ru/document/420243009 (accessed 19 February 2026).

implementation of strategic planning and program-based development in relation to the most vulnerable and, at the same time, unique segment of the region's population — the indigenous small-numbered peoples, whose presence not only contributes to the spatial and territorial consolidation of Russian statehood in the Arctic but also shapes a unique Arctic ethno-cultural identity.

Materials and methods

First and foremost, it should be noted that issues of strategic planning in the Arctic are directly or indirectly addressed in the academic publications of the following authors on relevant research topics: scientific planning and the aggregation of public interests for the modernization of public administration mechanisms in the Arctic (Morozov, Kondral, 2014); the role of Arctic regions in implementing Russia's new Arctic strategy (Podoplekin, Bestuzheva, 2014); the implementation of the "Belkomur" project to actively position the Arkhangelsk Oblast in the realization of Russia's Arctic policy (Zhuravlev, 2012); the promotion of linguistic diversity in the Arctic alongside a balance between integration processes and the preservation of the ethno-cultural identity of local Arctic communities (Sokolova, 2017); the similarities in the models of public administration in Arctic states relating to sustainable development, the balance between the economic exploitation of resources and environmental safety, and the priority given to international cooperation (Panikar, Shaparov, 2016); the success of international project activities, exemplified by the implementation of the Kolarctic project in the Arkhangelsk Oblast (Kudryashova, Zarubina, 2018); Arctic identity as a dynamic, unifying phenomenon that incorporates the traditions of indigenous peoples, the experience of Russian pioneering explorers, and modern socio-economic processes of developing the North (Shachin, 2019); the strengthening of information security in the Russian Arctic Zone through the development of secure communication and navigation systems for the Northern Sea Route, the improvement of the regulatory framework, and consideration of the Arctic region's specific characteristics (Tamitskiy, 2013); Russia's Arctic Strategy as a framework of guiding principles linked to strengthening its legal position in the context of extending the continental shelf, developing the infrastructure of the Northern Sea Route and modernizing the Arctic fleet, as well as supporting scientific research and cooperation among interested regions (Zalyvskiy, 2013); the integration of Canadian experience in the development of the North-West Passage in the context of the development of the Northern Sea Route and the strengthening of Russia's national interests (Goldin, 2024); analysis of the "North-Eastern Text" in relation to the archetypal foundations of Russian identity and the specific nature of the relationship with the North as a "sacred periphery", which plays a special role in Russia's spiritual and geopolitical history (Terebikhin, 2023); assessment of the role of humanitarian ties in providing a sustainable foundation for a long-term partnership between Russia and Norway within the Barents Euro-Arctic Region (BEAR) framework (Tevlina, 2012); retrospective analysis of the organizational structure of Arctic research in the USSR during the

1920s in the context of centralization, planning, and coordination (Saburov, 2016); the identification of key drivers of change in Arctic geopolitics, such as ice melt due to climate shifts, increased access to resources and transport routes, growing interest from Asian countries in the polar region, and intensified competition for control over strategic corridors and energy resources on the continental shelf (Panikar, 2023); the nature of the "regionalization" process in Northern Europe (Sokolova, Trufanova, 2025); and the adaptation of federal development programs to regional specificities as a key instrument for fostering the development of the Russian Arctic (Goldin, 2024).

The main focus of research is on the region's economy and industrial development, which account for the majority of the articles. At the same time, legal research is also represented in domestic scholarship, focusing on the following areas: the legal regulation of the development of the Northern Sea Route (Belborodova, 2024; Battakhov, 2025; Lantsov, 2025), the protection of the rights of the indigenous and small-numbered peoples of the North (Kryazhkov, 2025; Sleptsov, 2024), the preservation of the Arctic's cultural heritage (tangible and intangible) (Novikova, 2024; Doroftey, 2024); the specific features of labor relations in the AZRF (Krylov, Zykina, 2020; Zykina, 2018); the legal regulation of climate adaptation in Russian Arctic regions (Zadorin, 2023; Zadorin, Gladun, 2024); and the legal framework for investment activities in the Arctic (Battakhov, 2024; Battakhov, 2025).

In foreign, predominantly English-language, literature, the primary focus regarding the Russian Arctic is on microbiological, oceanographic, and general environmental research, with the key authors being Russian speakers. Nevertheless, a review of relevant academic sources highlights the following current topics of research: the statistical accounting for Russian Arctic territories (Glinskiy, Serga, Zaykov, 2017); the development of the Arctic railway network (Lagerev, Lagerev, 2021); Arctic logistics in general and freight transport in particular (Sergeev, Ilin, Fadeev, 2021; Vlasov, Kurganov, Bogumil et al., 2021); the legal regulation of the Northern Sea Route's development (Liu, Fan, Dang, Zhang, 2021; Gricius, 2026), etc. A direct analysis of strategic and policy documents relating to the socio-economic development of the Russian Arctic sector has not been identified in the English-language segment of scientometric indicators, or is limited to occasional mentions within comprehensive reviews of relevant issues.

A review of Russian publications concerning the traditional economic activities of Arctic aborigines[4] reveals a wide range of topics, covering both the 13 officially recognized traditional economic activities (Canosa, Biesbroek, Ford et al., 2023), ranging from reindeer herding (Kudelkin, 2022) to issues concerning a fundamental legal and administrative challenge: the

[4] In Russian academic discourse, the term "aborigine" is well-established when referring to the indigenous small-numbered peoples; it is regarded as a synonym for "indigenous" (or "native") and is used in publications at the level of the Federation Council of the Federal Assembly of the Russian Federation; it is not associated with the large-scale discriminatory policy of racism practised by the Australian authorities towards the indigenous population, as reflected in publications on the UN website. See: First Person: Aboriginal Australians suffer from 'violent history' and ongoing 'institutional racism'. URL: https://news.un.org/en/story/2023/04/1135827 (accessed 19 February 2026).

procedure for conducting “ethnological expert assessments” (Martynov, 2020).

In the international section, attention is focused on the relationship between indigenous communities and the mining sector (Novoselov, Potravny, Novoselova et al., 2023); the principle of “free, prior, and informed consent” (Novoselov, Potravny, Novoselova et al., 2023) on the part of indigenous small-numbered peoples during the implementation of energy infrastructure projects; the legal regulation of indigenous whaling (York, Zdor, BurnSilver et al., 2022), and other topics.

The present study applied formal-legal methods of inquiry, as well as methods of systemic and political-legal analysis. Thus, the object of this study is the social relations associated with the legal regulation of the traditional economic activities of the indigenous and small-numbered peoples of the North within the framework of state strategic planning and financial support at the level of state development programs (at the federal and regional levels).

Results

Strategic level of federal regulation

At the federal level, the key regulatory legal act governing the strategic development of the Russian Arctic Zone and ensuring national security until 2035 is the Decree of the President No. 645[5] of October 26, 2020 (hereinafter referred to as the Arctic Strategy 2035 or the Strategy).

Subparagraph “b” of Paragraph 4, Section I of the Arctic Strategy 2035 identifies the high sensitivity of the Arctic ecosystem to external impacts, particularly in areas where Russia’s indigenous small-numbered peoples traditionally reside, as one of the characteristics of the “Russian Arctic” that determine specific approaches to its socio-economic development and national security.

Therefore, the Strategy lists the limited availability of high-quality social services and housing, specifically in remote settlements where indigenous small-numbered peoples have traditionally conducted their economic activities, among the primary dangers, challenges, and threats posing risks to the development of the Arctic Zone and the assurance of national security (Subparagraph “g” of Paragraph 7, Section II).

The Strategy places particular emphasis on addressing social development challenges in the Arctic region; at least four subparagraphs of Paragraph 11 focus on social support for indigenous small-numbered peoples, ranging from healthcare (equipping medical personnel, primary health care, logistics for reaching remote areas and reindeer herder camps) and the preservation of indigenous cultural heritage (traditional culture and languages) to state support for housing construction (wooden housing in indigenous settlements, social and utility infrastructure) and investment in infrastructure of remote territories (subparagraphs “b”, “s”, “ts”, and “sh” of Paragraph 11, Section III).

[5] Decree of the President of the Russian Federation No. 645 of October 26, 2020, “On the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035” (as amended on February 27, 2023). URL: https://docs.cntd.ru/document/566091182 (accessed 19 February 2026).

State support for the traditional economic activities of indigenous peoples is to be provided through the development and implementation of state programs (subparagraph “v” of Paragraph 12, Section III), while infrastructure development involves the provision of mobile power supply sources and communication facilities (subparagraph “t” of Paragraph 13, Section III).

The Strategy also addresses international cooperation regarding the “indigenous agenda”, providing for the promotion of “strengthening ties” between indigenous peoples in the AZRF and those living abroad, including through the organization of international forums (subparagraph “i” of Paragraph 16, Section III).

Access to high-quality social services for indigenous people, including in the context of the intensification of their traditional economic activities, is provided for in the final phase of the Strategy’s implementation from 2031 onwards (subparagraph “v” of Paragraph 32, Section V).

Federal development program

Any strategy requires the development of supporting instruments to implement its provisions. For this reason, in March 2021, the Russian Government approved the State Program for the Socio-Economic Development of the Russian Arctic Zone[6].

Paragraph 2 of Section I of the State Program stipulates that “national interests”, the assessment of national security, as well as the main challenges and threats to the national security of the Russian Federation in the Arctic are defined in the “Fundamentals of State Policy of the Russian Federation in the Arctic until 2035”, approved by Decree of the President of the Russian Federation No. 164 dated March 5, 2020. The document also outlines the objectives of the Russian Federation’s state policy in the Arctic, aimed generally at improving the quality of life of the population of the Arctic Zone, including the indigenous small-numbered peoples of the AZRF.

Paragraph 24 of Section I of the State Program specifies that, in order to raise the level of socio-economic development in the AZRF and improve the quality of life and security of the population, the Ministry for the Development of the Russian Far East and the Arctic, in collaboration with the expert community and representatives of federal, regional, and municipal executive and legislative bodies, developed and approved (by Order of the Government of the Russian Federation No. 978-r of 15 April 2021) the Program of State Support for Traditional Economic Activities of Indigenous Small-Numbered Peoples of the Russian Federation Carried Out in the AZRF.

Paragraph 8 of Section II of the State Program states that the main instrument for implementing the Strategy for Developing the Russian Arctic Zone and Ensuring National Security is a comprehensive state program, which facilitates the implementation of this strategy in alignment with one of the key priorities of the Russian Federation’s state policy in the Arctic — strengthening of ties between small-numbered peoples and indigenous peoples living in the Arctic

[6] Decree of the Government of the Russian Federation No. 484 of March 30, 2021, “On Approval of the State Program of the Russian Federation ‘Socio-Economic Development of the Arctic Zone of the Russian Federation’”. URL: https://docs.cntd.ru/document/603154509 (accessed 19 February 2026).

territories of foreign states, within the framework of relevant international forums on this subject.

Regional level

Murmansk Oblast

The "Strategy for the Socio-Economic Development of the Murmansk Oblast until 2020 and for the Period up to 2025" (hereinafter referred to as the Murmansk Strategy 2025)[7] contains a wide range of provisions relating both to ethno-national issues and to specifically practical matters concerning the implementation of economic initiatives based on support for the "traditional economy".

In particular, the "General Provisions" section of the Murmansk Strategy 2025 notes that ethnographic tourism is not only a promising avenue for increasing tourist flows but also one of the most important means of preserving the distinct identity of the indigenous small-numbered peoples of the North.

The "Emerging Opportunities" section of the Murmansk Strategy 2025 forecasts the potential to attract investment to the Murmansk Oblast for international environmental protection projects, as well as for the preservation and development of the livelihoods of the indigenous small-numbered peoples of the North, which will also have a positive impact on the development of service and tourism infrastructure in the region. It is envisaged that political, institutional and economic "instruments" will be used within the framework of the Arctic Council's activities.

Paragraph 1.9 of the Murmansk Strategy 2025 stipulates that strengthening civic unity, harmonizing inter-ethnic relations, and promoting the preservation and development of the ethno-cultural diversity of the peoples of Russia are linked to the state policy priority of "preserving the cultural identity and unique way of life of the indigenous small-numbered peoples of the North in the Murmansk Oblast". The expected outcomes of addressing this task include strengthening the unity of the Russian nation and developing a unified ethno-cultural space as a crucial factor for sustainable development; reducing direct and indirect economic losses resulting from inter-ethnic and inter-religious tensions and conflicts; improving the ethno-cultural and social well-being of the indigenous small-numbered peoples of the North in the Murmansk Oblast.

Paragraph 1.10 of the Murmansk Strategy 2025 focuses the attention of implementers on the agricultural sector, noting that supplying the region's population with high-quality, locally produced agricultural goods and food relies, among other things, on such a state priority as the preservation and development of northern reindeer herding, which forms the basis of the livelihoods of the indigenous and small-numbered peoples of the North, including the promotion of premium-class product output.

Paragraph 3.8 of the Murmansk Strategy 2025, devoted to the development of the region's

[7] Resolution No. 768-PP/20 of December 25, 2013, "On the Strategy for the Socio-Economic Development of the Murmansk Oblast until 2020 and for the Period up to 2025" (as amended on June 6, 2024). URL: https://docs.cntd.ru/document/465602093 (accessed 19 February 2026).

fisheries sector, identifies the improvement of the organization of traditional fishing activities for the indigenous small-numbered peoples of the North as a key development priority.

Paragraph 3.9 of the Murmansk Strategy 2025 outlines the growing role of tourism in the region's economic and socio-cultural development, prioritizing the sustainable use of natural resources and the development of environmentally safe forms of tourism in areas where the indigenous small-numbered peoples of the North traditionally reside and conduct their economic activities.

It is noteworthy that the Sámi and the Kola Pomors are mentioned together as representatives of the region's indigenous population. However, it is important to note that the Kola Pomors are not officially recognized as an indigenous minority at the federal level. The legal status of this ethnographic group is similar to that of the Komi-Izhma people and is linked to the right to establish a national-cultural autonomy under federal legislation protecting the rights of national (ethnic) minorities.

Reindeer herding and fishing are also identified as key strategic priorities; this is reflected in the plan to establish, in the medium to long term, a separate export-oriented food cluster within the fisheries cluster, with facilities for the production, processing and export of environmentally clean products. It is specifically noted that these priorities could become effective drivers of growth for the regional economy, lead to the emergence of new facilities for the deep processing of biological products and the output of competitive food products (both premium-class and affordable, yet nutritionally complete) and high-value-added pharmaceutical products, as well as promote technological innovation and the development of supporting transport and logistics infrastructure (section: "Murmansk Oblast — Centre for the Development of the Arctic Zone of the Russian Federation")[8].

Particular mention should be made of the innovative Arctic technology cluster. This cluster encompasses such promising areas as the creation of an Arctic technology park for the deep and waste-free processing of aquatic biological resources (including underutilized and non-traditional aquatic species and mariculture products) and marine genetic resources (including algae). It also focuses on products of traditional reindeer husbandry such as commercial food products, bioactive substances and supplements, enzymatic protein hydrolysates, therapeutic and prophylactic agents, and other premium-class goods (section: "Profile of the Murmansk Oblast")[9].

Reindeer husbandry products are classified as premium if they possess the following characteristics: high quality (selected raw materials, strict production controls); premium pricing (above the market average due to unique properties and production costs); and added value (products undergoing deep processing, offering scientifically proven benefits, or featuring exclusive characteristics).

[8] Resolution No. 768-PP/20 of December 25, 2013, "On the Strategy for the Socio-Economic Development of the Murmansk Oblast until 2020 and for the Period up to 2025" (as amended on June 6, 2024). URL: https://docs.cntd.ru/document/465602093 (accessed 19 February 2026).
[9] Ibid.

The list of premium products includes the following categories:

- commercial food products — top-grade meat and offal, certified as environmentally clean, with distinctive flavor characteristics or specialized processing methods (e.g., dry-curing using traditional recipes, premium cuts);
- bioactive substances and supplements — purified and standardized concentrates derived from reindeer antlers, blood, and organs; products with proven health benefits (e.g., immunomodulators, adaptogens);
- enzymatic protein hydrolysates — highly purified protein fractions obtained through enzymatic processing; used in sports nutrition, dietary products, or pharmaceuticals;
- therapeutic and preventive products — products based on reindeer raw materials (e.g., ointments containing antler extracts, collagen-based dietary supplements) that are clinically proven to be beneficial and manufactured according to pharmaceutical standards.

Key characteristics of the premium segment include:

- scientific substantiation: research confirming biological activity or therapeutic effects;
- certification: compliance with organic product standards, GMP (for pharmaceutical products), or other prestigious standards;
- exclusivity: limited production, manual selection of raw materials, traditional processing methods;
- marketing: positioning as “elite”, “Arctic”, or “authentic” products aimed at discerning consumers.

In summary, the “premium” designation here is not merely a marketing term but an indicator of high-level processing, quality control, and a specific target audience (e.g., premium retail outlets, specialized pharmacies, and exports to countries with rigorous standards).

Thus, the traditional way of life of the indigenous minority peoples of the Murmansk Oblast is predominantly centered on expanding the industrial processing of reindeer meat for a wide range of purposes.

In order to address strategic priorities, the region implements the program “Murmansk Oblast — Strategic Center of the Arctic Zone of the Russian Federation”[10].

Republic of Karelia

The Republic of Karelia has adopted the “Strategy for the Socio-Economic Development of the Republic of Karelia until 2030” (hereinafter referred to as the Karelia Strategy 2030)[11].

[10] Resolution No. 126-PG of August 27, 2014, “On Approval of the Regional Socio-Economic Development Program ‘Murmansk Oblast — Strategic Center of the Arctic Zone of the Russian Federation’”. URL: https://docs.cntd.ru/document/412386353 (accessed 19 February 2026).

[11] Order of the Government of the Republic of Karelia No. 899r-P of December 29, 2018, “On Approval of the Strategy for the Socio-Economic Development of the Republic of Karelia until 2030” (as amended on November 26, 2025). URL: https://docs.cntd.ru/document/465420565 (accessed 19 February 2026).

Paragraph 22 of the Karelia Strategy 2030 identifies the facilitation of programs for the preservation and development of local communities and indigenous peoples, as well as their engagement in tourism activities, as an instrument for stimulating the development of various types of tourism.

Paragraph 43 of the Karelia Strategy 2030 lists the following among the key measures aimed at the ethno-cultural development of peoples and the assurance of inter-ethnic and inter-religious harmony:

- "securing subsidies from the federal budget to support the ethno-social and ethno-cultural development of the small indigenous peoples of the North, Siberia and the Far East of the Russian Federation, and the Veps living in the Republic of Karelia;
- ensuring the ethno-social and ethno-cultural development of the territories traditionally inhabited by indigenous peoples in the Republic of Karelia."

However, there is no mention of "traditional use of natural resources" or "traditional economic activities". The primary focus is on ethnography.

In addition to the regional tourism development program[12], which supports strategic initiatives, a federal targeted program "Development of the Republic of Karelia until 2030" has been approved[13].

Arkhangelsk Oblast

Similar to most Arctic regions, the Arkhangelsk Oblast has also adopted a regional "Strategy for the Socio-Economic Development of the Arkhangelsk Oblast until 2035" (hereinafter referred to as the Arkhangelsk Strategy 2035)[14].

Section II of the Arkhangelsk Strategy 2035, which outlines the factors influencing the socio-economic development of the Arkhangelsk Oblast, contains Table 3 regarding the external environment's impact on the region's socio-economic potential and competitiveness; it also highlights the worsening situation of the indigenous small-numbered peoples of the North as a result of increased economic activity in the Arctic.

Section III identifies the following as competitive advantages of the Arkhangelsk Oblast:

- agro-industrial complex: "Agriculture based on dairy cattle farming is a traditional sector in the Arkhangelsk Oblast. Currently, the southern part of the region is undergoing active restoration and expansion of dairy cattle farming";
- cultural heritage: "The Arkhangelsk Oblast possesses a rich cultural heritage, comprising

[12] State Program of the Republic of Karelia "Tourism Development". URL: https://economy.gov.karelia.ru/about/15208/ (accessed 19 February 2026).
[13] Decree of the Government of the Russian Federation No. 570 of June 9, 2015, "On Approval of the Federal Targeted Program 'Development of the Republic of Karelia until 2030'" (as amended on December 1, 2025). URL: https://docs.cntd.ru/document/420280470 (accessed 19 February 2026).
[14] Law of the Arkhangelsk Oblast No. 57-5-OZ of February 18, 2019 "On approval of the Strategy for the Socio-Economic Development of the Arkhangelsk Oblast until 2035". URL: https://docs.cntd.ru/document/462642024 (accessed 19 February 2026).

historical settlements and architectural ensembles, as well as spiritual heritage and traditional crafts. This contributes to the development of tourism, which is currently most advanced on the Solovetsky Islands and in the city of Arkhangelsk."

The "Northern Village" project appears to offer promising prospects, as it aims to preserve the traditional way of life in the region's villages, which has evolved over centuries. Furthermore, Russian wooden architecture represents a unique global phenomenon. Consequently, "tourist routes have been developed in the rural areas of the Arkhangelsk Oblast that incorporate historical and cultural heritage sites and locations where traditional folk crafts are practiced" (Section V: Key Projects and Objectives for the Socio-Economic Development of the Arkhangelsk Oblast)[15].

However, the traditional economic activities of indigenous small-numbered peoples are not mentioned, despite the presence of a Nenets population in three districts of the region: Mezenskiy, Primorskiy, and Leshukonskiy. As is the case in Karelia, the primary focus in the Arkhangelsk Oblast is on supporting ethnographic tourism (specifically, the Northern Russian village).

Similar to other regions, the Arkhangelsk Oblast has adopted state regional development programs; specifically, there are at least 25 such programs in the region[16].

Nenets Autonomous Okrug

The "Strategy for the Socio-Economic Development of the Nenets Autonomous Okrug until 2030" (hereinafter referred to as the Nenets Strategy 2030)[17] contains a crucial provision — Section 5.14 "Support for the Traditional Way of Life of the Indigenous Small-Numbered Peoples of the North Residing in the Nenets Autonomous Okrug".

Key areas of economic development for the Nenets Autonomous Okrug include the development of agriculture and the processing of agricultural products, particularly within the reindeer herding sector. The aim is to establish and maintain the expanded reproduction of domestic reindeer, as well as to develop a system for the harvesting, processing and marketing of products in order to preserve Nenets traditions. In support of this goal, the following tasks have been set: to improve the quality of the domestic reindeer herd; to develop the deep processing of sectoral products; to organize the training and retraining of qualified personnel for this sector; to focus state support measures on targeted assistance aimed at modernizing infrastructure, from harvesters to processors and distribution networks (section "Key Areas of Economic Development of the Nenets Autonomous Okrug")[18]. Identified challenges include a low level of technological

[15] Ibid.
[16] State programs of the Arkhangelsk Oblast. Website of the Government of the Arkhangelsk Oblast. URL: https://dvinaland.ru/budget/programs/ (accessed 19 February 2026).
[17] Resolution of the Assembly of Deputies of the Nenets Autonomous Okrug No. 256-sd of November 7, 2019, "On Approving the Strategy for the Socio-Economic Development of the Nenets Autonomous Okrug until 2030". URL: https://docs.cntd.ru/document/561620008 (accessed 19 February 2026).
[18] Ibid.

support (from grazing to slaughtering), degradation of reindeer pastures (and, consequently, a reduction in the forage base), a shortage of personnel, and economic instability (from "market dynamics" to environmental issues).

In addition to reindeer herding and meat processing, the Okrug has prioritized support for the traditional way of life of the Nenets people; the stated aim is to create conditions for the sustainable development of indigenous small-numbered peoples by strengthening their socio-economic potential while preserving their ancestral habitat, traditional lifestyle, and cultural values (paragraph 9.2).

Thus, the "indigenous factor" is most clearly evident in the NAO, linked to the comprehensive support for the traditional economic activities of indigenous peoples. At least 26 state programs are currently in operation within the Okrug[19].

Komi Republic

The "Strategy for the Socio-Economic Development of the Komi Republic until 2035" (hereinafter referred to as the Komi Strategy 2035)[20] alongside the strategies of the Murmansk Oblast and the Nenets Autonomous Okrug, identifies one of its objectives as the preservation of reindeer herding as a traditional form of economic activity, way of life and culture of the indigenous peoples of the Komi Republic living within its territory. The legal and administrative formulations in the strategy literally replicate similar phrasing used by neighboring regions.

Appendix 2 of the Komi Strategy 2035, titled "Strategic Analysis of the Socio-Economic Development of the Komi Republic", presents the results of a comprehensive analysis of the region's socio-economic development and macro-economic structure, in which the long-term development prospects for the integrated functionality of economic and transport projects include the preservation of traditional forms of natural resource use by indigenous peoples. Furthermore, it highlights the importance of "strengthening multilateral ties on a long-term basis to consolidate the efforts of Arctic constituent entities in implementing the Russian Federation's state policy in the Arctic".

Table 47 of the Komi Strategy 2035 characterizes Vorkuta as one of the republic's largest reindeer-herding municipalities. Consequently, in accordance with Decree of the Government of the Russian Federation No. 631-r dated 8 May 2009, the Vorkuta Urban District is classified as an area of traditional residence and economic activity for indigenous peoples whose main traditional livelihoods, alongside gathering, hunting, and fishing, include reindeer herding. The document notes the presence of "Tybertya" peoples in Vorkuta — the only registered clan-based community in the republic, as well as four posts ("Syr-Yaga", "Buredan", "Zapadnaya", and "Balbanty"),

[19] State Programs of the Nenets Autonomous Okrug. URL: https://dfei.adm-nao.ru/celevye-programmy-byudzhetnye-investicii-subsidii-yuridicheskim-licam/perechen-gosudarstvennyh-programm-nao/ (accessed 31 December 2025).
[20] Decree of the Government of the Komi Republic No. 185 of April 11, 2019, "On the Strategy for the Socio-Economic Development of the Komi Republic until 2035" (as amended on February 7, 2024). URL: https://docs.cntd.ru/document/553237768 (accessed 19 February 2026).

maintained by the "Olenevod" production and agricultural cooperative.

It is noteworthy that "areas of traditional nature use" often do not coincide with the boundaries of administrative-territorial units or regions; consequently, reindeer-herding enterprises from the Nenets (NAO), Yamalo-Nenets (YNAO), and Khanty-Mansi (KhMAO) Autonomous Okrugs operate within the territory of the Komi Republic, while enterprises from the Komi Republic utilize reindeer pastures located within the lands of those regions (see: Table 47 "Characteristics of the Vorkuta Urban District Municipality").

Therefore, reindeer herding is the specific sector highlighted as a focus for supporting the traditional way of life, economic activities, and trades.

As is the case with the Republic of Karelia, the Komi Republic implements a federal development program until 2028[21], alongside its regional program for the "Comprehensive Development of Rural Territories"[22].

Khanty-Mansi Autonomous Okrug

The "Strategy for the Socio-Economic Development of the Khanty-Mansi Autonomous Okrug – Yugra until 2036, with Target Indicators until 2050" (hereinafter referred to as the Khanty-Mansi Strategy 2036–2050)[23] outlines the region's ethno-national policy in Paragraph 2.1 of Section II. It notes that the formation of civil society in Yugra is shaped by regional characteristics, where the multi-ethnic composition of the population is determined by the high proportion of migrants, primarily Russians, Ukrainians, and Tatars, as well as the presence of indigenous small-numbered peoples of the North (Khanty, Mansi, Nenets). The traditions and customs of the latter are identified as a "primary potential".

In addition to oil extraction, which is designated as a "growth point", the agro-industrial complex is highlighted, including reindeer herding, traditional trades, and the marketing of products derived from the traditional economic activities of indigenous small-numbered peoples of the North.

Paragraph 2.5 of the Khanty-Mansi Strategy 2036–2050 stipulates that increasing the attractiveness of municipalities should be achieved, amongst other things, through regional support for the development of the traditional economy and the traditional way of life of the indigenous peoples of the North, including state grant support for projects in ethnographic tourism and traditional economic activities.

Overall, the review of the document revealed a significant amount of information relating

[21] Order of the Government of the Russian Federation No. 967-r of April 17, 2024, "Program for the Socio-Economic Development of the Komi Republic until 2028". URL: http://static.government.ru/media/files/pVKlcIuSSnOKEMsi3s8e7xLpA0rAT6Iz.pdf (accessed 19 February 2026).

[22] Decree of the Government of the Komi Republic No. 512 of November 1, 2023 "On approval of the State Program of the Komi Republic 'Comprehensive Development of Rural Areas'" (as amended on October 2, 2025). URL: https://docs.cntd.ru/document/406942731 (accessed 19 February 2026).

[23] Order of the Government of the Khanty-Mansi Autonomous Okrug – Yugra No. 679-rp of November 3, 2022, "On the Strategy for the Socio-Economic Development of the Khanty-Mansi Autonomous Okrug – Yugra until 2036, with Target Indicators until 2050". URL: https://docs.cntd.ru/document/406285990?marker (accessed 19 February 2026).

to indigenous peoples of the North (over 60 references in the text).

At least two state programs of the Khanty-Mansi Autonomous Okrug (KhMAO) directly affecting the traditional way of life of the indigenous peoples of the North should be highlighted: "Development of Economic Potential"[24] and "Sustainable Development of Indigenous Small-Numbered Peoples of the North"[25].

Krasnoyarsk Krai

The "Strategy for the Socio-Economic Development of the Northern and Arctic Territories and Support for the Indigenous Small-Numbered Peoples of the Krasnoyarsk Krai until 2035"[26] identifies, among the strategic stages and expected results of the document's implementation, the "introduction of measures aimed at preserving the traditional way of life of indigenous small-numbered peoples of the North, including projects to build ethnic villages in their traditional areas of residence and to establish processing facilities and collection points for the harvesting, processing, and packaging of produce from traditional trades" (sub-paragraph 7 of Paragraph 5.2, Section V).

The three main areas designated for traditional hunting and reindeer herding are the Taimyr Dolgan-Nenets, Evenki and Turukhansk municipal districts. Reindeer herding plays a "culture-defining role" in preserving the culture and way of life of over 500 nomadic families from among the indigenous peoples. The official website of the Krasnoyarsk Krai lists 22 state development programs[27].

Yamalo-Nenets Autonomous Okrug

The "Strategy for the Socio-Economic Development of the Yamalo-Nenets Autonomous Okrug until 2035" (hereinafter referred to as the Yamal Strategy 2035)[28] notes the existence of two economic models within the Okrug: a traditional one (based on the way of life of indigenous peoples) and an industrial one. At the same time, the region is a global leader in terms of the number of reindeer (over 800,000 head). The agro-industrial complex is developing in two main areas: reindeer husbandry and fisheries. The Okrug also exports furs, rawhides, footwear, textiles,

[24] Resolution of the Government of the Khanty-Mansi Autonomous Okrug – Yugra No. 557-p of November 10, 2023, "On the State Program of the Khanty-Mansi Autonomous Okrug – Yugra 'Development of Economic Potential'" (as amended on January 14, 2026). URL: https://docs.cntd.ru/document/406926975 (accessed 19 February 2026).

[25] Resolution of the Government of the Khanty-Mansi Autonomous Okrug – Yugra No. 478-p of October 31, 2021, "On the State Program of the Khanty-Mansi Autonomous Okrug – Yugra 'Sustainable Development of Indigenous Small-Numbered Peoples of the North'" (as amended on December 8, 2023). URL: https://docs.cntd.ru/document/577930683 (accessed 19 February 2026).

[26] Order of the Government of the Krasnoyarsk Krai No. 81-r of February 3, 2023, "On Approving the Strategy for the Socio-Economic Development of the Northern and Arctic Territories and Support for Indigenous Small-Numbered Peoples of Krasnoyarsk Krai until 2035". URL: https://docs.cntd.ru/document/406495269 (accessed 19 February 2026).

[27] List of state programs of the Krasnoyarsk Krai. Official portal of the Krasnoyarsk Krai. URL: http://krskstate.ru/realization/gosprog/0/id/24063 (accessed 19 February 2026).

[28] Resolution of the Legislative Assembly of the Yamalo-Nenets Autonomous Okrug No. 478 of June 24, 2021, "On the Strategy for the Socio-Economic Development of the Yamalo-Nenets Autonomous Okrug until 2035" (as amended on December 18, 2025). URL: https://docs.cntd.ru/document/574785875 (accessed 19 February 2026).

and souvenirs, the majority of which are the result of the traditional economic activities of the indigenous peoples of the North.

Paragraph 1.4 of the Yamal Strategy 2035, which is entirely devoted to the indigenous small-numbered peoples of the North, notes that one in four residents of the Okrug belongs to an indigenous group, and over 72% of those belonging to the indigenous peoples are Nenets. A small proportion (4%) is the Selkup people.

Regional measures of state support for indigenous small-numbered peoples include the following rights and guarantees: “subsidies for the purchase of fuel and lubricants for mini-power stations; procurement of satellite phones; provision of favorable conditions for traditional nature use; support for the production and sale of goods from traditional economic activities; assistance with employment and self-employment; provision of information (including in native languages); expert and consultative assistance; establishment of “posts”; creation of conditions for preserving and reviving distinctive social living structures; and support for personnel training for traditional economic activities”.

Certain categories of people belonging to vulnerable groups (pensioners, veterans, people with disabilities) amongst indigenous peoples, including “tundra dwellers”, are provided with housing, whereas representatives of indigenous peoples (including organizations) receive grants and awards. Since 2017, nomadic herders have been provided with an additional monthly allowance of 5,000 rubles, as well as special payments for a fixed period to enable them to maintain their traditional way of life (“regional standard of minimum material provision”). Additionally, “posts" offering educational, medical, cultural, and social services have been established along reindeer migration routes to ensure access to state and municipal services.

Preserving the traditional activities and culture of the indigenous peoples of the North is a key long-term priority of state policy; however, adverse climate changes, which directly affect the “reindeer-carrying capacity” of pastures, necessitate support for the vocational guidance and retraining of indigenous residents, as well as the creation of future employment opportunities.

The program for the indigenous small-numbered peoples of the North in the Yamalo-Nenets Autonomous Okrug (YaNAO) was adopted in 2017[29].

Republic of Sakha (Yakutia)

The “Strategy for the Socio-Economic Development of the Arctic Zone of the Republic of Sakha (Yakutia) until 2035” (hereinafter referred to as the Yakutia Strategy 2035)[30] identifies, among the key factors determining the competitive advantages of the Arctic Zone of the Republic

[29] Decree of the Governor of the Yamalo-Nenets Autonomous Okrug No. 132-PG of December 28, 2017, “On Approving the People’s Program for the Indigenous Small-Numbered Peoples of the North in the Yamalo-Nenets Autonomous Okrug” (as amended on March 24, 2023). URL: https://docs.cntd.ru/document/543538580 (accessed 19 February 2026).

[30] Decree of the Head of the Republic of Sakha (Yakutia) No. 1377 of August 14, 2020 “On the Strategy for the Socio-Economic Development of the Arctic Zone of the Republic of Sakha (Yakutia) until 2035”. URL: https://docs.cntd.ru/document/574612682 (accessed 19 February 2026).

of Sakha (Yakutia), the state policy of supporting, preserving and developing the traditional livelihoods of indigenous peoples, the Northern Yakuts, and the Russian-speaking long-established population — the Rusoustintsy and Pokhodchans (reindeer herding, fishing and hunting.

Yakutia has one of the most advanced regional legislative frameworks addressing Arctic issues, from responsible subsoil use to ethnological expertise.

Paragraph 3.1.5 of the Yakutia Strategy 2035 provides for the support and development of the "Young Reindeer Herder" project. This initiative establishes a one-time compensation payment of 1 million rubles, intended for housing improvements, for Russian citizens under the age of 35 who have worked in the reindeer herding sector within the republic's Arctic districts for at least four years.

The rural populations in most districts possess strong traditions and practical skills for the development of reindeer herding, hunting and fishing; meanwhile, such uluses as Abyyskiy, Verkhoyanskiy, and Srednekolymskiy are particularly well-suited for the development of cattle and horse breeding.

It has been concluded that the relatively low environmental impact, the level of development of the traditional livelihoods of the Northern Yakuts, the indigenous small-numbered peoples of the North, the Russian Arctic old-timers, and the potential for applying new technologies create the conditions for the comprehensive development of coastal fisheries and the expansion of a network of innovative enterprises specializing in the deep processing of aquatic biological resources and reindeer husbandry products. The comprehensive measures being implemented in these territories fully align with the key directions of state policy regarding the preservation and development of the indigenous environment and the traditional way of life of the peoples of the North.

Paragraph Z-3.5.5 of the Yakutia Strategy 2035 outlines the following promising regional projects:

- Project 1. "Faktoriya" (Post): implementing a set of measures to facilitate the creation of processing and storage facilities for products from traditional industries, trading and procurement centers, and product collection points as part of the "Trade and Logistics Center" project;
- Project 2. "International ISO Standard": certifying products derived from traditional natural resource use to improve quality and safety and to facilitate export promotion;
- Project 3. "Arctic Innovative Biotechnologies": promoting deep, waste-free processing of reindeer husbandry products and organizing the collection of endocrine-enzyme raw materials from reindeer herds; providing subsidies to certified enterprises for the acquisition of slaughterhouse facilities;
- Project 4. "Warmth of the Arctic": producing fur and reindeer leather goods using "wet-blue" technology, initiated by JSC FAIC "Sakhabult". The primary objective is to involve reindeer and fur-farming enterprises in the production of high-quality leather raw

materials with export potential;

- Project 5. “It’s All about Antlers”: reimbursing a portion of costs for enterprises exporting antlers, antler scraps, and processed antler products.

The main aim of all these projects is to move the traditional natural resource use practiced by indigenous minorities and the northern Yakuts away from a subsidy-dependent model towards economic self-sufficiency and sustainable development, as well as to create an innovative model of traditional economic activity that can be “replicated” across all regions of the AZRF.

The development of the republic’s Arctic zone and the indigenous small-numbered peoples residing there is outlined in the relevant republic-level program adopted in July 2022[31].

Chukotka Autonomous Okrug

The “Strategy for the Socio-Economic Development of the Chukotka Autonomous Okrug until 2030” (hereinafter referred to as the Chukotka Strategy 2030)[32] highlights the essence of the region’s traditional economic sectors: reindeer herding meets 45–50% of the local population’s meat needs, while marine mammal hunting (including whaling) supplies the indigenous populations of coastal villages with marine mammal meat. At the same time, the reindeer population is gradually declining due to anomalous weather conditions and organizational changes within reindeer-herding enterprises. Marine mammal hunting is a regulated activity; hunting is permitted, and quotas are allocated exclusively to the indigenous peoples of Chukotka for the purpose of preserving their cultural identity. A list of the 21 development programs is available on the website of the regional governor’s office and government[33].

Conclusion

Thus, at the federal level, support for indigenous small-numbered peoples focuses on the following areas: provision of social, medical, and construction services to members of the indigenous population, as well as support for traditional economic activities within the framework of state programs. Particular attention is paid to providing mobile power supply sources.

At regional level, the main focus, directly or indirectly linked to traditional economic activities, is on the following priority areas:

- Murmansk Oblast: premium-quality reindeer products;
- Republic of Karelia: ethnographic tourism (Veps);
- Arkhangelsk Oblast: ethnographic tourism (Northern Village);

[31] Decree of the Government of the Republic of Sakha (Yakutia) No. 431 of July 18, 2022 “On the State Program of the Republic of Sakha (Yakutia) ‘Development of the Arctic Zone of the Republic of Sakha (Yakutia) and Indigenous Small-Numbered Peoples of the North of the Republic of Sakha (Yakutia)’” (as amended on December 30, 2025). URL: https://docs.cntd.ru/document/406188533 (accessed 19 February 2026).

[32] Order of the Government of the Chukotka Autonomous Okrug No. 290-rp of July 16, 2014, “On Approval of the Strategy for the Socio-Economic Development of the Chukotka Autonomous Okrug until 2030”. URL: https://docs.cntd.ru/document/446123709 (accessed 19 February 2026).

[33] State Programs of the Chukotka Autonomous Okrug. URL: https://xn--80atapud1a.xn--p1ai/ekonomika/gosudarstvennye-programmy-chukotskogo-ao/ (accessed 19 February 2026).

- Nenets Autonomous Okrug: traditional economic activities (Nenets) — comprehensive support;
- Komi Republic: reindeer herding (Vorkuta Urban District);
- Khanty-Mansi Autonomous Okrug: reindeer herding and the traditional livelihoods of indigenous small-numbered peoples are integrated into a unified agro-industrial complex;
- Yamalo-Nenets Autonomous Okrug: traditional economic activities of indigenous small-numbered peoples as a contribution to "non-energy exports", reindeer herding and fishing within the agro-industrial complex;
- Krasnoyarsk Krai: reindeer herding, construction of "ethnic villages" in areas of traditional residence and traditional economic activities of indigenous peoples;
- Republic of Sakha (Yakutia): comprehensive support for the indigenous minorities of the North, northern Yakuts, and Russian Arctic old-timers, comprehensive support for traditional economic activities, including through projects and grants: "Young Reindeer Herders", "Arctic Innovative Biotechnologies", etc.;
- Chukotka Autonomous Okrug: reindeer herding and marine mammal hunting.

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Intercensal Dynamics of the Komi Population in the Regions of Russia since 1970: Trends and Factors

Andrey G. Manakov [1]✉, Dr. Sci. (Geogr.), Professor
Bogdan A. Vladykin [2], Post-Graduate Student

[1, 2] Pskov State University, pl. Lenina, 2, Pskov, Russia
[1] region-psk@yandex.ru ✉, ORCID: https://orcid.org/0000-0002-3223-2688
[2] vladykinbogdan1927@yandex.ru, ORCID: https://orcid.org/0009-0004-7959-3503

Abstract. The Komi are among the indigenous peoples of Russia's republics with the fastest-declining populations, yet they are characterized by a high level of concentration within their own republic. The aim of this study is to identify trends and the main factors influencing changes in the concentration of the Komi people in the regions of Russia during the intercensal periods from 1970 to 2021. The study primarily relies on a statistical and cartographic research method. From 1970 to 1989, the dynamics of Komi concentration in the regions of Russia were influenced by the positive natural increase of the Komi in their republic, which served as a source for their migratory distribution to other regions. Leningrad and Moscow, along with their surrounding regions, acted as the main centers of migration attraction for the Komi, but in the 1980s, the direction of migration through the Volga region to the South of Russia became evident. The concentration of the Komi people declined in Southern Siberia, where they had previously been represented by fairly large groups. In the post-Soviet period, assimilation processes, accompanied by a natural decline in the population of this ethnic group, began to influence the dynamics of Komi concentration across the country's regions to a greater extent. Their concentration levels decreased in most regions located outside the Komi's main area of habitation. Komi migration in the post-Soviet period no longer played as significant a role in their distribution across the country as it had during the Soviet era, but St. Petersburg and Moscow retained their role as centers of migration attraction for the Komi.
Keywords: *ethnic concentration, Finno-Ugric peoples, titular ethnic groups, population census, migration, assimilation*

Introduction

The peoples of the Finno-Ugric group within the Uralic language family, who live in the European part of Russia, are characterized by a centuries-long history of contact with the Slavic population and a traditional religion — Orthodox Christianity — which they share with the Russian population and which has shaped many common elements of their material and spiritual culture. This cultural proximity is one of the main reasons why these peoples are currently subject to processes of assimilation, leading to a rapid decline in their numbers. Among the titular peoples of the Finno-Ugric republics, the Komi are second only to the Karelians in terms of population decline during the last intercensal period within their republic and the Russian Federation as a whole. However, they currently exceed the Karelians in terms of their share of the republic's population.

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At the same time, the Komi have the highest concentration of their population within their national-territorial entity among the titular peoples of the Finno-Ugric republics of Russia. Only 11.4% of the Komi currently live outside their republic, and a significant portion of them are concentrated in regions neighboring the Komi Republic, where Komi ethno-areal groups are present (in the Murmansk Oblast, the Nenets, Yamalo-Nenets, and Khanty-Mansi Autonomous Okrugs). This largely explains why the characteristics of the Komi people's territorial distribution outside their main area of residence, as well as the dynamics of the Komi population at the regional level in Russia during various intercensal periods, remain poorly studied.

The aim of this study is to identify trends and the main factors influencing changes in the concentration of the Komi people in the regions of Russia during the intercensal periods from 1970 to 2021.

The study is based on ethnic statistics at the regional level in Russia, obtained from the population censuses conducted between 1970 and 2021, as published on the websites of Demoscope Weekly[1] and Population statistics of Eastern Europe & former USSR [2].

Research prerequisites

First of all, it is necessary to note previously conducted studies, in which the demographic trends of the Komi population over a long period (from 1897 or from 1926) have been examined within the current borders of the Komi Republic. This analysis is carried out either when researching the ethnic structure of the population of the republic as a whole (Rozhkin, 2012), or when studying the dynamics of various ethnic groups with a significant presence in the republic, such as natives of the Caucasus (Zherebtsov, Fauzer, 2023; Zherebtsov, Fauzer, 2025). Issues of differences in the natural movement of Komi and Russians living in the Komi Republic are also addressed (Zherebtsov, Rozhkin, 2012).

Changes in the ethnic structure of the population within the Komi Republic over the period from 1926 to 2021 were considered in the study (Vladykin, Alekseeva, Terenina, 2024). Furthermore, based on the concept of ethno-contact zones, an analysis of ethnic dynamics in the post-Soviet period was carried out at the level of the republic's municipalities (Manakov, Terenina, Vladykin, 2024; Terenina, Ivanov, Vladykin et al., 2024). In the second study, the object of research was the contact zone between the Slavic and Finno-Ugric populations in the north-east of European Russia, including the territory of the Komi Republic.

When discussing changes in the population of the Komi within the borders of the Russian Federation, researchers usually refer to studies on the demographic dynamics of the country's contemporary Finno-Ugric peoples (Fauser, 2011; Loginova, Rebrova, 2013; 10, Loginova, Kildishova, Semina et al., 2013; Myasnikova, 2015). These dynamics are usually examined over a

[1] Demoscope Weekly. Population censuses of the Russian Empire, the USSR, and 15 newly independent states. URL: http://www.demoscope.ru/weekly/ssp/census.php?cy=8 (accessed 02 August 2025).
[2] Population statistics of Eastern Europe & former USSR. URL: http://pop-stat.mashke.org/ (accessed 02 August 2025).

long time interval, but greater attention is paid to analyzing changes in population size during the most recent intercensal period, that is, from 2010 to 2021.

However, there are relatively few studies that focus specifically on the population dynamics of the Komi living outside their republic. Such an analysis is presented, for example, in the work of A.R. Khamidullin (Khamidullin, 2024), which examines, from this perspective, the Komi-Izhma and the Komi in general living in the Murmansk Oblast and the Nenets, Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs. In essence, this study is a continuation of the monograph by N.D. Konakov and O.V. Kotov (Konakov, Kotov, 1991), which is devoted to the formation and current state of the Komi ethno-areal groups. In this regard, it is also worth noting the article by V.P. Krivonogov (Krivonogov, 2023), which discusses contemporary ethnic processes among the Komi-Izhma people of the Kola Peninsula.

In our view, in order to analyze changes in the Komi population across intercensal periods at the level of all regions of Russia, we need an indicator that would allow these dynamics to be visualized on a map. Z.A. Trifonova, in one of her works (Trifonova, 2008), proposed an indicator which she termed the ethnic concentration coefficient (ECC). In another publication (Trifonova, Lobastova, Rostovtseva et al., 2016), this indicator is used to assess the settlement patterns of the Chuvash people in Russia and neighboring states from 1926 to 2010. The essence of the ECC is to identify the share of each region of the country in the total number of representatives of a certain ethnic group. We tested this indicator when analyzing the ethno-demographic dynamics of the titular ethnic groups of the republics of Russia from 1939 to 2010 (Manakov, 2022).

However, it should be noted that the analysis of ethnic concentration is based on various indicators, which are typically used to address issues relating to the assessment of ethnic heterogeneity within a population (Sokolov, 2025). For example, a similar term, namely the ethnic concentration coefficient (ECC), is used to describe an indicator proposed by D.V. Zhitin (Zhitin, 2024) to assess the localization of ethnic groups in different districts of St. Petersburg. In the author's earlier work, this indicator is referred to as the ethnic localization coefficient (Zhitin, Krasnov, 2015). This indicator is calculated as the ratio of the proportion of a particular ethnic group in the population of an urban district to the proportion of that ethnic group in the city's population, which is quite different from the essence of the ECC proposed by Z.A. Trifonova.

In international academic research, the concept of ethnic concentration is usually applied when studying the patterns of immigrant settlement in developed countries (Gang, Rivera-Batiz, Yun, 2002; de Graaff, de Groot, 2004; Guerra, Patuelli, Maggi, 2012) and is often associated with issues of ethnic segregation (Johnston, Manley, Jones, 2016; de Bézenac, Clark, Olteanu et al., 2022). Various indicators are used in these studies to examine ethnic concentration, for example, the Herfindahl-Hirschman index (Guerra, Patuelli, Maggi, 2012), the segregation index (Johnston, Manley, Jones, 2016), etc.

In order to avoid confusion, in our study, the indicator proposed by Z.A. Trifonova (Trifonova, Lobastova, Rostovtseva et al., 2016) is not designated as either a coefficient or an index. In the

works of S.Ya. Sushchiy, devoted to the geodemographic dynamics of Russians in neighbouring countries (Sushchiy, 2020) and Armenians in southern Russia (Sushchiy, 2018), the full formulation of the indicator is used, which, without the introduction of special terms, reflects its fairly simple essence. This is the proportion (share) of individual regions in the total population of a particular ethnic group in Russia. The same formulation will be used in this article.

Research methodology

The study is based primarily on a statistical and cartographic research method. The proportion of regions in the total Komi population living within the current (since 2022) borders of Russia was calculated using data of all population censuses from 1970 to 2021. The maps present the indicator in per mille; this is due to the high proportion of the Komi Republic (88.6% in 2021) in the total population of this ethnic group, and consequently the low proportion of other regions, as well as the relatively insignificant dynamics of this indicator, which are more conveniently analyzed at the tenth of a percent level.

The year 1970 was chosen as the baseline for this study. It should be noted that there have been no significant changes in the administrative-territorial division of Russia since 1959, which is important for calculating the dynamics of this indicator, as this should be carried out within territorial units with unchanging boundaries. However, during the 1959 census, the Komi were not included in the list of the registered ethnic groups in most regions of Russia. Therefore, the calculation of the indicator's dynamics was carried out starting from 1970, for which complete ethnic statistics are available for all regions of the country.

In the second stage of the work, the dynamics of the share of each region in the total Komi population in Russia were calculated for all five intercensal periods from 1970 to 2021. However, we present the results of the statistical and cartographic analysis for four intervals characterized by similar trends in the share of the Komi Republic and other regions within the total Komi population living in Russia. Thus, during the periods from 1970 to 1979 and from 1989 to 2010, a positive trend in this indicator was observed in the Komi Republic, while from 1979 to 1989 and from 2010 to 2021, a negative trend was recorded.

Results and discussion

According to the results of the 2021 population census, 143,500 Komi people lived in the Russian Federation, of whom 127,000 lived in the Komi Republic, representing 88.6% of the total Komi population in the country. Outside the Komi Republic, the top three regions in terms of the proportion of Komi people within their total population were neighboring autonomous okrugs (Fig. 1): Yamalo-Nenets (2.4%), Nenets (1.7%), and Khanty-Mansi (1.1%). The top five regions for this indicator included the Murmansk Oblast (0.8%) and St. Petersburg (0.6%). The proportion was relatively high (over 0.2%) in the Arkhangelsk, Kirov, Leningrad, Moscow, and Tyumen Oblasts, the Perm and Krasnodar Krais, and in Moscow.

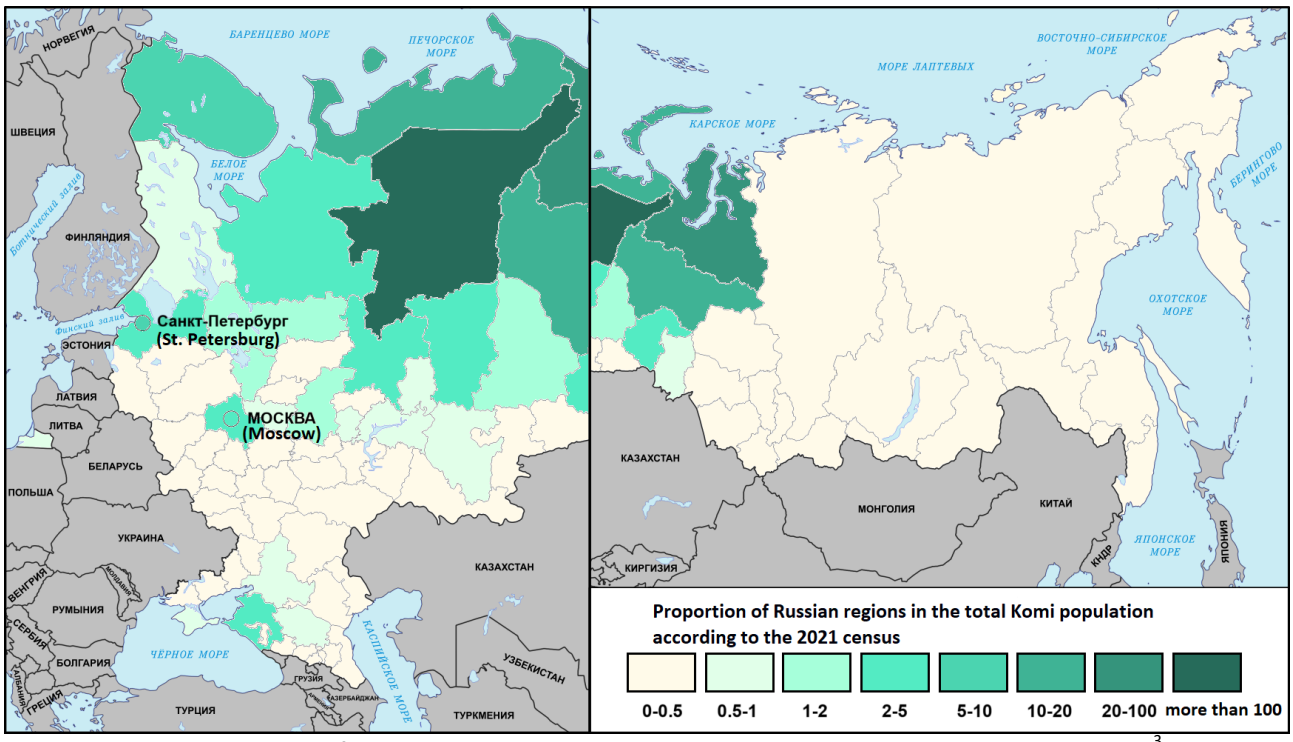


Fig. 1. Proportion of Russian regions in the total Komi population according to the 2021 census[3].

Changes in the Komi population within the modern territory of Russia and the Komi Republic (Fig. 2) are characterized by an increase during the late Soviet period (between the 1959 and 1989 censuses) and a decline during the post-Soviet period (between 1989 and 2021). From 1959 to 1989, their population in Russia increased by 19.6%, in the Komi Republic — by 19%, indicating a slight increase in their proportion in other regions (from 13.3% to 13.8%). Between the 1989 and 2021 censuses, the decline in the Komi population in their republic was slower than in the country as a whole, as a result of which the share of other regions of Russia in the total Komi population fell to 11.4%.

[3] Compiled by the authors.

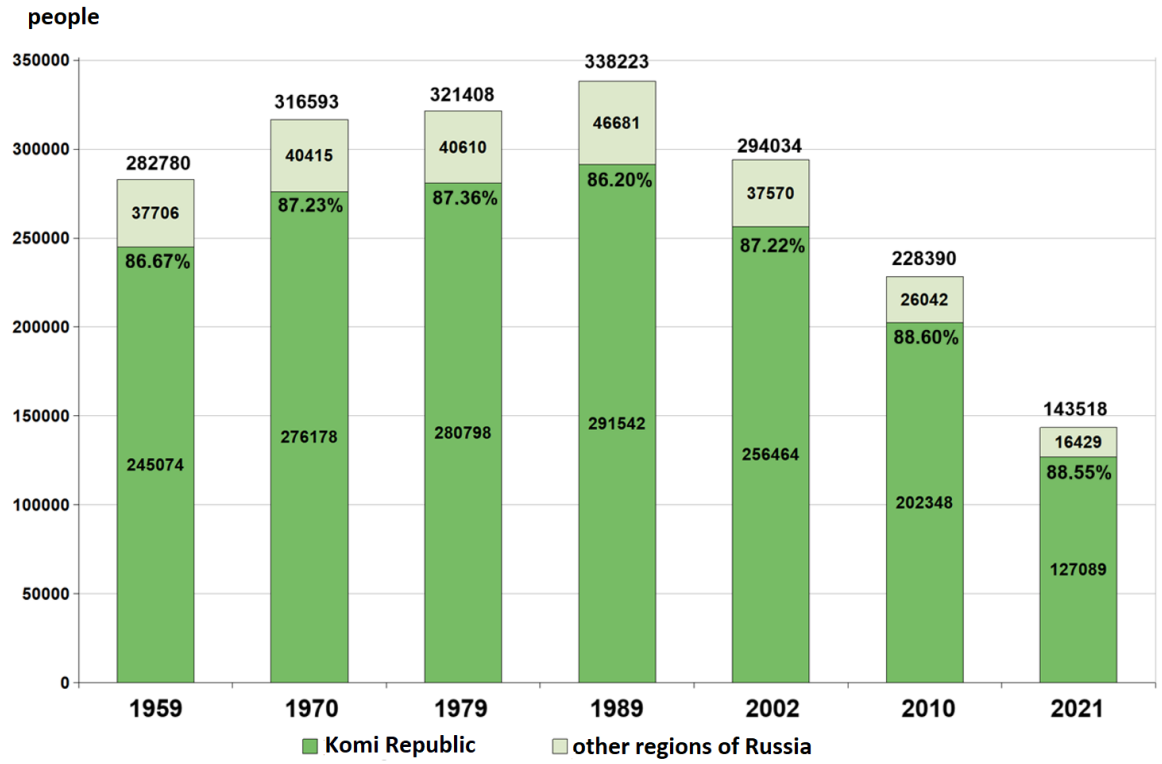


Fig. 2. Dynamics of the Komi population within the modern territory of Russia and the Komi Republic, as well as their concentration in their republic (in %), based on the results of the 1959, 1970, 1979, 1989, 2002, 2010, and 2021 censuses[4].

The dynamics of the share of Russian regions in the total Komi population from 1970 to 1989 is presented in Fig. 3. Between the 1970 and 1979 censuses, there was a significant increase in the concentration of the Komi people in the Komi ASSR and the Moscow Oblast, with less significant increases in the Arkhangelsk, Murmansk, Leningrad, Yaroslavl, Vladimir, and Irkutsk Oblasts, as well as in Leningrad, the Tatar ASSR, and the Yamalo-Nenets Autonomous Okrug. In a number of other regions, there was a slight increase in the concentration of the Komi population. Nevertheless, regions with a declining Komi population predominated in Russia, among which the following were particularly notable: the Nenets Autonomous Okrug, which neighbors the Komi ASSR, the Perm and Sverdlovsk Oblasts and the Khanty-Mansi Autonomous Okrug, as well as the Omsk, Novosibirsk and Kemerovo Oblasts, the Altai Krai in southern Siberia, and the Chita and Kamchatka Oblasts in the Far East. In the south of European Russia, the concentration of the Komi people in the Krasnodar Krai decreased slightly.

[4] Compiled by the authors.

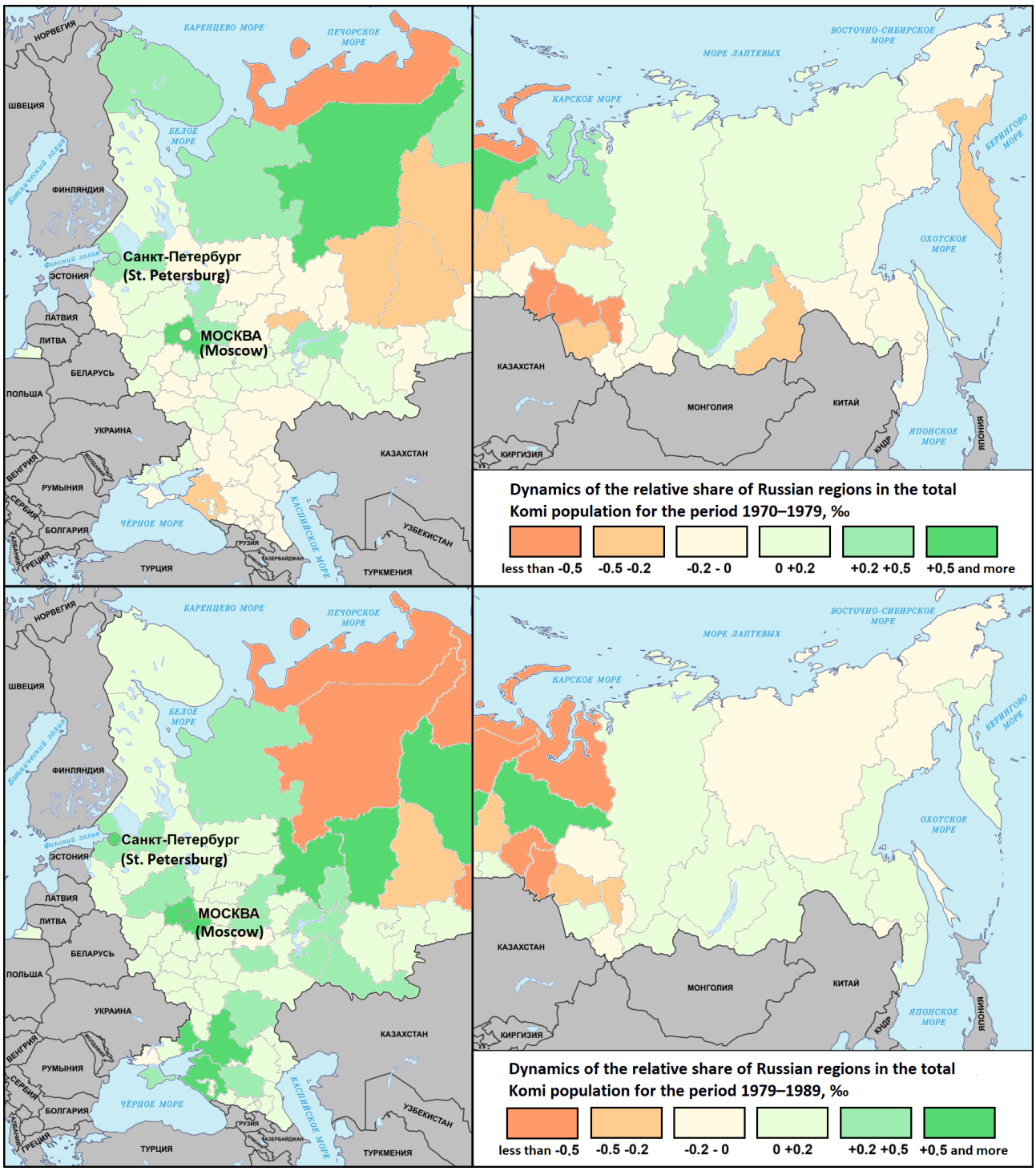


Fig. 3. Dynamics of the relative share of Russian regions in the total Komi population for the periods 1970–1979 and 1979–1989, ‰[5].

Overall, this trend indicates the existence of several regions that act as centers of migration attraction for the Komi people, primarily Moscow, Leningrad and the surrounding regions. It should be noted that during this period, there was a relatively high natural increase in the Komi ASSR (Zherebtsov, Rozhkin, 2012), which may explain, on the one hand, the growing concentration of Komi people within their own republic and, on the other hand, the availability of resources enabling their migration to other regions of Russia. At the same time, the Asian part of Russia was

[5] Compiled by the authors.

dominated by regions with declining Komi populations, which is most likely the result of assimilation processes rather than migration outflow.

Between 1979 and 1989, there was a significant decrease in the concentration of the Komi people within their republic, and, to a lesser extent, in two neighboring autonomous okrugs (Nenets and Yamalo-Nenets), as well as in a number of regions forming a single belt from the Middle Urals to Kuzbass. At the same time, a clear southward trend in Komi migration flows emerged, starting from the Kirov and Perm Oblasts, through the multi-ethnic Volga region, to the regions of southern Russia. In the second half of the 1980s, there was a sharp fall in the birth rate in the Komi ASSR (Zherebtsov, Rozhkin, 2012). This, coupled with the continued migration outflow of the titular ethnic group from their republic to other regions of the country, resulted in a decline in the republic's share of the total Komi population in Russia.

The dynamics of the proportion of the Komi population living in different regions of Russia during the post-Soviet period are presented in Fig. 4. Between the 1989 and 2010 censuses, the Komi Republic and the Yamalo-Nenets Autonomous Okrug experienced significant growth in this indicator, while the Murmansk Oblast and the Nenets Autonomous Okrug observed a less noticeable increase. However, in most regions of the country, the indicator showed a decline, with the most significant decrease occurring in the Arkhangelsk and Sverdlovsk Oblasts, which border the Komi Republic, in the Perm Krai, and in a number of other regions. The most probable reason for the increase in the concentration of Komi people within their republic and in the adjacent territories of their traditional residence (which include three neighboring autonomous okrugs and the Murmansk Oblast) is the accelerated assimilation of the Komi in the rest of the country. During this period, there was a sharp decline in the share of Komi in the total number of regions located in the Urals, southern and central Siberia, southern European Russia, as well as Moscow and St. Petersburg.

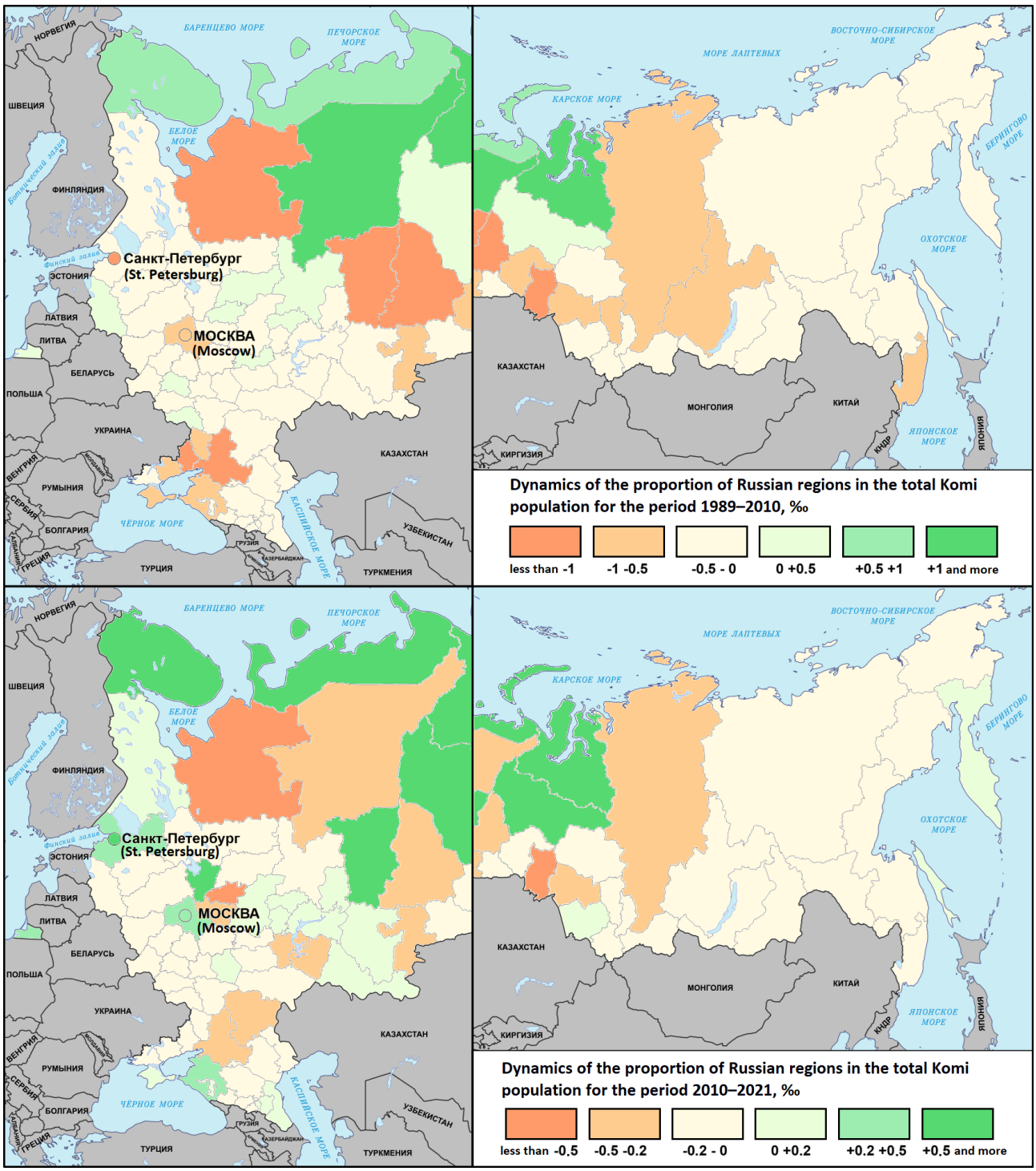


Fig. 4. Dynamics of the proportion of Russian regions in the total Komi population for the periods 1989–2010 and 2010–2021, ‰ [6].

The period between the 2010 and 2021 censuses was characterized by a decline in the concentration of the Komi people within their republic, but, as in the previous period, the decrease was more pronounced in the Arkhangelsk Oblast. The concentration of the Komi people increased in areas where they have long been settled — in the three autonomous okrugs neighboring the Komi Republic and in the Murmansk Oblast. Overall, the number of regions in Russia showing positive trends in this indicator increased. Specifically, this type of trend returned to Perm

[6] Compiled by the authors.

Krai, St. Petersburg, Moscow, and the Moscow Oblast. Nevertheless, in most regions of the country, the decline in the concentration of the Komi population continued, which is fully explained by assimilation processes.

Three main factors can be identified as contributing to the significant decline in the Komi population during the post-Soviet period, which also influenced the specific dynamics of their concentration across Russia's regions. Firstly, there is the natural movement of the Komi people, primarily within their republic, where members of the indigenous ethnic group live predominantly in rural areas. In the last decade of the 20th century, there was a downward trend in the birth rate in rural settlements of the Komi Republic; at the same time, the death rate rose significantly, and the natural increase of the republic's titular ethnic group shifted from positive to negative (Zherebtsov, Rozhkin, 2012). Thus, natural decline became one of the key reasons for the sharp decrease in the Komi population, both within their republic and in Russia as a whole.

Secondly, there are the processes of assimilation, which, in our view, were the main cause of the Komi population falling by more than half over the three post-Soviet decades. A comparative assessment of the susceptibility of different ethnic groups to assimilation by the Russian population can be made using an indicator calculated by the ethno-demographer E.L. Soroko on the basis of the frequency of ethnically mixed marriages between members of different ethnic groups (Soroko, 2014; Soroko, 2018). This indicator, which E.L. Soroko referred to as "inter-ethnic distances", was proposed by N.K. Terenina to be termed the ethnic contrast index (ECI) or the Soroko coefficient (SC) (Terenina, 2023).

Using microdata from the 2010 census and in accordance with E.L. Soroko's methodology, we calculated the ECI (SC) for pairs of major ethnic groups across all regions of the Russian Federation. Notably, in pairs formed by Russians and titular peoples of the Finno-Ugric republics of Russia, the Komi were approximately on par with the Karelians and significantly lower than the Mari, Mordvins, and Udmurts. This indicates lower barriers to the formation of marital couples between the Komi and Russians compared with other titular peoples of the Finno-Ugric republics (with the exception of the Karelians). It indirectly confirms the Komi's high predisposition to assimilation in the post-Soviet period. In the regions neighboring the Komi Republic, the most common inter-ethnic marriages are between Komi and Russians living in the Arkhangelsk Oblast (which explains the sharp decline in the concentration of Komi people in that region during the post-Soviet period). Such marriages are significantly less common in the Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs, and extremely rare in the Nenets Autonomous Okrug.

Thirdly, a factor that was particularly relevant in light of the 2021 census results is the high proportion of the population without a stated ethnicity. According to the 2021 census, 22.8% of the population in the Komi Republic did not specify their nationality for various reasons (28.5% in urban areas, 3.1% in rural areas). A similar situation has developed in the regions neighboring the Komi Republic: 15.7% of the population of the Arkhangelsk Oblast (19.6% in urban settlements, 2.5% in rural areas), 9.9% of the population of the Nenets Autonomous Okrug (13.1% and 0.9%,

respectively), 21.3% of the population of the Yamalo-Nenets Autonomous Okrug (24.3% and 4.9%), 26.4% of the population of the Khanty-Mansi Autonomous Okrug (28.2% and 5.6%).

However, it should be taken into account that the majority of Komi in their republic and other noted regions, except for the Arkhangelsk Oblast, live in rural areas (62.6% in the Komi Republic, 56.9% in the Nenets Autonomous Okrug, 67.3% in the Yamalo-Nenets Autonomous Okrug, and 61.4% in the Khanty-Mansi Autonomous Okrug). Since the nationality of the majority of the rural population in these regions was recorded in 2021, this factor is unlikely to be the primary cause of the decline in the Komi population between the 2010 and 2021 censuses (Fauser, 2023). Nevertheless, some Komi, particularly those living in towns, could not avoid being categorized as "people without specified ethnicity" (for example, in the case of accounting based on administrative sources). Therefore, it is possible to suggest that the Komi population has been undercounted in their republic and across Russia in the official results of the 2021 census (Khamidullin, 2024). This may well be the reason for the decrease, albeit a slight one, in the Komi concentration rate within their republic between 2010 and 2021.

The redistribution of population between regions, which also determines the dynamics of the ethnic concentration indicator, is the result of migration. While during the Soviet period migration played a significant role in the settlement of the Komi people across Russia, in the post-Soviet period there were no longer any regions in the country with a growing Komi population, i.e., regions clearly experiencing an inflow of Komi migrants. If such an influx occurred, it was immediately "neutralized" by assimilation, which became the dominant factor in the dynamics of the Komi population both within the Komi Republic itself and beyond. Even during the Soviet period, the impact of migration on changes in the Komi population in most regions of Russia was minor, as the increase in the concentration rate in many of them was achieved through natural growth of the Komi population (and, consequently, an increase in their numbers) against a backdrop of lower growth or even a slight decline in the Komi population, initially in some regions neighboring the Komi ASSR (between the 1970 and 1979 censuses), and then in the republic itself (between the 1979 and 1989 censuses).

Conclusion

The study revealed that the main trends in Komi concentration at the regional level in Russia during the intercensal periods of the Soviet era, more specifically from 1970 to 1979 and from 1979 to 1989, were largely determined by the positive natural increase in the Komi population in Russia, and especially within their republic, which created resources for the migratory distribution of Komi across other regions of Russia. The main destinations for Komi migration from their main area of residence were Leningrad and Moscow along with their surrounding regions; however, in the 1980s, a distinct southward migration trend emerged — through the Volga region towards the south of European Russia.

At the same time, in the middle of the last Soviet decade, there was a dramatic decline in the Komi birth rate within their main area of residence. This, coupled with continued Komi migration to other regions, led to a decrease in their concentration in the Komi ASSR and neighboring regions (especially in the Nenets and Yamalo-Nenets Autonomous Okrugs). There was also a decrease in Komi concentration in some Asian regions of Russia, particularly in southern Siberia, where there were relatively large Komi populations. Most likely, the main reason for this was not the outflow of Komi, but the processes of their assimilation that had already begun during Soviet times.

In the post-Soviet period, assimilation processes emerged as the leading factor influencing the dynamics of the Komi population's concentration across the country's regions, becoming more significant than the natural decline of the number of members of this ethnic group. This affected, to a greater extent, regions located outside the main Komi settlement area, most of which experienced a decline in the concentration of the Komi people. However, within this area, the concentration of the Komi population continued to grow from 1989 to 2010, and only in the second decade of the 21st century, a decrease in the concentration of the titular ethnic group in the Komi Republic became evident. Komi migration in the post-Soviet period no longer played as significant a role in their distribution across the country as it did during the Soviet period, but it is worth noting that St. Petersburg and Moscow remained centers of attraction for Komi migrants.

It is also necessary to highlight a factor that became fully evident only during the 2021 census, and which therefore influenced the dynamics of the Komi population and its concentration across Russia's regions during the intercensal period from 2010 to 2021. The official results of the most recent All-Russian Population Census revealed an extremely high proportion of people who did not specify their ethnicity. Moreover, some regions within the main Komi settlement area were among the country's leaders in terms of the proportion of the population without a stated ethnicity. Although rural areas, where the majority of the Komi people live, were more fully covered by the census, some Komi people, particularly those living in towns, may have fallen into this category, thereby slightly undercounting the official figures for the Komi population in the Komi Republic and, consequently, the republic's share of the total Komi population in Russia.

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The New Generation of Arctic Tourism: Integration of Creative Industries, AI and Traditional Knowledge of Indigenous Peoples

Galina A. Karpova [1], Dr. Sci. (Econ.), Professor
Alexey D. Shmatko [2], Dr. Sci. (Econ.), Professor
Anna V. Mikhailova [3]✉, Cand. Sci. (Econ.), Associate Professor

[1] Saint Petersburg State University of Economics, Naberezhnaya Kanala Griboedova, 30-32, lit. A, Saint Petersburg, Russia
[2] North-Eastern Federal University named after M.K. Ammosov, ul. Belinskogo, 58, Yakutsk, Russia
[3] Institute for Regional Economics Studies of the Russian Academy of Sciences, ul. Serpukhovskaya, 38, Saint Petersburg, Russia
[1] karpovaga@rambler.ru, ORCID: https://orcid.org/0000-0001-6139-3336
[2] info@iresras.ru, ORCID: https://orcid.org/0000-0001-7139-3276
[3] av.mikhailova@s-vfu.ru ✉, ORCID: https://orcid.org/0000-0002-3110-7017

Abstract. The article explores the prospects for the development of creative tourism in the Arctic regions of the Russian Federation, analyzing its role in sustainable socio-economic development. The paper examines unique tourism practices linked to ethno-cultural heritage, natural features, and innovative approaches. Particular attention is paid to the integration of creative industries, folk art, environmental projects, and digital platforms to create new opportunities for local communities. Recommendations on creating infrastructure, promoting creative tourism products, and using artificial intelligence to increase the attractiveness of regions are made. The article analyzes the challenges associated with the limited transport accessibility and the need to preserve the ecological balance. It provides examples of successful case studies from other regions of Russia, such as the Rostov Oblast and Sevastopol, where digital tools and creative approaches are contributing to the development of tourism. The authors emphasize the importance of preserving the cultural heritage and traditions of indigenous peoples, as well as the need to develop comprehensive organizational approaches and programs to support small businesses and advance digitalization, which will help to improve the tourism attractiveness index of the Arctic regions of the Russian Federation. The authors highlight the unrealized potential of the Arctic and the possibilities of using it to diversify the regional economy and improve the quality of life of the population.

Keywords: *creative tourism, Arctic regions of the Russian Federation, sustainable regional development, ethno-cultural heritage, tourism infrastructure, innovations, socio-economic effect, digitalization, best practices of creative tourism*

Introduction

The Arctic occupies a special place in the strategic development of the Russian Federation, which is confirmed by a number of key documents, such as Decree of the President of the Russian Federation of October 20, 2020 No. 645 “On the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035”[1], Order of the Government of the Russian Federation of

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[1] Decree of the President of the Russian Federation of October 20, 2020. URL: https://base.garant.ru/74810556/ (accessed 12 April 2025).

September 24, 2020 No. 2464-r "National Program for the Socio-Economic Development of the Far East until 2024 and with a Perspective up to 2035"[2] and Order of the Government of the Russian Federation of December 28, 2024 No. 4146-r "On Approval of the Strategy for Spatial Development of the Russian Federation until 2030 with a Forecast up to 2036"[3]. These and other documents define priority strategic directions, including the exploitation of natural resources, the development of transport infrastructure, the improvement of the population's quality of life, and the creation of new centers of economic growth in the Arctic and the Russian Far East. Particular attention is paid to the development of tourism, which is regarded as a driver of sustainable development in the Arctic territories (Kugiejko, 2025).

G.N. Kvita, N.A. Luchina and A.N. Arshinova note that the issue of economic survival and social security for people in Russia's Arctic territories is currently becoming increasingly important (Kvita, Luchina, Arshinova, 2022). In the context of limited resources, creative ideas gain a competitive advantage and receive support.

One of these ideas is creative tourism. This term is believed to have been introduced in 2000 by G. Richards and K. Raymond (Cherevichko, Temyakova, 2022). This sector is becoming increasingly promising, contributing not only to attracting tourists, but also to preserving the cultural heritage of the indigenous peoples of the North, developing local communities, and promoting the unique cultural landscape.

Researchers (Kvita, Luchina, Arshinova, 2022; Cherevichko, Temyakova, 2022; Tsapuk, Shchegolkov, 2024) emphasize the role of this form of tourism in regional development, linking it to the digital and creative economies. In our view, the concept of "creative tourism" in the Arctic encompasses a wide range of activities: from participation in master classes on traditional crafts to creation of contemporary art objects inspired by the region's extreme natural environment.

However, despite its significant potential, the development of this promising type of tourism in the Arctic faces a number of challenges, including limited transportation accessibility, a lack of infrastructure, and the need to ensure environmental safety.

We highlight the following challenges that hinder this development in Arctic regions:

- firstly, insufficient integration of tourism practices with local cultural and natural features (Ren, Jóhannesson, Ásgeirsson et al., 2024);
- secondly, the lack of comprehensive programs aimed at developing creative tourism products (Parding, Styvén, Lindström et al., 2023; Chen, Chen, 2016);
- thirdly, the high costs of organizing tourism infrastructure in harsh climatic conditions (Chen, Chen, 2015);
- fourthly, the need to maintain a balance between tourism development and the preservation of the fragile Arctic ecosystem (Degteva, Bobretsov et al., 2021).

[2] Order of the Government of the Russian Federation of September 24, 2020. URL: https://docs.cntd.ru/document/565853199 (accessed 12 April 2025).
[3] Order of the Government of the Russian Federation of December 28, 2024. URL: https://www.consultant.ru/document/cons_doc_LAW_495567/ (accessed 12 April 2025).

At the current stage of creative economy development in the Arctic regions of the Russian Federation, a new tourism paradigm is required, based on the synthesis of innovative technologies, creative industries, and the traditional knowledge of the indigenous peoples. The new generation of Arctic creative tourism is a complex interdisciplinary phenomenon demanding a comprehensive scientific analysis in the context of the global challenges of sustainable regional development.

Research methodology

Our research is based on the concept that creative tourism is a form of tourism that involves active participation of travelers in joint cultural practices, including creation, co-creation and learning within local communities; it is characterized by authentic interaction and mutual exchange of knowledge, skills and cultural values. Tourists become both consumers and participants in cultural processes, while local communities act as active agents of development, ensuring a balance between economic feasibility and socio-cultural responsibility.

The research methodology is based on an integrative sociocultural-economic approach (Rakhmeeva, Chesnyukova, 2024) that influences regional development. Its foundation comprises the principles of sustainable development (the trinity of economy, ecology and society) at the micro-, macro-, and global levels (Drobot, Makarov, Pochepaev, 2020), participatory engagement in local governance (Odintsova, 2024), the concept of integrating economy and culture, the theory of social exchange (mutual benefit for tourists and the community (Butova, Danchenok, Egoshina et al., 2021)), and impact assessment methodologies (SROI, return on social investment)[4].

The aim of the study is to analyze the creative potential of Russia's Arctic territories and to formulate recommendations for the development of creative tourism as a tool for the region's sustainable socio-economic development. The object of the study is tourism practices in Russia's Arctic regions; the subject of the research is the mechanisms and tools for developing tourism in Arctic conditions. The study uses methods of theoretical analysis of the literature and strategic development documents, systemic and comparative analysis, as well as socio-economic methods for assessing potential.

Discussion

Researchers (Zhelnina, Sizova, Khoreva, 2023) note that in the Arctic regions of the Russian Federation, creative tourism is being strengthened through the integration of folk art, environmental projects and digital platforms, creating new opportunities for local communities. The interaction of tourism and creative industries contributes to economic diversification and consolidation of cultural identity. Using the example of tourist destinations in the North-Western Federal District of the Russian Federation, new prospects for the development of tourism through inter-regional cooperation, state support for infrastructure development, and territorial branding are highlighted (Karpova, Valeeva, 2015).

[4] SPOI Methodology. URL: https://www.undp.org/sites/g/files/zskgke326/files/migration/eurasia/Appendix-SROI-methodology_ENG.pdf (accessed 12 April 2025).

Research (Karpova, Rybalchenko, Ignatova, 2020) points out that the development of the health resort sector in Russia offers potential for medical tourism. In our view, the Arctic can offer not only traditional health resort treatments, but also other formats that combine health improvement with unique experiences. For example, art therapy accompanied by the Northern Lights (meditative practices and creative workshops in the Murmansk Oblast and in the Arctic regions of the Republic of Sakha (Yakutia)), or the practice of cryotherapy and ethno-therapy (the therapeutic effects of the khomus musical instrument). However, promoting such practices requires digital tools, such as the launch of VR/AR aggregators for medical tourism services (combining virtual and real-world elements). We believe the Arctic has the potential for innovative tourism formats that combine wellness, natural resources, culture, art, and local traditions.

Ethnographic programs, which offer an immersive experience of traditional ways of life, are of particular interest in the Arctic regions of the Russian Federation, as is extreme tourism — journeys to the Pole of Cold, cruises along the Northern Sea Route and through the Arctic archipelagos. Despite complex logistics and high costs, Arctic tourism is growing due to the unique offerings, from ice fishing to watching polar bears. This creates the preconditions for the development of innovative tourism practices (Sarafanova, Sarafanov, 2024), based on sustainable development methodology and concepts of integrating economics and culture, as well as social exchange theory. For example, the development of creative practices in Yakutia relies on unique ethno-cultural traditions and local folk crafts, integrating them into the economy through support for small businesses and digitalization. We believe that the key effect of regional development is achieved through social cohesion and the preservation of cultural heritage.

Results

The development of creative tourism in the Arctic regions of the Russian Federation can benefit from the experience of other regions. For example, the Rostov Oblast has significant potential due to its unique cultural and historical sites (the M.A. Sholokhov and A.P. Chekhov museums, the archaeological reserve, and special events). Digital tools (booking platforms, VR, AR guides, QR codes) and the development of infrastructure and transport accessibility are used to enhance its appeal (Khanina, 2023).

Creative tourism in small towns (using Venev, Chekalin, and Bezhetsk as examples) is based on the creation of local cultural centers (museums, workshops) and engaging tourists in authentic practices (crafts, folklore). Key tools include, firstly, the creation of comfortable public spaces; secondly, engaging narratives (using stories, legends, and tales of indigenous peoples, natural monuments, and landscapes); thirdly, network projects that strengthen territorial identity and stimulate small businesses and self-employment (Tsapuk, Shchegolkov, 2024).

We agree with the researchers (Sarafanova, Sarafanov, 2022) that territorial development requires transforming their core factors into assets with higher symbolic value. The Arctic regions of the Russian Federation possess unique tourism potential due to their natural landscapes, includ-

ing glaciers, tundra, and Northern Lights, as well as their rich cultural heritage and historical sites. At the same time, attention should be paid to the process of forming a comprehensive system of economic security for tourism and recreational zones (Karpova, Khmelnitsky, 2023).

The experience of Sevastopol, a city of federal significance, is of particular interest, as it is enhancing its appeal to tourists through creative projects linked to its military-historical heritage (military reenactments, quests) and natural resources (coastal trails) (Shabalina, Kashirina, 2024). Territory branding, emphasizing uniqueness (symbolism, emotional narratives), and engaging local communities in the creation of tourism products play an important role.

We agree with A.S. Krasilnikov (Krasilnikov, 2024) that it is necessary to formulate concepts for the development of Arctic creative industries in the Arctic Zone of the Russian Federation to ensure unified approaches, consistent actions, and coordinated measures for the creative economy in the Russian Arctic.

Against a backdrop of global changes, including glacial melt and the development of new technologies, the Arctic is becoming accessible to a wide range of tourists. The Arctic Zone of the Russian Federation comprises nine regions. Each region has the potential for tourism development (Table 1).

Table 1

Analysis of the sectoral structure of the regions in the Arctic Zone of the Russian Federation[5]

Region	Territories located in the Arctic zone of Russia	Sectors of the economy
1	2	3
Murmansk Oblast	Entire region	• mining (nickel, apatite, copper, and others); • shipbuilding (there are several large shipyards specializing in the construction and repair of various types of sea vessels); • fishing; • tourism (unique natural beauty of the Kola Peninsula attracts tourists from all over the world, facilitating the development of the hotel industry, service infrastructure, and other tourism-related industries); • agriculture
Nenets Autonomous Okrug	Entire region	• mining (primarily oil and gas; the region has significant reserves of these resources, making it a major player in the Russian energy market); • metalworking industry; • construction and building materials production; • agriculture (reindeer herding, dairy farming, fishing, greenhouse vegetable growing); • tourism (unique natural environment, indigenous culture, and outdoor recreation opportunities attract tourists from all over the world)
Chukotka Autonomous Okrug	Entire region	• natural resource extraction (gold, silver, copper, aluminum, coal, oil, gas); • non-ferrous metallurgy; • mining; • fishing; • reindeer herding; • construction; • transport sector (aviation)

[5] Compiled by the authors based on open data (official websites of the regions indicated in Table 1).

Yamalo-Nenets Autonomous Okrug	Entire region	• hydrocarbon production (oil and gas); • agriculture (reindeer herding, hunting, dairy farming, cattle breeding, pig farming, cage-based fur farming, harvesting of wild plants); • development of transport infrastructure (Yamal's transport infrastructure plays a key role in connecting the region to the rest of the world; as most settlements are located in remote areas, the development of transport is of great importance in ensuring availability of services and goods for residents of the district)
Karelia Republic	1) MO "Belomorskiy Municipal District"; 2) MO "Kalevalskiy National Municipal District"; 3) Kemskiy Municipal District; 4) MO "Kostomuksha Urban Okrug"; 5) Loukhskiy Municipal District; 6) MO "Segezhskiy Municipal District"	• forestry (forestry complex plays a significant role in the republic's economy due to its rich forest resources); • production of wood products, pulp and paper, wooden structures and furniture; • mining; • agriculture; • tourism (tourism plays a significant role in the republic's economy due to its unique natural heritage: lakes, forests, and mountains attract tourists from all over the world)
Komi Republic	1) MO of the "Vorkuta" Urban District; 2) MO of the "Inta" Urban District; 3) MO of the "Usinsk" Urban District; 4) "Ust-Tsilemskiy" Municipal District	• extraction and processing of natural resources (oil, gas, mineral resources): the oil and gas complex plays a key role in the region's economy. The Komi Republic has large oil and gas deposits, which enables the development of the oil and gas industry. Local enterprises are engaged in both raw material extraction and processing; export of these products generates significant revenue for the region; • forestry is also of great importance to the economy of the Komi Republic; it comprises wood harvesting enterprises, wood product manufacturing enterprises (boards, plywood, furniture), as well as the pulp and paper sector. • production of construction materials; • mining industry (stone, sand); • agriculture (livestock, pig farming, poultry farming, trout farming, crop production, fishing) • tourism (ecotourism and fishing)
Republic of Sakha (Yakutia)	1) Abyiskiy ulus (district); 2) Allaikhovskiy ulus (district); 3) Anabarskiy ulus (district); 4) Bulunskiy ulus (district); 5) Verkhnekolymskiy ulus (district); 6) Verkhoyanskiy ulus (district); 7) Zhiganskiy ulus (district); 8) Momskiy ulus (district); 9) Nizhnekolymskiy ulus (district); 10) Olenek Evenki national ulus (district); 11) Srednekolymskiy ulus (district); 12) Ust-Yanskiy ulus (district); 13) Eveno-Bytantayskiy national ulus (district)	• mining (coal, diamonds, gold, silver). Diamond mining is one of the region's most important industries; • food industry; • light industry; • construction; • forestry; • agriculture (horse and reindeer breeding); • tourism (unique natural environment, cultural heritage of the Yakut people, and opportunities for active tourism make this region attractive to tourists from all over the world)
Krasnoyarsk Krai	1) MO City of Norilsk; 2) Taimyr Dolgan-Nenets Municipal District;	• mining (a leading role in the region's economy); • forestry (one of the region's main resources); • mechanical engineering and metalworking;

	3) MO Turukhansk District; 4) Rural settlements in the Evenki Municipal District: Surinda Settlement, Tura Settlement, Nidym Settlement, Uchami Settlement, Tutonchany Settlement, Essey Settlement, Chirinda Settlement, Ekonda Settlement, Kislokan Settlement, Yukta Settlement	• energy (due to the presence of large hydroelectric power stations on the Yenisei River and other reservoirs, the region is one of Russia's largest electricity producers); • agriculture and food industry
Arkhangelsk Oblast	1) MO City of Arkhangelsk; 2) MO "Mezenskiy Municipal District"; 3) MO "Novaya Zemlya" Urban District; 4) MO City of Novodvinsk; 5) MO "Onezhskiy Municipal District"; 6) MO "Primorskiy Municipal District"; 7) Urban District "Severodvinsk"; 8) MO "Leshukonskiy Municipal District"; 9) MO "Pinezhskiy Municipal District"	• mining (oil and gas), production of petroleum products; • forestry (logging, wood processing, pulp and paper production, sawn wood production, wooden building materials); • shipbuilding and ship repair; • tourism (unique natural beauty of the North and cultural attractions make the Arkhangelsk Oblast an attractive tourist destination)

Table 1 lists the regions that are part of the Arctic Zone of the Russian Federation. All of them have a unique economic structure, determined by their natural resources, industrial specialization and geographical characteristics.

Russia's Arctic regions offer unique opportunities for creative tourism, including visits to national parks, nature reserves and specially protected natural areas, wildlife watching and experiencing the culture of indigenous peoples.

Table 2 summarizes the characteristics of the tourism potential of Russia's Arctic regions. The data was compiled using information from the "Tourism Attractiveness Index of Russian Regions"[6] and official statistics (EMISS)[7].

Table 2

Tourism potential of the Arctic regions of the Russian Federation

Region	Tourism sector	Characteristics	Tourism Attractiveness Index (2024)	Gross value added of the tourism industry in the economy of a constituent entity (million rubles, as of January 1, 2023)	Share of the tourism industry's gross value added in the gross regional product of a constituent entity (January 1, 2023), %
1	2	3	4	5	6
Murmansk Oblast	Arctic tourism	Leader in Arctic tourism with well-developed infrastructure for eco-tourism: nature reserves, Sámi	0.44	24 705.5	3.1

[6] Tourism Attractiveness Index of Russian regions, 2024. URL: https://russiacb.com/upload/iblock/e98/46p8eqt8qvn1b3083o3bgreav9im0exl.pdf (accessed 09 April 2025).
[7] EMISS. URL: www.fedstat.ru/indicator/62197 (accessed 10 April 2025).

		ethnic villages, cruises along the Barents Sea, ice fishing, Northern Lights viewing.			
Nenets Autonomous Okrug	Ethnographic tourism	Unique ethnographic programs: Nenets nomadic camps, reindeer herding, traditional crafts, natural sites, exclusive tours with a focus on authenticity	0.30	3 672.8	0.9
Chukotka Autonomous Okrug	Scientific expeditions	Expeditions to Wrangel Island to observe polar bears and walruses, visits to indigenous settlements with traditional ceremonies, cruise tours	0.29	4 056.3	2.3
Yamalo-Nenets Autonomous Okrug	Ethno-cultural tourism	Ethno-cultural tourism, visiting nomadic families, reindeer sledging, festivals and national holidays of indigenous peoples, visiting natural phenomena such as craters and tundra landscapes	0.34	27 660.2	0.5
Karelia Republic	Eco-trails	Ecotourism (eco-trails) in nature reserves and to the White Sea Petroglyphs. Currently, the most visited protected area in Russia. As well as Kivach Waterfalls, Paanajärvi National Park, and the Kizhi Museum-Reserve	0.33	12 758.3	3.7
Komi Republic	Active tourism	Visits to national parks with pristine taiga and mountains. Ethnographic tours to the Komi-Zyryans with their hunting and fishing traditions. Limited availability maintains the exclusivity of the programs. For example, a visit to the Buredan Waterfall and one of the Seven Wonders of Russia — the famous pillars on the Manpupuner Plateau	0.37	17 454.2	1.6
Republic of Sakha (Yakutia)	Extreme tourism	Extreme tours to the Pole of Cold (Oymyakon), rafting on the Lena, Amga, and other rivers. Ethnic festivals (Ysyakh, the Sun Festival), Bakaldyn (Evenki ritual festival), the world's only mammoth museum, the "Kingdom of Permafrost" Museum, creative centers, and creative districts. Lena Pillars National Park, Amga Pillars, and Olenek Pillars	0.34	43 218.6	2.0
Krasnoyarsk Krai	Nature and ecotourism	One of the key tourist regions of Siberia, combining natural attractions, cultural heritage, and extreme types of tourism. Krasnoyarsk Pillars National Park with unique syenite rocks. Trails of the Putorana Plateau, Tunguska Nature Reserve, Manskaya Loop, as well as the region's sandy beaches with their developing infrastructure	0.38	67 980.4	2.1
Arkhangelsk Oblast	Historical tourism, gastronomic tourism	The Novaya Zemlya and Franz Josef Land archipelagos — historic routes for polar expeditions. Cultural branding through Pomor cuisine	0.43	24 282.4	2.4

TOTAL			Average value: 0.365	Total for the Arctic regions: 225,788.7	Average value: 2.07

Table 2 shows that the Arctic regions of the Russian Federation demonstrate significant tourism potential, based on a combination of unique natural landscapes, ethno-cultural heritage of indigenous peoples, and specialized tourism practices.

The Murmansk Oblast (index 0.44) and the Arkhangelsk Oblast (index 0.43) are the leaders in tourism attractiveness among the Arctic regions of the Russian Federation. The Krasnoyarsk Krai also shows high potential. The Krasnoyarsk Krai generates the highest gross value added (GVA) in the region's economy (67,980.4 million rubles); significant contributions are made by the Republic of Sakha (Yakutia) (43,218.6 million rubles) and the Yamalo-Nenets Autonomous Okrug (27,660.2 million rubles).

The Republic of Karelia has the largest share of the tourism industry's gross value added (GVA) in the gross regional product (GRP) (3.7%), followed by the Murmansk Oblast (3.1%) and the Arkhangelsk Oblast (2.4%). This is due to well-developed infrastructure, transport accessibility, and the availability of routes and tour operators. The average tourism attractiveness index for the Arctic regions of the Russian Federation is 0.365, indicating moderate, but stable potential. The average share of the tourism industry's gross value added (GVA) in gross regional product (GRP) is 2.07%, demonstrating a significant, but not dominant, contribution of tourism to the economy of these regions. The Nenets and Chukotka Autonomous Okrugs have low tourism GVA in GRP due to their remoteness and limited infrastructure. The Komi Republic and the Republic of Karelia attract tourists through eco-tourism and active tourism, confirming the potential of creative tourism.

An analysis of the tourism attractiveness index and tourism's contribution to the region's GRP allows us to identify leading regions, such as the Murmansk Oblast, where well-developed infrastructure and a variety of offerings ensure sustainable demand. Tourists can visit little-known areas of the Arctic, where they can not only enjoy the beauty of nature, but also take part in creating art installations or developing new environmental projects. Such trips generate new forms of communication between people from different cultures and open up new prospects for the development of the tourism industry in the region.

The distinctive features of tourism development in the Russian Arctic are determined by its specific characteristics:

- The environmental sustainability, the richness and diversity of natural resources, the vast tundra and taiga, and the unique atmosphere of the territories attract tourists seeking to enjoy nature in its pristine state. These natural resources are contributing to the growth of creative tourism, which includes ecotourism, hiking and Arctic cruises;
- The cultural heritage of Arctic peoples is an important component of development in the Russian Arctic. The distinctive culture and traditions of the Sami, Nenets, Khanty, Evenki,

and other indigenous peoples attract many tourists from various countries. Tourists have the opportunity to learn about the history and customs of these peoples, attend national festivals, and participate in traditional crafts. This is a fascinating experience that allows visitors to discover new worlds and understand the cultural heritage of the Arctic. Furthermore, various workshops on making ethnic handicrafts and clothing, as well as culinary events, will generate particular interest in creative tourism;

- The remoteness and climatic conditions of the Arctic create obstacles to tourism development, but at the same time, they stimulate the search for new forms and directions. Currently, more and more tourists are interested in discovering unique places and extreme experiences. Arctic expeditions, water and ice sports, and unique tours through the Arctic depths are becoming increasingly popular among adventure seekers.

Creative tourism in the Arctic is only beginning to develop. In particular, tours are organized to the Yamalo-Nenets Autonomous Okrug, the Murmansk Oblast, the Arkhangelsk Oblast, and the Republic of Karelia. The creative aspects of these tours include:

- immersion in the traditional way of life of the northern indigenous peoples;
- participation in festive events;
- participation in culinary master classes;
- interactive communication.

The development of gastronomy could become one of the most promising and important areas for tourism. The Arctic region is characterized by harsh winters and short summer seasons, when the availability of fresh vegetables, fruit and other produce is limited. However, the Arctic offers unique biodiversity, as well as traditional fishing and hunting practices, which contribute to the development of gastronomy and the creation of unique culinary dishes. The development of gastronomic tourism in the Russian Arctic provides an opportunity to draw attention to the wealth of local produce and culinary traditions. Due to its remoteness from the main agricultural regions, the region relies on food production within its own territories, which creates opportunities for the development of a unique cuisine based on Arctic ingredients such as seafood, wild berries, mushrooms and herbs. These products not only have unique flavors, but are also rich sources of nutrients, making them attractive to tourists and gourmets.

After analyzing tourism development practices in Arctic countries and the Arctic regions of Russia (Lamers, Steins, van Bets, 2024; Sarafanova, Sarafanov, 2024; Kvita, Luchina, Arshinova, 2022; Zhelnina, Sizova, Khoreva, 2023; Butova, Danchenok, Egoshina et al., 2021; Gres, 2024), we compiled the following classification of creative tourism practices (Table 3).

Table 3

Classification of creative tourism practices[8]

Tour name	Region	Tour content
Winter in Tiltim	Yamalo-Nenets Autonomous Okrug	ethnic tour, immersing in the traditional way of life of the Northern Khanty, one of the indigenous peoples of Yamal
Kuzyol. Deer Creek	Yamalo-Nenets Autonomous Okrug	ethnic tour with a visit to an authentic reindeer herders' camp
Cedar Tour	Yamalo-Nenets Autonomous Okrug	farewell to the Yamal summer at the KedrFest festival, interaction with local residents, participation in events
Bachelorette Party in the Arctic	Murmansk Oblast	active recreation, interactive engagement
Weekend in the Arctic: Discovering Chukotka	Chukotka Autonomous Okrug	tasting local delicacies; learning the craft of a Chukchi musher; dog sledging; interactive engagement
Delicious Pinega	Arkhangelsk Oblast	excursion; green tourism; interactive master class "Baking Kalachi and Shangi"
New Year's Adventures in Murmansk	Murmansk Oblast	active recreation; a trip to a Sami village to meet the indigenous people and animals of the North, interactive engagement
Travels in Karelia	Republic of Karelia	excursions, Karelian cuisine, master classes, aerial tours and ice fishing, snowmobiles, interactive engagement

The presented classification of creative tourism practices in Russia's Arctic regions demonstrates their diversity, including ethnographic tours, extreme tourism, gastronomic and event programs. A key feature is the active engagement of tourists in authentic cultural practices combined with digital formats, resulting in a unique tourism product that represents a new paradigm for the new generation of Arctic tourism, promoting heritage preservation and sustainable development.

Currently, utilizing the potential of AI (artificial intelligence) in the new generation of Arctic tourism is a matter of great relevance. The use of AI for the development of tourism in the Arctic regions of the Russian Federation is also promising. As we have already noted, AI opens up new opportunities for tourism development, particularly in the Arctic, given the complex logistics challenges for tourists. For example, the implementation of AI platforms for optimizing tourist route logistics, personalizing offers based on the analysis of natural and cultural resources, and forecasting demand with consideration of seasonality (dynamic pricing), as well as for managing tourist safety (drones for route monitoring, chat-bots). Machine learning algorithms can analyze tourist preferences, behavior, and reviews to offer unique routes that take into account each visitor's interests. Tourists from all over the world can receive recommendations for ethnographic complexes, open-air museums, or natural sites. For example, AI might recommend visiting the Lena Pillars in the Republic of Sakha (Yakutia). They represent two rare natural phenomena: modern permafrost karst and the consequences of the Cambrian explosion, during which the populations of chordates, arthropods, mollusks and echinoderms increased. Another option is to watch the flight of the Siberian white crane. The Sakha people believe that anyone who sees a Siberian crane (a rare bird included in the IUCN Red List) even once will be blessed with lifelong happiness.

Another important aspect of using AI is improving interactions with tourists. AI-powered virtual assistants and chat-bots can provide information about history, attractions, routes, weather conditions, cultural events, and national dishes in real time, which is especially important in the

[8] Compiled by the authors based on open data.

Arctic. Furthermore, AI can be used to create virtual and augmented realities, allowing visitors to immerse themselves in the region's unique atmosphere. This is particularly important for attracting tourists from other countries, who can appreciate the uniqueness of the Russian Arctic in advance and plan their trip.

AI also helps to optimize the management of tourist flows. AI-based analytical platforms can predict infrastructure loads, optimize logistics and resource allocation, and minimize environmental impact.

Furthermore, AI can be used to preserve and promote Arctic cultural heritage. Using image recognition and natural language processing technologies, it is possible to create digital archives, interactive museums, and educational programs. This not only preserves cultural heritage, but also makes it accessible to a wider audience.

Overall, the use of artificial intelligence for tourism development in the Arctic regions of the Russian Federation opens up new horizons for creating unique tourist experiences, enhancing the region's attractiveness, and promoting the sustainable development of the tourism and creative industries. These factors can increase the competitiveness of the Arctic regions' tourism potential, despite infrastructure and data limitations. Digitalization is transforming creative tourism through personalization of services (AI recommendations, dynamic pricing) and the creation of digital ecosystems that connect local producers in creative spaces with tourists. A balance between technology and authentic experience is essential to avoid the "depersonalization" of cultural content.

We identify the following areas for the implementation of artificial intelligence (Table 4).

Table 4

AI in Arctic tourism in the Russian Federation: personalization and innovation

Direction	Content
Smart recommendations	AI algorithms analyze tourists' preferences and suggest personalized routes. For example, if a traveler is interested in ethnography, the system can recommend workshops with the Nenets or Sami people, while if they are interested in nature, it can plan a tour to walrus haulouts.
Virtual guides and augmented reality	Using AR glasses and mobile apps, tourists can "bring to life" historical sites: view 3D reconstructions of ancient settlements or animated legends of northern peoples. A real-time AI translator will help them communicate with local residents.
Sustainable tourism and forecasting	AI helps to minimize the impact on the fragile Arctic ecosystem by forecasting tourist flows, optimizing routes, and planning logistics. Neural networks can monitor the weather and adjust programs to ensure people's safety.
Content creation and brand promotion	AI creates attractive tour descriptions, automatically generates photos and videos, and adapts advertising to different audiences. This is especially important for remote Arctic regions of the Russian Federation, where marketing resources and infrastructure solutions are limited.

The integration of AI into the new generation of Arctic creative tourism is transforming the Russian Arctic not just into a destination for extreme travel, but into a space for deep immersion in culture, science and nature. Technology makes tourism more personalized, safe, and environmentally friendly, while creative formats enhance a region's brand, making tours more engaging and memorable. In the future, this symbiosis could become a driver of sustainable development in the Arctic region.

We propose conducting an economic analysis of creative tourism practices within the new paradigm of the new generation of Arctic tourism using the following economic indicators, which reflect their potential and economic feasibility of implementation in the Arctic conditions (Table 5).

Table 5

Assessment of creative tourism practices[9]

Name	Formula	
Overall economic impact (E)	$E = D + M \cdot I + S$	E — overall economic impact D — direct revenue from tourism (accommodation, food, entertainment, purchase of souvenirs, etc.) M — economic impact multiplier I — investment in tourism development S — social and cultural impacts (preservation of cultural heritage, development of tourism potential, job creation, improved quality of life)
Economic impact multiplier (M)	$M = \frac{1}{1 - MPC}$	M — economic impact multiplier MPC — marginal propensity to consume (proportion of income spent on consumption)
Region's tourism potential assessment (P)	$P = \frac{T \cdot A \cdot C}{C_t}$	P — region's tourism potential T — number of tourists A — average spend per tourist C — region's accessibility coefficient (logistics, infrastructure) Ct — seasonality coefficient
Social effectiveness assessment (S)	$S = \frac{N_e + Q_l + C_c}{P_i}$	S — assessment of social effectiveness N_e — new jobs Q_l — improved quality of life C_c — preservation of cultural heritage P_i — population size
Sustainable development index (Is)	$I_s = \frac{E_c + S_c + C_c}{A_r}$	I_s — sustainable development index E_c — economic component S_c — social component C_c — cultural component A_r — administrative support

Table 5 presents estimates of the overall effectiveness of creative products within the framework of a new type of Arctic tourism. Formulas are proposed, including calculations of the overall economic impact (E), the economic impact multiplier, tourism potential, social effectiveness and the sustainable development index. These metrics enable a comprehensive assessment of both direct revenue from tourism and long-term socio-cultural effects, such as the preservation of cultural heritage, the creation of new jobs and positive changes in socio-economic indicators.

The Arctic regions of the Russian Federation are building their strategies on the basis of local identity as the foundation for creative programs, the active use of AI and digital tools to expand accessibility and personalization, and event tourism and participatory practices as drivers of the experience economy. The development of creative tourism should be based on the principles of sustainable development, taking into account the interests of local communities, environmental conservation, and the creation of tourism infrastructure. The study has resulted in the formulation of recommendations for the development of creative tourism (Table 6).

[9] Compiled by the authors.

Table 6

Recommendations for the development of creative tourism in the Arctic regions of the Russian Federation

Direction	Content
Branding and promotion of unique tourism products	• development of thematic routes (e.g., ethnographic tours, wildlife watching, expeditions to unique UNESCO World Heritage natural sites) • use of digital technologies to promote creative tours (virtual tours, AI, VR, AR technologies)
Investments in infrastructure	• construction and modernization of eco-friendly hotels, guest houses, recreation centers, etc. • development of transport accessibility (subsidies for air, rail, and water transport)
Digitalization	• personalization of services using AI (collection of information about consumers, suppliers, and stakeholders) • digitalization of services, setting up online payments • development of websites, landing pages, chat-bots, etc.
Support for local communities	• involvement of local communities in the creation and implementation of tourism programs • financial support for entrepreneurs and self-employed individuals working in the tourism sector (according to OKVED-2)
Environmental responsibility	• development of standards for eco-tourism • involvement of tourists in environmental projects
Public-private partnerships, grant programs	• creation of special programs to support creative tourism • attracting private investment through tax incentives and grants • training local residents in tourism industry standards • organizing and holding forums and festivals

The Arctic regions of the Russian Federation offer a wide range of tourism opportunities linked to their natural, historical and ethno-cultural characteristics. The development of infrastructure and the promotion of unique tourism products can significantly enhance the creative potential, attractiveness, and economic contribution to regional budgets.

Creative tourism in the Arctic regions takes the form of ethnic tours and excursions with interactive engagement through master classes. This sector is developing in the Yamalo-Nenets Autonomous Okrug, the Murmansk Oblast, the Chukotka Autonomous Okrug, the Arkhangelsk Oblast and the Republic of Karelia. However, the small number of tours and their irregularity suggest that this sector is not well-developed in the Russian Arctic. Currently, the Arctic regions of the Russian Federation possess significant potential for the development of a creative economy. Preserving the unique natural environment, cultural heritage, and indigenous traditions, as well as utilizing innovative approaches in various economic sectors, can contribute to the sustainable and diversified development of this region. The Russian Arctic is rich in the cultural heritage and traditions of its indigenous peoples, which is a valuable resource for the development of the cultural industry. Organizing workshops on traditional crafts, holding festivals, and other events help to diversify the region's economy and improve the standard of living and quality of life for Arctic residents.

The new generation of Arctic tourism is a model of tourism that combines traditional forms of travel with digital technologies, the creative industries and the principles of sustainable development. Unlike traditional ecotourism or extreme expeditions, creative Arctic tourism emphasizes the following key features (Table 7).

Table 7

Features of the new generation of Arctic tourism[10]

No.	Name	Content
1	Hybrid formats	Online tourism (VR tours, digital exhibitions, online workshops on indigenous crafts)
		Offline immersive experiences (ethnographic programs, participation in traditional rituals, creation of art objects in collaboration with local communities)
2	Technological integration	Use of artificial intelligence to personalize routes (e.g., chat-bots with recommendations based on tourist preferences)
3	Sustainability	Minimizing carbon footprint through green logistics (hydrogen-powered transport, electric sledges, etc.)

Example: The "Winter in Tiltim" tour, which includes accommodation in a chum and reindeer herding training + a VR diary for remote participants (video blog). In the Murmansk Oblast, the "Sami Games" festival with AR guides broadcasting the myths of indigenous peoples via smartphones and mobile apps. In Chukotka — scientific and tourist expeditions to Wrangel Island with AI analysis of polar bear migration data.

The new generation of Arctic tourism is not just a trend, but a strategic tool for the harmonious development of the regions of the Russian Federation. Success depends on the synergy of three elements: technology, traditional knowledge, and public-private partnerships.

Conclusion

The new generation of creative Arctic tourism, as a new direction in the development of the tourism industry in the Arctic regions of the Russian Federation, contributes to attracting tourists, preserving the cultural heritage of indigenous peoples, developing local communities, and promoting the region's unique cultural landscape. The integration of creative industries, folk art, environmental projects, and digital platforms creates new opportunities for local residents, facilitating the diversification of the regional economy. Creative tourism in the Arctic regions of the Russian Federation is a driver of sustainable socio-economic development. It is important to overcome limitations related to infrastructure, transport accessibility, environmental and economic security. Development requires a comprehensive approach, including government support, private investment, and the active participation of local communities. It is essential to maintain a balance between economic growth and the preservation of the region's unique nature and culture. The introduction of digital technologies and artificial intelligence could be a key factor in increasing the Arctic's attractiveness as a tourist destination. The Arctic Zone of the Russian Federation possesses all the necessary resources to become a leader in the field of creative tourism.

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A.D. Shmatko — work on the introduction and conclusion, scientific editing of the text;
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Problems and Importance of Tourism Development in the Arctic

Arseniy A. Morozov [1]✉, Research Assistant

[1] Institute of Economics of the Karelian Research Centre of the Russian Academy of Sciences, pr. Nevskiy, 50, Petrozavodsk, Russia
[1] morozov589@gmail.com ✉, ORCID: https://orcid.org/0000-0003-0873-5071

Abstract. In the current conditions, the development of Arctic tourism is becoming strategically important for the socio-economic growth of the northern territories. This study focuses on analyzing the potential and prospects for the development of tourism activities in the Arctic region, taking into account international experience and Russian specifics. The article discusses the key areas of development of Arctic tourism: cultural, educational, gastronomic, event and environmental. Particular attention is paid to the institutional environment and legal regulation of tourism activities in the Arctic territories of Russia in comparison with international practices. Based on a comprehensive analysis, the main challenges and barriers to the development of Arctic tourism have been identified, including insufficient infrastructure development, seasonality, transport accessibility and the need to preserve fragile ecosystems. An assessment of the tourism potential of the Arctic territories has been carried out, considering the natural and climatic features, the cultural heritage of indigenous peoples, and the unique natural sites. As a result of the research, specific recommendations have been proposed for government agencies and business structures on the formation of an effective system for the development of Arctic tourism. Special emphasis is placed on the need to introduce innovative approaches to the organization of tourism activities, the creation of modern infrastructure, and the development of unique tourism products that meet international standards of quality and safety. The research materials can be used in the formulation of tourism development programs in the Arctic regions of Russia.

Keywords: *Arctic tourism, economically depressed regions, cultural heritage, regional development, sustainable tourism*

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Introduction

Arctic tourism is acquiring strategic importance for the development of the northern territories of Russia and other northern states. Unique natural landscapes, rich cultural heritage of the indigenous peoples of the North, as well as growing interest in ecological and educational tourism create significant potential for the development of the tourism industry in the Arctic zone. Current trends in the tourism industry demonstrate a steady increase in interest in the Arctic territories from both Russian and foreign travelers. Natural phenomena, such as the Northern Lights, polar days and nights, unique flora and fauna, attract tourists from all over the world. At the same time,

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the border location of many Arctic regions creates additional opportunities for international cooperation in the field of tourism (Ubonova, 2024).

The specifics of the Arctic territories determine the need for a special approach to organizing tourism activities. Harsh climatic conditions, distance from large populated areas, special requirements for transport and tourism infrastructure form a set of challenges that require a systematic solution. Arctic tourism can become a driver of socio-economic development of the northern regions.

The relevance of the study is due to the need for scientific understanding of the potential of Arctic tourism as a tool for the development of economically depressed northern regions. Analysis of international experience, assessment of Russian practice and formulation of recommendations for the development of this sector are of significant interest both to the scientific community and to practitioners in the tourism industry.

In the context of modern geopolitical challenges, the significance of domestic tourism in Russia's Arctic regions is particularly noteworthy. According to estimates from the Eastern Center for State Planning, the share of tourist flows to the Arctic regions in 2023 did not exceed 5% of the national total, which amounts to 4.3 million trips. Forming a high-quality tourism product, creating comfortable conditions for travelers and promoting the unique features of the northern territories are becoming priority tasks for all participants in the tourism market (Akisheva, 2025).

A comprehensive study of the prospects for the development of Arctic tourism makes it possible to identify key areas of work, assess existing potential and formulate practical recommendations for its effective use. This is especially important in the context of the implementation of state policy for the development of the Arctic zone of the Russian Federation.

The academic community is showing a growing interest in Arctic tourism, as evidenced by a significant increase in the number of publications over the past decade. Current studies focus on several key areas of tourism development in the Arctic region.

Fundamental research in recent years has highlighted the transformation of tourism demand in Arctic territories. Analysis of consumer preferences reveals a growing interest in ecological and ethnographic tourism, as well as formation of new routes based on the natural and cultural heritage of the indigenous peoples of the North.

Researchers pay special attention to the issues of sustainable development of tourism infrastructure in harsh climates. Recent academic work has focused on finding a balance between the development of tourism potential and the preservation of fragile Arctic ecosystems (Mesablishvili, 2023).

A trend towards a comprehensive analysis of the tourism potential of Arctic territories can be observed in contemporary academic literature. Scientists emphasize the need to take into account climatic, logistics, and socio-economic factors when planning the development of the tourism industry (Sekushina, 2021).

Academic publications demonstrate a growing interest in the study of international cooperation in the field of Arctic tourism. Particular attention is paid to the analysis of successful practices in the development of tourism infrastructure in circumpolar regions and the creation of cross-border tourist routes (Morozov, 2024).

Modern research focuses on the digitalization of tourism services in the Arctic. Scientific work in recent years has revealed the potential of digital technologies to improve the accessibility and safety of Arctic tourism, as well as to develop booking systems and information support for tourists (Julianti, Pinpak, 2024).

Analysis of publications shows growing attention to the issues of training qualified personnel for Arctic tourism. Researchers emphasize the need to develop specialized educational programs that take into account the specific nature of working in the Far North (Bitter, Nyurenberger, Petrenko et al., 2025).

The theoretical framework for Arctic tourism is based on several fundamental concepts that shape the contemporary understanding of this phenomenon. The spatial organization of tourism activities in the Arctic is based on the theory of polarization development, adapted to the specifics of northern territories.

The conceptual analysis demonstrates the evolution of approaches to the study of Arctic tourism (Table 1).

Table 1

Evolution of scientific approaches to the study of Arctic tourism (2014–2024)[1]

Period	Scientific approach	Key characteristics
2014–2016	Resource	Assessment of natural and cultural potential
2017–2019	Systemic	Comprehensive development of tourism infrastructure
2020–2022	Sustainable development	Balancing economic and environmental interests
2023–2024	Digital transformation	Integration of modern technologies

The methodological basis for contemporary research into Arctic tourism includes a geosystemic approach, which allows tourist destinations to be viewed as complex natural and social systems. This approach facilitates an understanding of the interrelationships between natural conditions, infrastructure development and socio-economic factors.

The territorial-cluster concept of Arctic tourism emphasizes the formation of tourist clusters, taking into account the natural and climatic characteristics and transport accessibility of the regions. This approach involves the creation of “growth points” for tourism activity based on unique natural and cultural sites (Kuzmina, 2024).

The concept of sustainable tourism, as applied to Arctic territories, is being transformed into a model of responsible nature management. The scientific community emphasizes the need to maintain ecological balance when developing tourism infrastructure in fragile Arctic ecosystems.

[1] Compiled by the author.

The integration of digital technologies into the development of Arctic tourism is forming a new area of scientific research — the digital transformation of the tourism space. Modern concepts focus on the creation of digital platforms for the promotion of Arctic tourism products.

Contemporary scientific thought in the field of Arctic tourism is represented by the work of scholars who have formulated fundamental approaches to the development of tourism activities in polar regions. Recent scientific research reveals the multifaceted nature of approaches to organizing tourism in the Arctic.

Advanced investigations are focused on developing a methodology for assessing the tourism potential of Arctic territories. The academic community emphasizes the need for a comprehensive approach that takes into account the natural and climatic characteristics, transport accessibility and ethno-cultural distinctiveness of the regions (Timoshenko, 2021).

A separate area of research is devoted to examining the mechanisms of state support for Arctic tourism. Tools for stimulating entrepreneurial activity in the tourism sector and the formation of special economic regimes for the development of tourism infrastructure are subjected to detailed analysis.

The environmental aspect of Arctic tourism is reflected in the work of specialists in natural resource management. Scientific research explores mechanisms for minimizing anthropogenic impacts on Arctic ecosystems when organizing tourism activities.

Studies in the field of ethno-tourism have made a significant contribution to the development of the theory of Arctic tourism. Academic works explore the potential for integrating the traditional culture of the indigenous peoples of the North into modern tourism products, and for creating unique tourist routes based on ethno-cultural heritage (Masuku, 2025). Since 2020, the development of domestic tourism has intensified, particularly in the European part of the Russian Federation. One of the main types of tourism in the Arctic and northern territories is ethno-cultural and educational tourism (Morozova, Belaya, Kozyreva et al., 2024).

Recent scientific research focuses on the digital transformation of Arctic tourism. Developments in information technology are opening up new opportunities for promoting Arctic tourist destinations and improving the quality of service for tourists in the extreme conditions of the North. The global Arctic tourism industry is demonstrating significant achievements in organizing travel to polar regions. Norway has elaborated a unique model for the development of Arctic tourism based on the principles of sustainable development and the preservation of natural heritage. Norwegian experience demonstrates the effectiveness of creating tourism clusters around natural attractions such as fjords and glaciers (Tømmervik, Thuestad, Stien et al., 2025). Iceland has successfully implemented programs to develop geothermal tourism, integrating natural hot springs into its tourism infrastructure. The country has created a network of modern spa complexes, built in accordance with environmental requirements and the traditions of the local population. Finland has developed an attractive tourism product based on Sami culture and Arctic natural phenomena. Lapland has become a popular destination due to its comprehensive approach to organizing

winter recreation, including viewing the Northern Lights, dog sledding and learning about the way of life of indigenous peoples (Fig. 1).

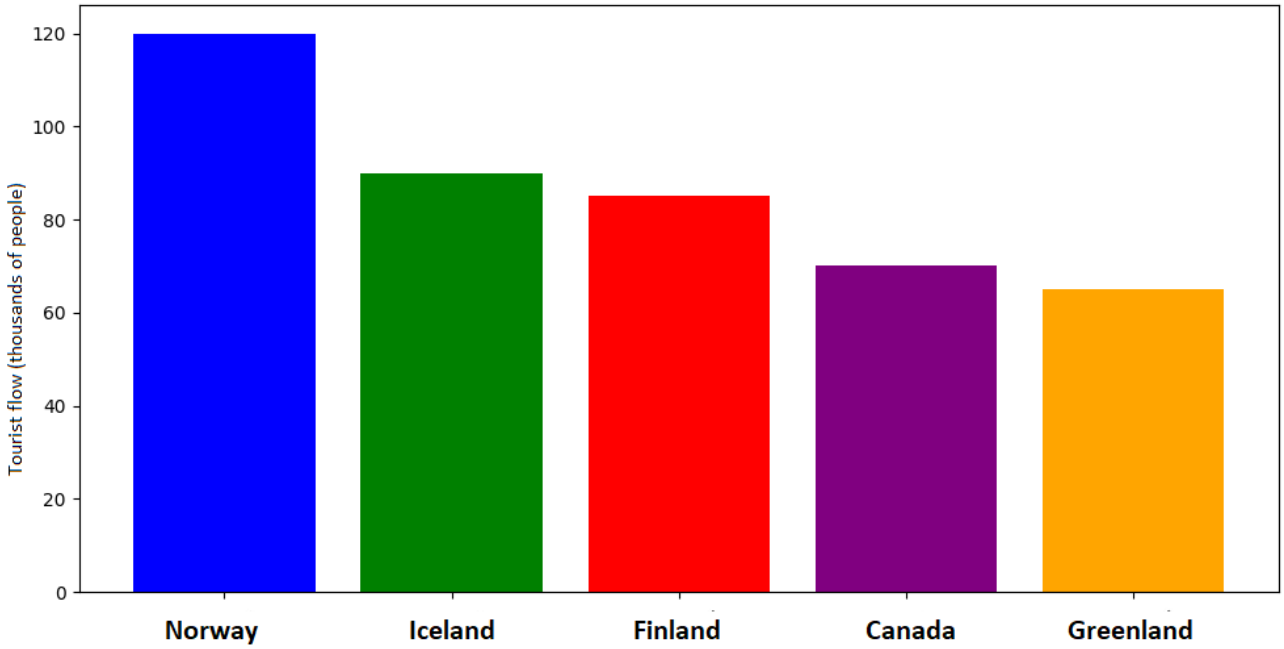


Fig. 1. Tourist flows to Arctic regions of the world (Orlova, 2021).

An analysis of statistical data demonstrates a steady increase in tourist flows to Arctic regions. Norway occupies the leading position, attracting travelers with its diverse natural landscapes and well-developed infrastructure. Iceland and Finland offer unique tourist attractions that combine natural and cultural sights.

Canada is developing Arctic tourism through the creation of national parks and nature reserves. Particular attention is paid to preserving Inuit culture and involving the Inuit community in tourism activities. Canadian experience demonstrates the effectiveness of public-private partnerships in developing tourism infrastructure (Tsyrenov, 2024).

Greenland is successfully promoting cruise tourism by organizing expedition routes along the coast. Local authorities have introduced strict environmental standards for cruise operators, ensuring a balance between tourism development and environmental protection (Karlsdóttir, 2024).

A comparison of practices in the development of Arctic tourism in Russia and other countries reveals significant differences in approaches to organizing tourism activities in polar regions. An analysis of statistical indicators points to a substantial gap in tourist numbers (Table 2).

Table 2

Comparative indicators of Arctic tourism development, 2019–2024 (Tkachenko A.A., 2023)

Indicator	Russia	Norway	Finland	Iceland
Number of tourist routes	45	120	85	95
Average length of stay	5	8	7	9
Share of local residents in the tourism industry (%)	15	45	40	35

An overview of the regulatory framework identifies various approaches to the regulation of tourism. The Scandinavian countries have developed a comprehensive system for the protection

of natural areas while simultaneously ensuring their accessibility to visitors. In Russia, the legal framework for Arctic tourism is currently undergoing active development.

The experience of the northern countries in creating tourism infrastructure deserves particular attention. Finland and Norway have implemented the concept of “distributed hotels”, integrated into local communities. This approach minimizes environmental impact and maximizes local involvement in tourism activities (Korvenkangas, 2024).

Transport accessibility in Arctic territories also demonstrates differences in approaches. Foreign countries have developed an effective system of small aviation and maritime transport. In Russia, it is characterized by a predominance of seasonal routes and dependence on weather conditions.

An analysis of marketing strategies reveals the advantage of Scandinavian countries in promoting Arctic tourism products on the international market. Their experience is based on the creation of recognizable brands and the active use of digital technologies in promotion.

The system for training personnel in Arctic tourism in other countries includes specialized programs with compulsory practical work in polar regions. The Russian education system is only beginning to develop similar training programs.

International practices offer a wide range of opportunities for adapting successful models to the Russian context. The development of eco-tourism in the Arctic region is a particularly promising area. Scandinavian countries have elaborated effective mechanisms to control human impact on natural areas by implementing a system of visitor quotas and seasonal regulation of tourist flows.

Iceland’s experience in promoting geothermal tourism is particularly relevant to Russian practice. The creation of modern complexes based on natural hot springs, using energy-efficient technologies, will provide a unique offering for tourists in the Russian Arctic (Pilyasov, 2021).

Finland’s experience in ethno-cultural tourism demonstrates the effectiveness of integrating the traditional lifestyle of indigenous peoples into the modern tourism industry. The creation of cultural centers, the organization of master classes on traditional crafts, and the inclusion of elements of national cuisine in the tourism product form the basis for the development of sustainable tourism. The Norwegian model of cruise tourism offers solutions for the creation of coastal routes in the Russian Arctic. The introduction of environmental standards for shipping companies and the development of coastal infrastructure will facilitate the expansion of marine tourism. The Canadian approach to organizing scientific tourism opens up opportunities for creating specialized tours with an educational component. The incorporation of research stations and nature observatories into tourist routes contributes to the development of educational tourism (Badarchi, Sevek, Sereezhikpey, 2022).

The advancement of digital technologies in Arctic tourism, which has been successfully implemented in Sweden, will improve access to information about tourism opportunities in the Rus-

sian Arctic. The creation of interactive maps, virtual tours, and mobile apps will expand the possibilities for travel planning.

An analysis of the current state of Arctic tourism in Russia demonstrates a steady upward trend in tourist flow to the country's northern regions. From 2019 to 2023, the number of tourists visiting Russia's Arctic territories increased by 45%. Popular destinations include the Franz Josef Land archipelago, Novaya Zemlya, the Taimyr Peninsula, and Chukotka. The growth dynamics of Arctic tourism are confirmed by statistical data (Fig. 2) (Zhelyuzina, Sizova, 2024).

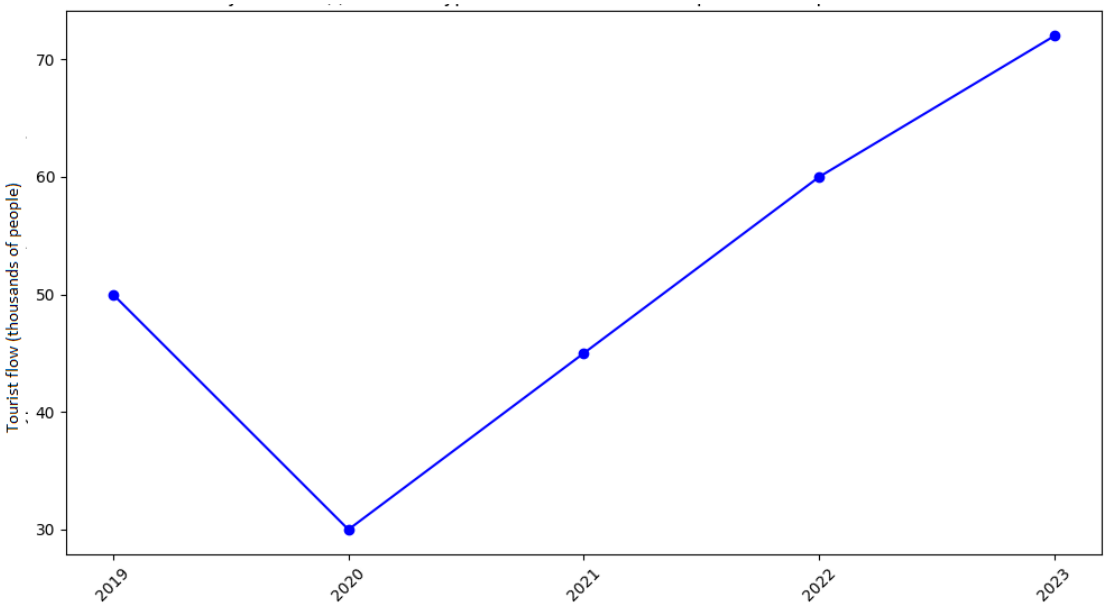


Fig. 2. Dynamics of tourist flow to the Arctic regions of Russia[2].

Tourist flow to these regions grew by an average of 5% per year from 2014 to 2019, but declined by a third during the COVID-19 pandemic. In 2021, tourist flow to the Arctic regions fully recovered and began to grow. Analysis of the presented data shows that after a decline in 2020 caused by the COVID-19 pandemic, tourist flow to Russia's Arctic regions is demonstrating steady growth. This is facilitated by the development of transport infrastructure, including the modernization of airports in Murmansk, Arkhangelsk, and Naryan-Mar.

The uniqueness of Arctic tourism is determined by seasonality and specific infrastructure requirements. Summer is characterized by increased demand for cruise routes along the Northern Sea Route, while winter attracts tourists with the opportunity to observe the Northern Lights and to participate in ethnographic tours (Chkhotua, 2022).

The regulatory framework for Arctic tourism in Russia has been formed gradually, reflecting the government's growing attention to the development of northern territories (Table 3). The Federal Law "On the Fundamentals of Tourism Activity in the Russian Federation" has been supplemented with specific provisions for the development of Arctic tourism. The Strategy for Developing the Russian Arctic Zone until 2035 has identified tourism as a priority area for the diversification of the economies of the northern regions. The modernization of existing tourist infrastruc-

[2] Compiled by the author on the basis of Rosstat data.

ture and the creation of new facilities are taking place within the framework of federal and regional development programs (Davyborets, Vladimirova, Radikov, 2022).

Table 3

Key regulatory acts related to Arctic tourism in Russia[3]

Year	Document	Main provisions
2014	State Program "Socio-Economic Development of the Arctic Zone of the Russian Federation"	Development of tourism infrastructure
2020	Strategy for Developing the Russian Arctic Zone until 2035	Formation of tourism clusters
2022	National Project "Tourism and Hospitality Industry"	Support for Arctic tourism projects
2023	Cruise Tourism Development Program	Modernization of port infrastructure

The institutional framework for Arctic tourism management involves federal and regional authorities and specialized development institutions. The State Commission for Arctic Development coordinates inter-ministerial cooperation. The Far East and Arctic Development Corporation implements support mechanisms for investment projects through the Advanced Special Economic Zone (ASEZ) regime.

Regional tourism development programs in the Arctic regions of the Russian Federation include tax incentives, loan interest rate subsidies, and partial reimbursement of costs for the creation of tourism infrastructure. Particular attention is paid to supporting ethnographic tourism projects and preserving the cultural heritage of the indigenous peoples of the North.

A comparison of the Russian institutional framework with international experience reveals similar approaches to protecting the natural environment and cultural heritage. At the same time, foreign countries are more actively implementing public-private partnership mechanisms in tourism infrastructure development and applying more flexible investment attraction tools. The effectiveness of this institutional framework is confirmed by the growth of private investment in tourism projects in the Arctic regions. Between 2020 and 2023, investment volume increased 2.5-fold, more than 30 new tourist routes were launched, and 5 visitor centers were created in national parks (Gusevskaya, Taskaeva, 2023).

An assessment of the tourism infrastructure in Russia's Arctic regions reveals an uneven distribution of accommodation and tourist service facilities. Spatial analysis has enabled the identification of several key clusters of tourism infrastructure (Table 4).

Table 4

Distribution of tourism infrastructure facilities in the Arctic zone of the Russian Federation[4]

Region	Number of accommodation facilities	Number of catering facilities	Transport accessibility
Murmansk Oblast	35	42	high
Arkhangelsk Oblast	28	35	medium
Nenets AO	12	15	low

[3] Compiled by the author.
[4] Compiled by the author based on data from Rosstat, the "Arctic in Figures" collection, and regional ministerial reports, 2022–2023.

Yamalo-Nenets AO	25	30	medium
Taimyr District	8	12	low
Chukotka AO	15	18	low

An analysis of Arctic tourism infrastructure has identified differences between regions in terms of their level of development. The western part of the Russian Arctic has a higher concentration of accommodation and service facilities. The Murmansk Oblast leads in the number of hotels and catering enterprises, due to its well-developed transport network and proximity to major cities of the European part of Russia.

Transport accessibility determines the specific nature of tourism infrastructure development. Regions with year-round land transport links offer comprehensive tourism products, including various types of activities. Areas with limited transportation accessibility focus on seasonal tourism, developing specialized accommodation facilities such as glamping sites, ethnic villages, and modular hotels.

Existing infrastructure is being modernized with consideration for environmental requirements and the Arctic's climatic conditions. Energy-efficient technologies and autonomous life support systems are being implemented, and environmentally friendly building materials are being used. Particular attention is paid to the creation of visitor centers in specially protected natural areas, as well as the development of ecological trails and observation platforms (Nurmatova, 2021). The quality of accommodation is characterized by a predominance of economy-class facilities, accounting for 65% of the total. Four- and five-star hotels account for no more than 10% of the total number of rooms and are concentrated in regional administrative centers. Alternative forms of accommodation are developing, including Arctic capsule houses and modular hotels, which allow tourists to observe the Northern Lights in comfortable conditions[5].

The eco-tourism infrastructure comprises a network of visitor centers, nature trails, and observation points in the "Russian Arctic" and "Beringia" national parks, the "Great Arctic" stare nature reserve, and others. The development of eco-tourism routes takes into account the need to minimize impacts on fragile Arctic ecosystems.

The preservation and promotion of the Arctic's cultural heritage is a strategic priority for the development of the region's tourism industry. This priority is centered on unique archaeological sites, ethnographic complexes, historic settlements, and the traditional crafts of the indigenous peoples of the North (Gusevskaya, Taskaeva, 2023).

Ancient rock art sites, such as the Kanozero petroglyphs, the Belomor petroglyphs, and the rock paintings of the Rybachy Peninsula, occupy a central place in Arctic cultural tourism. These sites attract both Russian and international tourists who want to experience the millennia-old history of northern exploration.

[5] Ministry of Economic Development of the Russian Federation. More than 1,000 new rooms in modern hotels are set to be created in the Arctic as part of a national project. URL: https://www.economy.gov.ru/material/news/minekonomrazvitiya_v_arktike_poyavitsya_bolee_1_tys_novyh_gostinichnyh_nomerov_v_sovremennyh_otelyah_blagodarya_nacproektu.html (accessed 10 April 2025).

The ethnographic potential of Arctic tourism is revealed through an introduction to the distinctive cultures of indigenous peoples — the Sami, the Nenets, the Chukchi, and the Evenks. Tourist routes include visits to traditional settlements and an opportunity to learn about the rituals, crafts and way of life of the northern ethnic groups. In the Murmansk Oblast, the “Sami Village” and “Snow Village” ethno-villages offer visitors the opportunity to immerse themselves in the atmosphere of traditional life.

The historical and cultural landscapes of villages and towns form a unique category of tourist attractions. The wooden architecture of the Russian North, represented by churches, chapels, and residential buildings, creates the unique architectural character of the Arctic territories.

Traditional crafts — bone carving, birch bark weaving, embroidery, and weaving — are forming the basis for the development of creative industries and souvenir production. Master classes on traditional crafts are included in tourist programs, allowing visitors not only to observe, but also to learn ancient techniques for working with natural materials.

The cultural heritage of the Arctic provides a stable foundation for the creation of a unique tourism product that combines informative, educational and creative elements. This sector contributes to the preservation of the tangible and intangible heritage of the northern territories, creating conditions for intercultural dialogue and the sustainable development of Arctic communities (Valkova, Glemeyda, 2023).

The Arctic’s culinary traditions offer unique tourism potential, based on distinctive recipes and methods for preparing northern foods. The region’s gastronomic offerings include dishes made from northern fish, wild plants, reindeer meat and seafood, which are becoming central elements of tourist programs.

Arctic cuisine attracts attention due to its organic ingredients and unique food preparation methods. Northern cuisine festivals held in Murmansk, Arkhangelsk, Kem, and Salekhard demonstrate the richness of local culinary traditions. Tourists have the opportunity to taste nelma stroganina (slices of frozen fish), smoked reindeer, cloudberry desserts, and other regional delicacies.

A promising area of development is the organization of gastronomic tours that include visits to traditional fishing cooperatives, reindeer herding farms, and wild plant gathering sites. Tourists are immersed in the process of harvesting and processing local products, and learn about ancient methods of storing and preparing food in the North.

The Arctic restaurant industry is actively developing the concept of “new northern cuisine”, reinterpreting traditional recipes in a modern style. Chefs create signature dishes based on local ingredients, combining centuries-old traditions with innovative culinary techniques.

Master classes on preparing traditional dishes of the indigenous peoples of the North complement the gastronomic programs. Tourists learn to cook Sami fish soup, Nenets pies with reindeer meat, and Chukchi seafood dishes, discovering the secrets of Arctic cuisine.

The integration of the gastronomic element into other forms of tourism — ethnographic, ecological, and cruise tourism — expands the possibilities for creating a comprehensive tourism product. Tasting programs, culinary schools, and farm tours are shaping new directions for Arctic tourism development.

The Arctic festival movement is forming a unique calendar of tourist events, attracting guests from all over the world. The “Teriberka” international festival in the Murmansk Oblast combines contemporary art and traditional culture in the Arctic. The program includes musical performances, art installations, and gastronomic master classes with unique natural landscapes as a backdrop (Morozov, 2019).

Sports events generate additional tourist traffic to the Arctic region. The “Beringia” dog sled races in Kamchatka, northern multi-sport competitions, and international winter sports tournaments attract both professional athletes and spectators.

Traditional festivals of the indigenous peoples of the North reveal the richness of the region’s cultural heritage. The Reindeer Herders’ Day, the Polar Day Festival, and the First Fish Festival allow tourists to experience the atmosphere of authentic celebrations and to learn about the rituals and traditions of northern ethnic groups (table 5).

Table 5

Promising projects for the development of event tourism in the Arctic 2024–2030 (Vladimirova, Davyborets, Radikov, 2022)

Direction	Projects	Expected tourist flow
Festivals	Arctic Film Festival, Northern Lights Festival	15 000
Sports events	Arctic Games, Arctic Circle Marathon	12 000
Ethno-cultural events	Festival of the Peoples of the North, White Nights Festival	8 000
Business events	Arctic Economic Forum, Polar Explorers Congress	5 000

Scientific conferences and business forums are expanding the geography of event tourism. The St. Petersburg International Economic Forum and the Arctic Forum in St. Petersburg are becoming platforms for discussing the region’s development prospects, attracting representatives from business, science, and government.

The Arctic Light Festival and the Northern Lights Festival are opening up new dimensions of event tourism. Light shows, multimedia installations, and observations of natural phenomena create a unique tourism product that highlights the region’s distinctive natural features.

Modernization of the Arctic’s transport infrastructure includes the development of a network of small aircraft airports, seaports, and highways. In the Murmansk Oblast, a project to reconstruct Khibiny Airport is underway, creating conditions for increasing tourist flow to the Khibiny Mountains. Modernization of port infrastructure in Arkhangelsk and Murmansk is opening up new opportunities for the development of cruise tourism.

The creation of tourism and leisure clusters is forming points of attraction for tourist flows. The Bolshoy Vudyavr (BigWood) ski resort in Kirovsk and the Teriberka tourist complex on the Bar-

ents Sea coast demonstrate successful examples of integrated tourism infrastructure development. The construction of visitor centers, glamping sites, and ethno-cultural complexes expands the range of services for various categories of tourists (Barinova, Zemtsov, Mikhailov et al., 2022).

The engineering infrastructure of Arctic territories is being improved in line with environmental requirements. The introduction of autonomous power supply systems based on renewable energy sources, modern water treatment and waste disposal technologies ensures the sustainable operation of tourist facilities in the Far North.

The digitalization of tourism infrastructure involves the creation of a unified booking information system, virtual tours, and mobile applications for navigation and obtaining information about tourist attractions. The development of telecommunications networks increases the accessibility and comfort of Arctic tourism.

Particular attention is being paid to creating a barrier-free environment for people with limited mobility. Adapting accommodation facilities, transport infrastructure, and tourist routes to the needs of people with disabilities expands the social focus of Arctic tourism.

Conclusion

Research into the development of Arctic tourism has made it possible to formulate a number of key principles and elaborate practical recommendations. The priority area is the transformation of the tourism sector in the Arctic region, taking into account current trends and challenges. An analysis of Russian and international experience demonstrates the need for a comprehensive approach to the formation of tourism products.

The improvement of regions with low socio-economic development facilitates the creation of conditions for investment, business expansion, and the increase of a territory's potential. Practical interaction is already underway and influences socio-economic development within the context of institutional and geopolitical factors. However, indicators reflecting the potential for cooperation are not always of great interest due to the need to realize this potential, which can be hampered by institutional and geopolitical factors.

This study confirms the significant potential of Arctic territories for the development of various types of tourism. Cultural, educational, ethnographic, and ecological routes are particularly promising. The creation of unique tourism products based on the natural and cultural heritage of the indigenous peoples of the North is becoming increasingly important.

For the effective development of Arctic tourism, it is advisable to focus efforts on the following areas:

- creating a comfortable tourist environment through the modernization of transport and engineering infrastructure;
- developing a system of benefits and preferences for investors in the tourism sector;
- creating a unified information platform for Arctic tourism;
- developing public-private partnerships in the implementation of tourism projects.

Government authorities are recommended to:

- improve the regulatory framework for Arctic tourism;
- develop mechanisms to support small and medium-sized businesses in the tourism industry;
- implement a system of environmental monitoring of tourism activities;
- ensure the training of qualified personnel for the tourism industry.

Business community is advised to:

- focus investment activities on the creation of modern accommodation facilities;
- develop interregional cooperation in the creation of integrated tourist routes;
- introduce innovative technologies in tourist services;
- expand the range of additional services, taking into account the specific features of the Arctic territories.

The practical implementation of the proposed recommendations will enable the creation of a competitive tourism product that contributes to the sustainable development of Arctic territories. A key factor for success is achieving a balance between the economic efficiency of tourism activities and the conservation of the Arctic's unique natural environment. The formation of a modern Arctic tourism model should be based on the principles of sustainable territorial development, combining economic interests with environmental safety and social responsibility. This approach guarantees long-term prospects for the development of the tourism industry in the Arctic zone.

As part of RSF Project No. 24-28-00092, a group of researchers, including the author of this article, carried out work to collect empirical data on the development of Arctic tourism. The data is currently being analyzed and processed and will be presented in the form of research articles, analytical reports, and other information. As part of the project, proposals are being developed on cooperation, partnerships, digitalization and other aspects of the development of Arctic tourism.

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Indicators of Population Welfare and Life Expectancy for the Arkhangelsk Oblast and Several Other Regions: Analysis and Modelling

Vladimir S. Stepanov [1]✉, Cand. Sci. (Phys. and Math.), Leading Researcher

[1] Central Economics and Mathematics Institute of the RAS, Nakhimovskiy pr., 47, Moscow, Russia
[1] vladstep0355@gmail.com ✉, ORCID: https://orcid.org/0000-0002-4478-376X

Abstract. The article uses two regression models, previously constructed using panel data from the Central Federal District (CFD) and the Volga Federal District (VFD). The main focus of their application is on the Arkhangelsk Oblast. At the preliminary stage, two composite indicators were developed using principal component analysis combined with correlation analysis of the variables: the level of welfare and the development of transport infrastructure. They were calculated for each region using statistics from the CFD covering a number of years prior to the COVID-19 pandemic. In the next stage, two regression models with variable structures were constructed. The dependent variable in Model 1 is the indicator of the population's welfare, in Model 2 —the life expectancy at birth (LEB). Both of these models are new; the specification of Model 1 is provided for the Pomorye region. Another novel aspect is the formalization of the relationship between the aggregate welfare measure and indicators of infrastructure, the digitalization of the economy and life expectancy at birth. The models enabled the identification of informative factor variables, which were then examined in detail. Finally, they were applied to two regions of the Arctic Zone of the Russian Federation (AZRF) and a number of others. The factors in Model 1 that significantly influence the level of welfare were examined more closely: the infrastructure variable, digital economy indicators, life expectancy at birth, and others. Model 2, which functions well for many regions of the Russian Federation, is briefly described. Following a comparison of indicators for the Arkhangelsk Oblast and other regions, an illustrative example of forecasting for 2019 and 2020 is presented. The discussion identifies the region's problem areas and provides a brief overview of work on infrastructure, digitalization, innovations, and LEB. A number of parallels identified in regional development may also be of interest. Similarly, the research methodology can be applied to other territories of the AZRF and neighboring areas, as well as to other regions. The findings of the study may be useful to the authorities responsible for managing the regional development of territories within the AZRF or a number of other regions.
Keywords: *regression model with variable structure, welfare level, transport infrastructure, digital economy, life expectancy, household income, innovation*

Introduction

In accordance with a decree of the President of the Russian Federation[1], improving the quality of life and increasing the life expectancy of the population (in particular, life expectancy at birth) were identified as the most important priorities for the country and its regions. National

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[1] Decree of the President of the Russian Federation No. 1351 dated October 9, 2007, "On Approval of the Concept of Demographic Policy of the Russian Federation until 2025" (as amended and supplemented on July 1, 2014). URL: https://base.garant.ru/191961/ (accessed 17 July 2025).

project "Demography"[2] is being implemented to address demographic challenges in the Arkhangelsk Oblast. A brief overview of studies analyzing and assessing the demographic situation in the regions is provided in the article (Kuznetsova, Vasilyeva, 2023). It also briefly describes key strategic documents for regions fully or partially included in the Arctic Zone of the Russian Federation (AZRF): both the strategies and the corresponding programs for their implementation[3]. One of the primary objectives is to increase life expectancy in the regions.

The study (Stepanov, 2024) described a regression model constructed by the author using panel data from the Volga Federal District, which links life expectancy to a number of explanatory variables (economic, medical-social, etc.). This model performs well for many other regions; its applicability has been demonstrated for two regions of the North-Western Federal District (NWFD)[4] and, similarly, for the Central Federal District (CFD) (Stepanov, 2024). Following the analysis of data from 126 countries, a model similar to this one was developed in the article (Shtun, 2021).

Furthermore, the article (Novikov, 2022) noted that "a joint and comprehensive approach to the development of Arctic coastal territories, in conjunction with issues … relating to improving the socio-demographic situation and the quality of life of the population, as well as environmental protection" offers promising prospects for addressing the challenges of AZRF development. In this regard, it is worth drawing attention to another model, constructed using data from 17 regions of the CFD, covering the five-year period prior to the recent pandemic[5]; it was developed based on findings from (Stepanov, Bobkov, Shamaeva et al., 2022). In this model, the dependent variable is an aggregated composite variable that characterizes the level of material well-being of the population (WBP) at a regional level. Its factor variables included a composite variable for infrastructure, a range of indicators measuring the digitalization of organizations' activities, life expectancy for males (LEm), and others.

Given the strategic importance of regions fully or partially located in the AZRF, it would be of interest to apply these models jointly, selecting the Arkhangelsk Oblast as a case study. For comparison, it is useful to consider another AZRF region — the Republic of Karelia — as well as two neighboring regions and several others from the Siberian and Far Eastern Federal Districts. Almost all these regions had population densities similar to that of the Pomorye region (Table 4, see below). Moreover, in almost all cases, with the exception of Karelia, the ethnic Russian

[2] Website of the Government of the Arkhangelsk Oblast. URL: https://dvinaland.ru/gov/national_projects/demogr/ (accessed 24 July 2025).
[3] Decree of the Government of the Russian Federation No. 484 dated March 30, 2021, "On Approval of the State Program of the Russian Federation 'Socio-Economic Development of the Arctic Zone of the Russian Federation'" (as amended on September 24, 2024). URL: http://www.consultant.ru/document/cons_doc_LAW_381261/ (accessed 31 July 2025).
[4] Stepanov V.S. On the Application of Regression Models to Regional Data: Population Quality of Life and Life Expectancy. Problems of Economic Growth and Sustainable Regional Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 19–21, 2025. Section 1. Paper 6. 5 p. Vologda: Vologda Research Center. URL: http://econproblem.volnc.ru (accessed 24 July 2025).
[5] Ibid.

population share consistently exceeded 91.5%. In most regions, excluding those located east of the Ural Mountains, temperatures in January or July were comparable (based on 2017 and 2019 data, excluding Primorye, where temperatures were almost identical to those in Pomorye). In many cases, the urban settlement pattern resembles that of Pomorye: a regional capital of moderate size, followed by a city with a significantly smaller population, and then a series of towns with progressively smaller populations. The share of the urban population is quite similar across seven regions (only the Leningrad Oblast lags behind). The structure of the gross regional product (GRP) was also examined (Table 3, see below). In all eight regions, the share of the agricultural, forestry, and fisheries sectors in GRP ranges from 3.9% to 7.3%. The construction and energy sectors show similar levels of development (with the exception of two regions that stand out with higher figures), while the trade sector does not exceed 16% (it is higher in two regions of the Far Eastern Federal District); the transport sector is also well-developed (with only the Kostroma Oblast lagging slightly behind). The ICT sector typically accounts for 1.4%–2.4%, real estate — for 7.5%–11.5%, and the scientific-technical sector — for 1.6%–2.5% (with the Pomorye region showing a lower figure); the services and security sector contributes between 8.8% and 14.5% (except for the Leningrad and Vologda Oblasts). The education and healthcare sectors are well-developed in these regions. Many also recorded similar per capita GRP figures in 2019, indicating that the regions have a number of comparable characteristics. Interestingly, the proportion of the population living in poverty also varied slightly across the regions in 2023, ranging from 8.7% in the Kostroma Oblast to 10.2% in Karelia (compared to 6.8% for the Leningrad Oblast and 11.3% for the Tomsk Oblast).

Comparing these indicators makes it possible to select realistic benchmarks applicable to the Arkhangelsk Oblast. These can then be used to demonstrate, through a numerical example, what specific steps might have led to a slight increase in the region's aggregate well-being indicator in 2020 and to an increase in life expectancy in 2019. This example is purely illustrative, and the increments have been chosen so that the Pomorye region's graph for that year would run almost parallel to the Leningrad Oblast's graph.

Using a similar methodological approach, these two models can be applied to other regions within the AZRF or those located nearby: the Yamalo-Nenets Autonomous Okrug, the Khanty-Mansi Autonomous Okrug; the Republics of Karelia and Komi; the Tyumen, Tomsk and Irkutsk Oblasts; the Krasnoyarsk, Primorskiy and Khabarovsk Krais; and others. It is important to note that each Russian region is unique, making such generalizations rather conditional. Nevertheless, the specific characteristics of different regions are partially taken into account in Models 1 and 2 through dummy variables included in their specifications; therefore, the value of the constant in these models often varies from region to region.

The aim of this study is to describe the results of applying two regression models, developed using panel data from regions in Central Russia and the Volga region, in which the dependent variables are an aggregate indicator of population well-being and life expectancy. The

performance of these models and the dynamics of their factors are examined using data from the Arkhangelsk Oblast and several other regions of Russia.

The study's novelty lies in the application of an improved version of the author's model for the aggregate indicator of population well-being to Rosstat data collected in the Arkhangelsk Oblast and other Russian regions, with an analysis of the impact of its factor variables on the dependent endogenous variable. This improvement involves considering updated official Rosstat data, resulting in slight adjustments to the list of factor variables, all model b-coefficients, and certain time lags. Consequently, the model's accuracy has increased slightly.

Furthermore, a second model is applied to these regions for the first time, with a similar analysis of its factors regarding life expectancy at birth. Finally, an example is presented to illustrate how the models work, and a number of constraints for the Pomorye region are listed. The data analysis methodology can also be applied to some of the AZRF regions or their neighbors, as well as to other regions in the Central, North-Western, and Volga Federal Districts.

The performance of Model 2 was tested by the author across a significant number of regions of the Russian Federation during the periods 2011–2019 and 2021–2023. For the majority of regions — with the exception of those in the Arctic, the northern part of the Far Eastern Federal District, or a number of southern regions (the North Caucasus Federal District, etc.) — the results demonstrated high accuracy. Model 1 was applied to the eight regions under study as follows: first, the actual values of the dependent variable for the Vologda Oblast for 2018–2020 were obtained for its previous variant, and a dummy variable from the model was selected to ensure that the forecast point was close to the actual value[6] (Fig. 3). Subsequently, similar procedures were carried out for the Arkhangelsk, Vologda, and Tomsk Oblast, the Republic of Karelia, and the Primorskiy and Khabarovsk Krais for 2018–2019.

The first part of the article describes the development of a model for an aggregated indicator of population well-being (specifically, the integral indicator of the well-being of the population, II WBP). The second part details the application of this model to statistics collected in the Pomorye region. It also presents graphs for several regions, two of which are partially located in the AZRF, as well as those bordering them. The third part analyzes the factor variables which, within the framework of Model 1, could improve the quality of life indicator under consideration in the Pomorye region, as well as in a significant number of other regions. The fourth part briefly examines the life expectancy indicator at the regional level and describes Model 2, which is applied to a number of regions within the Russian Arctic Zone and several adjacent ones, with a particular focus on the Arkhangelsk Oblast. An illustrative example for the Pomorye region is also presented here, demonstrating the projected increase in life expectancy (for 2019) and the change in the aggregated WBP variable (for 2020) that would result from improving certain factors

[6] Stepanov V.S. On the Application of Regression Models to Regional Data: Population Quality of Life and Life Expectancy. Problems of Economic Growth and Sustainable Regional Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 19–21, 2025. Section 1. Paper 6. 5 p. Vologda: Vologda Research Center. URL: http://econproblem.volnc.ru (accessed 24 July 2025).

included in these models, primarily in previous years. The last part discusses the results and outlines the problem areas identified in this region.

Brief description of the stage of building a model of WBP using data from the CFD

Let us briefly describe the model of population's welfare (WBP model), which is regarded as one of the dimensions of the population's quality of life. First, according to the methodology (Aivazian, 2012), the integral indicator (II) of WBP was calculated by convolving the set of variables $x_1,\ldots, x_p$; the variables themselves are listed in the study (Stepanov, Bobkov, Shamaeva et al., 2022), in which $p = 15$. We also provide the list of variables below (Table 1); the result of the grouping of variables carried out during the application of the methodology, as will be described further, is shown on the right.

Table 1

List of indicators for constructing the II WBP

	Indicator (variable)	Block No.
1	GRP_i for year *t* (per capita), divided by the ratio (SR_i / SR_{RF}), where *i* — the region number [*1)]	3
2	Retail turnover combined with the paid services volume in the region (calculated similarly)	3
3	CI/SR — purchasing power of per capita cash income (CI)	3
4	Share of household (HH) expenditure on food (incl. housing, utility, and fuel costs), %	2
5	Share of education expenditure in total household consumption expenditure, %	3
6	Average individual deposit in RUR accounts in the SBRF, as a share of SR	3
7	Average housing provision (total residential floor area per capita) [m²/person]	1
8	Commissioning of total residential floor area in residential buildings per 1,000 population	1
9	Share of dilapidated and unsafe housing in the region's total housing stock, %	1
10	Integral indicator of housing stock amenities in the region – II HA [*2)]	1
11	Average provision of personal passenger cars (per 1,000 population)	3
12	Share of low-income population — number of residents with per capita CI below SR, %	2
13	Index of household (HH) financial security in the region [*3)]	2
14	Funds coefficient (C_f), calculated by income groups with 10% of rich and 10% of poor	4
15	Share of households (HH) with Internet access (among all HH) by the end of year t	2

[*] *Notes:* 1) SR_i , SR_{RF} — subsistence rate for the fourth quarter for the i-th region and the Russian Federation, respectively; 2) II HA is calculated using the methodology proposed by Aivazyan (2012) based on a set of indicators regarding housing amenities, as described by Stepanov (2022) (this index represents the first principal component: a linear combination of the shares of the total residential floor area equipped by year-end with running water, sewage systems, heating, hot water supply, bathtubs/showers, and mains gas or electric ranges); 3) the HH Index based on financial security (Table 1) is derived from the distribution of HHs published in tables based on Rosstat surveys of HH heads regarding their financial situation in year t[7].

The II WBP variable, which has an aggregated type, is calculated according to official Rosstat statistics collected in 17 regions of the CFD over 5 years[8]. This was done using correlation and component analysis methods, through their application to data with variables $x_1,\ldots,x_p$. They

[7] Household Income, Expenditure, and Consumption: Statistical Bulletin. Moscow, Rosstat. URL: https://rosstat.gov.ru/folder/11110/document/13271 (accessed 15 August 2025).

[8] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

form a table of initial data with observations, comprising *p* columns and *n* rows (in our case, *n* = 85). As a result of this stage of calculations, all indicators $x_1,\ldots,x_p$ (Table 1) were divided into *M* blocks; simultaneously, the weighting contribution for the *j*-th block ω_j is determined, where $j = 1,..,M$[9]. The value ω_j is taken to be proportional to the variance of the variable Y_j and the number of indicators p_j from the *j*-th block, according to the formulas from (Aivazian, 2012). The Y_j variable is the "block version" of the II WBP; this is usually the first principal component found from the covariance matrix of the variables in the *j*-th block: $x_1,\ldots,x_{pj}$ (they were first reduced to the same scale). These weights are used in the calculation of the summary indicator; the sum of all ω_j is equal to 1. The technology for working with data is similar to that given in (Stepanov, Bobkov, Shamaeva et al., 2022). The block-partitioning stage is necessary because the set of variables $x_1,\ldots, x_p$ is usually heterogeneous, and therefore the principal component method is applied in a block form for such tasks. In other words, it is assumed that the correlation coefficient matrix for all p variables can be approximately replaced by its block-diagonal analogue (as can the covariance matrix) (Stepanov, Bobkov, Shamaeva et al., 2022). As a result, the number of blocks $M = 4$, and the values of the weights $\omega_1,\ldots,\omega_4$ were initially equal to those given in the work[10]. However, in subsequent Rosstat publications[11], the values of many standard of living variables (in its statistical collections) changed quite significantly, and after processing these updated data, the following values were obtained: $\omega_1 = 0.24$; $\omega_2 = 0.2544$; $\omega_3 = 0.373$ and $\omega_4 = 0.132$. In order to clarify: block 1 is related to the housing stock and the provision of housing for citizens, taking into account its quality ($p_1 = 4$); block 2 combined poverty indicators ($p_2 = 4$); block 3 forms income indicators: GRP, etc. ($p_3 = 6$); block 4 contains the fund coefficient, after its normalization ($p_4 = 1$) (see Table 1). In other words, the importance of block 4, which measures social stratification by income, increased according to ω_4, the weight of ω_3 of the block with GRP decreased, and the weight of ω_2 for the housing block changed.

The weights ω_j are used in the calculation of the "aggregate II" of the WBP (Aivazian, 2012; Stepanov, Bobkov, Shamaeva et al., 2022), denoted below as *Y*, and its estimate — as $Y^{(t)}$. Specifically: for the *i*-th set of observations $x_1,\ldots, x_p$ over a given region of the country, the value of *Y* is calculated as the difference: $Y = 10 - \sqrt{\sum_{j=1}^{M} \omega_j \cdot (10 - Y_j)^2}$, according to (Stepanov, Bobkov, Shamaeva et al., 2022). The index *i* here, as well as below, is not shown to simplify the notation. Under the root sign is the value Y_j — an indicator for the *j*-th block, or "block II" (Aivazian, 2012). It is obtained by linear convolution of all p_j variables $x_1,\ldots,x_{pj}$ that formed the composition of the *j*-th

[9] Stepanov V.S. On the Application of Regression Models to Regional Data: Population Quality of Life and Life Expectancy. Problems of Economic Growth and Sustainable Regional Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 19–21, 2025. Section 1. Paper 6. 5 p. Vologda: Vologda Research Center. URL: http://econproblem.volnc.ru (accessed 24 July 2025).
[10] Ibid.
[11] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

block, where $1 \le p_j < p$. The new variables Y_j and Y take values from [0, 10], according to (Aivazian, 2012). Thus, the value $Y = 10$ corresponds to a hypothetical region (reference region) which could have the most favorable values for each of $x_1,\ldots, x_p$. Conversely, if $Y = 0$, this corresponds to the situation where all $x_1,\ldots, x_p$ could turn out to be the worst possible (for another hypothetical region). Ultimately, Y is calculated as the weighted Euclidean distance between a pair of points in 4-D space: $(10,\ldots,10)^T$ — for the reference region and $(Y_1,Y_2,Y_3,Y_4)^T$, obtained by calculations based on the values of the variables $x_1,\ldots,x_p$ for the i-th observation. This was previously illustrated in (Stepanov, 2019) for the option in which the number of blocks is $M = 3$.

The initial vector of observations at the "model building" stage was a set of values $x_1,\ldots,x_p$ for a certain area of the CFD, taken in the year $t \in \{2015,\ldots,2019\}$. Each of these variables was first scaled to the range [0,10] by means of a simple linear scaling operation. Furthermore, the calculation of the aggregated variable Y_j for the j-th block is carried out using the methodology (Aivazian, 2012), based on a minor modification made to one of the principal component analysis formulas (Stepanov, Bobkov, Shamaeva et al., 2022). In other words, if $p_j > 1$, then the value Y_j is most often the first principal component for all p_j variables $x_1,\ldots, x_{pj}$ or (much less often) some approximation of it (Stepanov, Bobkov, Shamaeva et al., 2022; Aivazian, 2012). In our case, this took place for blocks 1–3, while the last block includes a single indicator of income stratification calculated based on 10% population groups (i.e., "funds coefficient")[12,13] (Stepanov, Bobkov, Shamaeva et al., 2022).

A methodologically similar calculation was carried out using 10 indicators other than $x_1,\ldots,x_p$; describing the development of road and transport infrastructure in the region (Stepanov, 2022). These infrastructure indicators also formed their own blocks. These blocks, along with the method for calculating "weights" for the regions of the Volga Federal District (VFD), were presented in a brief report[14]. The highest weight, approximately 0.47, was assigned to the block comprising the density of public-use railways and similar hard-surfaced roads, the share of roads with improved hard surfacing, and the density of navigable river routes. A second block, with a weight of approximately 0.3, included regional and inter-municipal roads meeting standard requirements, the share of "asphalted roads", and regional road traffic capacity. The other two blocks took into account road safety and the availability of public buses to the population. Consequently, an aggregate variable — the transport infrastructure integral indicator (II TI) — was calculated annually for each region of the CFD. It takes values in the range [0, 10] and

[12] Stepanov V.S. On the Application of Regression Models to Regional Data: Population Quality of Life and Life Expectancy. Problems of Economic Growth and Sustainable Regional Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 19–21, 2025. Section 1. Paper 6. 5 p. Vologda: Vologda Research Center. URL: http://econproblem.volnc.ru (accessed 24 July 2025).

[13] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

[14] Stepanov V.S. Econometric Model for Estimating an Aggregated Welfare Variable in the Volga Oblast. Problems of Economic Growth and Sustainable Territorial Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 17–19, 2023. Vologda: Vologda Research Center; 2024: 180–184. URL: https://elibrary.ru/nhydez (accessed 31 July 2025).

subsequently serves as the factor variable X_1 in the model specification.

Constructing aggregate and block-level indicators (using the aforementioned variants for WBP and TI) and analyzing their dynamics over time (as the reference year *t* increases) for a given region make it possible to produce illustrative graphs, such as those shown in Figures 5–7 in (Stepanov, 2019). Studying the dynamics of block indicators Y_j over *t* makes it possible to identify problem areas ("bottlenecks") within the list of indicators $x_1,\ldots, x_{pj}$ for a given block. This approach was proposed in the methodology set out in (Aivazian, 2012). For example, it was applied to the Republic of Crimea (Stepanov, 2019), and a similar analysis was conducted for the Arkhangelsk Oblast (results are presented in the "Discussion" section).

Subsequently, a key concept proposed by (Aivazian, 2012) was implemented: using econometric methods to establish a link between the II WBP and a set of variables directly or indirectly influenced by policies pursued in the region and/or country. Such an approach could be of interest to regional authorities if they took it into account when formulating their development strategy. Ultimately, a regression model with a variable structure and 14 factors in its specification was constructed using panel data from the CFD. For this model, the adjusted coefficient of determination $R^2_{adj} \approx 96.7\%$ with a standard error *RMSE* = 0.22 and a mean absolute percentage error *MAPE* = 4.0(±3.2)% (Carlberg, 2017). In other words, this regression model explained a high proportion of the variation in *Y* around the mean value calculated across all CFD regions over the five-year period.

Research results and discussion

Application of the well-being model to data from the Arkhangelsk Oblast and other areas

The Arkhangelsk Oblast is partially included in the Arctic Zone of the Russian Federation, and the development of information infrastructure in AZRF territories is a priority task (Kuratova, 2023). This region is strategically important to the Russian government due to its geopolitical and economic position (Kuznetsova, Vasilyeva, 2023). When applied to data from the Arkhangelsk Oblast, the model described above can be represented as follows:

$$Y^{(t)} = -8{,}834 + 0{,}364X_1 + 0{,}0285X_2 + 0{,}072X_3 + 0{,}14X_4 - 0{,}037X_5 + 0{,}77(X_6)^{0.5} + 0{,}139X_7, \quad (1)$$

where $Y^{(t)}$ — II WBP for year *t*, previously constructed by aggregating variables $x_1,\ldots,x_p$;
X_1 — TI factor, derived in a similar manner and taken with a lag of τ = 1 year[15,16] (Stepanov, 2022);
X_2 — number of PCs per 100 employees in organizations with Internet access[17], τ = 2 years;

[15] Stepanov V.S. On the Application of Regression Models to Regional Data: Population Quality of Life and Life Expectancy. Problems of Economic Growth and Sustainable Regional Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 19–21, 2025. Section 1. Paper 6. 5 p. Vologda: Vologda Research Center. URL: http://econproblem.volnc.ru (accessed 24 July 2025).
[16] Stepanov V.S. Econometric Model for Estimating an Aggregated Welfare Variable in the Volga Oblast. Problems of Economic Growth and Sustainable Territorial Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 17–19, 2023. Vologda: Vologda Research Center; 2024: 180–184. URL: https://elibrary.ru/nhydez (accessed 31 July 2025).

X_3 — share of organizations in the region using specialized software (such as CRM, ERP, or SCM systems — CES[18,19,20]) in year *t-4*; the lag is $\tau = 4$ years, the factor is expressed in %;
X_4 — share of organizations using RFID technologies in year *t-2*[21,22], in %;
X_5 — level of subsidies for the region's consolidated budget (*BT/GRP*), expressed as a percentage for year $t - \tau$, where BT (budget transfers) refers to non-repayable budget receipts[23] (i.e., the lag $\tau = 2$);
X_6 — variable calculated as the proportion of per capita GRP attributable to the economic sector comprising forestry, agriculture, and the fishing industry for year *t*; it is calculated relative to the subsistence minimum rate (SR)[24] of the population in the region under consideration for year *t*;
X_7 — life expectancy at birth for males (LE_M) in the year preceding year *t* (i.e., here $\tau = 1$). Only X_6 enters equation (1) simultaneously with $Y^{(t)}$.

The indicators $X_2,\ldots,X_4$ without taking lags into account, were also examined in (Kuratova, 2023; Akberdina, Naumov, Krasnykh, 2023). The male infant life expectancy indicator (LE_M) proved to be more informative than the overall LE at the regional analysis stage, that is, during the process of constructing a fixed-effects regression model (with 14 factors). This was found as follows: when the LE_M variable is included instead of the LE factor, the coefficient of determination R^2 increases significantly, and the Student's *t*-statistic for LE also becomes significant. The wide disparity in life expectancy between the male and female populations of Russia is due to a combination of factors (the consequences of the 1941–1945 war and a number of other factors). This gender gap has a negative impact on the economy and the social sphere in the regions of the Russian Federation.

The performance of model (1) as applied to data from the Arkhangelsk Oblast and the Republic of Karelia, as well as two neighboring regions, is shown in Fig. 1. Some of the districts and towns in these regions are part of the AZRF. The figure also displays actual $Y^{(t)}$ values for 2018–2019; these were derived from regional values of variables $x_1,\ldots, x_p$ and calculated using the previously described methodology, alongside the initial set of 85 observations. When calculating the estimate $Y^{(t)}$ by substituting values for $x_1,\ldots, x_p$ into equation (1), the values of the constants may vary between regions (i.e. a model with 14 variables was effectively used).

[17] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[18] Ibid.
[19] Note: ERP system integrates information and functions across an organization's departments; CRM system manages customer relationships; SCM system manages the organization's supplier orders; RFID is a computer technology for the automatic identification of objects.
[20] Digital Economy Indicators: 2021. Moscow: HSE, 2021. https://doi.org/10.17323/978-5-7598-2385-8
[21] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[22] Digital Economy Indicators: 2021. Moscow: HSE, 2021. https://doi.org/10.17323/978-5-7598-2385-8.
[23] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[24] Ibid.

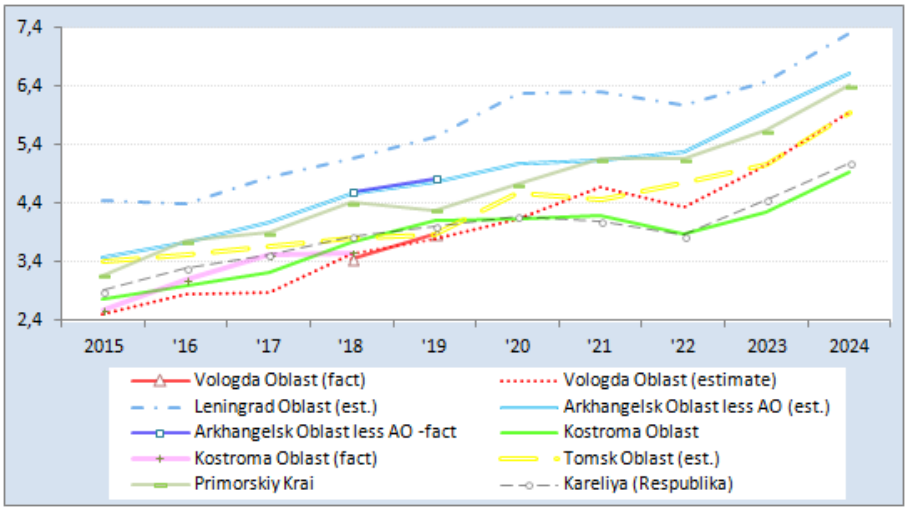


Fig. 1. Dynamics of the II WBP for seven regions across the NWFD, CFD, SFD, and FEFD[25].

Graphs showing $Y^{(t)}$ estimates for the Primorskiy Krai and the Kostroma Oblast are also provided. Although both regions have population densities more than four times higher than that of Pomorye, they share several characteristics with this northern area (as noted in the introduction). A graph for the Tomsk Oblast, a leader in innovation, is also shown; however, the local natural and climatic conditions are considered uncomfortable.

A comparison of the graphs reveals that the model-based $Y^{(t)}$ estimates for the Arkhangelsk Oblast and the Primorskiy Krai exhibit similar dynamic behavior over t. It is interesting to note that a number of settlements and four districts in the Primorskiy Krai are classified as part of the Far North. It is evident that, since 2018, the graph for Karelia has almost coincided with that of the Kostroma Oblast.

Analysis of factors influencing $Y^{(t)}$: the Arkhangelsk Oblast and others

An examination of the elasticity coefficients from the original model (from which formula (1) was derived) indicates that the primary contributions came from the factors LE_M, X_1, X_6, followed by measures related to the digitalization of organizational activities: X_2, *CES*, *RFID*. We proceed to examine the factors X_1, X_2, *CES*, *RFID* and LE. Table 2 (columns 2–5) presents the four-year trend for factor X_1 in Pomorye alongside data from six other regions across the North-Western, Central, and other federal districts.

Table 2

Dynamics of the II TI for seven regions and the transport accessibility index in 2018[26]

Region	2015	2016	2017	2018	*TAI*	TAI rank
1	2	3	4	5	6	7
Arkhangelsk Oblast	3.0	3.0	3.0	3.0	7.0	62
Vologda Oblast	4.13	4.09	4.54	4.56	11.2	33
Komi Republic	4.1	4.04	4.07	4.02	7.03	61
Republic of Karelia	4.9	4.95	5.17	5.22	7.73	58
Kostroma Oblast	3.78	3.78	3.756	3.77	13.0	17

[25] Author's calculations are based on official data from Rosstat publications: materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat) and their visualization. URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

[26] The author's calculations are presented in columns 2–5; columns 6 and 7 present the results of other authors.

Tomsk Oblast	3.66	3.62	3.78	3.76	7.57	59
Primorskiy Krai	4.4	4.36	4.46	4.4	5.57	69

Columns 6 and 7 present the transport accessibility index (TAI) from (Lavrinenko, Romashina, Stepanov et al., 2019) and its ranking for 2018. The values of X_1 shown on the left are for a number of regions situated near the Arkhangelsk Oblast and the AZRF, as well as two other regions that share certain characteristics with Pomorye: similar winter and summer air temperatures and comparable per capita GRP figures (in 2019, Karelia ranked 31st, Pomorye 33rd, and Vologda 34th in Russia). Population densities in Karelia and Pomorye are relatively comparable, and both regions lie partially within the AZRF; urbanization rates are also similar: 79.2% of urban population in Karelia, 77.4% in Pomorye, and 72.4% in Vologda. The largest cities in these regions had the following populations: Petrozavodsk — 279,000; Arkhangelsk — 350,000; and Cherepovets — 318,000 (as of early 2018); each region had 20–22 urban settlements. The two largest cities in Pomorye have a combined population of 523,000, compared to 630,000 in the Vologda Oblast (whereas in Karelia, the figure was only 309,000). Beyond the top three, the remaining urban settlements in these regions are small (with populations of 38,000 or less). If the area of the Karelian territory is divided by the number of its rural settlements, the result is approximately 2,100 km²; if the same calculation is carried out for Pomorye, the result is 2,350 km². A comparison of the sectoral structure of the GRP in these three regions for 2019 reveals no significant differences (Table 4). While the Vologda Oblast lacks an extractive industry, it successfully compensates for this absence through four other sectors: manufacturing, construction, trade, and scientific-technical activities. Furthermore, because the manufacturing sector here is focused on metallurgy, the chemical industry, pharmaceutical production and others (Table 5), this region significantly outperformed Pomorye in 2018 in terms of both the value of the CDI and its ranking. Finally, regarding the level of innovation activity, the Vologda Oblast has been rapidly outpacing the corresponding figures for Pomorye since 2013 (Fig. 6).

For instance, the Leningrad Oblast, together with St. Petersburg, has TAI value of 15.1 and would rank 7th in Table 2, whereas Pomorye is among the outsiders. The benchmark region, defined by the ten variables aggregated to derive this II TI, has an X_1 value of 10. In other words, it would exhibit the most favorable values for all ten variables among the territories analyzed in the study (Stepanov, 2022). Its roads would be in a standard-compliant (or near-compliant) condition, the density of public road and rail networks would be attractive, water transport would be optimally developed, and so on.

It has previously been noted that a formalized approach to calculating the TAI is important for practical applications (Lavrinenko, Romashina, Stepanov et al., 2019). This paper also provides references to studies on the transport accessibility of a territory. This is defined as the ability to reach a region's territory using various types of infrastructure. Another review of research in the field of transport infrastructure is presented in (Stepanov, 2022). However, neither article took maritime transport into account, and (Stepanov, 2022) also excluded air transport. Another

difference between these two works lies in the methodology for calculating the TAI when compared with that used for the II TI. Thus, in (Lavrinenko, Romashina, Stepanov et al., 2019), the TAI value is estimated by accounting for all transport costs, including actual monetary expenditures and travel time to a given region; these factors are considered across various modes of transport and for citizens residing in all regions of the Russian Federation. The methodology for calculating the II TI value is based on the construction of integral indicators as described in (Aivazian, 2012). This approach employs a combination of principal component analysis and correlation analysis, making it quite versatile. For example, it was used by Dao Mai Han (2007) — a postgraduate student at the Central Economics and Mathematics Institute of the RAS (CEMI) from Vietnam — when modelling foreign trade for that country (the fisheries sector). The list of variables in the article (Stepanov, 2022) was limited to regional data from Rosstat; if its website had provided annual data on air and sea transport, these would also have been used in calculating the TI index.

Thus, considering the Primorskiy Krai case in Table 2, this FEFD region is remote from the central part of the Russian Federation. Consequently, a trip to Primorye is costly and time-consuming for the average Russian, resulting in TAI rank of 69. On the other hand, the region is characterized by having only 74 rural settlements across a territory of 164.7 thousand km², and their ratio is 2.23, which is only slightly lower than that of the Pomorye case. However, Primorye is more developed in terms of urban centers: its capital has a population of 600,000, and there are three towns with over 100,000 residents, five towns with populations exceeding 40,000, and so on. Furthermore, due to its proximity to Japan (which is why reliable Japanese cars, albeit not new ones, are more affordable in Primorye), residents are better equipped with private vehicles: 447 versus 332 (based on 2019 data). This is probably why the condition of the roads here is closer to the standards, and their density is considerable. There are also many rivers, a large lake and a well-developed water transport system; there is a good railway network. Hence: $X_1 \approx 4.4–4.5$ (this represents the II TI*).*

An examination of the graphs for variable X_2 (Internet access) for the average value across all regions of the CFD regions over a nine-year period with the corresponding graphs for four NWFD regions, the Kostroma and Tomsk Oblasts, and Primorskiy Krai reveals that the graph for the Kostroma Oblast is very close to this average, whereas the graph for the Tomsk Oblast is significantly higher, ranging from 38 to 55 per 100 employees (Fig. 2).

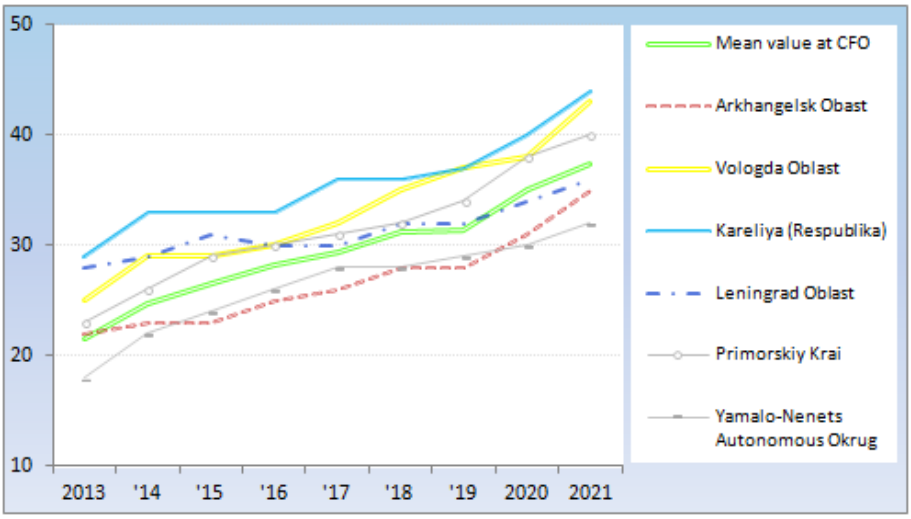


Fig. 2. Internet access in organizations across six regions and the average level in the CFD (number of PCs)[27].

It is evident that the situation in the Yamalo-Nenets Autonomous Okrug and the Arkhangelsk Oblast was rather unfavorable from 2013–2014 to 2020. This variable is examined in the regions of the AZRF in (Kuratova, 2023), where it is designated as X_{20}; it also appears labeled as X_2 in Table 5 of the same study. It follows from the information provided and Table 5 that the provision of one computer with internet access for every 100 employees was a bottleneck in Pomorye, similar to the situation in the Yamalo-Nenets Autonomous Okrug. Regarding Internet usage, it is worth noting that the rate of internet access in Pomorye organizations has remained virtually stagnant since 2016. Moreover, since 2015, broadband access in the region has declined noticeably when compared to the CFD, a trend particularly significant for rural settlements in Pomorye. While the Vologda Oblast's figures were close to this average between 2013 and 2018, the corresponding indicator for Pomorye has lagged behind by 3–4% annually since 2015.

An analysis of the CES indicator for the period 2011–2019 reveals that, in this respect, organizations showed relatively little variation across the regions under consideration, with one trend often dominating: organizations in Pomorye experienced a temporary decline in CES usage during 2016–2017. However, following the pandemic and the start of the special military operation in Donbas, the frequency of CES usage across the seven regions began to diverge significantly, with Pomorye organizations falling behind[28].

In terms of trends in RFID usage, the situation in Pomorye is more favorable (Fig. 3). However, there is a noticeable gap between Pomorye and the innovative Tomsk Oblast, as well as the Russian average.

[27] Created by the author based on the statistical compilation "Regions of Russia: Socio-Economic Indicators" and materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[28] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025)

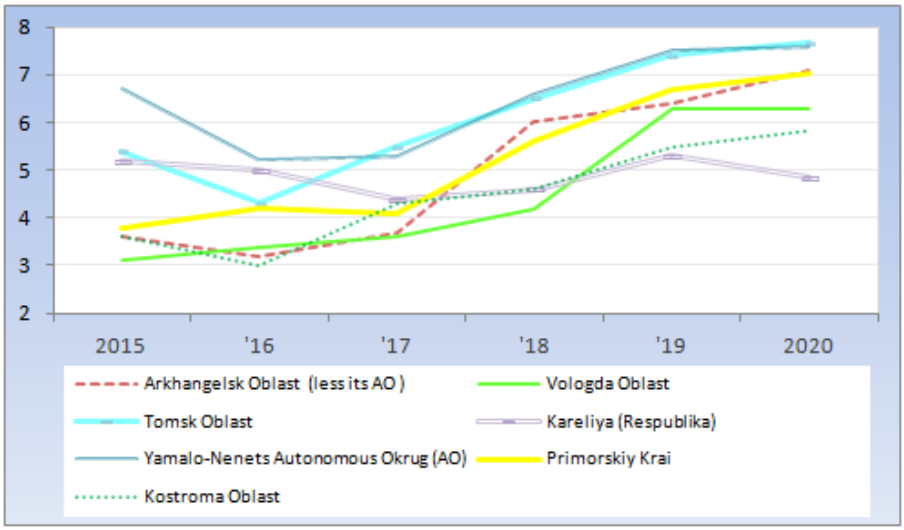


Fig. 3. Frequency of RFID technology usage in regions of the NWFD and other districts (%)[29].

It is worth noting that the Tomsk and Leningrad Oblast have almost always dominated; for the latter, the RFID adoption rate ranged from 5% to 6.5% between 2015 and 2020. This is even more pronounced in the economically powerful regions of Western Siberia — the Yamalo-Nenets Autonomous Okrug (YaNAO) and the Khanty-Mansi Autonomous Okrug (KhMAO), with the latter showing a higher share of RFID adoption than the YaNAO. For comparison, the RFID share in organizations in some European countries in 2018 was as follows: for Hungary, Denmark, Romania and the Russian Federation — 7% each; the Czech Republic and the United Kingdom — 8% each; Latvia — 9%; Lithuania — 10%; France — 11%; Estonia — 12%[30].

A comparison of the X_6 factor values across the regions under review reveals that the situation in Pomorye is quite favorable. Only in terms of indicator X_5, which measures budget subsidies, it lags behind the aforementioned regions during the period 2015–2023. For instance, in 2017, the X_5 value for Pomorye was 3.4%, whereas for Primorye it was 2.64% and for the Tomsk Oblast — 2.3%. A comparison of the levels of budget subsidies from Primorye and Pomorye over the period 2013–2021 revealed that it was only in 2014 and 2018 that this subsidy measure decreased for Pomorye. However, in the remaining seven years, the region was more heavily subsidized: by approximately 20%. In other words, Pomorye's consolidated budget was generally less self-funded than that of the Primorskiy Krai. Nevertheless, in the cases of Karelia and Kostroma, budgetary provision was even worse: the X_5 values were 5.27% and 3.97%, respectively. Thus, the Karelian budget was the least self-sufficient, followed slightly better by the Kostroma budget. Below, we present a range of data on the life expectancy (LE) indicator for the entire population, which is close to X_7.

[29] Created by the author based on the statistical compilation "Regions of Russia: Socio-Economic Indicators" and materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[30] Table 2.1.21 "Information Society: Key Characteristics of the Subjects of the Russian Federation", 2019. Statistical compilation, Rosstat, 2019. URL: https://rosstat.gov.ru/storage/mediabank/info-ob_reg2019_405742.pdf (accessed 15 August 2025).

Analysis of factors influencing LE: the Arkhangelsk Oblast and others

A model, originally developed using 84 observations across the Volga Federal District (VFD) regions and estimated using pooled regression, helps to analyze the possible causes of variations in life expectancy (LE) across the regions of the Russian Federation. This is a regression model with a variable structure that incorporates lags for several factors; its constant varies by region based on changes in the model's dummy variables. Subsequently, measures of the population's physical activity and investment in healthcare were added to the list of factors, while the sample size increased to n = 112. The model was then further refined: some factors were replaced by others, and the sample size now stands at n = 140 (Stepanov, 2024). One of the new factors better accounts for the negative impact of alcohol and drugs, while other factors included the rate of unnatural mortality (deaths from external causes), the level of urbanization, and others. In essence, the improvements involved increasing the panel data sample size and making minor adjustments to the list of explanatory variables and the values of some of their lags. As a result, the model's quality metric rose to $R^2_{adj} \approx 97\%$; the standard error (RMSE) was 0.29, and the approximation error (MAPE) was 0.31 (±0.22)% based on calculations across all *n* observations.

The model can be useful in developing measures aimed at increasing LE in many regions of the country. Thus, average elasticity coefficients have been calculated for it (Carlberg, 2017). It has been found that a reduction in the Gini index, a measure of social stratification by cash income (CI), is of paramount importance for increasing LE in the VFD[31,32]. The next factors are the incidence rates of alcoholism and drug addiction, followed by the ratio *med(CI)/SR*[33,34] (Stepanov, 2024). When calculating the numerator of this ratio, median income is used; in other words, the distribution of CI across eight population strata in the current year *t* is taken into account. The next indicators are the level of physical activity amongst the population and the proportion of urban residents; these are followed by the availability of doctors in the area and the external mortality rate. An increase in the value of *med(CI)/SR*, together with a decrease in Gini coefficient values, contributes to a reduction in the level of chronic stress amongst a section of the population[35]. This will significantly reduce the consumption of cigarettes, alcohol and drugs; men are more prone to such behavior (Stepanov, 2024; Stepanov, Rybkina, Orlova, 2023).

Based on these results, data from Pomorye and 7–8 other regions were analyzed using a methodology similar to that described above. A model scenario is then proposed, using the indicator values for this area listed in rows 1–9 of the table below. When applying Model 2, we assume that the value of factor X_7 from equation (1) rises slightly to reach the value shown in row

[31] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[32] "Rich and Poor" (from a conversation with Prof. A.Yu. Shevyakov). *In the World of Science*. 2005; 7: 73–79.
[33] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[34] "Rich and Poor" (from a conversation with Prof. A.Yu. Shevyakov). *In the World of Science*. 2005; 7: 73–79.
[35] Ibid.

10. The application of Model 2 to the Vologda and Leningrad Oblasts is illustrated in the paper[36]. The dynamics of LE in eight Russian regions during the decade preceding the pandemic are shown below (Fig. 4).

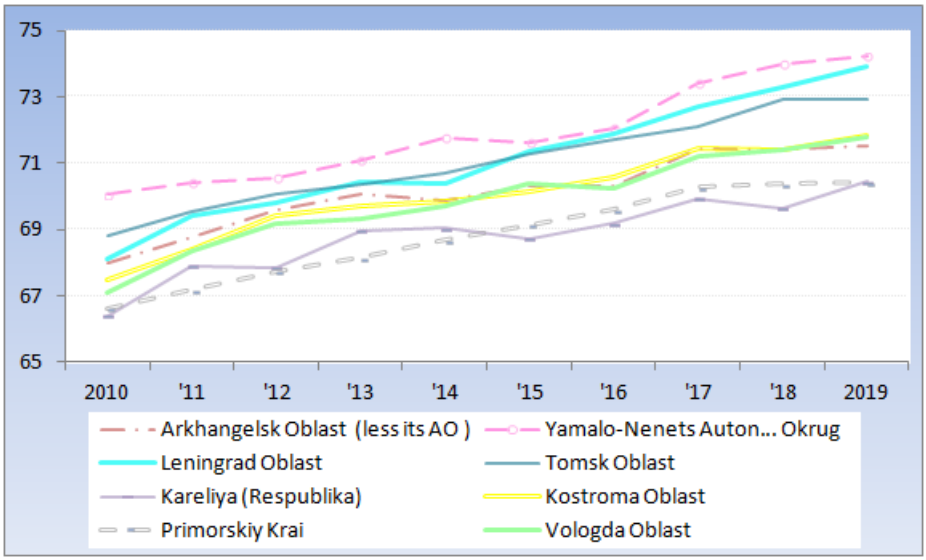


Fig. 4. Dynamics of LE in eight regions across the NWFD, CFD, FEFD, UFD, and SFD; years [37].

It is evident that during the period 2010–2019, the Yamalo-Nenets Autonomous Okrug and the Primorsky Krai, together with the Republic of Karelia, were the outliers at both the top and bottom of the distribution. Fig. 4 shows how the Leningrad Oblast curve occasionally caught up with that of the Yamalo-Nenets Autonomous Okrug, and reveals that LE values in the Vologda and Arkhangelsk Oblasts were very similar from 2014 onwards. It is also evident that the Arkhangelsk Oblast trend shows a noticeably shallower slope as the year *t* progresses from 2014 onwards. Actual LE values for these years, covering the AZRF regions and the country as a whole, were presented in Table 2 in (Provorova, Smirennikova, Ukhanova, 2024). It clearly shows that LE was above the national average only for residents of the Yamalo-Nenets Autonomous Okrug between 2005 and 2019. Meanwhile, LE figures for the Murmansk and Arkhangelsk Oblasts were slightly below the Russian average, while all other AZRF regions lagged even further behind. This is attributed, in particular, to the adverse impact of the harsh climate on the health of populations permanently residing in or near the AZRF regions (Provorova, Smirennikova, Ukhanova, 2024).

Following an analysis of the series of graphs and the above, let us provide an example.

Example: a model-based change in factors in Pomorye with estimates for 2019 and 2020

Table 3 shows how positive changes in the set of factor variables considered for both models could contribute to an improvement in the LE value for the Arkhangelsk Oblast in 2019, as

[36] Stepanov V.S. On the Application of Regression Models to Regional Data: Population Quality of Life and Life Expectancy. Problems of Economic Growth and Sustainable Regional Development: Proceedings of the 10th International Scientific and Practical Internet Conference, May 19–21, 2025. Section 1. Paper 6. 5 p. Vologda: Vologda Research Center. URL: http://econproblem.volnc.ru (accessed 24 July 2025).

[37] Created by the author based on the statistical compilation “Regions of Russia: Socio-Economic Indicators” and materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

well as its II WBP value in 2020.

Table 3

Example with actual and forecast values for the Arkhangelsk Oblast[38]

Factor variables		Variable values in the two models	
		Fact	Model
1		2	3
1	Gini index of income inequality in 2019	0.364	0.359
2	Value of Ln(*med(CI)/SR*) in 2019	0.79	0.82
3	Number of people with alcoholism in 2017	932.4	885.8
4	Incidence of alcoholism and drug addiction		5% decline
5	Volume of atmospheric emissions of pollutants in 2016, kg/capita		3% decline
6	Share of employed people with higher education in 2018, %	27.4	28.77
7	Physical activity per 1,000 inhabitants, 2019	350.2	367.7
8	External mortality rate in 2019	120.5	115.7
9	Ln(BadWater) — % of substandard water samples (from the distribution network)	2.6734	2.5665
10	Value of variable X_7 (male life expectancy) in 2019, years	65.94	66.29
11	Transport infrastructure indicator in 2019, points	3.0	3.06
12	PCs with web access per 100 employees, units, in 2018	28	30
13	CES indicator for organizations in 2016, %	13.5	15.2
14	Use of RFID in organizations in 2018, %	6.0	6.1
15	Measure of regional budget subsidization in 2017, %	3.24	3.175
16	Estimate of Y(t) for II WBP after substitution into formula (1)	5.077	5.344

Thus, if the following set of measures were implemented in Pomorye — a) reduce the 2019 Gini index to the average value for the Tomsk and Vologda Oblasts; b) reduce the level of alcoholism by 5%; c) reduce the logarithm of the proportion of substandard water samples taken from the water supply network in 2017 by 4%; d) reduce the logarithm of the volume of emissions from stationary sources of pollution (SSP) into the atmosphere per capita by 3% — it could be assumed that, as a result of some of these actions, the external mortality rate in Pomorye would decrease by, for example, 4% (Table 3). Implementing these measures would increase the calculated LE by 0.87%, bringing the 2019 figure to 72.54 years instead of the actual 71.91 years. Assuming that the related indicator of LE_M increases in the same proportion, the resulting value would correspond to the figure in row 10 (Table 3).

Let us now turn to modeling variable *Y*, or estimating $Y^{(t)}$, under the scenario where the region successfully implements the following set of steps: a) increasing factor X_1 by 2%; b) raising factor X_2 to the level of the Republic of Sakha (Yakutia); c) slightly increasing factor X_4 (or RFID); d) raising factor X_3 (CES) to the level of the Murmansk Oblast; e) reducing variable X_5 (representing the level of budget subsidies for Pomorye) by 2%, bringing it down to the level of the Primorsky Krai (row 15). If the values from column 3 (Table 3) are substituted into formula (1), $Y^{(t)}$ yields the value shown in Table 3, and the graph for the Pomorye region runs roughly parallel to the Leningrad Oblast graph (Fig. 1). As previously mentioned, this example is purely illustrative.

[38] Author's calculations.

Discussion of results and identification of problem areas for the Arkhangelsk Oblast

In accordance with Russia's strategy, spatial development challenges include[39]: mismatch between the development level of transport infrastructure and the needs of the economy and population; infrastructure constraints; weak transport connectivity between regions and economic growth centers; insufficient integration of different modes of transport; and others.

The study (Zakolyukina, 2023) focused on analysing the factors hindering the effective functioning of transport infrastructure as a driver of regional economic growth. The literature review refers to the link between these infrastructure indices and quality of life (Zakolyukina, 2023). It describes studies involving the calculation of integrated infrastructure indices.

The importance of developing transport infrastructure, as well as improving logistics alongside the progress of the digital economy, was highlighted in a review article (Levina, Dubgorn, Fadeev et al., 2024). This requires the development of land transport networks as well as shipping routes, specifically the Northern Sea Route (NSR) and river transport lanes. Such measures would facilitate more efficient movement of freight and labor resources (Levina, Dubgorn, Fadeev, et al., 2024). The digital economy is generally defined as the segment of economic output generated through digital skills and equipment (telecommunications equipment, hardware, software) and the use of digital goods and services. Furthermore, the article provides a number of references to relevant studies.

The study (Kuznetsova, Vasilyeva, 2024) assessed the level of development of transport infrastructure in two regions of the AZRF and provided an overview of the regulatory and legal documents affecting economic activity. It was noted that the development of AZRF seaport infrastructure and the formation of a digital subsystem would proceed in parallel with the development of the Northern Sea Route. Thus, among the promising projects, the development plan for the port of Arkhangelsk and its transport hub, as well as the creation of a logistics hub for the transshipment of container cargo, were highlighted. Additionally, Table 2 in the same study (Kuznetsova, Vasilyeva, 2024) demonstrated that the proposed transport infrastructure development index for Pomorye was the lowest among the regions within the specified parts of the AZRF during 2019–2021. This aligns with the data in Table 1 (see above). Finally, Table 6 (Kuznetsova, Vasilyeva, 2024) presented various coefficients, such as the Engel coefficient, etc. Given that population density in the Arkhangelsk Oblast is lower than in the Murmansk Oblast and slightly lower than in Karelia, the data in Table 6 allow for the following specific conclusion: these coefficients for Pomorye were at a normal level when compared to regions with similar population densities, namely the Nenets Autonomous Okrug and the Krasnoyarsk Krai. Table 7 of the study also presents data on seaports, with Pomorye ranking among the leading regions. For instance, the port of Arkhangelsk is classified as a "large" port, similar to the port of Murmansk; it also

[39] Spatial Development Strategy of the Russian Federation until 2025: approved by Order of the Government of the Russian Federation No. 207-r dated February 13, 2019. URL: http://static.government.ru/media/files/UVAlqUtT08o60RktoOXl22JjAe7irNxc.pdf (accessed 31 July 2025).

possesses a significant advantage in the form of a railway connection. Furthermore, these cities possess significant airport facilities, as shown in Tables 11–13 (Kuznetsova, Vasilyeva, 2024). Consequently, it is concluded that the transport infrastructure in the western part of the Russian Arctic Zone contributes to the growth of the GRP and improves living conditions for the population. Currently, there is an insufficient level of transport provision in Pomorye, which was explained in (Kuznetsova, Vasilyeva, 2024) by the region's geographical characteristics, harsh climate, and low population density.

According to our calculations, the relatively low value of the II TI variable (Table 2) for Pomorye is linked to the high proportion of local, inter-regional and inter-municipal roads which, between 2015 and 2019, were in a condition below the standards, with their quality being the worst in the NWFD. It is also linked to the fact that this northern region ranks last in terms of density of its public railway network. Furthermore, Pomorye ranks second to last regarding the share of roads with a hard surface, ahead of only the Vologda Region; in terms of density of these roads, Pomorye also lags behind many others, followed only by the Murmansk Oblast and the Komi Republic. Other problems of the Arkhangelsk Oblast in 2013–2019 include a rise in the unemployment rate since 2016 (according to rankings based on 85 regions across the country), as well as a slightly increased level of poverty (ranked 24th in 2019, despite a noticeable decline since 2015). Many of the region's challenges stem from issues with transport infrastructure and territorial accessibility. The region has a high proportion of housing stock classified as unsafe (condemned), and in 2018, the share of dilapidated housing was also elevated. When comparing housing amenity indicators across all regions for 2018, Pomorye ranked 72nd in terms of household access to running water and 74th — to centralized heating. It also ranked a low 75th regarding household access to centralized gas supplies and/or electric stoves. Furthermore, the region ranks low on three other indicators — access to sewerage, a bath or shower, and hot water supply — with scores ranging between 61 and 69. Finally, the proportion of the population with a good education was relatively low. This probably explains why internet access in urban areas declined over time, and the proportion of broadband internet access in rural settlements remained low. It is worth noting that a study (Zemtsov, Demidova, Kichaev, 2022) used econometric methods to reveal that web access depends on household income and the population's average age and education level, while the use of ICT depends on factors such as access to the global internet and the business climate. Furthermore, the Pomorye region lags behind in terms of innovation.

The article (Blinova, Bylina, 2019), which analyzed correlations among variables across a sample of 78 Russian regions in 2015, revealed a significant finding regarding the rural population: indicators of housing amenities showed a strong correlation with life expectancy. Moreover, these correlations were even stronger with the factor "density of paved public roads".

The research (Bogdanova, Saburov, Minchuk et al., 2024) analyzed key areas of digitalization in regional development that foster innovation in the rural territories of the western

part of the AZRF (using the Arkhangelsk Oblast and its autonomous district as a case study). In particular, the study considers the development of information and communications infrastructure, the introduction of digital services, and the development of digital skills among residents. It is emphasized that digital transformation is likely to have a positive impact on a number of areas of the region's life: the economy, the environment, the social sphere, as well as its governing bodies. Particular emphasis is placed on improving the population's quality of life in relation to the level of regional digitalization. The review of foreign studies presented here also notes the potential negative impact on quality of life (Bogdanova, Saburov, Minchuk et al., 2024). The "Strategy for the Socio-Economic Development of the Arkhangelsk Oblast until 2035" is also mentioned, which addresses a number of aspects relating to the digitization of society.

An analysis of the 42 regions that ranked above Pomorye in the "Digital Russia" index at the end of 2018[40] reveals that after excluding the two capital cities (Moscow and St. Petersburg), which significantly outperformed the other regions, the following scatter plot can be obtained for the remaining territories, including Pomorye (Fig. 5).

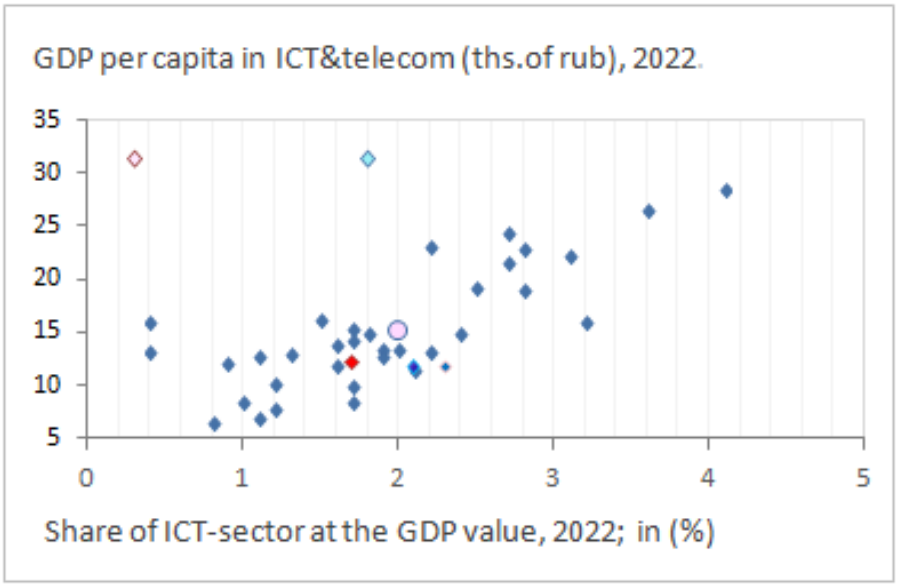


Fig. 5. Contribution of the ICT sector to the economy: Arkhangelsk Oblast and 40 other regions; thousand rubles[41].

The y-axis shows the contribution of the "ICT and Communications" sector to the per capita GRP in 2022 (in thousand rubles). The x-axis indicates the share of this economic sector in GRP for that year. Four regions stand out significantly from the main cluster, forming an "ellipsoid-shaped cloud of points": two points at the top (the Yamalo-Nenets Autonomous Okrug and the Murmansk Oblast), and two on the left and below (the Khanty-Mansi Autonomous Okrug and the Sakhalin Oblast). The Pomorye region is marked in bright red, while the Samara Oblast is marked with a pink circle. It is evident that the entire ellipsoidal cluster can be divided into two subgroups:

[40] "Digital Russia" Index: Appendix 1. Moscow: SKOLKOVO School of Management. URL: https://www.skolkovo.ru/researches/indeks-cifrovaya-rossiya/ (accessed 31 July 2025).
[41] Created by the author based on the statistical compilation "Regions of Russia: Socio-Economic Indicators" and materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

12 points situated to the right and above that small circle, and all the remaining points are located to the left and/or below. The points for the following regions lie between and near the points of these two areas: several areas within the CFD, the Moscow, Tyumen, and Chelyabinsk Oblasts, the Republic of Udmurtia, and Primorskiy Krai. Pomorye's position according to these two measures of development in "ICT and communications" was fairly good compared with a large number of Russian regions in 2022.

Nevertheless, it is worth noting that among the 12 regions in the ICT-leading subgroup, there are many that fall into Group 1, the strongest in terms of innovation potential (Nureev, Simakovskiy, 2017). Moreover, according to another innovation ranking for 2018–2019, the majority of these regions were included in the list of the country's 14 leaders (Abashkin, Abdrakhmanova, Bredikhin et al., 2021). The locations of some of these innovative regions are situated close to the pink circle in Fig. 5. Based on this observation, if we take 11 regions from this subgroup (excluding the Kaliningrad Oblast), calculate the average level of innovation activity for 2006–2023[42], and finally take the average values for each of the three years, we obtain the graph shown in Fig. 6).

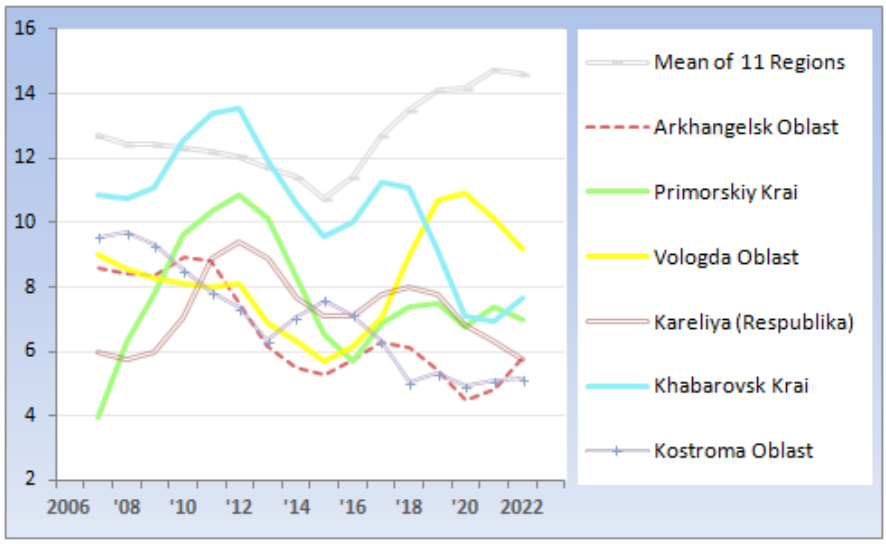


Fig. 6. Level of innovation activity of organizations: dynamics in a number of regions, %[43].

It should be noted that this indicator was informative and had previously been included in the list of model factors from the study (Stepanov, Bobkov, Shamaeva et al., 2022). Here, for comparison, the average values—calculated using a 3-year moving window—are shown for several additional regions: Pomorye, Primorye; the Vologda and Kostroma Oblasts; the Republic of Karelia and the Khabarovsk Krai. In terms of a number of its characteristics, Pomorye is similar to these Russian territories. These graphs show that, since 2012, organizations in Pomorye have begun to lag behind those in other regions shown in Fig. 6 in terms of their level of innovation

[42] Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).
[43] Created by the author based on the statistical compilation "Regions of Russia: Socio-Economic Indicators" and materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

activity. It can also be observed that the sharp decline in the level of innovation in the Khabarovsk Krai after 2015 had a negative impact on the dynamics of the Krai's $Y^{(t)}$ estimate in Fig. 1. Thus, between 2015 and 2018, the curve for $Y^{(t)}$ in this region ran close to that of Pomorye; however, between 2020 and 2023, the Khabarovsk curve for $Y^{(t)}$ shifted significantly lower, closer to the curve for Tomsk.

When approaching the red point representing Pomorye in Fig. 5 and moving downwards along the major axis of the ellipse, points representing regions from Group 2, which lags slightly behind Group 1 in terms of innovation, appear more frequently. These included four regions from the CFD, five regions from the VFD, the Tyumen and Omsk Oblasts, the Khabarovsk Krai, and others. Regions such as Pomorye, the Krasnoyarsk and Primorskiy Krais, the Republic of Bashkortostan, and the Leningrad, Magadan, Murmansk and Tver Oblasts belonged to the weaker Group 3. They required relatively high financial investment and the development of specific government support measures to foster innovation (for the period 2011–2016). Furthermore, the Tomsk and Vologda Oblasts were included in the leading ICT sub-group comprising 12 regions; both of them outperformed Pomorye in terms of the ICT index in 2017 and 2018. The Tomsk Oblast belongs to Group 1 (Nureyev, Simakovskiy, 2017), whereas the Vologda Oblast — to Group 2. When interpreting the data presented above for the Tomsk Oblast (as well as the data in Figures 1–6), it is worth mentioning that this region was a consistent leader in the HSE ranking from 2015 to 2018, according to their report (Abashkin, Abdrakhmanova, Bredikhin et al., 2021). It also holds 4th place in the SMART ranking, while Pomorye is in Group D, ranking only 70th[44].

To raise the level of innovation in organizations in Pomorye, the findings from the article (Toomsalu, Tolmacheva, Vlasov et al., 2019) could be useful; that study analyzes the determinants of innovation in small and medium-sized enterprises, drawing on data from 776 observations, including from EU countries. It is found out that stronger competition, investment in technology, and optimization of business processes at enterprises foster innovation. Conversely, outdated or obsolete equipment, a passive workforce that makes little effort to improve skills and overall level of knowledge, and financial and administrative barriers hinder innovation to varying degrees.

Let us now discuss the similarities in the dynamics of the $Y^{(t)}$ variable (i.e., the estimated value of the II WBP index) shown in Fig. 1. In the case of the Pomorye–Primorye pair, this can be explained by the fact that their GRP structures are similar (Table 4); the values for a number of indicators—GRP, ICT and the digitisation of the economy—were also close in these regions.

Table 4

Sectoral structure of GRP: contributions of 8 regions in 2019 (%)[45]

Region	Sequence number of the economic activity sector														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Density

[44] 2022 SMART Regions Rating. Association of Innovative Regions. URL: https://i-regions.org/ (accessed 15 August 2025).

[45] Based on Table 9.4 from the statistical compilation "Regions of Russia: Socio-Economic Indicators". Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

Leningrad Oblast (22)	4.4	0.6	28.9	6.7	9.1	9.7	13.6	0.7	9.2	2.5	5.9	2.1	3.6	3	22.4
Khabarovsk Krai (25)	5.8	6.0	9.4	2.7	5.6	15.0	15.0	2.4	8.7	1.7	12.2	4.2	5.2	2	1.7
Tomsk Oblast (30)	3.2	27.5	10.1	2.3	4.8	8.0	8.3	1.9	9.7	4.4	8.8	3.9	4.3	1	3.4
Primorskiy Krai (32)	7.3	1	9.2	2.2	4.4	15.9	18.3	2.0	11.3	2.5	14.2	3.2	4.7	3	11.5
Arkhangelsk Oblast (33)	5.5	4.4	24.5	2.6	4.4	9.2	11.4	1.4	10.5	1.2	10.7	3.9	6.6	3	2.7
Vologda Oblast (34)	3.9	0.0	38.4	2.3	6.3	11.2	10.8	1.7	7.5	2	6.6	2.3	4.0	4	8.0
Republic of Karelia (31)	5.4	18.8	18.4	2.6	3.4	6.0	9.4	1.6	8.2	2	11.2	3.9	6.2	4	3.4
Kostroma Oblast (69)	6.7	0.1	22.9	8.2	4.4	12.5	6.4	2.4	10.1	1.6	10.6	4.7	5.4	4	10.5

Note: A) 1 — agriculture, forestry, and fisheries sector; 2 — extractive industry; 3 — manufacturing industry; 4 — energy sector; 5 — construction; 6 — trade sector; 7 — transport; 8 — ICT and communications sector; 9 — real estate and leasing; 10 — scientific and technical activities, etc.; 11 — services and security; 12 — education; 13 — healthcare and social services; B) column 14 — innovation potential group from (Toomsalu, Tolmacheva, Vlasov et al., 2019); 15 — population density (as of January 1, 2020); C) column 1 — the region's rank by per capita GRP in 2019 (in parentheses).

Although both regions were classified in the weaker Group 3 in terms of innovation potential (Nureev, Simakovskiy, 2017), Primorye has outperformed Pomorye in terms of innovation activity since 2010 (Fig. 6). Apparently, this is due to the fact that the structure of processing industries in Primorye is heavily dominated by the machinery sector 9 (Table 5), as well as sectors 6 and 8.

Table 5

Structure of "goods, works, and services shipped" in the PI sector (%), 2019[46]

Regions	1	2	3	4	5	6	7	8	9	10	11
Arkhangelsk Oblast	6.3	20	44.3		2.4		3.8		14.6		5.4
Vologda Oblast	7.7	5.4			19.4	2.0	58.4				
Leningrad Oblast	19.5	2.6	9.7	28.4	8.1	5.7	4.7	3.9	14.1	2.3	
Republic of Karelia	12.7	16.6	47.5		2.7	2.7	6.3		3.4		6.7
Kostroma Oblast	8.6	21.9		4.5	3.7	2.1	18.9		13.8	21	
Primorskiy Krai	20.2	4.2				5.5	2.8	1.8	46.4	3.6	10.8
Tomsk Oblast	18.5	8.7	2.6	19.3	15.1	3.0	6.5	18.3	2.5		4.4
Khabarovsk Krai	11.5	3.8		15.9		2.8	36.8		23.5		3.8

Note: A) 1 — food production; 2 — wood processing (PI); 3 — pulp and paper production; 4 — petroleum/coke/rubber/plastics production; 5 — medical/chemical production; 6 — non-metallic mineral manufacturing; 7 — metallurgy; 8 — electronics/electrical equipment manufacturing; 9 — machinery/equipment manufacturing; 10 — furniture and other product manufacturing; 11 — repair and installation of machinery/equipment. B) If the contribution was below 1.8%, it was not shown in the table (for simplicity).

The same can be said, more or less, when comparing data from the Kostroma Oblast with similar data from Karelia. It is also evident from the rows in Table 5 that the economic sector structures in Pomorye, the Kostroma Oblast, and the Republic of Karelia are similar. In these three regions, the share of Sector 4 (manufacture of petroleum products, coke, rubber and plastic products) is very small. Along with other factors, this likely contributes to the fact that the graphs of the variable $Y^{(t)}$ in Fig. 1 exhibit similar dynamics, differing only by a shift along the y-axis. However, due to better dynamics of the RFID (Fig. 3) and slightly better LE dynamics (Fig. 4),

[46] Based on Table 13.5 from the statistical compilation "Regions of Russia: Socio-Economic Indicators". Materials from the website of the Federal State Statistics Service of the Russian Federation (Rosstat). URL: https://rosstat.gov.ru/ (accessed 11 August 2025).

higher ranking in terms of the CDI in 2017–2018, and even stronger innovation potential (Table 4, column 14), the Pomorye region slightly increased its lead over the two aforementioned regions following the pandemic.

Furthermore, it is important to note that variable X_5, relating to subsidies, requires correct interpretation. A reduction in the budget transfer payments (BT) in the regional budget does not directly lead to an increase in the II WBP indicator. This means that if the socio-economic situation in a region improves, leading its authorities to borrow less from the federal treasury, the BT will decrease, while the aggregate II WBP indicator will subsequently tend to rise slightly.

As regards the appropriateness of using Model 1, which was constructed using panel data from the CFD, in relation to territories within or near the AZRF, this issue requires specific investigation. It would appear be more appropriate to select a set of AZRF regions and/or neighboring ones (both fully and partially included in AZRF), compile a panel dataset covering the periods 2015–2019 and 2022–2025, and then calculate the actual *Y* values based on the methodology described above and in existing publications (Stepanov, Bobkov, Shamaeva et al., 2022; Aivazian, 2012; Stepanov, 2022; Stepanov, 2019). Subsequently, a panel regression model could be constructed using the calculated *Y* values and data collected for potential explanatory variables. Examining international experience would also be highly beneficial in this regard.

Briefly addressing aspects related to LE, the following points can be noted. The life expectancy at birth indicator is frequently used in comparisons between countries (Shtun, 2021) or Russian regions (Stepanov, 2024; Rodionova, Kopnova, 2020; Blinova, Bylina, Rusanovskiy, 2020; Lopaeva, Lopaeva, 2022), as well as in statistical modeling. Furthermore, this indicator is a key component of the human capital development index, which is widely used to compare countries or Russian regions. In practice, LE is calculated using mortality tables based on data on the number and age of deceased individuals obtained from civil registry offices; it also serves as an indicator of the population's health status. LE also serves as one of the measures of the socio-economic living conditions of the population (Shtun, 2021). The following factors are frequently used in life expectancy models: the Gini index of social inequality; the proportion of residents with access to safe drinking water; alcohol consumption among adults (adjusted to 95°); other alcohol-related factors; cigarette smoking; CO_2 emissions; various indices of residents' educational attainment, and many others (Stepanov, 2024; Shtun, 2021; Amos, Smirnov, 2022; Vladimirskaya, Kolosnitsyna, 2023; Perova, Korchemny, 2021; Rodionova, Kopnova, 2020; Blinova, Bylina, Rusanovskiy, 2020).

The study (Lopaeva, Lopaeva, 2022) concludes that, across the world, "mortality depends primarily on on living conditions and circumstances that are mainly caused by … conflicts and a low level of social responsibility on the part of the state". It also presents the contributions of various factor groups to life expectancy, based on WHO estimates and the opinion of Prof. G.E. Ulumbekova.

Western researchers have demonstrated the positive impact of implementing a set of

measures aimed at increasing life expectancy in a given area (Nguyen, Li, Wang et al., 2023). These measures include complete smoking cessation, minimal and infrequent alcohol consumption, adequate physical activity, stress reduction, balanced diet, and others. Their implementation can significantly increase life expectancy regardless of citizens' gender, ethnicity, or various other factors. It is worth noting that the issue of reducing tobacco consumption is particularly relevant for the population of the AZRF regions listed in the table in (Kuratova, 2023). For instance, the prevalence of smoking among adult residents, with the exception of three high-income autonomous okrugs, was above the average level; another exception is Karelia, where this figure was equal to the Russian average for the first half of 2025[47].

A group of researchers, primarily from Harvard University, had previously conducted an in-depth study on the impact of five lifestyle factors on the risk of premature mortality and life expectancy, using the average US resident aged 50 or older as a model, and presented their findings in (Li, Pan, Wang et al., 2018). The study examined deaths from all causes as well as those resulting from major chronic non-communicable diseases. Based on data from over half a million people across 17 countries, it was determined that approximately 60% of premature deaths could be attributed to five unhealthy lifestyle indicators: cigarette smoking, excessive alcohol consumption, physical inactivity, unbalanced diet, and obesity. Statistics were also compiled over a 40-year period based on data from approximately 79,000 American nurses (at the turn of the 20th and 21st centuries), and, slightly later, for approximately 44,000 healthcare professionals of both sexes, similarly over a 30-year period. For each observation, five levels of variation for each factor were recorded; for example, regarding smoking: "never smoked", "used to smoke but has given up", "1–14 cigarettes per day", "15–24 cigarettes per day", and "25 or more cigarettes per day". Reference values representing the lowest mortality risk were then selected for these factors: "never smoked", "5–15 g of alcohol per day", "at least 3.5 hours of physical activity per week" at the required intensity, a body mass index of "23–25" (kg/m^2), and an "optimal" diet quality index. Additionally, a composite healthy lifestyle score, ranging from 0 to 5, was obtained for each subject from a US national database. The authors then analyzed approximately 42,000 deaths within this population over 34 years of observations from the official WONDER database and calculated life expectancy figures. Using the powerful SAS statistical software package and the Cox's proportional hazards model, they estimated hazard ratios and constructed 95% confidence intervals for the variables under consideration. They present several tables and graphs illustrating how various combinations of the five aforementioned factors influence the risk of premature mortality for the average US citizen aged 50 or older. This analysis was conducted for three scenarios: all-cause mortality, mortality from cancer, and mortality from cardiovascular disease. Thus, if the patient is a 50-year-old American woman and all these factors are at their reference values, she can, on average, gain 14 years of life due to this lifestyle, with a 95% confidence

[47] Interdepartmental Information and Statistical System (EMISS): Prevalence of tobacco smoking among the population aged 15 and older. URL: https://fedstat.ru/indicator/63004 (accessed 18 August 2025).

interval (11.8; 16.2), compared with another average US resident for whom each of the five factors was at its worst level. The study also provides very useful graphs for each gender, showing the average reduction in life expectancy (starting at age 50) associated with an unhealthy lifestyle (based on variables such as daily cigarette consumption, weekly alcohol intake, physical activity levels, etc.). It is clear that, with minor adjustments, these results would be useful in developing preventive measures in the regions of the AZRF and many other territories.

Conclusion

The Arkhangelsk Oblast, which is partially included in the AZRF, was selected as the object of the study.

The methodological basis of the study was the application of algorithms drawn from two branches of statistics: principal component analysis and correlation-regression analysis. These algorithms were applied to panel data compiled for regions in Central Russia and the Volga region. Additionally, the study employed the quality-of-life analysis methodology outlined in S.A. Aivazian's monograph (2012), in particular when constructing an aggregated variable serving as a measure of the population's well-being. Two regression models were applied to multi-year statistical data from Pomorye and several other regions, and the results obtained are clearly illustrated.

An attempt has been made to justify the selection of the regions used for benchmarking the indicators from Pomorye. An illustrative example is also presented, demonstrating measures that could improve the aggregated welfare indicator for 2020, as well as life expectancy of the population of Pomorye in 2019. The discussion includes a brief overview of works regarding the development of transport infrastructure and information technologies in several regions of the AZRF, as well as research on life expectancy and its modeling. Attention is also focused on innovative aspects of development and on the progress made by Western scientists towards increasing life expectancy.

For the first time, the specification of Model 1, which was applied to data from the Pomorye region, is presented, and the dynamics of its key factor variables are analyzed. These variables include an infrastructure metric, several indicators of organizational digitalization, a human capital indicator (specifically life expectancy), and others. Examining the dynamics of these factor and aggregate variables revealed a number of problem areas in Pomorye across several dimensions. Some of these issues are clearly illustrated in charts and graphs and compared with 7–8 regions that share similar characteristics with Pomorye. Another novel aspect is that a statistical relationship has been formally established between road and transport infrastructure variables, as well as indicators of the digitalization of organizations' activities and an aggregated variable for well-being. In addition, a new regression model for life expectancy was applied to the data described above for the first time. Both models made it possible to identify the factor variables with the strongest influence.

The data analysis methodology may also be of independent interest, as it can be applied to other regions within the AZRF and/or neighboring regions, as well as to other regions selected from various districts across the country. A number of parallels identified during the analysis of the socio-economic development of the regions may also be of interest. The findings of the study may be useful to the authorities responsible for managing the regional development of the AZRF territories and other regions of Russia when formulating measures to implement their strategic programs.

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Russian Arctic Tourism in the Era of Sanctions Pressure from the "Collective West": A New Window of Opportunity for the Murmansk Oblast. Part I

Diana S. Timoshenko [1]✉, Cand. Sci. (Econ.), Senior Researcher

[1] Institute of Europe, Russian Academy of Sciences, ul. Mokhovaya, 11-3, Moscow, Russia
[1] artemideus@gmail.com ✉, ORCID: https://orcid.org/0000-0002-2780-6464

Abstract. Western sanctions have affected the socio-economic development of Russia's regions and contributed to a systemic transformation of the domestic tourism market. The response to the new, tense reality of international relations and the economy has been a large-scale restructuring of domestic national projects, including in the tourism sector, which has impacted the Arctic regions. The aim of the study was to identify competitive advantages, determine the prospects and key challenges for the development of Arctic tourism in Russia against the backdrop of sanctions pressure from the "collective West", using the Murmansk Oblast (MO) as a case study. The article identifies the key problem of the MO's socio-economic development as population outflow. At the same time, it assesses the development of the MO as a destination that is favorable and promising for the advancement of domestic, inbound and international Arctic tourism. Based on an analysis of data from Rosstat and Murmanskstat, the dynamics of tourist arrivals in a number of countries within the Baltic-Scandinavian macro-region (BSM), Russia and the MO have been determined. Problems and prospects for the development of inbound tourism under the sanctions pressure are outlined. The application of systemic and comprehensive approaches, as well as abstract-logical and statistical research methods, has led to the conclusion: due to the annually increasing inflow of tourists and the region's strategic and socio-economic position, tourism should be regarded as an effective means of long-term, systematic, and cultural development for the Murmansk Oblast, supported by advanced technologies for the North and the protection of the Russian Federation's national interests and strategic priorities. A proposal has been put forward for the cautious stabilization of international relations with Western countries on a bilateral basis, within the framework of official Arctic and tourism organizations. In order to enhance the competitiveness of the tourist product of the Murmansk Oblast, increase the share of tourism in the region's GRP, and improve staffing levels in the tourism industry, it is recommended to create an international-level Arctic tourism research and educational campus on the basis of the Institute of Creative Industries and Entrepreneurship of Murmansk Arctic University (ICIE MAU) and to expand scientific cooperation with research institutes of the Russian Academy of Sciences and leading universities of Russia. The results of the study can be used in strategic planning of tourism in the Russian Arctic.

Keywords: *Arctic, AZRF, Finland, Norway, Sweden, Murmansk Oblast, Murmansk Arctic University, tourism, sanctions, tourism destinations*

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Introduction

Specifics of the development of Russia's tourism industry

The tourism industry exerts both direct and indirect influence on the social, economic, and political development of territories at the macro, meso, and micro levels. Tourism possesses a significant multiplier effect and influences culture, traditions, lifestyle and the nation's health. It determines the investment attractiveness of regions, transcends the administrative boundaries of the country's constituent entities, fosters inter-regional and international links, creates integrated destinations, and shapes the tourism identity of regions, as well as socio-cultural and socio-economic associations.

As in Soviet times, the Russian government attaches great importance to the tourism industry, the effective development of territories, including economically depressed and sparsely populated areas, and small towns, the creation and enhancement of existing tourism infrastructure, the improvement of local quality of life, the creation of jobs for tourism and hospitality sectors, and the expansion of health resort and sanatorium sectors to improve the nation's health. At the federal and regional levels, conditions are being created to foster the development of small and medium-sized enterprises in the tourism and hospitality sectors, driven by a favorable socio-economic climate and the growing investment appeal of the regions, including the Arctic.

Constant changes in the structural hierarchy of executive authorities responsible for tourism over the past two decades have hindered effective long- and medium-term planning at the national level; meanwhile, at the regional level, administration teams responsible for tourism were unable to ensure coordinated and consistent work on the implementation of federal target programs (FTPs) for regional development, particularly in the early 2010s. Many regions demonstrated the ineffectiveness of these FTPs. Tourism was funded on a residual basis, which had an extremely negative impact on the implementation of federal plans.

The Western sanctions of 2014 intensified the pressure in 2022 and introduced adjustments following the start of the special military operation, preventing most Russian citizens from travelling abroad; this, however, helped domestic tourism to recover following the COVID-19 pandemic and simultaneously contributed to the systemic transformation of Russia's domestic tourism market.

It is worth noting, that extractive, energy, and transport companies have made significant contributions to the sustainability of the Russian Arctic and the economic and tourism development of Arctic regions over the past 15 years. This policy was not dictated by sanctions pressure or any influence from Russia's adversaries, but was driven by the need for leadership in the relevant market segments at the international level, as well as by the domestic need to create necessary and comfortable working conditions for employees, alongside environmental safety and the socio-economic sustainability of the local population — principles that are reflected in the

mission statements of Russian industrial enterprises. For example, PJSC GMK Norilsk Nickel[1], JSC Zarubezhneft, PJSC T Plus, PJSC Novatek, PJSC Rosneft Oil Company, PJSC Gazprom and PJSC Gazprom Neft are included, according to the Polar Index ranking, in the "A" category of companies demonstrating an active policy in the field of sustainable development[2]. Other Russian enterprises, including Rosatom, Alrosa, Rosmorport, Sovcomflot, Sibur, and Yamal LNG, also contribute to environmental and biodiversity conservation, improvements in local quality of life, scientific cooperation, and the development of business and industrial tourism. They achieve this by modernizing production facilities, reducing emissions, implementing environmentally neutral production practices, promoting renewable energy generation, and improving working conditions for their employees. The sanctions imposed by the West and the European Union (EU) on Russian Arctic businesses have underscored the need for companies to base their strategic planning on sustainable development independent of foreign partners and on self-sufficiency; these sanctions have also pointed toward new avenues for international cooperation and prompted a re-evaluation of strategies for accessing sales markets.

A series of government decisions helped to restore domestic tourism figures to pre-pandemic levels relatively quickly (the tourism market had experienced a 40% decline) and to exceed them significantly. These measures provided businesses with tax incentives, offered investors and enthusiasts opportunities for investment and self-realization, and gave travelers access to genuine domestic tourism "with a human face" in the form of a progressive system of discounts and benefits (Timoshenko, 2022).

In 2024, V.V. Putin noted the dynamic development of tourist centers, including Karelia and the Russian North, and emphasized that the total number of annual domestic trips is set to increase to 140 million by 2030. Tourism's contribution to Russia's GDP is expected to double, reaching 5%[3]. At a meeting on the creation of federal year-round resorts held on March 28, 2024, the President noted that implementation of the updated "Tourism and Hospitality Industry" national project (hereinafter referred to as the National Project) should begin in early 2025. Furthermore, the development of tourism infrastructure across all national parks is to be

[1] This was initiated by Vladimir Igorevich Strzhalkovskiy (Candidate of Economic Sciences, 1st Class Active State Councillor of the Russian Federation) during his tenure as CEO and Chairman of the Management Board of Nornickel from 2008 to 2012. Prior to this, Vladimir Igorevich made a significant personal contribution to the development of tourism and regional economies in Russia while serving in the civil service from 1999 to 2008, holding the posts of Deputy Minister of the Russian Federation for Physical Culture, Sport and Tourism, Deputy Minister of Economic Development and Trade of the Russian Federation, and Head of the Federal Agency for Tourism. His extensive experience in the operational management of a large-scale tour operator, the organisation of world-class tourism exhibitions, and the drafting of legal acts and regulations that formed the basis of Russian tourism legislation, and the development of special economic zones have enabled him to focus on a fundamentally new approach to the management of northern enterprises and Arctic territories based on the principles of sustainability, including giving impetus to the development of related business and industrial tourism, as well as socially oriented labour migration, which underpin the operation of Arctic industry.

[2] Polar Index. Companies — 2025. URL: https://polarindex.ru/ratings/polar-index-companies/2025/ (accessed 17 July 2025).

[3] Address by the President of the Russian Federation of February 29, 2024. URL: http://www.kremlin.ru/acts/bank/50431/page/5 (accessed 12 November 2024).

completed by 2030 as part of the national project on the environment. The aim is to ensure the full and comprehensive development of tourism through the expansion of intra- and inter-regional transport links, including air transport, the modernization of the core road network and inland waterways, and the construction of new high-speed railways and motorways[4].

On November 18, 2024, the Ministry of Economic Development announced the completion of the updated National Project[5]. On November 25, 2024, a meeting of the Government Commission on the Development of Tourism in the Russian Federation was held, chaired by D.N. Chernyshenko. The key objectives of the updated National Project program include raising tourism's share of national GDP to 5% by 2030 (compared to 2.8% in 2023), increasing the number of tourist trips to 140 million, and tripling the export of tourism services relative to 2023 levels (when it stood at 3.6 billion USD). Over 200 billion rubles have been allocated for the implementation of the National Project's initiatives. In 2023, the number of trips within the Russian Federation reached 84 million (45 million in 2020). Approximately 92 million tourist trips were projected for 2024. An increase in investment in the tourism industry has been observed; in the first half of 2024, the sector attracted 377 billion rubles (60% more than in 2023). In December 2024, a competition for modular hotel projects — a critical initiative for the tourism sector — with 15 billion rubles allocated from the federal budget for the 2025–2027 period[6].

According to E.V. Onishchenko, V.N. Sharafutdinov, and A.B. Krylovskiy, "the technological foundation of the national system for managing tourism development in the regions should be based on addressing the challenges associated with creating a tourism technology ecosystem, the basis of which is the formation of a digital ecosystem for the tourism sector of the economy, with the aim of modelling the key production ratios of regional tourism products and, ultimately, the parameters of the national tourism product" (Onishchenko, Sharafutdinov, Krylovsky, 2023). It can be argued that one of the most important decisions for the micro- and meso-levels of the tourism economy was the exemption from VAT of hotel accommodation services until 2027, as well as the President's decision to extend the zero-rate VAT for hotels until 2030 and to exempt tour operators from VAT until 2027[7].

An important step towards strengthening the Arctic Zone of the Russian Federation (AZRFs), alleviating socio-economic tensions and improving the living environment was the approval in 2023 of the list of closed administrative-territorial formations (ZATO) and Arctic cities.

The European market is the most competitive of all macro-regions and has dominated in

[4] Meeting on the creation of federal year-round resorts. URL: http://www.kremlin.ru/events/president/news/73754 (accessed 12 November 2024).
[5] The Ministry of Economic Development has finalized the "Tourism and Hospitality" national project. URL: https://economy.gov.ru/material/news/minekonomrazvitiya_zavershilo_formirovanie_nacproekta_turizm_i_gostepriimstvo.html (accessed 18 November 2024).
[6] Dmitry Chernyshenko: There is positive momentum across all indicators of the "Tourism and Hospitality Industry" national project. URL: https://www.economy.gov.ru/material/news/dmitriy_chernyshenko_polozhitelnaya_dinamika_est_po_vsem_pokazatelyam_nacproekta_turizm_i_industriya_gostepriimstva.html (accessed 25 November 2024).
[7] Alexander Chernov. Russia has approved the charter for the new "Tourism and Hospitality" national project. URL: https://www.gazeta.ru/social/news/2024/11/25/24470791.shtml (accessed 25 November 2024).

terms of absolute figures for tourist arrivals and exports of tourism services for many years. Arctic tourism in Russia, when compared with the tourism offerings of destinations in the Scandinavian region, the Baltic States and other Western countries, is still in its formative stages.

It has been established that the development of tourism in the AZRF requires a comprehensive approach aligned with state strategy, involving government authorities, public and scientific organizations, and the business community. Tourism is viewed as a tool for mitigating conflict potential and as an element of civilizational development in the North (Timoshenko, 2021).

It is anticipated that, in conjunction with updated federal Arctic legislation and strong, comprehensive state support for the Arctic (in particular, the tourism industry), the AZRF has every chance of competing with the leaders in Arctic tourism within 5–10 years. Achieving a major breakthrough requires expanding the network of local professionals and enhancing the factors that determine the growth of the AZRF's investment appeal. It is essential to continue promoting the idea of travelling to and living in the North among the general public, while simultaneously fostering a culture of responsible tourism consumption. Efforts to attract foreign tourists and investors to the AZRF can leverage partnerships with countries that support Russia's approach to Arctic development and the goals of sustainable development.

Characteristics of tourist flows between Finland, Norway, Sweden, and Russia

According to estimates by a research team from Peter the Great St. Petersburg Polytechnic University, presented in a comparative analysis of tourism development in the Murmansk Oblast and Norway, the Russian central government does not support the local tourism sector as effectively as the governments of Fennoscandia (Kikkas, Sosnina, Rubtsova, 2021). The competitive weakness of tourism in the Russian Arctic is currently evident when compared with other parts of the Arctic.

In order to assess Russia's current competitiveness in Arctic tourism within domestic and international tourism markets, it is necessary to analyze the dynamics of tourist arrivals and tourist exchange between Arctic tourism destinations.

Finland and Norway are Russia's European Arctic neighbors and share a land border with it. Sweden, which officially joined NATO on March 7, 2024, had long attracted tourists from Russia with its northern regions, the Arctic territories of Västerbotten and Norrbotten, as well as the cities of Kiruna and Luleå. Sweden, Finland, and Norway offer well-developed, organized ethnographic tourism products, making extensive use of elements of the rich Scandinavian culture and mythology; these features stimulate interest and generate high tourist demand amongst Russians. Figures 1 and 2 illustrate the dynamics of tourist flows between Norway, Sweden, Finland, and Russia from 2016 to 2023, presenting data on total inbound and outbound travel. The use of a tornado chart for both graphs has made it possible to highlight annual tourist arrival figures for individual countries, as well as to provide a clear visual representation of the total

tourist flow for the period under review[8].

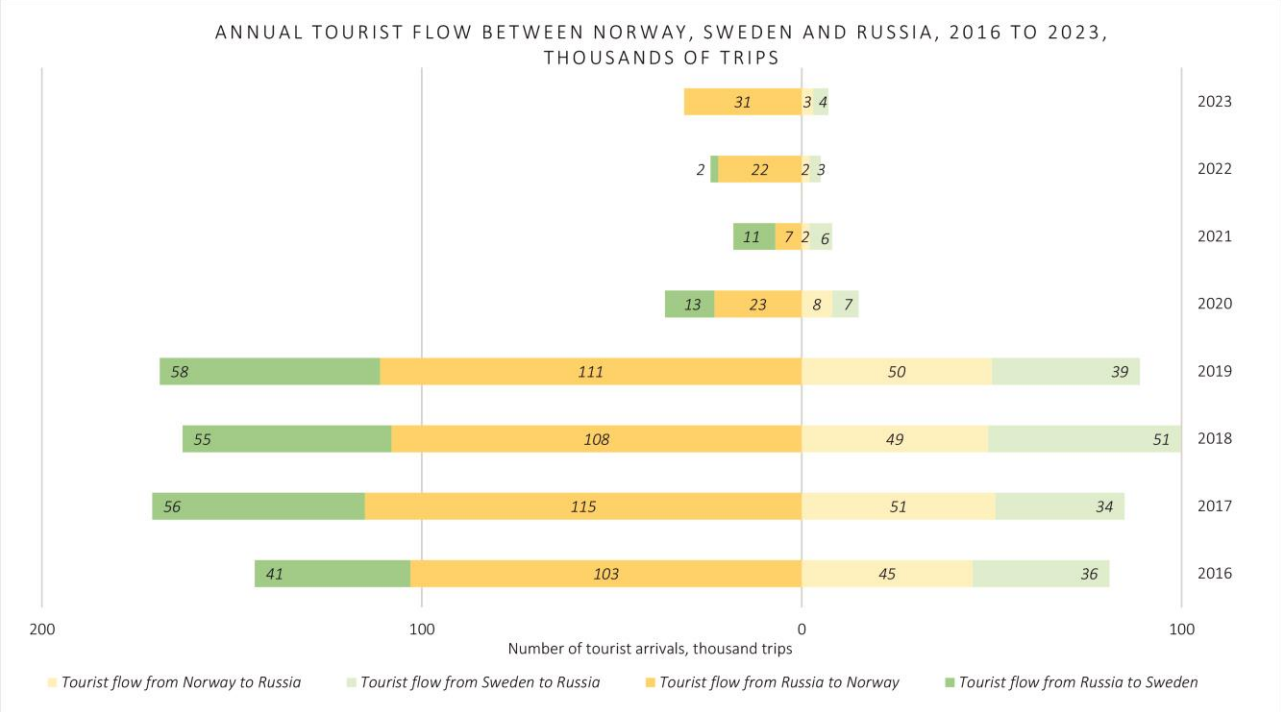


Fig. 1. Tourist flow between Norway, Sweden, and Russia, 2016–2023[9].

Both graphs clearly show that outbound tourism from Russia to Arctic countries, such as Norway, Sweden and Finland, exceeds the number of tourists arriving in Russia from these countries. An analysis of the data presented leads to the conclusion that tourism to foreign Arctic destinations is quite popular among Russians, with a preference for countries bordering Russia, specifically Finland and Norway. The decline in the trend shown in the chart also demonstrates a sharp downturn in the tourism market and demand during the COVID-19 pandemic (2020–2022) compared to the pre-pandemic period; this decline persisted at low levels into the period coinciding with the start of the special military operation (SMO) in Ukraine.

Significant differences in the three sets of indicators for Finland, Norway, and Sweden are rooted in the historical international, diplomatic, and trade relations between the USSR/Russia and Finland. Due to the high level of competition between Finland and the Murmansk Oblast, driven by similar tourism offerings and various historical factors, this section of the study examines the current state of Finnish tourism in greater detail to assess development prospects for the Murmansk Oblast.

[8] An analysis of reciprocal tourist flows between “Denmark and Russia” and “Iceland and Russia” is not carried out in this study due to low figures or their complete absence in the official Rosstat data for the selected period — author’s note.

[9] Compiled by the author based on Rosstat data. URL: https://rosstat.gov.ru/storage/mediabank/Poezdki_05-2025.xlsx (accessed 10 July 2025).

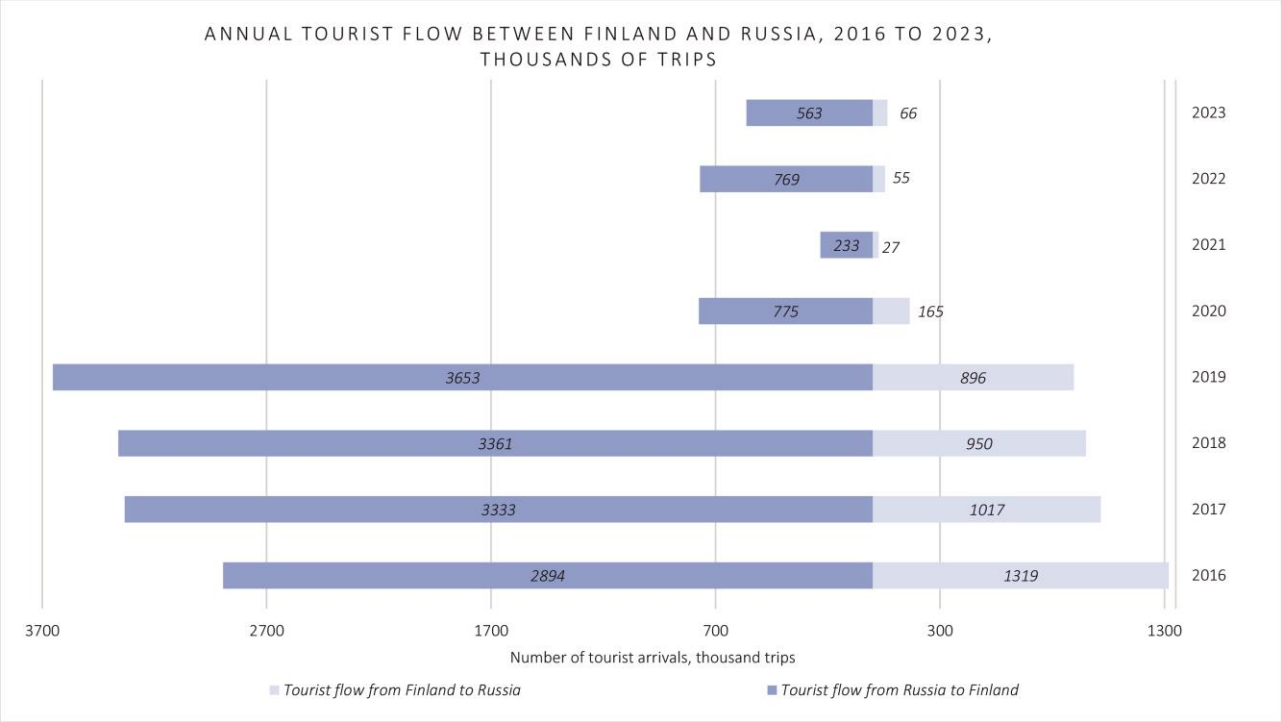


Fig. 2. Tourist flow between Finland and Russia, 2016–2023[10].

Bilateral tourism relations between Russia and Finland were strong and stable, largely due to their close proximity, shared history, economic ties, trade cooperation, and social factors. In 2009, Sari Lammensalo, Regional Director of the national tourism board Visit Finland in Russia, noted that Russia as a whole, and Moscow in particular, were Helsinki's primary tourism market and emphasized the need to maintain effective marketing efforts within the Russian Federation[11]. During the 2010s, Finland was a highly popular destination for Russians due to several factors: easy transport accessibility; frequent business trips by entrepreneurs and experts from both countries; attractive cost of organizing group and individual ski trips and eco-tours (combining forest recreation and fishing) compared to Russia's own Arctic regions; the established tradition of weekend rail trips from St. Petersburg; popularity of shopping tours to Finland and "gastronomic and alcohol-focused" tours by Finns to Russia; and the large number of cross-border family ties between Finnish and Russian citizens, which undoubtedly stimulated additional tourism driven by personal reasons.

A noticeable cooling of international and economic cooperation occurred in 2014 when Finland, as an EU member, joined the "collective West" in imposing economic and political sanctions on Russia in response to events in Crimea and the Donbas, to which Moscow responded similarly. However, the tourism sector remained virtually unaffected. Nevertheless, a further round of diplomatic and economic tension was linked to the start of the special military operation, when Helsinki suspended the issuance of tourist visas to Russians and restricted the entry of Russian tourists into the country from September 30, 2022, including via land borders. The

[10] Compiled by the author based on Rosstat data. URL: https://rosstat.gov.ru/storage/mediabank/Poezdki_05-2025.xlsx (accessed 10 July 2025).

[11] The Finnish tourism office is ceasing operations in Russia due to the crisis. URL: https://www.tourprom.ru/news/7658/ (accessed 25 December 2024).

national tourism board, Visit Finland, ceased its marketing activities in Russia. Finland, alongside other Baltic Sea countries, began supplying Ukraine with increasing amounts of arms and other military aid, simultaneously expanding its defense-industrial complex. The funding of the Finland-Russia Society was suspended in 2023. Russian residents in Finland have faced discrimination, including restrictions on access to tourist attractions during travel within the country[12]. However, Finland has begun to experience an acute shortage of Russian tourists. In total, the country lost approximately one million overnight stays by Russians, and the number of foreign tourist arrivals dropped by about one-fifth compared to 2019 levels. There was also a decline in visitors from Asian markets, most of whom used to fly to Helsinki via Russia. In the industry's heyday, flights from Tokyo crossed Russian airspace and took about nine hours. By 2023, the journey from Tokyo to Helsinki had extended to 14 hours, significantly reducing the likelihood of repeat visits. According to estimates by Statistics Finland, the shortage amounted to around 1 billion euros in 2023, caused by a decline in inbound tourism (16.3 billion euros in 2019 compared with 15.3 billion euros in 2023). Business activity in eastern and south-eastern Finland has begun to decline due to the absence of its target market — tourists from Russia. Finnish tourism companies are attempting to refocus on European and North American tourists. For example, Finnair, whose strategy was previously based on Asia, has invested in the United States[13].

On April 4, 2023, Finland officially joined NATO, thereby exacerbating geopolitical tensions in the Baltic Sea region. On May 1, 2023, the Russian Embassy in Helsinki noted that the foundation of what was once close and mutually beneficial bilateral cooperation between Russia and Finland had been almost completely destroyed[14].

Following a two-year absence of Russian tourists, in the autumn of 2024, Finnish authorities decided to allocate around 7 million euros to develop the tourism industry and boost the competitiveness of businesses in the country's eastern regions bordering Russia, with a view to restoring good-neighborly relations in the tourism sector[15]. Meanwhile, in October 2024, the Finnish authorities seized a stretch of beach owned by the Russian state and used as a holiday resort for diplomats (17.3 hectares of land and 3.5 hectares of marine waters). At least five other properties owned by Russians have been confiscated in Helsinki and the Åland Islands, including the Russian Centre for Science and Culture in Helsinki[16]. These actions tend to elicit surprise rather than a willingness to cooperate on matters of international diplomacy and the strengthening of good-neighborly ties. By comparison, on January 31, 2025, Finnish President Alexander Stubb

[12] Lukiolainen ei päässyt retkelle ydinvoimalaan — Olkiluoto pitää Suomen ja Venäjän kaksoiskansalaisuutta turvallisuusuhkana. URL: https://yle.fi/a/74-20135843 (accessed 31 January 2025).
[13] Suomen matkailu on jäänyt surkeaan jamaan — tulijoiden ja lähtijöiden välillä entistä isompi ero. URL: https://yle.fi/a/74-20085245 (accessed 05 December 2024).
[14] Trade turnover: what is happening with trade between Russia and Finland. URL: https://iz.ru/1505818/elnar-bainazarov/tovaropovorot-chto-proiskhodit-s-torgovlei-rossii-i-finliandii (accessed 15 May 2025).
[15] Eastern Finland has been allocated three million euros to support tourism. URL: https://yle.fi/a/74-20117387 (accessed 02 February 2025).
[16] Finland has seized a stretch of beach belonging to the Russian Federation. URL: https://www.interfax.ru/world/989117 (accessed 22 December 2024).

signed a decree granting Ukraine the 27th package of military aid worth 198 million euros; the total value of military equipment already supplied by Finland to Ukraine stood at 2.5 billion euros by the end of January 2025[17].

Currently, the sharpest decline in international tourism to Finland has been recorded in the South Karelia region. Whereas in 2019, the region recorded over 230,000 overnight stays by foreign tourists, including Russians, by 2024, this figure had fallen to just over 30,000. Local companies are losing revenue generated by foreign visitors. In South Karelia, domestic and inbound international tourism generated over 35.5 million euros for regional tourism companies during 2019, a record year for the sector. For Helsinki, the decline in international tourism means a reduction of 9 million euros in the region's tourism revenue. It is noted that domestic tourism is insufficient to sustain all tourism companies in Eastern Finland. According to Susanna Markkola, a project manager at the national tourism board Visit Finland, travel agencies in the Saimaa region are in a difficult position; many are experiencing challenges, and there have been cases of closures due to a lack of demand for their services[18].

Compared to Finland, Norway had a higher "average spend" per visitor; nevertheless, Russian enthusiasts of sports, skiing, eco-tourism, extreme sports, and fishing sought unique experiences in the land of Vikings and trolls. This was facilitated by the active marketing and promotional efforts of the Norwegian tourism office, Visit Norway, in Moscow and St. Petersburg, the presence of the Norwegian Consulate General in Murmansk, good transport accessibility, and support at both the interstate and international expert levels within the framework of the relevant working groups of the Russian-Norwegian Intergovernmental Commission and tour operators specializing in Scandinavian destinations. According to a survey of tourists conducted in Norway in 2014, over 80% of Russian citizens visited the country for the purpose of enjoying the countryside. The second most popular reason was visiting natural attractions, discovering local cuisine and exploring local history. More than a third of the tourists surveyed were repeat visitors. Approximately 40% of Russian tourists traveled independently, while around 30% used the services of travel agencies[19].

At the onset of the SMO and amidst intense sanctions pressure from Barents-Euro-Arctic region (BEAR) countries, the issue of blocking Russian activities in Svalbard became more acute; however, Russia's economic and scientific presence on the archipelago is currently expanding and intensifying. In May 2024, Norway ceased issuing visas to Russian tourists. It is worth noting that Sweden did not resort to such a measure.

In 2025, the Baltic states and the "collective West" as a whole continued discrimination against Russian tourists, violating the fundamental principles of the 1985 Tourism Bill of Rights and

[17] Finland will provide 198 million euros in military aid to Ukraine. URL: https://www.interfax.ru/world/1005700 (accessed 02 February 2025).
[18] Saksalainen matkanjärjestäjä perui kesän lennot Saimaalle — ulkomaalaiset turistit karttavat nyt Itä-Suomea. YLE. URL: https://yle.fi/a/74-20164150 (accessed 17 July 2025).
[19] The number of overnight stays by Russians in Norway decreased by 35%. URL: https://ratanews.ru/news/news_31082015_2.stm (accessed 01 December 2024).

Tourist Code, specifically Articles 1, 2, 3, 4, 5, and others[20]. Latvia's Minister of the Internal Affairs, Rihards Kozlovskis, called on European Union countries to follow Latvia's example and ban the issuance of Schengen tourist visas to Russian citizens, citing a threat to the EU's internal security. Speaking at a meeting of the Justice and Home Affairs Council of the European Union in Brussels, he stated that member states were "morally obliged to refuse such a service"[21].

Irreversible processes are underway regarding cooperation within the Barents Euro-Arctic Council (BEAC), the Arctic Council, and the EU's "Northern Dimension" initiative in the Barents-Euro-Arctic region. Since March 9, 2022, Nordic countries and the EU have suspended cooperation with Russia within the frameworks of the BEAC, the Arctic Council, and the EU's "Northern Dimension"[22]. Russia, as an Arctic power, and the Murmansk Oblast, as one of the key Arctic regions, played a significant role in the international activities of these organizations aimed at the sustainable development of the entire Arctic. On March 27, 2025, Helsinki announced that Finland had terminated the agreement between Finland, Norway, Russia and Sweden on the establishment of an international Barents Secretariat for cooperation in the Barents/Euro-Arctic region, with effect from January 1, 2025 (entering into force on January 1, 2026), which also undermines cooperation in the field of tourism[23].

In July 2025, NATO Secretary General Mark Rutte informed US President Donald Trump that several countries, including Denmark, Sweden, Finland, Canada, and Germany, were prepared to continue providing enhanced financial support to Kyiv. "Ukraine will be able to receive a truly huge amount of military equipment, both for air defense and missiles and ammunition," he said, noting that the transfer of equipment from Europe to Ukraine would be carried out rapidly[24].

In August, the Norwegian government issued a statement regarding the delivery of priority US military equipment to Ukraine via NATO; according to this plan, Sweden, Norway, and Denmark intend to jointly fund the latest "Prioritised Ukraine Requirement List" (PURL) initiative. The total value of the support package will amount to 500 million US dollars, with Oslo making a direct contribution of approximately 135 million US dollars (1.5 billion Norwegian kroner)[25]. On August 19, 2025, the foreign ministers of the Nordic countries and Canada issued a joint statement in

[20] Resolutions Adopted by the General Assembly at its Sixth Session — A/6/RES. URL: https://www.e-unwto.org/doi/abs/10.18111/unwtogad.1985.1.x5m4720x34646807 (accessed 01 July 2025).
[21] Kozlovskis aicina ES dalībvalstis pārtraukt izsniegt Šengenas tūristu vīzas Krievijas pilsoņiem. URL: https://www.iem.gov.lv/lv/jaunums/kozlovskis-aicina-es-dalibvalstis-partraukt-izsniegt-sengenas-turistu-vizas-krievijas-pilsoniem (accessed 10 March 2025).
[22] Joint Statement on Arctic Council Cooperation following Russia's Invasion of Ukraine. URL: https://um.fi/current-affairs/-/asset_publisher/gc654PySnjTX/content/joint-statement-on-arctic-council-cooperation-following-russia-s-invasion-of-ukraine (accessed 01 July 2025).
[23] Valtioneuvoston asetus UM/2025/30 Valtioneuvoston asetus Suomen, Norjan, Venäjän ja Ruotsin välillä kansainvälisen Barents-sihteeristön perustamisesta Barentsin euroarktisen alueen yhteistyötä varten tehdyn sopimuksen voimaansaattamisesta annetun tasavallan presidentin asetuksen kumoamisesta. URL: https://valtioneuvosto.fi/paatokset/paatos?decisionId=3460 (accessed 01 July 2025).
[24] Remarks by NATO Secretary General Mark Rutte with the President of the United States of America, Donald J. Trump at the White House. URL: https://www.nato.int/cps/fr/natohq/opinions_237051.htm (accessed 15 July 2025).
[25] Går sammen om støtte til Ukraina. Regjeringa.no. URL: https://www.regjeringen.no/no/aktuelt/gar-sammen-om-stotte-til-ukraina/id3115344/ (accessed 06 August 2025).

Nuuksio, Finland, regarding their support for Ukraine. The statement calls for the continuation and intensification of pressure on Russia's military economy, the maintenance of existing restrictive measures, and the imposition of additional sanctions. "Russia poses a long-term threat to European security," declared the foreign ministers of the Nordic Five (N5) — Finland, Sweden, Norway, Denmark, and Iceland — and Canada[26].

Since the start of the SMO, Sweden has allocated approximately 83 billion Swedish kronor (7.4 billion euros or 8.6 billion US dollars) in military support to Ukraine[27]. Norway has provided Kyiv with nearly 141.6 billion Norwegian kroner (11.9 billion euros or 13.8 billion US dollars); furthermore, the parties in the Storting agreed to increase support for Ukraine by 50 billion Norwegian kroner in 2025. Norway's total funding for Ukraine has thus been raised to 205 billion Norwegian kroner[28]. Finland's military aid to Kyiv has amounted to approximately 2.7 billion euros, with humanitarian aid totaling around 1 billion euros[29].

This large-scale funding and support for an adversary of Russia, compounded by sanctions pressure on Moscow, undermine the long-standing efforts of Russia and the countries of the Baltic-Scandinavian macro-region to establish good-neighborly relations and cooperation in the sphere of international political and economic interaction.

All the aforementioned factors underscore the undeniable urgency and critical importance of formulating new strategies and tactics for the domestic tourism sector at national and regional levels, and of developing effective practical measures and methodological solutions to replace tourist offerings from countries unfriendly to Russia with competitive domestic tourism products. The current economic and foreign policy situation suggests that, given appropriate standards of service, infrastructure, and pricing, as well as enhanced product quality, Russian Arctic destinations (among which the Murmansk Oblast is of great strategic and geopolitical importance) possess great potential to redirect the flow of Russians who previously travelled abroad for Arctic tourism towards Russian Fennoscandia, offering them a unique holiday experience and a rich array of competitive tourism products.

Legislative framework for tourism development in the Murmansk Oblast

The ambitious development goals for the AZRF are reflected in a series of government documents. The direction of socio-economic, tourism, and infrastructure development for the Murmansk Oblast, as an outpost of the AZRF and the Northern Sea Route (a vital transport artery), is evident in the implementation of the objectives set out in paragraph 20 of the Strategy for

[26] Joint Statement by the Foreign Ministers of the Nordic countries and Canada on their support to Ukraine. Regjeringa.no. URL: https://www.regjeringen.no/en/aktuelt/joint-statement-by-the-foreign-ministers-of-the-nordic-countries-and-canada-on-their-support-to-ukraine/id3116292/ (accessed 19 August 2025).
[27] Government Office of Sweden. Military support to Ukraine. URL: https://www.government.se/government-policy/swedens-support-to-ukraine/military-support-to-ukraine/ (accessed 06 August 2025).
[28] Norwegian support to Ukraine and neighbouring countries. URL: https://www.regjeringen.no/en/topics/foreign-affairs/humanitarian-efforts/neighbour_support/id2908141/ (accessed 30 April 2025).
[29] Ministry of Foreign Affairs of Finland. Finland supports Ukraine. URL: https://um.fi/finland-s-support-to-ukraine (accessed 05 June 2025).

Developing the Russian Arctic Zone and Ensuring National Security until 2035.

The Murmansk Oblast (hereinafter referred to as the MO) is located in the north-west of the European part of the Russian Federation and covers an area of 144,900 km². It spans approximately 550 km from west to east and 400 km from north to south. Almost the entire territory of the region lies north of the Arctic Circle and is situated on the Kola Peninsula. The region borders the Republic of Karelia to the south-west, and Norway and Finland to the west[30]. This location makes the region attractive for the development of tourism and active travel; at the same time, it necessitates strengthening its position by ensuring border security, maintaining constant vigilance against external pressures, and serving as an outpost of the Russian Federation.

In May 2020, the "Capital of the Arctic" Territory of Advanced Development (TAD "Capital of the Arctic") was established. Paragraph 20 of the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 is dedicated to the comprehensive infrastructure development of the Murmansk Oblast, with specific sub-paragraphs (a, g, h, and k) defining the tourism-oriented direction of the economy. In addition to federal legislation, a regional regulatory framework for the tourism and hospitality industry has been formed in the Murmansk Oblast, supported by strategically important regional government directives.

In 2021, the "Strategy for the Development of the Tourism and Recreation Cluster of the Murmansk Oblast for 2021–2025" (hereinafter referred to as the Strategy) was approved within the framework of the Murmansk Oblast's Socio-Economic Development Strategy until 2020 and the Period up to 2025[31]. The Strategy outlines the goals and objectives for developing the region's tourism and recreation cluster (hereinafter referred to as the TRC MO), identifies key tourism development hubs and local sub-clusters, and analyzes target markets. The strategic goal for the development of the TRC MO is to develop the tourism industry in the Murmansk Oblast by enhancing its competitiveness[32]. The Strategy identifies the following target types of tourism: active nature tourism, which involves the use of the region's natural resources; cultural and educational tourism; gastronomic tourism; health and wellness tourism; and industrial tourism.

Current state of the tourism market in the Murmansk Oblast

According to the development targets for the Murmansk Oblast's tourism and recreation cluster, the projected total tourist flow for 2023 was 35,423 people (comprising 4,535 foreign and

[30] Strategy for the Socio-Economic Development of the Murmansk Oblast until 2020 and for the Period up to 2025. Approved by Order of the Government of the Murmansk Oblast No. 72-RP of April 15, 2021. URL: https://murmancluster.ru/upload/photo/%D1%81%D1%82%D1%80%D0%B0%D1%82%D0%B5%D0%B3%D0%B8%D1%8F%20%D1%80%D0%B0%D0%B7%D0%B2%D0%B8%D1%82%D0%B8%D1%8F%20%D0%A2%D0%A0%D0%9A%202021-2025.pdf (accessed 25 November 2024).

[31] Strategy for the Socio-Economic Development of the MO until 2020 and for the Period up to 2025. URL: https://minec.gov-murman.ru/ppmo-ot-25.12.13-_-768_pp_20-_v-red.-ot-10.07.17_.pdf (accessed 01 December 2024).

[32] Order of the Government of the MO No. 72-RP of April 15, 2021, "On Approving the Development Strategy for the Tourism and Recreation Cluster of the MO for 2021–2025" URL: https://murmancluster.ru/upload/photo/%D1%81%D1%82%D1%80%D0%B0%D1%82%D0%B5%D0%B3%D0%B8%D1%8F%20%D1%80%D0%B0%D0%B7%D0%B2%D0%B8%D1%82%D0%B8%D1%8F%20%D0%A2%D0%A0%D0%9A%202021-2025.pdf (accessed 25 November 2024).

30,888 domestic tourists), with 144 collective accommodation facilities and a total volume of paid tourism and accommodation services amounting to 1,735.73 million rubles[33]. In fact, the value of paid services exceeded 5,996.00 million rubles as early as 2022. According to Rosstat data, the tourism volume in 2023 totaled 492,213 trips, comprising 469,275 trips by Russian citizens and 22,938 by foreign tourists. Following a sharp decline during the "COVID year" of 2020, the rate of domestic tourist arrivals in the Murmansk Oblast began to rise rapidly, whereas the rate of arrivals by foreign tourists in 2022 reached a 10-year minimum. The dynamics of inbound tourism to the Murmansk Oblast from 2012 to 2023 are illustrated in Fig. 3.

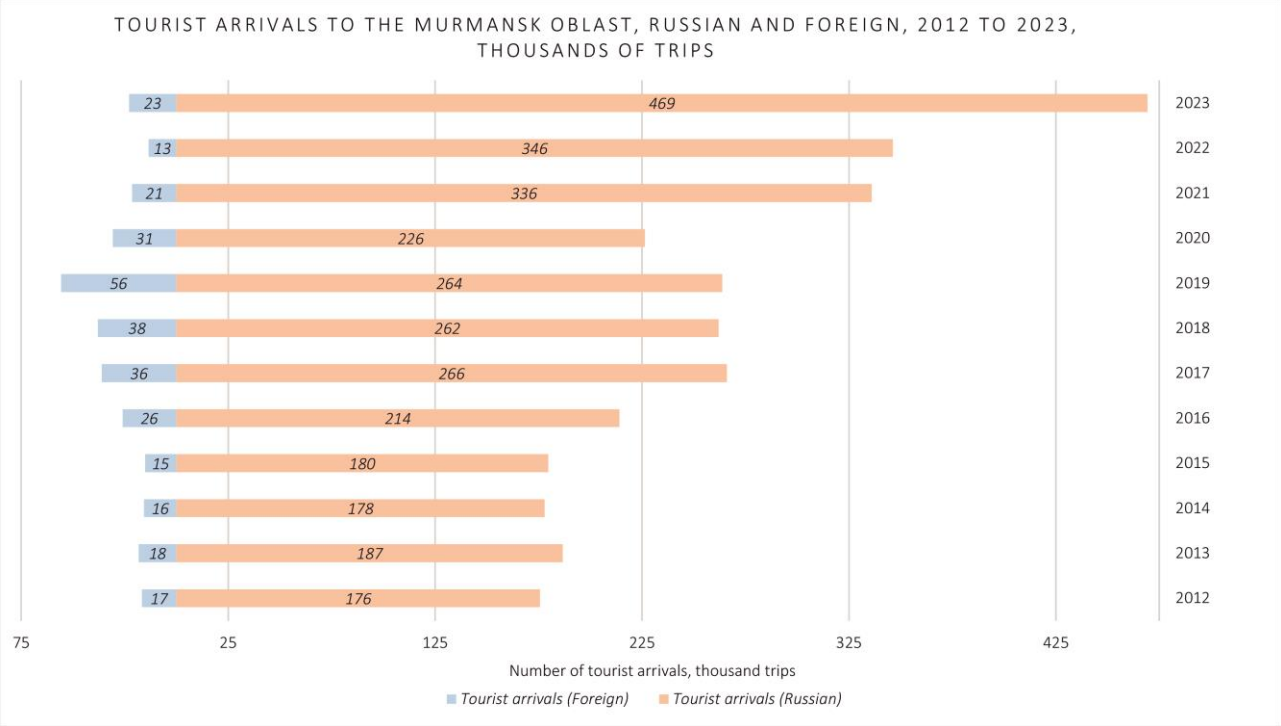


Fig. 3. Inbound tourism flows to the Murmansk Oblast, 2012–2023 (thousands of arrivals)[34].

It should be noted that the Strategy was adopted prior to the start of the SMO, at a time of intense competition from the Nordic countries and a large number of frequent and regular trips by Russians to visit relatives and friends residing in the countries of the Baltic-Nordic macro-region.

According to Rosstat data, in 2023, the value of paid tourism services in the MO amounted to approximately 6 billion rubles, which is 36.4% more than in 2022 (in 2020 — 1.9 billion rubles, in 2021 — 4.2 billion rubles, in 2022 — 4.4 billion rubles)[35].

As of 1 December 2024, there were 70 tour operators specializing in inbound and

[33] Ibid.

[34] Compiled by the author based on Rosstat data. Source: https://51.rosstat.gov.ru/. URL: https://51.rosstat.gov.ru/storage/mediabank/01001_2024.pdf#page=57; https://51.rosstat.gov.ru/storage/mediabank/04045+_2017_311180.xls; https://51.rosstat.gov.ru/storage/mediabank/06099_2013_311186.xls; https://51.rosstat.gov.ru/storage/mediabank/06099_2014_311184.xls; https://51.rosstat.gov.ru/storage/mediabank/%D0%9A%D0%A1%D0%A0.xls; https://51.rosstat.gov.ru/storage/mediabank/04045+_2016_311181.xls; https://51.rosstat.gov.ru/storage/mediabank/04045+_2017_311180.xls; https://51.rosstat.gov.ru/storage/mediabank/04045_2018_311179.xls; https://51.rosstat.gov.ru/storage/mediabank/04045_2019_311178.xls; https://51.rosstat.gov.ru/storage/mediabank/04114_2020(1)_311177.xls; https://51.rosstat.gov.ru/storage/mediabank/04114_2021.xls; https://51.rosstat.gov.ru/storage/mediabank/04114_2022.xls; https://51.rosstat.gov.ru/storage/mediabank/04114_2023.xls; https://51.rosstat.gov.ru/storage/mediabank/04114_2024.xls (accessed 01 June 2025).

[35] MO Tourism Committee. URL: https://tourism.gov-murman.ru/documents/statisticheskie-dannye/ (accessed 01 December 2024).

domestic tourism operating within the Murmansk Oblast.

According to expert studies, the primary visitors to the region are young people (aged 18–34) from Moscow and St. Petersburg with average or above-average incomes. The main reasons for visiting are nature and wildlife (35%), friends and relatives (28%), and sightseeing (26%). The average trip duration is 12 days, and the average cost is 69,369 rubles[36].

The cost of tours to the MO in 2025 for 5 days/4 nights with accommodation in a 3* hotel ranges from 70,000 to 220,000 rubles per person. Big data analysis revealed that 1.9 million search queries related to the "Northern Lights" category were made during the 2022–2023 season, rising to 2.4 million queries in 2023–2024. Thus, there has been a 25% increase in interest among Russians in viewing the aurora; tourists most frequently travel to the MO, the Arkhangelsk Oblast, the Komi Republic, Karelia, the Krasnoyarsk Krai, Yamal, and Yakutia for this purpose[37].

The trends in GRP and the volume of paid tourism and hospitality services in the Murmansk Oblast are shown in Fig. 4. There has been a positive trend in the increase in tourism's share of the region's GRP, as well as a strengthening of its socio-economic position and influence on the region's investment climate.

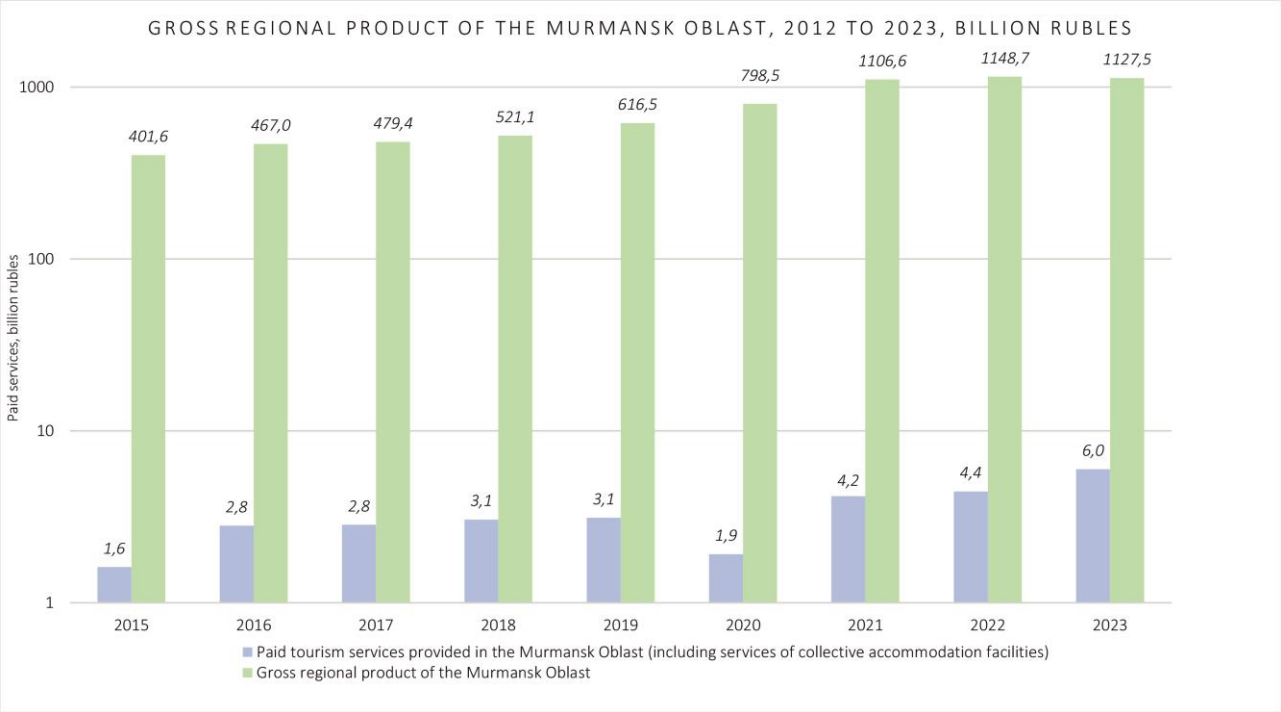


Fig. 4. GRP and the volume of paid tourism and hospitality services in the MO (at basic prices, billion rubles)[38].

The introduction of the national program for the development of tourism and the provision of state support in the form of subsidies, tax rates and other measures led to a positive trend in the growth of the number of collective accommodation facilities (CAFs) in the Murmansk Oblast.

[36] Study of the Tourism Appeal of the Murmansk Oblast. URL: https://www.tutu.ru/c/wp-content/uploads/2023/07/murmanskaja_oblast_issledovanie_turisticheskoj_privlekatelnosti.pdf (accessed 05 December 2024).

[37] Interest among Russians in the Northern Lights has grown by 25%. URL: https://www.trn-news.ru/news/207841 (accessed 30 November 2024).

[38] Compiled by the author. Source: URL: https://tourism.gov-murman.ru/documents/statisticheskie-dannye/ (accessed 14 March 2025).

In 2024, the total number of collective accommodation facilities in the MO, including general-purpose and specialized entities such as hotels, holiday centers, campsites, health resorts, tourist centers, etc. reached 262 units[39]. By comparison, the corresponding figure for all types of CAFs in 2012 was 122 units. Thus, over the past 12 years, the Murmansk Oblast has doubled the number of accommodation facilities in the tourism and hospitality sector (Fig. 5).

When examining issues of socio-economic development in the Murmansk Oblast, experts highlight the following negative factors: labor market issues; healthcare challenges, including a lack of high-quality, accessible medical services; low educational quality; high consumer costs; low safety levels; and an insufficient number of cultural, leisure, and sports facilities (Samarina, Skufina, Serova, 2024). Addressing these issues could significantly improve the population's quality of life and the quality of recreational services available to visitors to the Murmansk Oblast.

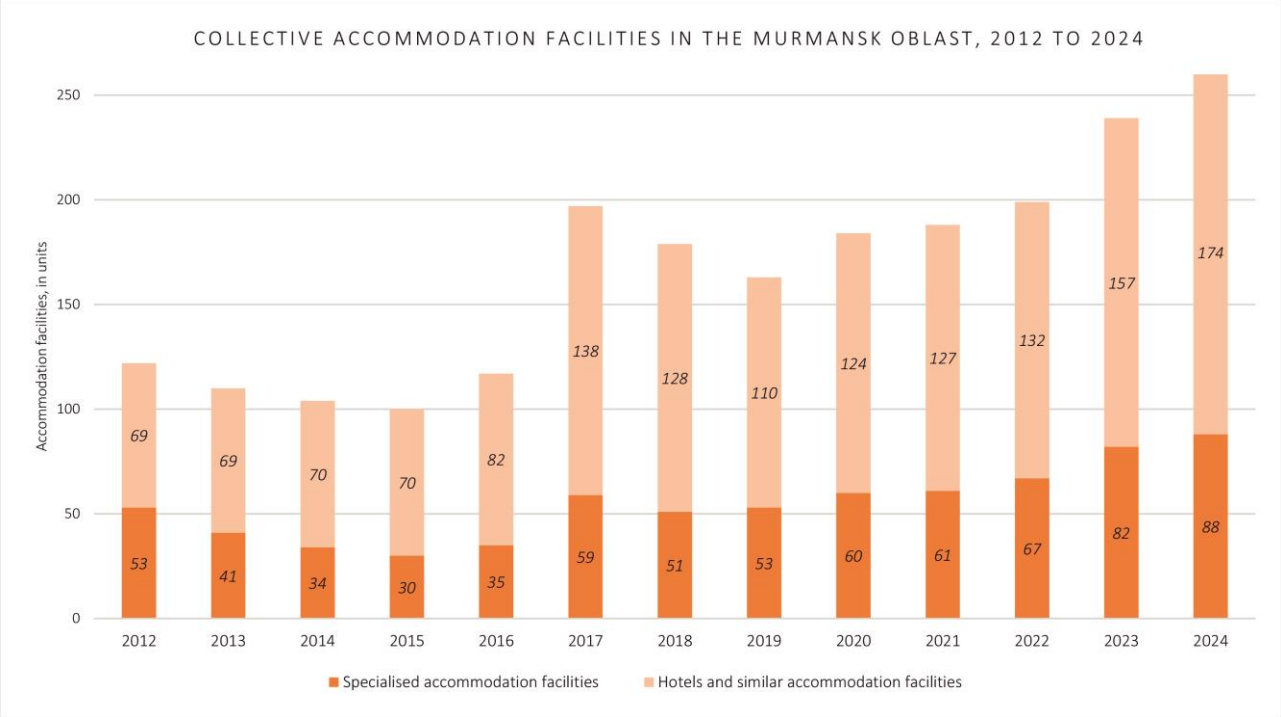


Fig. 5. Collective accommodation facilities in the Murmansk Oblast, 2012–2023 (units)[40].

Currently, there is a pressing need to develop a concept for the growth of Arctic creative industries within the AZRF (Krasilnikov, 2024); without these industries, progressive and sustainable tourism development, in both its current and future contexts, is impossible. The effective implementation of state programs[41] will make it possible to significantly improve the region's comprehensive tourism infrastructure and strengthen its image as a tourist destination.

[39] Rosstat. Operations of collective accommodation facilities in the Murmansk Oblast in 2024. URL: https://51.rosstat.gov.ru/storage/mediabank/04114_2025.xls (accessed 10 July 2025).
[40] Compiled by the author. Source: URL: https://51.rosstat.gov.ru/folder/72871 (accessed 14 March 2025).
[41] List of active state programs of the MO, approved by Order of the Government of the MO No. 30-RP dated February 1, 2013 (as amended by Order No. 53-RP dated March 1, 2024). URL: https://minec.gov-murman.ru/activities/devel_city/sub05/instruction/rasporyazhenie-v-redaktsii-ot-05.10.22-_-241_rp-_1_.pdf (accessed 01 December 2024).

Tourism transport system of the Murmansk Oblast

The availability of rail, road, and air links makes the Port of Murmansk the leading multimodal Arctic hub (Vasekha, Yarotskaya, Nikiforova et al., 2022). In 2023, passenger traffic at the Murmansk International Airport named after Nicholas II — one of the most important air transport hubs in the Russian North and the largest airport north of the Arctic Circle — totaled 1.4 million people[42]. During the first ten months of 2024, passenger traffic reached 1.2 million people (a 3.9% increase over the 2023 figure); 2,599.865 tons of cargo and mail were transported (cargo turnover increased by 42.1% compared to 2023). The most popular destinations include Moscow, St. Petersburg, Arkhangelsk, Kazan, Kaliningrad, Sochi, and Cherepovets[43]. Belavia and Smartavia provide direct connections to Minsk[44]. Regular passenger services are operated by Nordwind Airlines, Pegas Fly, S7 Airlines, Smartavia, Aeroflot, Jetika LLC, Pobeda, Rossiya, and Severstal. Nordwind Airlines is actively expanding its network of direct and connecting flights to Kazan, Ufa, and other cities[45]. In 2024, passenger traffic totaled 1.5 million people, and four new terminal complexes were put into operation. A new terminal is being designed at Murmansk Airport; its architecture will reflect the Russian North and promote the region's tourism image[46].

In 2024, the Murmansk railway station, which serves approximately 310,000 passengers annually, marked its 70th anniversary[47]. The railway network covers a wide range of destinations, including St. Petersburg, Moscow, Smolensk, Pskov, Saratov, Novorossiysk, Adler, Anapa, and Sevastopol (served by JSC "RZD/FPC" and JSC "GSE"(Tavria)).

Russian Railways (RZD) is actively promoting Arctic tourism. From January 31 to September 2, 2024, the "To the Arctic on Father Frost's Train" rail cruise operated. The Moscow — St. Petersburg — Petrozavodsk — Murmansk — Sortavala — Moscow route took 5 days and 6 nights[48]. In 2025, RZD was offering the 7-day "Russian North" rail cruise (launching on May 30, 2025). This round route from Moscow passes through Velikiy Ustyug, Arkhangelsk, Belomorsk, Murmansk (Teriberka), Petrozavodsk, Sortavala, and Vyborg, uniting key tourism gems of the Russian Arctic Zone[49]. A 5-day "To the Northern Lights" rail cruise through northern cities was scheduled to launch on October 31, 2025, linking Moscow, Petrozavodsk, Murmansk, Belomorsk,

[42] Connecting flights to the capital of the Republic of Bashkortostan will become available to passengers at Murmansk Airport. URL: https://airport-murmansk.ru/mediacenter/news/382936/ (accessed 05 December 2024).
[43] Since the beginning of the year, passenger traffic at Murmansk Airport has exceeded 1.2 million people. URL: https://airport-murmansk.ru/mediacenter/news/385215/ (accessed 05 December 2024).
[44] Belavia launches a direct flight to Murmansk. URL: https://belavia.by/novosti/4880746/ (accessed 30 November 2024).
[45] Nordwind launches direct flights between Murmansk and Kazan. URL: https://nordwindairlines.ru/ru/news/458 (accessed 05 December 2024).
[46] Governor Andrey Chibis inspected the progress of the new terminal complex construction at Murmansk Airport. URL: https://gov-murman.ru/info/news/538897/ (accessed 02 February 2025).
[47] Murmansk railway station marks its 70th anniversary. URL: https://murman.tv/news-n-21975--murmanskij-zheleznodorozhnyj-vokzal-otmechaet-70-letie (accessed 05 December 2024).
[48] "To the Arctic on Father Frost's Train". URL: https://www.rzd.ru/ru/10419/page/103290?id=20347 (accessed 05 December 2024).
[49] Travel with Russian Railways. "Russian North". URL: https://www.rzd.ru/ru/10428/page/103290?id=19504 (accessed 05 December 2024).

and Vologda via a sightseeing route[50]. Russian Railways (RZD) has also begun transporting passengers' vehicles on the weekly train No. 92/91 (Moscow – Murmansk), with a capacity of up to four cars or 14 motorcycles[51]; this expands opportunities for organizing car and motorcycle tourism in the Murmansk Oblast.

Serious obstacles to the interregional development of rail and air links in the Murmansk Oblast currently include enemy attacks and sabotage, the supply of long-range weapons by the enemy's supporters, as well as the resulting disruptions to the regular timetables of trains travelling to Murmansk, and the functioning of departure and arrival airports. Since 2022, this situation has particularly affected the entire western part of Russia, characterized by drone and UAV attacks on civilian targets, the destruction of critical infrastructure, various acts of sabotage in Russia's European regions, and terrorist acts perpetrated by Ukraine.

Transport services for residents and visitors of the Murmansk Region are provided by regular bus routes, suburban rail services, and the "Klavdiya Elanskaya" passenger ship[52].

In 2025, for the period of July 22–29, the cost of 8-day cruises on the "Lenin" ship departing from St. Petersburg started at 115,320 rubles per person; however, the itinerary's visit to Murmansk involved a train transfer from Svir[53].

At the same time, high-latitude tourism and Arctic cruises are extremely expensive. The cost of the 12-day cruise "On an Icebreaker to the Top of the World" on the nuclear-powered icebreaker "50 Let Pobedy" (departing from Murmansk on July 2–14 and July 13–25, 2025) ranged from 3.2 million to 5 million rubles[54]. In July 2024, a 12-day tour in a "luxury" cabin cost 6.96 million rubles.

Financial support for the development of tourism infrastructure in the Murmansk Oblast

Between 2022 and 2024, a number of measures were introduced to support the tourism industry. In 2022, the regional government provided subsidies to tourism industry operators, as well as additional funding for the development of roadside services and eco-tourism, and for supporting public initiatives aimed at creating modular, non-capital accommodation facilities.

In 2023, the regional government issued a call for proposals from legal entities and individual entrepreneurs to subsidize a portion of the costs associated with investment projects for creating modular, non-capital accommodation facilities. Financial support was provided in the form of regional budget subsidies to domestic and inbound tourism operators in the Murmansk Oblast; a federal subsidy was also allocated for the purchase and installation of modular, non-

[50] Travel Archive. "Lights of the North". URL: https://www.rzd.ru/ru/10418/page/103290?id=19609 (accessed 05 December 2024).
[51] One can travel from Moscow to Murmansk by train with one's own car. URL: https://www.trn-news.ru/digest/207203 (accessed 30 November 2024).
[52] Ministry of Transport and Road Facilities of the Murmansk Oblast. Public transport services. URL: https://mintrans.gov-murman.ru/activities/trans_service/ (accessed 05 December 2024).
[53] An Arctic Encounter: A Cruise Tour to Murmansk and Teriberka. URL: https://vodohod.com/cruises/2025/teplohod-lenin-22-jul-29-jul-2025-2/ (accessed 23 December 2024).
[54] Expedition Cruise: "On an Icebreaker to the Top of the World". URL: https://polartravelclub.ru/severnyj-poljus/na-ledokole-k-vershine-planety/297/ (accessed 23 December 2024).

capital accommodation units as part of investment projects.

In 2024, as part of the implementation of the national project, a subsidy from the regional budget (ranging from 3 to 7 million rubles) was allocated to organizations involved in domestic and inbound tourism in the Murmansk Oblast, subject to a co-financing requirement where the project owner contributes at least 50% of the requested amount from their own funds. These funds are designated for specific purposes: developing the “Zapolyarny Kaleidoscope” and “From the Barents to the White Sea” national tourist routes, establishing camping facilities, and purchasing tourism equipment.

Conclusion

In summary, it is worth noting that for many years, the Russian Arctic lacked competitiveness in organizing high-quality leisure experiences, lagging behind its neighbors and the countries of the Baltic-Scandinavian macro-region (such as Finland, Norway, and Sweden).

Tourist destinations in the Baltic-Scandinavian macro-region possess a rich history of development, underpinned by long-term targeted investment at the micro, meso and macro levels. They are characterized by a high level of local professional expertise, well-developed tourism and hospitality infrastructure, and extensive experience in providing tourism services and training highly qualified personnel.

Tourism has the potential to make a significant contribution to changing the image of the Murmansk Oblast, shifting it away from its perception as merely a peripheral region and a supplier of raw materials.

Despite the active promotion of the Murmansk Oblast as a tourist destination and increased interest from potential consumers of Arctic tourism services, the region’s tourism industry — like that of other northern regions — continues to face key challenges: a shortage of skilled personnel, inconsistent standards of tourism and hospitality services, underdeveloped tourism infrastructure, and a lack of experience in providing high-quality service to both domestic and international travelers.

An analysis of economic indicators demonstrates an expansion of the potential Arctic tourism segment and growing interest in it within the domestic market; however, it does not indicate a clear willingness among citizens to incur high travel expenses. The number of accommodation facilities and tour operators working in the fields of domestic and inbound international tourism is growing in the Murmansk Oblast. The number of tourist arrivals by Russians and foreign visitors to the Russian Arctic is also showing steady growth. The share of tourism and related services in the gross regional product is increasing. The transparency of the tourism economy in the Arctic regions is improving.

Due to the current foreign policy situation and the sanctions imposed by neighboring European countries, consideration is being given to a measured and cautious approach to establishing ties and stabilizing international relations with northern neighbors, both on a bilateral basis and through official Arctic and tourism organizations. It is essential to make the most

effective use of this opportune moment to develop domestic, inbound and international tourism in the Murmansk Oblast.

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Cultural Cooperation as a Tool for Shaping Regional Identity in the Barents Euro-Arctic Region Prior to the Transformation of Multilateral Cooperation in 2022

Ludmila A. Shaltaeva [1]✉, Research Assistant

[1] Institute of Economics, Karelian Research Centre of the Russian Academy of Sciences, pr. A. Nevskogo, 50, Petrozavodsk, Russia
[1] mila.shaltaeva@gmail.com ✉, ORCID: https://orcid.org/0009-0006-6121-3175

Abstract. This study examines the role of cultural cooperation in the development of identification mechanisms in the Barents Euro-Arctic Region (BEAR) prior to the transformation of multilateral interaction, associated with Russia's termination of its participation in 2022 and its withdrawal from the Barents Euro-Arctic Council in 2023. The Barents Region is considered a construct formed by political elites, the existence of which was sustained, amongst other things, by the implementation of identity policies through cultural interaction between participants in interregional cooperation. The study reveals how cultural interaction contributed to the formation of the Barents Region's identity. The article analyses a number of cultural projects through which identity politics were implemented in the BEAR. Using qualitative content analysis of cultural initiatives, the study identified the key symbolic narratives underpinning identity politics in the BEAR. These narratives include categories used to represent the Barents Region to both internal and external audiences. It is emphasized that the formation of regional identity in BEAR has been largely a by-product of broader multilateral cooperation, rather than a formally defined strategic objective of the cooperation partners. The findings are particularly relevant in the context of recent political changes. This study is of interest both for further academic research and for practical regional development planning.
Keywords: *Barents Euro-Arctic Region, BEAR, identity, cultural cooperation, content analysis, constructivism*

Introduction

The Barents Euro-Arctic Region (BEAR), established in 1993, encompassed the northern border regions of Finland, Norway, and Sweden, as well as the north-western regions of the Russian Federation, thereby uniting 14 administrative-territorial entities of these states. This space became a common platform for interaction between diverse peoples with distinct cultural codes, historical experiences, and value systems. In 1993, at the initiative of Norway, two key institutions were established to coordinate cooperation in the Barents Euro-Arctic Region: the Barents Euro-Arctic Council (BEAC), responsible for interstate cooperation, and the Barents Regional Council (BRC), coordinating interregional cooperation[1].

It should be noted that one of the key goals set out in the 1993 Kirkenes Declaration on Cooperation was to ensure greater stability and reduce tensions in the Barents Region, which was also emphasized in the activities of the BEAC (Heininen, 2024). At the same time, the concept of a

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[1] Barents Euro-Arctic Cooperation. Cooperation in the Barents Euro-Arctic Region. URL: https://barents-council.org/about-us/cooperation-in-the-barents-euro-arctic-region (accessed 17 July 2025).

Barents regional identity emerged in academic discourse (Honneland, 1998). Thus, in the Barents Cooperation Program for 2019–2023, the creation of a regional identity was noted as one of the goals of regional cooperation[2].

From the perspective of constructivist approach, social phenomena do not possess inherent objectivity, but are shaped and consolidated within collective perception and discourse, representing the result of social agreements and interpretations (Carlsneas, Risse, Simmons, 2002). Identity implies "a person's sense of belonging to a particular social group, which allows them to define their place in the socio-cultural space and the surrounding world" (Pavlova, 2011), and is a phenomenon that manifests itself at both the individual and collective levels, encompassing social entities such as nations and regions. It should be noted that a sense of regional belonging is one of the key resources ensuring the sustainability and development of a regional community, as it leads to the growth and strengthening of people's loyalty to that community (Hall, 1999).

Following the theory of Kaj Zimmerbauer, the BEAR is viewed as a project of regional and national elites ("a top-down construction"), which, in addition to ensuring security goals, was created to realize the economic interests and business initiatives of the cooperation participants (Zimmerbauer, 2013). Therefore, within the framework of the constructivist approach, cultural cooperation as a form of institutionalized cross-border interaction contributes to the construction of the region's image as a unified social and symbolic space. Cultural projects, art initiatives, and intercultural exchange help to create and promote the perception of BEAR as a cohesive regional community.

This perception is consistent with the concept of identity politics, which suggests the activity of political elites aimed at shaping a collective identity (Tsumarova, 2012). Identity politics is used as a means of forming specific groups and communities (Paasi, 2003). In this study, identity politics refers to the formation of discourse on the BEAR and the dissemination of a specific image of the region, carried out by actors directly involved in regional cooperation, particularly through cultural cooperation.

A case study by Anastasia Rogova presents an example of the successful formation of a common identity in the cross-border areas of the Barents Region. According to the author's conclusions, active cross-border interaction has contributed to a transformation in the way residents of Russia's border territories perceive Norway's border territories. For example, the city of Kirkenes is no longer perceived as a foreign space, acquiring the characteristics of a common socio-cultural environment (Rogova, 2009).

However, current research into Barents regional identity is consistent with the view expressed by G. Honneland: "The rhetoric of Barents identity is nothing but rhetoric; an argumentative instrument in the hands of authorities aimed at creating an 'imagined community' of East and

[2] The Barents Regional Council. The Barents Program 2019–2023. Kirkenes: The Barents Secretariat, 2018. URL: https://barents-council.org/files/Barents-Programme/Barents_program_2019-2023_adopted_24_May_2018.pdf (accessed 05 September 2024).

West in the area" (Honneland, 1998). Thus, it can be concluded that the Barents Euro-Arctic Region was initially a political and social construct, the sustainable existence of which depended to a large extent on recognition and support from the local population, making identity issues of significant importance to the region.

When examining the process of community formation, it is important to consider the "we – they" dichotomy. According to I. Neumann's approach, the formation of a collective identity is impossible without simultaneously identifying "the others" — a group opposed to one's own community (Neumann, 2004). Thomas H. Eriksen distinguishes two levels of group identity: "we as a subject" ("*we-hood*") and "we as an object" ("*us-hood*"), emphasizing that the first category reflects the community's internal sense of self, based on cohesion around common tasks, characteristics, and challenges, while the second category shapes the perception of the group by contrasting it with external actors (Eriksen, 1995). In order to reflect T. Eriksen's approach, the following formulations of key concepts are used in this study: "*we-hood*" — the representation of the "we-community" for an internal audience; "*us-hood*" — the representation of the "we-community" for an external audience.

Cultural practices are one of the most powerful ways of representing a community both for its members and for external actors, thereby contributing to the creation of a collective regional identity. History and culture offer "an appropriate relationship to experienced reality", which facilitates the formation of identity (Paasi, 2003). Cultural potential can also be used to "shape the region's image not only as a political entity, but also as a cultural and economic entity with a unique history and mission" (Syssner, 2009).

The main coordinating mechanism for cultural interaction within the Barents Euro-Arctic Region (BEAR) is the Joint Working Group on Culture (JWGC). Its activities are aimed at strengthening cultural identity, promoting intercultural dialogue, and expanding cultural ties between the states and regions that are part of the BEAR[3].

From 2003 to 2018, the JWGC developed and adopted four cultural cooperation programs in the BEAR. In 2019, the Strategy of Cultural Cooperation "Creative Barents" (2019–2023) was adopted, continuing the development of cultural interaction and complementing the region's overall development program in this area. The priority objectives of the cultural cooperation were to disseminate information about the region internationally, to strengthen mutual understanding and trust between the partners, to intensify interaction[4], and to shape the image of BEAR as a dis-

[3] Barents Euro-Arctic Cooperation. Culture. URL: https://barents-council.org/working-groups/culture (accessed 17 July 2025).

[4] New Wind in the Barents Region: The Second Programme of Cultural Cooperation 2008–2010. Barents Euro-Arctic Council, 2008. URL: https://barents-council.org/files/Working-Groups/New_Winds_in_the_Barents_Region_Second_Program_of_Cultural_Cooperation_2008-2010.pdf (accessed 17 July 2025).

tinctive and unique region of Northern Europe[5]. Thus, cultural practices can be viewed as a tool for representing the "we-community" to both internal and external audiences.

Case study review and research methodology

The research method of the study was qualitative content analysis of documents, which allows for the identification of not only explicit, but also implicit meanings embedded in texts (Mayring, 2000). This method is particularly effective when the primary focus is on the content and contextual significance of sources (Hsieh, Shannon, 2005). Content analysis involves the systematic coding of texts aimed at identifying key ideas, concepts and discourses relevant to the research objectives. In this case, a code is a word or short phrase that reflects important semantic content within the topic being studied (Saldaña, 2013).

In accordance with Saldaña's concept (Saldaña, 2013), the structure of the analysis is built up in stages. Subcategories, categories and conclusions are formed on the basis of the identified codes (see Fig. 1). Subcategories refer to a further classification of codes, enabling a more in-depth and comprehensive analysis of the source data (Saldaña, 2013).

The analysis of the texts involved a thorough examination of all the collected materials to obtain a holistic understanding of their content. Key ideas were extracted, and the initial codes were generated on this basis. It is assumed that these codes reflect the main ideas and "are often taken directly from the text, then become the initial coding scheme" (Hsieh, Shannon, 2005). As a result of applying the qualitative analysis method to the collected data, two main categories were identified: representation of "we-community" for external audiences and representation of "we-community" for internal audiences. Each of these was supplemented by subcategories that clarify the nature of identity narratives.

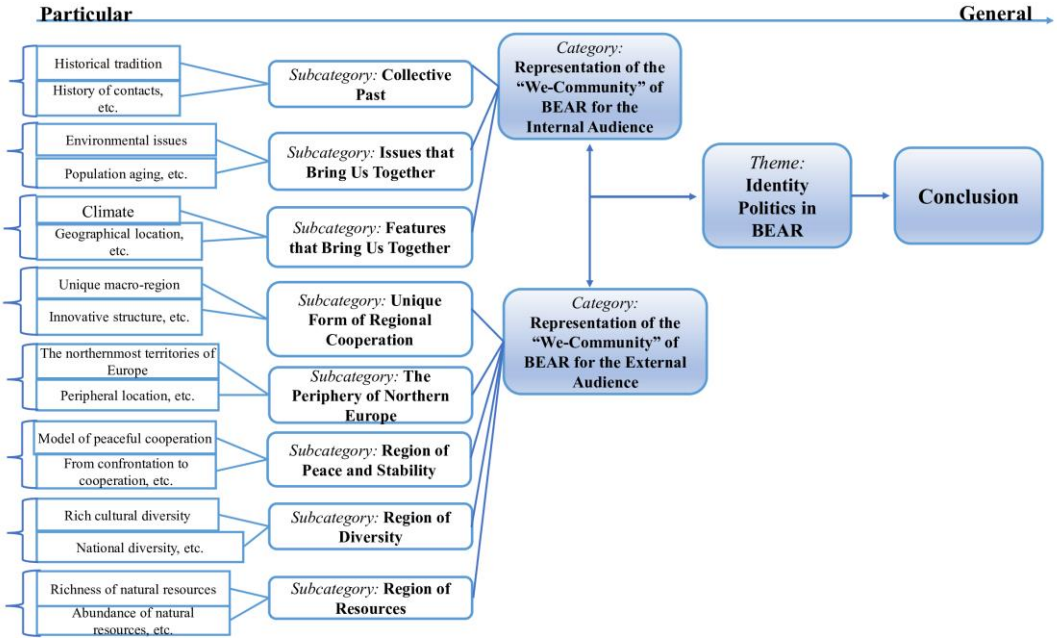


Fig. 1. Qualitative analysis of identity politics in the BEAR.

[5] Voices in the Barents Region: Cultural Cooperation Programme 2003–2006. Barents Euro-Arctic Council, 2003. URL: https://barents-council.org/document/Voices_in_the_Barents_Region_2003-2006.pdf (accessed 17 July 2025).

The choice of content analysis as a method was determined by the specific focus of the research. As the aim is to identify and interpret the meanings conveyed through texts, practices and cultural forms, content analysis enables the systematic identification of key semantic structures, repeated motifs and categories used to describe the community and the region. This makes it the most effective tool for examining representations related to identity and the symbolic inclusion of participants in a cross-border community.

The study analyzed three practical projects in the cultural sphere, including two academic projects: the publication of a book on the history of the BEAR, "The Barents Region: a Transnational History of Subarctic Northern Europe"; the publication of "Encyclopedia of the Barents Region"; and a cultural project unrelated to the academic sphere of cultural cooperation in the BEAR — the "Barents Spektakel" festival.

The selection of case studies for analysis is based on their significance in the context of the formation of a collective identity within the BEAR. The project "The Barents Region: a Transnational History of Subarctic Northern Europe" emphasizes the role of shared historical memory as a foundation for uniting cross-border communities. The aim of compiling and publishing the "Encyclopedia of the Barents Region" was to collect, systematize, and disseminate knowledge about life in northern transnational societies (Olsson, 2016).

The "Barents Spektakel" festival was aimed at developing cross-border ties between the region's inhabitants in the fields of culture, politics and business (Viken, 2016). The project's authors noted that "the idea behind its development was to build bridges across the borders of the Barents Region through culture and contemporary art..."[6]. Thus, the project can also be regarded as a relevant example in the context of analyzing cultural cooperation as a tool for constructing the identity of the BEAR community.

All three projects represent a collection of materials containing textual, visual, and symbolic forms of representation. Through detailed descriptions of their content, objectives and structure, they provide a comprehensive and multi-layered basis for analysis, allowing them to be regarded as significant examples of cultural interaction in the context of identity formation in the Barents Region.

The projects covered a wide range of topics related to the BEAR: from historical and political narratives to cultural practices and the expression of identity through symbolic forms, enabling a comprehensive examination of the processes of regional identity formation. Furthermore, the projects involved all key participants in cross-border cooperation. It is also significant that the projects were supported by the Barents Euro-Arctic Council (BEAC) structures, as well as national and regional authorities, making them representative examples of the implementation of identity politics. The initiators of the publication of the book "The Barents Region: a Transnational History of Subarctic Northern Europe" were the Olof Palme International Center and the Administrative

[6] Fedorenko M. Lyuba Kuzovnikova and "Girls on the Bridge". 2010. URL: http://citycelebrity.ru/citycelebrity/Post.aspx?PostId=3890 (accessed 14 July 2025).

Council of the Swedish County of Norrbotten (Elenius, 2015). Funding for the "Barents Spektakel" project continues to this day, provided in particular by institutional bodies such as the Norwegian Barents Secretariat*, the Norwegian Ministry of Culture, and regional authorities. Therefore, at the institutional level, we can observe interest in shaping certain identity narratives and disseminating them in the public sphere. It should be noted, however, that the authors and initiators of the projects did not declare the existence of a Barents identity at the time of their implementation (Elenius, 2015).

At the same time, observations of the "Barents Spektakel" festival since 2022 reveal changes in the rhetoric and thematic content of this cultural project, which may indicate a transformation in identity politics in the Barents Euro-Arctic Region. In particular, the 2024 festival, titled "Soft Shields", addressed issues relating to the military landscape and civil defense[7]. However, as this study focuses on analyzing the period prior to the transformation of multilateral cooperation, an in-depth examination of these changes is beyond the scope of this paper and represents a promising direction for future research.

Research results

Representation of the "we-community" of the BEAR for internal audiences

According to T. Eriksen, the formation of a "we-community" image for an internal audience is associated with the development of a sense of belonging and solidarity between group members. This cohesion is formed through joint participation in certain practices, including mutual concern and a focus on a common goal (Eriksen, 1995). As a result of the content analysis of the projects, it was revealed that the presentation of "we-community" for the internal audience is carried out through the promotion of such elements of regional discourse as: *"collective past", "problems that unite us" and "features that unite us".*

Collective past

The *existence of historical ties* in the region served as an important factor in justifying the official establishment of the BEAR in 1993. In particular, the *historical tradition of cross-border cooperation* is emphasized. It is argued that the creation of the BEAR was a logical and natural outcome of the existence of historical contacts within a common geographical space (Elenius, 2015). An analysis of cultural projects revealed that one of the key ideas underlying the concept of the Barents Region was to demonstrate the *historically established cross-border interactions* between people. These interactions were based on *horizontal links* at the local level and were mutually beneficial for all parties involved.

∗ The Norwegian non-governmental organization "Norwegian Barents Secretariat" (Barentssekretariatet IKS) was added to the list of "undesirable organizations" in Russia on February 25, 2026 (by decision of the Prosecutor General's Office of the Russian Federation; officially published/formalized via Ministry of Justice Order No. 293-r dated March 6, 2026). URL: https://gogov.ru/articles/unwanted-orgs; https://tass.ru/politika/26731765

[7] Barents Spektakel 2024. Pikene på Broen. URL: https://www.pikene.no/barents-spektakel-2024-2/ (accessed 22 July 2025).

Problems that unite us

Among the key challenges faced by the Barents Euro-Arctic Region are *environmental problems* such as pollution and global warming, as well as *climatic conditions*, including harsh and extreme weather. The demographic situation is also noted as a common regional issue, namely a steady decline in population and a higher proportion of older people compared to the southern and central territories of the BEAR countries (Gassen, Heleniak, 2016). The region's *peripheral location* is highlighted as a significant challenge, as it is often associated with limited opportunities for sustainable development. Overall, it can be concluded that the region's inhabitants face similar difficulties and are forced to solve similar problems.

Features that unite us

During the analysis of cultural initiatives, it was revealed that the unifying features of the Barents Region include its geographical location, climatic conditions, topographical characteristics, as well as rich natural resources (Lagutina, 2019). These features not only form the material basis of life in the region, but are also actively used in cultural narratives aimed at creating a sense of community and uniqueness of the territory. It is noted that even during the period of ideological confrontation, the countries of the BEAR region were influenced by similar processes, including rapid development and modernization (Elenius, 2015), as well as a high level of urbanization. In the context of the region's geographical identity, there are such characteristics as: *northern space, remoteness, Arctic zone, peripherality*. In addition, the BEAR is often positioned as a common living space for residents of the North (Elenius, 2015). This highlights the strong connection of the local population with the northern territorial identity. It is worth noting that the Barents Region is a unique part of Europe, inhabited by indigenous peoples (Sami, Vepsians, Nenets).

Representation of the "we-community" of the BEAR for external audiences

The creation of a regional image, based on the distinctive characteristics of the territory, relies on contrasting the regional community with external actors, creating a contrast between "insiders" and "outsiders", thereby strengthening a sense of belonging to a particular social group, which becomes a key factor in shaping the common identity of the region's population. The analysis identified the main strategies for representing the BEAR community to an external audience. These include the form of regional cooperation, the region's geographical location, and the positioning of the BEAR as a region of peace and stability, a space of cultural and social diversity, and a territory possessing significant natural resources.

Unique form of regional cooperation

Within the framework of the cultural initiatives examined, the Barents Euro-Arctic Region serves as an example of a new approach to interregional cooperation that challenges established models of national and regional system formation. One of the key distinguishing features of cooperation in the Barents Region was the interconnection between the *national, regional, and individ-*

ual levels. The BEAR became one of the first international institutions that provided representation to the region's indigenous peoples. The inclusion of non-state actors served as a unique example of cooperation in terms of political security. Particular emphasis is placed on the fact that the BEAR was established during a period of intense transformational processes associated with globalization, highlighting its uniqueness as a socio-political and economic entity. The BEAR was presented as a modern cross-border macro-region with a *new model of political organization*, a unique project *uniting peoples and territories* previously located on opposite sides of the "Iron Curtain" (Lagutina, 2019).

Periphery of northern Europe

Geographical characteristics played an important role in shaping the image of the Barents Region, including through cultural cooperation. Descriptions of the region emphasized such characteristics as *"northern territories", "the northernmost parts of four nation states", and "the northern dimension of Europe"*. The region's *peripheral location* was also a key distinguishing feature of the BEAR, highlighted in the context of cooperation and serving as an important asset for regional branding. Thus, the region was contrasted with territories in the central and southern parts of the participating countries, as well as, in a broader sense, with the territories of Europe located south of the BEAR's geographical boundaries.

Region of peace and stability

The Barents Region was also promoted as a model of peaceful coexistence and cross-border cooperation. The image of the Barents Region was based on the idea of overcoming historical conflicts, demonstrating that even deep-rooted differences can be transformed into a driving force for joint development. In the context of cultural initiatives, the region was described as an area that had successfully transformed itself from a zone of geopolitical tension into a zone of regional partnership. Being the first macro-region to overcome Cold War-era differences, it was seen as a precedent for regional cooperation between formerly hostile states. It is noted that the development of cooperation in the Barents Region at the interstate and interregional levels became a signal of the transition from "hard security" to alternative and more flexible approaches to ensuring security (Rafaelsen, 2013).

Region of cultural and social diversity

One of the key characteristics actively used in shaping the image of the Barents Euro-Arctic Region has been its social and cultural diversity. An analysis of cultural projects revealed that the following key characteristics of the region, related to the category of "regional diversity", are emphasized: *"open and dynamically developing cultural space", "distinctive socio-cultural environment"*, and *"active multicultural dialogue"*. The "Encyclopedia of the Barents Region" notes that "throughout history, the multinational society of the Barents Region has been one of its most characteristic features" (Niemi, 2016).

Resource-rich region

One of the most frequently mentioned characteristics of the Barents Region was its rich resource potential (Westin, Druzhinin, 2016). This richness of natural resources was repeatedly emphasized in cultural and political discourse, contributing to the BEAR's positioning as a resource-rich periphery of strategic importance, while reinforcing the unique image of the regional entity. Thus, it can be argued that the BEAR's resource potential served as the basis for distinguishing it from other European regions and for the formation of a Barents identity.

Conclusion

The results of the analysis suggest that the idea of forming a distinct Barents identity was reflected in the communication strategies and rhetoric accompanying regional cooperation within the BEAR. It has been found that cultural forms of cooperation played a key role in constructing and consolidating identity-forming practices in the region. The promotion of interregional cultural initiatives contributed to the strengthening of the collective "we" image, shaped both for internal consolidation and for the external symbolic representation of the region.

The representation of the BEAR "we-community" to an internal audience was built on key features of the region such as its collective past, similar problems faced by its residents, including environmental challenges, harsh climate, and demographic difficulties, as well as unique regional characteristics — climate, topography, and geography. In turn, the representation of the BEAR "we-community" to external audiences was based on promoting a discourse on the region's unique form of regional cooperation, its specific geographical location (on the periphery of Northern Europe), the effective maintenance of peaceful relations between the participants in the cooperation, and the region's cultural, social and resource diversity.

At the same time, it should be noted that the implementation of individual projects in the field of cultural cooperation could not have a significant impact on the creation of a regional community. The process of forming the BEAR regional identity was the result of a broader range of cooperation rather than a strategic objective of regional collaboration. This confirms the assumption that identity formation is typically a "by-product" of efforts aimed at promoting a region (Zimmerbauer, 2018). The formation of a sustainable BEAR regional identity required more systematic, long-term and comprehensive efforts. Taking into account the region's significant dependence on the international political context of relations between the participating countries, changes in the foreign policy course of BEAR member states have a direct impact not only on the overall dynamics of regional cooperation, but also on the process of forming a regional identity.

Since 2022, there have been significant changes in the BEAR, linked to Russia's cessation of participation in interregional initiatives and its withdrawal from the Barents Euro-Arctic Council in 2023. Furthermore, Finland also decided to withdraw from the Barents Euro-Arctic Council after 2025. These events were accompanied by a transformation in the public rhetoric of some cultural projects in the region, including, for example, the "Barents Spektakel" festival, discussed in this

study. However, an analysis of these changes is beyond the scope of this article and may form the subject of a separate study.

The results of this study provide an opportunity to analyze and interpret the evolving dynamics of identity politics and cooperation in the Barents Region. The approach used to understand the "we-community" can be applied in future research focusing on other cross-border regions experiencing political stress, as well as in re-evaluating cooperation in the context of new geopolitical realities.

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Transforming the Perception of the Russian Arctic among Chinese University Students: The Potential of Language Courses

Inga M. Zashikhina [1]✉, Cand. Sci. (Philos.), Associate Professor
Olga E. Griva [2], Cand. Sci. (Philol.), Associate Professor
Xu Le [3], Postgraduate Student

[1, 2, 3] Northern (Arctic) Federal University named after M.V. Lomonosov, Naberezhnaya Severnoy Dviny, 17, Arkhangelsk, Russia
[1] zashikhinaim@mail.ru ✉, ORCID: https://orcid.org/0000-0002-8217-2302
[2] o.griva@narfu.ru, ORCID: https://orcid.org/0000-0002-4423-7945
[3] 178090128@qq.com, ORCID: https://orcid.org/0009-0007-8092-2222

Abstract. In the context of aligning development strategies for the Northern Sea Route and China's "Polar Silk Road" initiative, the humanitarian dimension of the bilateral partnership has become an imperative. The article explores the potential of short-term intensive educational programs as a "soft power" tool aimed at bridging the cognitive gap in the perception of the Russian Arctic among Chinese students. The study aims to assess the effectiveness of these formats in transforming the regional image and establishing a system of verified knowledge about the Arctic among PRC citizens. The study was conducted within the framework of a qualitative case study methodology. The materials were collected during a summer school of the Russian language and culture held at the Northern (Arctic) Federal University. Data collection was carried out in two stages across three thematic blocks: physical-geographical, historical-cultural, and geopolitical. Additionally, a psycholinguistic association experiment was used to identify latent shifts in perception. The university's educational environment was regarded as a controlled experimental base for evaluating the effectiveness of educational diplomacy tools; the study was conducted in accordance with ethical standards of voluntary participation and data depersonalization. The results indicate an increase in respondent awareness from 32% to 79% and a qualitative shift in the associative field: moving from environmental stereotypes to an understanding of the region's geo-economic and technological uniqueness. The practical significance of the work lies in the verification of educational diplomacy as an effective mechanism for developing a pool of loyal international experts.
Keywords: *Arctic, Russian-Chinese cooperation, soft power, educational diplomacy, cognitive transformation, case study, Northern (Arctic) Federal University, Northern Sea Route*

Introduction

In the current decade, cooperation between the Russian Federation and the People's Republic of China in the Arctic has acquired the characteristics of a sustainable, practical partnership, going beyond declarative statements. This dynamic is driven by a convergence of long-term national interests, as confirmed by the work of both Russian and international researchers (Rekets, 2024; Pogodin, Lun, 2024). The process of aligning the development strategies for the Northern

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Sea Route and the "Polar Silk Road" initiative is shaping the configuration of the Eurasian economy, within which Arctic transport corridors are beginning to act as a competitive alternative to traditional southern routes (Zuenko, 2023). Modern political analysis rightly notes that Beijing's interest in high-latitude territories is not situational, but doctrinally grounded, and is supported by active intellectual work of the elites to justify the PRC's special status in the region (Li Bo, 2024; Yunyushkina, 2025). Consequently, resources are becoming a security factor, and the country is aiming to participate in the global Arctic governance (Rekets, 2024).

Amid the unprecedented transformation of the world order that began in 2022 and the partial suspension of the Arctic Council's activities by Western states, Russian-Chinese cooperation has become a stabilizing factor in the region (Kharichkin, Shamarov, 2024). However, the successful implementation of macro-economic projects is impossible without the formation of an appropriate social foundation and comprehensive humanitarian support. The "soft power" toolkit in Russian-Chinese dialogue today is increasingly based on a synthesis of rational pragmatism and cultural empathy, which appears to be critically important for reducing turbulence in interstate communication systems (Zhang, Kerimov, 2024). A natural outcome of this trend is a shift in the focus of the bilateral partnerships from purely technocratic and resource-based parameters (production volumes, infrastructure facilities) toward the development of human capital and the deepening of interpersonal communication (Nikolaev, 2022). In expert discourse, scientific and educational cooperation is positioned as the "fourth strategic direction" of China's Arctic policy, complementing research, economic, and managerial activities (Pitukhina, Belykh, 2024). In the context of "soft power" theories, the export of educational services is interpreted not as a commercial activity, but as an effective geopolitical mechanism aimed at shaping loyal foreign elites incorporated into the Russian value and ideological framework (Lebedeva, Faure, 2009; Zeveleva, Kokunov, 2024). Educational exchanges, rather than opportunistic trade agreements, lay the foundations for long-term strategic partnerships that remain resilient during periods of geopolitical instability (Rekets, 2024; Lyu Peiying, 2024).

However, despite the high level of interstate dialogue noted by political scientists, significant cognitive dissonance is observed at the micro-level. Empirical studies indicate that for a considerable proportion of the Chinese audience, including students, the Russian Arctic remains terra incognita (Nikolaev, 2022; Zashikhina, 2024). Perceptions of the region are often fragmented and mythologized, limited either to climatic stereotypes or to resource-related clichés disseminated through popular culture and social media (Li Yuejiao, Vasilyeva, 2025). This gap between the doctrinal attitudes of the elites and the actual level of knowledge among specialists creates systemic risks for the long-term effectiveness of bilateral cooperation.

In the current conditions, short-term intensive educational formats, in particular summer and winter schools, are increasingly important, allowing for the prompt dissemination of relevant agendas and the adjustment of the region's image in the minds of Chinese youth (Zeveleva, Kokunov, 2024; Maryanchik, Popova, 2022). The Northern (Arctic) Federal University named after

M.V. Lomonosov serves as a unique testing ground for these "soft power" technologies; its geostrategic location and well-developed scientific and educational infrastructure provide the necessary conditions for such activities (Andreychenko, 2022).

Theoretical approaches to understanding education as a "soft power" resource

The conceptual framework for the phenomenon of "soft power", which traces its origins to the seminal works of Joseph Nye, is based on an understanding of a nation-state's ability to achieve its foreign policy priorities not primarily through the use of coercive force, but rather through the attractiveness of its own cultural code, value-based ideological attitudes, and its model of institutional organization (Nye, 2004). Within the context of the contemporary foreign policy strategy of the Russian Federation, higher education is identified as one of the most effective channels for transmitting these values, allowing the state's academic authority to be organically projected onto its international prestige (Torkunov, 2012). The training of foreign specialists creates long-term social ties capable of evolving into a policy-making resource as graduates of Russian universities are incorporated into the national elites of their countries of origin (Lebedeva, Faure, 2009).

In this study, educational diplomacy is interpreted as a multi-component geopolitical tool of "soft power" aimed at forming a loyal segment of foreign elites integrated into the Russian value and ideological space (Gutenev, Lagutina, Sergunin, 2023). In the Arctic policy system, this approach takes on the status of its "fourth strategic foundation", organically complementing the scientific-research, economic and administrative-management vectors of activity (Ryzhkova, 2012). During periods of geopolitical turbulence, the sustainability of partnerships developed through educational diplomacy is ensured by an intangible asset — the deep, emotionally internalized capital of academic exchange participants at the level of individual experience (Nye, 2004).

In the context of the development of theoretical concepts of "soft power", it is necessary to emphasize that the Russian school of political science is making significant adjustments to this concept, focusing not only on passive attractiveness, but also on the state's active efforts to construct a positive image (Panova, 2012). Developing this thesis, researchers note that the effectiveness of such activities today depends ever less on a centralized ideological resource and ever more on the ability of regional universities to build horizontal academic ties based on the principles of scientific ethos, rather than political expediency (Sychev, Fofanova, 2025). As A.V. Torkunov rightly states, in the modern system of international relations, "soft power" is being transformed into a universal language of international political communication (Torkunov, 2012). As applied to higher education, this means that universities act not simply as transmitters of knowledge, but as full-fledged actors and relays of "soft power", generating trust in the national development model through academic mobility and joint research projects. This approach makes it possible to consider educational diplomacy as a mechanism for forming the long-term cognitive and axiological foun-

dation for international cooperation, which is particularly significant in the context of the highly competitive Arctic agenda (Efimenko, 2025).

Achieving effectiveness in the Arctic dimension is directly linked to the ability of the higher education system to transform perceptions of the region: to shift the focus from interpreting the Arctic as a natural phenomenon to understanding it as a space of geopolitical resources and strategic opportunities (Kefeli, Nikolaenko, 2021). This reorientation of attitudes necessitates abandoning the primacy of extensive quantitative metrics in favor of qualitative shifts in the cognitive sphere, where abstract geopolitical constructs give way to specific knowledge gained through immersive engagement with the regional context (Knight, 2023).

Empirical data from recent years indicate that, despite the pressure of sanctions and the "cancel culture" policies in Western countries, Chinese citizens' interest in receiving a Russian education remains stable, and university administrations are adopting new tools to attract prospective students (Zhang, Kerimov, 2024). The effectiveness of this approach is confirmed by the fact that educational exchanges create conditions for deep immersion in the culture of the partner country, thereby developing a talent pool for professional communication in international cooperation forums (Talanov, 2024).

The linguistic dimension of cooperation: language as a resource of sovereignty and influence

In contemporary political discourse, language is regarded as the fundamental basis of a nation, ensuring the reproduction of national identity in daily practices. In the context of globalization, China views the dissemination of the Chinese language through the network of Confucius Institutes as a tool for preserving its own identity and increasing its influence globally (Zhang, Kerimov, 2024). The activities of the "Russkiy Mir" Foundation and Rossotrudnichestvo follow a similar trajectory, aimed at strengthening the position of the Russian language as a key means of transmitting Russian values.

Within the context of Arctic cooperation, Russian is acquiring the status of a language of professional communication in the fields of scientific and logistical diplomacy. As rightly noted in the literature, teaching Chinese specialists the Russian language with a focus on Arctic issues contributes to the formation of a common terminological framework, which becomes of critical importance in the implementation of mega-projects such as Yamal LNG (Pogodin, Lun, 2024). Empirical observations in border regions (Zabaykalskiy Krai, Manchuria) reveal a high latent demand for learning Russian: up to 60% of Chinese youth declare their willingness to learn the language if the appropriate conditions exist (Toporkova, Zhou Lisya, 2015). From a theoretical and methodological perspective, language learning is a process of forming a secondary linguistic identity, whose cognitive worldview is enriched by additional cultural codes, thereby laying the foundations for deeper mutual understanding (Vladimirova, Sharri, 2025).

Ethno-psychological profile of the Chinese student community and the specific features of the educational environment

The effectiveness of educational initiatives is largely determined by the socio-cultural and psychological characteristics of the target audience. The cognitive strategies of Chinese students are shaped by the national educational paradigm and centuries-old cultural traditions, which influence their perception of educational material and interaction patterns in the academic environment (Denisov, Yuan, Marchenko, 2024). Among the characteristic features of this category of learners, researchers highlight the dominance of visual and auditory perception, a pronounced orientation toward collective forms of activity, and a strong respect for the academic hierarchy and the lecturer.

Empirical observations indicate that Chinese students demonstrate the highest levels of learning motivation when multimedia content is used, particularly films and music. Such formats help to overcome language barriers and foster an emotional connection with the material being studied, which is particularly important in the context of intercultural communication. A noteworthy example of the successful adaptation of the educational environment is the experience of the Shenzhen MSU-BIT University, where the concept of an “artificially created language environment” was tested. Within this model, interaction with native speakers is integrated into students’ daily practices, creating the effect of natural immersion in the linguistic and cultural context (Yun, Dubakov, Dubakova, 2025). Corresponding results were obtained during the work of Samara State University of Social Sciences and Education: the use of authentic materials and virtual travel technologies demonstrated high effectiveness in reducing cultural barriers and accelerating acculturation processes (Kislova, Shalifova, Klyushina, 2022).

As applied to the Arctic agenda, these approaches acquire additional significance. The development of educational pathways for Chinese students at NArFU’s seasonal schools requires consideration of the ethno-psychological characteristics (Table 1). The integration of multimedia components representing the “northern narrative” of Russian culture, as well as the creation of conditions for collective learning and the development of hierarchically organized communication with leading experts in Arctic research, can significantly enhance the effectiveness of “soft power” programs and reinforce positive attitudes toward the Russian Arctic (Maryanchik, Popova, 2022).

Table 1

Ethno-psychological profile of Chinese students

Characteristics of Chinese students	Impact on the educational process
Visual orientation	High effectiveness of video materials and infographics
Memorization tradition	Tendency to memorize large amounts of data
Intercultural analysis	Desire to compare foreign cultures with one's own
Emotional capital	Importance of personal trust in the teacher/region
Pragmatism in planning	Education as a career stage in a global context (Talanov, 2024)

Empirical studies in recent years have identified a consistent trend: the majority of Chinese students at Russian universities do not share the attitudes of the “cancel culture” policy towards

Russia, viewing it as irrational. Moreover, a significant proportion of respondents demonstrate solidarity with Russia's position on key international issues and do not experience discomfort with sanctions pressure (Zhang, Kerimov, 2024). This phenomenon can be interpreted as evidence of the development of a deep level of trust and loyalty generated by the educational environment itself.

According to research data from 2024, the majority of Chinese citizens initially view studying in Russia as a stage in building a global career path, often with a view to subsequently relocating to the US, Canada or the UK. However, during the process of academic socialization at Russian universities, a significant transformation of initial intentions is observed: approximately 33% of bachelor's degree graduates continue their studies in Russian master's programs, and 20% of master's degree students decide to enroll in postgraduate programs (Davydova, 2024). These data indicate that the qualitative characteristics of the educational environment have the potential to modify the career strategies of international students. It is also significant that, despite inflation and exchange rate volatility, only a small proportion of Chinese students choose not to continue their studies in Russia, which confirms continued attractiveness of Russian education (Kushnarev, 2024).

The seasonal school programs offered by the Northern (Arctic) Federal University are based on the principles of ethno-methodology, which involves combining language training with an exploration of the northern dimension of Russian culture (Zashikhina, Griva, 2024). This approach helps to overcome stereotypical representations of the Arctic as an "icy desert", depicting the region as a vibrant cultural space (Maryanchik, Popova, 2022). For Chinese students belonging to Generation Z, significant factors in choosing an educational pathway include not only the academic component, but also the level of safety, the quality of infrastructure, and the degree of digitalization of the university's services.

Research methodology

The study is based on an interdisciplinary approach, which combines quantitative methods for assessing pedagogical effectiveness with a qualitative analysis of socio-cultural transformations. The empirical data were collected during the implementation of a short-term summer school on Russian language and culture, held at the Northern (Arctic) Federal University named after M.V. Lomonosov from June to July 2025.

Justification of the sample structure and its content richness

The empirical basis of this study was formed by data obtained from 25 students from the People's Republic of China (N=25). The sample comprised bachelor's and master's degree students from a number of higher education institutions in the PRC, including:

- Shandong Normal University;
- Shanghai Second Polytechnic University;

- Dalian Ocean University;
- Shanghai University;
- Changchun University;
- Shenyang University of Technology;
- Yulin University;
- Heilongjiang University;
- Shanghai International Studies University.

The analyzed sample included only those program participants whose attendance rate exceeded 75% of the total number of academic hours, who demonstrated engagement in discussion-based activities, and who completed the required number of assessment tasks on time.

The rationale for the size of the study cohort deserves special attention. In analyzing the theoretical completeness of the sample, we drew on the experience of qualitative socio-humanitarian research. Scientists note that the majority of semantic units and code categories (up to 80–90%) emerge when processing a corpus of 12–15 interview protocols or transcripts (Guest, Bunce, Johnson, 2006; Hennink, Kaiser, Marconi, 2017). Including more than 100 observation units in the analysis would inevitably result in a loss of hermeneutic depth and the formalization of interpretive procedures. According to K. Malterud's conceptual framework, if the population under study is homogeneous (same country of origin, identical educational program), the value of the data extracted from each individual case increases significantly (Malterud, Siersma, Guassora, 2016). For the purpose of recording transformation of cognitive structures over a three-week period, a data set comprising 25 respondents appears to be entirely sufficient, as it allows avoiding the effect of redundancy (Sandelowski, 1995; Malterud, Siersma, Guassora, 2016). The group under consideration possesses a high degree of informational capacity and retains its representativeness specifically within the qualitative research paradigm.

The educational environment of the Northern (Arctic) Federal University was regarded as a verifiable experimental site designed to test "soft influence" resources. The research procedure was implemented in strict compliance with ethical imperatives: respondents took part in the survey on a voluntary basis, and the data collected was anonymized and presented in aggregated form.

Collection procedure and structural composition of empirical data

Data collection was conducted in two stages (initial and final checks). The research instrument (questionnaire) was structured into three main sections:

- Section A (physical and geographical): devoted to issues concerning the delimitation of the Russian Federation's Arctic territories and the functioning of the Northern Sea Transport Corridor;

- Section B (historical and cultural): covered topics related to the traditions of the Pomor people, the history of the region's economic development, and the role of M.V. Lomonosov in this process;
- Section C (geopolitical): addressed aspects of the alignment of strategic priorities of Russia and China in high latitudes, as well as the specifics of legal regulation.

The methodological framework was supplemented by a psycholinguistic associative testing procedure, aimed at explicating non-obvious transformations in the sphere of individual and group perception.

Qualitative methods and associative experiment

In order to identify profound transformations in the perception of the region, implying a shift from declarative knowledge to personal meanings, methods from psycholinguistics and visual sociology were integrated into the research toolkit (Li Yuejiao, Vasilyeva, 2025; Vladimirova, Sharry, 2025).

The free association method was implemented by providing respondents with the stimulus concept "Russian Arctic" and instructing them to record the first three nouns or adjectives that came to mind. A comparison of the associative cores (the most frequent responses) at the initial and final stages made it possible to objectively assess the dynamics of the transformation of the territory's image.

Creative interpretation as a research technique was embodied in the final task, which involved the preparation of mini-presentations on the topic "My Arctic". Content analysis of the presentation materials was carried out using criteria such as the presence of emotional engagement markers and the use of specific regional codes (lexical units, visual images), which, from a theoretical perspective, serves as an indicator of the effectiveness of the "soft power" strategies being implemented (Talanov, 2024; Davydova, 2024).

Empirical data processing

The quantitative indicators obtained during the testing were analyzed using descriptive statistical methods, including the calculation of percentage distributions and growth trends (in percentage points). The qualitative data, represented by associative series, were processed using semantic clustering. All recorded responses were classified into categories ("Natural and climatic", "Resource and economic", "Cultural and humanitarian"), which made it possible to visualize the shift in the students' focus under the influence of the educational program.

Research results

Cognitive dynamics: quantitative assessment of the level of preparation

The pre-test, conducted at the initial stage of the educational program's implementation, revealed an insufficient level of competence among Chinese students regarding various aspects of the Russian Arctic. The average percentage of correct answers across the sample was only 32%.

Respondents had the greatest difficulty with questions related to the historical development of northern territories, the administrative-territorial structure of the Arctic zone of the Russian Federation, and the highly specialized details concerning the operation of the Northern Sea Route. The results indicate that, prior to the start of the program, the Arctic region was perceived by the majority of students as terra incognita, conceptualized exclusively through the prism of climate stereotypes, ignoring the historical context and socio-cultural specifics of the region.

After completing the three-week educational course, a significant positive trend was recorded: the average percentage of correct answers reached 79%, representing an increase of 47 percentage points. This indicator is statistically significant and clearly demonstrates the effectiveness of the methodology of intensive immersion in the linguistic and cultural environment for developing subject-specific knowledge about the region. A more detailed analysis of knowledge growth trends by thematic sections is presented in Table 2.

Table 2

Cognitive dynamics of Chinese students' knowledge of the Russian Arctic

Thematic section	Before the course (%)	After the course (%)
Geographical location and climate	44	92
History of polar exploration	16	68
Geopolitics and the Northern Sea Route	36	92
Culture and traditions of the peoples of the North	28	64
Ecology and sustainable development	36	80
Average value	**32**	**79**

A more detailed analysis of the figures in Table 2 reveals that the growth in knowledge across different topics was uneven. The largest increase — by 56 percentage points — was in the "Geopolitics and the Northern Sea Route" section. This indicates that Chinese students are particularly interested in practical topics, such as transport flow organization and commercial shipping work. They regard this knowledge as a foundation for their future careers. The section on the history of polar exploration also showed a significant increase — up by 52 points. This suggests that we have succeeded in conveying to the audience the Russian perspective on the history of Arctic development, even though most students had essentially no prior knowledge of the subject.

Another noteworthy finding is that, upon completion of the program, 92% of participants were able to accurately describe the Northern Sea Route and its advantages over traditional southern routes. Although initially many of them confused the Northern Sea Route with the Trans-Siberian Railway or had a very vague understanding of its geography (for example, they did not know that it stretches from Novaya Zemlya to the Bering Strait), even a short educational program could fill this gap and provide participants with their first professional knowledge of the Arctic.

Transformation of the associative field: from mythologized representations to conceptualization of reality

A qualitative analysis of the results of the associative experiment revealed profound changes in the structure of perceptions of the region, going beyond a simple increase in factual

knowledge. The associative field, reconstructed during the pre-test stage, was characterized by a predominance of abstract and climate-determined concepts. The core of the associations (the most frequent responses) included the following lexemes: “cold” (92%), “ice” (88%), “polar bear” (76%), “snow” (64%), and “far away” (52%). This configuration of the associative field suggests that the Arctic was perceived by Chinese students as a hostile, sparsely populated, and static territory, devoid of historical dynamics and economic specificity.

Upon completion of the summer school, the structure of the associative core underwent a radical transformation. Concepts representing the region’s geo-economic significance and its cultural and historical uniqueness came to the fore. The structure of the associative core at the final stage of the study is presented in Table 3.

Table 3

Structure of the “Russian Arctic” associative core (based on program results)

Association (after the program)	Frequency (%)	Category
Northern Sea Route	92	Geoeconomics / Logistics
Pomors	84	Culture/History
Friendship	80	Emotional capital
Icebreaker	76	Technologies
Lomonosov	68	Science/Education
Prospects	60	Future

The fact that the concept of “Northern Sea Route” appeared in the final associations of 92% of participants is highly significant. In essence, the Northern Sea Route became the main symbol of the Russian Arctic for them — exactly as it should be perceived after becoming informed about the actual state of affairs. Another finding is equally significant: 84% of respondents named “Pomors” among their first associations. This is precisely an instance in which the region ceases to be anonymous. Through learning about the history and culture of the people who have been settling these harsh lands for centuries, students discovered the “human face” of the Arctic, which is no longer simply a cold space on a map (Maryanchik, Popova, 2022). This result can be regarded as empirical confirmation of the successful overcoming of the stereotypical representation of the Arctic as a deserted, static space, and the formation of its image as a territory of life and labor for a unique ethno-cultural community. This conclusion correlates with the findings of studies devoted to the role of the historical and cultural component in the structure of regional identity (Maryanchik, Popova, 2022).

This shift in emotional and value-based perceptions is reflected in the emergence of the associations “friendship” (80%) and “prospects” (60%) in the core. Such a trend may be interpreted as evidence of the formation of sustainable positive emotional capital in relation to the Russian Arctic. There has been a transformation in the perception of the region from a negative context (threats, extreme conditions) to a positive one (opportunities for professional self-realization and intercultural dialogue). The high ranking of the association “icebreaker” (76%) highlights the Chinese audience’s respect for Russia’s technological potential, which, according to the concept of

"soft power", is a significant factor in the country's attractiveness as a partner in the implementation of complex infrastructure projects (Pogodin, Lun, 2024; Lebedeva, Fort, 2009).

An analysis of the peripheral zones of the associative field reveals a qualitative increase in complexity. Along with the dominant concepts, respondents' answers included such images as "Malye Korely", "Arctic cuisine", "nuclear fleet", and "research station". Such detailing indicates a shift from a one-dimensional, climate-determined image to a multidimensional and "textured" representation of the Russian North, incorporating cultural, ethnographic, technological, and scientific research components. These details — which may seem peripheral, but are in fact very memorable and personal — contribute to creating a unique perception that cannot be obtained from books or online articles. It arises solely through personal experience and vivid impressions. Therefore, it can be said that the program achieved more than simply filling gaps in knowledge. It provided participants with a foundation for understanding the Arctic as something close to their hearts and personally meaningful, rather than an abstract academic topic (see Fig. 1).



Fig. 1. A school participant's associative map[1].

Demythologization of the Arctic as an educational strategy

The summer school program was based on the idea of a consistent demythologization of the Arctic. The aim was to gradually replace the stereotypical images commonly conveyed by the media with scientifically verified knowledge. In terms of structure, this process can be divided into three stages. Each stage was designed for a specific level of perception and addressed its own objectives in changing the way students think and feel about the region.

Climate demythologization. At this stage, the aim was to deconstruct the persistent myth of the Arctic as a region entirely covered by permafrost, associated with existential threats. During educational activities, students expanded their knowledge of the landscape diversity of Arctic territories, learned about the urban features of modern northern cities with developed infrastructure (Arkhangelsk, Murmansk), and received empirical evidence that the Arctic's climatic conditions

[1] Source: the map was created by a participant of the 2025 summer school of Russian language and culture.

during the summer can be characterized as comfortable. This representation helped to reduce biologically determined fears of the region and, consequently, increased its tourist and educational appeal in the perception of the Chinese audience.

Technological demythologization. At this stage, the main objective was to overcome another persistent myth that the Arctic is a technologically outdated region. Students were shown the reality of Russia's presence in the high latitudes, where advanced technologies are used. This included the nuclear-powered icebreaker fleet, digital systems that facilitate navigation along the Northern Sea Route, and construction solutions enabling the building of facilities in permafrost conditions. For Chinese youth, who are highly sensitive to technological innovations, this information became a compelling argument in favor of the conclusion that Russia occupies a leading position in the development of the Arctic and possesses unique capabilities unmatched by any other country.

Geopolitical demythologization. The third stage of the program was devoted to reassessing Western narratives that portray the Arctic as a zone of inevitable confrontation. The Arctic was conceptualized as a space for dialogue in which the interests of the Russian Federation and the People's Republic of China can be harmonized on the principles of mutual benefit and long-term strategic partnership. This approach is consistent with the concept of "positive securitization", which emphasizes the region's potential for cooperation as opposed to conflict scenarios (Rekets, 2024).

The effectiveness of the implemented demythologization strategy is empirically confirmed by the final testing data: 80% of participants disagreed with the statement reducing the Arctic to an "icy desert". In the qualitative responses, the region was described as a "territory of the future", a "resource treasure trove", and a "key link in global logistics". The results suggest that the educational impact contributed to shifting the perception of the Arctic from a purely "natural phenomenon" to a "geopolitical resource" and "space of opportunities", which is consistent with the goal of developing an adequate understanding of Russian national interests in the region among foreign audiences.

The role of the Northern (Arctic) Federal University in implementing "soft power" strategies in the Arctic

The Northern (Arctic) Federal University named after M.V. Lomonosov (NArFU) occupies a special place in the institutional architecture of the Russian Federation's educational diplomacy. Positioning itself as the "gateway to the Arctic", the university accumulates and adapts best practices in working with international students to the specific characteristics of the northern macroregion. The experience of organizing the 2025 summer school demonstrated that integrating linguistic training with a specialized regional studies component creates a pronounced synergistic effect, enabling the achievement of results that would be unattainable if these approaches were applied in isolation.

For Chinese students, NArFU acted not only as an educational institution, but also as an institutional guarantor of the reliability of the bilateral partnership. Chinese cultural tradition, as is well known, places significant emphasis on the status of an educational institution and its affiliation with the state agenda. The fact that NArFU has the status of a federal university, tasked with providing personnel for the Arctic zone of the Russian Federation, significantly increases the legitimacy of the knowledge it transmits in the perception of Chinese youth; this is consistent with the findings of researchers who have noted the significance of the institutional factor in the structure of educational attractiveness (Davydova, 2024).

The university's accumulated experience includes extensive practice in applying expedition-based learning formats. In particular, the "Arctic Floating University" project can be described as one of the most immersive educational methods. Moreover, even when the program is implemented in the campus, students have the opportunity to directly engage with researchers who have recently completed fieldwork in the high latitudes. Such a pedagogical framework enhances the credibility of the knowledge transferred and fosters a sense of involvement in current scientific research.

Furthermore, NArFU serves as a unifying platform for initiating professional contacts and shaping long-term collaboration trajectories. Upon completion of the 2025 summer school, a significant number of students expressed their intention to continue their academic development in master's or postgraduate programs. This should be seen as an indicator of the establishment of a stable channel for attracting talented international applicants — essentially, a channel for attracting students. In this paradigm, short-term educational modules serve as an initial test of the Russian higher education system, allowing candidates to formulate realistic expectations and minimize the likelihood of subsequent socio-cultural difficulties. Thus, such formats contribute to expanding the export potential of Russian education and, from a strategic perspective, to strengthening the Russian Federation's cultural influence within the People's Republic of China.

Discussion of research results

The data obtained during the empirical study, reflecting the transformation of the perception of the Arctic region among Chinese students participating in the 2025 NArFU summer school, allow us to conceptually understand the potential of short-term educational formats as a tool for implementing the Russian Federation's "soft power" strategies. Against the backdrop of contemporary geopolitical dynamics, characterized by a reorientation of international cooperation vectors from the West to the East (Pogodin, Lun, 2024; Nikolaev, 2022), intensive educational programs are acquiring not only a pedagogical but also a strategic dimension. Working with international students is now an integral component of the state's image-building policy and a mechanism for forming loyal, pro-Russian elites (Makhmutova, 2019). The experience of the Northern (Arctic) Federal University demonstrates that the transition from abstract, mythologized representations

of the Arctic to specific, professionally oriented concepts is possible through the adaptation of educational strategies to the "new reality" of educational services exports.

Cognitive transformation: from information vacuum to strategic awareness

The cognitive dynamics observed during the study — a statistically significant increase in knowledge levels from 32% to 79% — indicates overcoming the critical "cognitive gap" previously identified by researchers as a significant barrier to advancing Russia's educational presence (Nikolaev, 2022). The fact that the maximum increase (+56 percentage points) was achieved in the "Geopolitics and the Northern Sea Route" section allows this result to be interpreted as an indicator of the Chinese audience's high level of pragmatic motivation. The identified pattern correlates with China's overall strategic focus on deepening its engagement in Arctic processes and the practical implementation of the Polar Silk Road initiative (Rekets, 2024).

Chinese students belonging to Generation Z demonstrate a clear focus on acquiring knowledge that is of practical significance for their future professional careers in the context of global competition. The fact that upon completion of the program, 92% of participants could correctly assess the role of the Northern Sea Route as an alternative global transport artery confirms the effectiveness of this educational format as a channel for transmitting the strategic priorities of the Russian Federation. It is of fundamental importance that, unlike declarative political statements, the educational program creates conditions in which students independently come to the conclusion that Russian control over the Northern Sea Route is mutually beneficial, thereby adopting these attitudes as personally meaningful.

Qualitative transformation of perception: from stereotype to image

A qualitative analysis of the results of the associative experiment revealed a fundamental restructuring of the associative core — a shift from the dominance of natural and climatic concepts ("cold", "ice") to socio-cultural and geo-economic representations. The appearance of the concept "Pomors" in the core of associations, with a frequency of 84%, can be interpreted as a key indicator of the successful demythologization of the region: the Arctic has acquired an anthropological dimension, personified through the history and culture of a specific subethnic group (Andreychenko, 2022). This transformation aligns with the objectives of building the country's reputational capital through immersion in the local context, or, using the researchers' terminology, through the actualization of the "genius loci". The shift in the focus of the associative field towards the "Northern Sea Route" and "icebreaker" as a symbol of technological presence confirms that, in students' perceptions, the region has begun to be conceptualized as a complex technological system, within which Russia possesses unique competencies that have no analogues in global practice (primarily in the nuclear icebreaker fleet). Such a representation is critically important for fostering a sustainable confidence in Russia's reliability as a strategic partner in high-latitude projects among future members of the Chinese elite.

These results contrast to some extent with the findings of earlier studies, which identified serious difficulties in the socio-cultural adaptation of Chinese students, related to their tendency to isolate themselves within national groups and high levels of acculturation stress, exacerbated by the language barrier. The program's success, evidenced by the emergence of the association "friendship" at the core of the final associative field (80%), demonstrates that short-term intensive formats have the potential to overcome the insularity of national "bubbles".

The principles of intensive learning — communicative focus, situational approach, individualization — make it possible to create an atmosphere of trust and interpersonal closeness within a short timeframe. The accelerated immersion provided by the summer school serves as a kind of "test drive" of the Russian educational environment, significantly lowering the barrier for entering a cross-cultural context and fostering an initial sense of loyalty, which may subsequently form the basis for building long-term educational and professional trajectories.

Strategic dimensions of educational diplomacy in the Arctic

An analysis of the obtained results suggests that the educational programs implemented in the Arctic region successfully fit into the updated "soft power" strategies of both countries. For China, participation in such formats is an element of implementing the concept of dual circulation, which entails the qualitative enrichment of domestic resources through cultural confidence and international interaction (Zinevich, Selezneva, 2022). For Russia, educational diplomacy in the Arctic is considered as an effective tool for protecting national sovereignty, achieved by forming a pool of loyal international experts capable of acting as advocates for Russian interests in their own countries (Kharichkin, Shamarov, 2021).

The study confirmed that effective work in the Chinese educational market requires more than simply translating content into Chinese; it necessitates a profound adaptation of the content's meaning to the values of the "community with a shared future" concept. The success of the program at NArFU was achieved precisely through such adaptation, in which Russia's interests in the Arctic were presented not as self-serving ambitions, but as an integral part of the shared future of the two nations, built on the principles of mutual benefit and long-term strategic partnership.

The transition from Russia's "resource-based" image in the Arctic to that of a technological and scientific leader capable of ensuring the region's sustainable development in the interests of all humanity requires systematic efforts by the state, the academic community, and civil society institutions to promote national interests in the global humanitarian space. In order to consolidate the achieved results, universities need to strengthen the digital component of their promotional activities by mastering SMM tools in Chinese social networks and messaging apps (Baidu, WeChat), which will enable continuous communication with the target audience beyond the scope of short-term educational intensive programs (Nikolaev, 2022).

Conclusion

This study provided a comprehensive analysis of the role and effectiveness of educational diplomacy as a tool for shaping regional identity and strengthening the Russian Federation's humanitarian presence in the context of Russian-Chinese cooperation in the Arctic zone. Empirical data obtained during a short-term summer school at the Northern (Arctic) Federal University named after M.V. Lomonosov confirm that intensive educational formats, such as seasonal language schools, serve as a statistically verifiable mechanism for bridging the cognitive gap and deconstructing stereotypical representations of the Russian Arctic in the minds of Chinese students.

The **scientific novelty** of the study lies in the theoretical justification and empirical verification of the transition from extensive, quantitative indicators of educational activity to qualitative transformations in the structure of regional perception. Using psycholinguistic tools and an associative experiment method, a fundamental restructuring of the associative core was documented: from the dominance of natural and climatic concepts ("cold", "ice", "polar bear") to geo-economic and socio-cultural representations ("Northern Sea Route", "Pomors", "icebreaker", "friendship"). It was revealed that a successful transformation of the Arctic's image from an "icy desert" to a "region of the future and a key logistics link" can only be achieved through a profound semantic adaptation of educational programs to the value orientations of Chinese youth, and, above all, to the concept of a "community with a shared future", which integrates Russian strategic interests into the broader context of bilateral partnership.

The **practical significance** of this work is determined by the evidence of the high effectiveness of the intensive educational formats implemented at NArFU in addressing "soft power" objectives in the Arctic region. The patterns identified in the study — the dominance of the visual perception channel, the critical importance of emotional capital for the formation of sustainable positive attitudes, and the expressed pragmatic interest of the Chinese audience in the Northern Sea Route infrastructure projects — can be used to optimize the export strategy of Russian higher education, as well as to develop targeted programs to attract international students from Asia-Pacific countries.

In order to strengthen Russia's humanitarian presence in China, several areas should be addressed in the future. Firstly, it is important to develop digital communication channels with the target audience — for example, by being more active in Chinese social media and messaging apps like Baidu and WeChat. This will ensure that contact with students is maintained after completion of short-term programs. Secondly, scientific and educational activities should be integrated into the long-term framework of the strategic partnership between the two countries. The aim is to shift from one-off events to building entire educational pathways: from undergraduate to master's degrees, then to postgraduate studies and, subsequently, to joint research projects. Thirdly, there is a need for a more profound adaptation of educational materials to the values of the Chinese audience, while maintaining a focus on Russian national interests.

Considering the research results as a whole, it becomes clear that educational diplomacy

today is not merely a matter of pedagogy, but a full-fledged strategic resource. It helps to form a pool of foreign experts loyal to Russia. This creates the foundation for the continuity of Russian-Chinese dialogue in the Arctic, serves as a kind of institutional memory, and guarantees the stability of cooperation even in the event of geopolitical fluctuations. In the future, it would be worthwhile to undertake a comparative analysis of different models of educational diplomacy, as well as to examine how short-term programs influence the career trajectories of foreign graduates and their willingness to participate in joint projects with Russia.

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Phone: +7 (8182) 218979

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