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Innovative and Technological Development of the Fuel and Energy Complex of the Russian Arctic

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Abstract. The article discusses the process of development of the Arctic zone of Russia, in particular, in the energy and oil and gas industries. Particular attention is paid to the fact that comprehensive development of the Arctic is currently one of the strategic priorities of the state. As a measure to increase the attractiveness of this region for entrepreneurs, investments and innovations, a decision was made to create a special economic regime in the Arctic zone, which is already proving to be effective. The development of the Arctic is impossible without the active introduction of innovations and technologies adapted to specific natural and geographical conditions. Russian companies play a key role in this process, and cooperation with friendly countries such as China opens up new opportunities for solving common tasks and achieving mutual goals. The main areas of such cooperation are the development of trade in energy resources and the expansion of scientific and research cooperation, which ultimately contributes to more effective development of the Arctic region. The article also touches on the development of the Northern Sea Route logistics corridor, its infrastructure and its role in delivering resources from the Arctic to Asia. Examples of successful projects such as Yamal LNG and Arctic LNG-2, Prirazlomnaya and Kola wind farms are considered. In general, the article provides an overview of the current state of development of the Russian Arctic zone in terms of innovative development and its further prosperity.
Keywords: *Arctic, Russia, energy, innovation, technology, oil and gas industry, Northern Sea Route, China, liquefied natural gas, development*

Introduction

According to the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035, a list of measures aimed at developing the fuel and energy complex and the innovative technological advancement of the Arctic was outlined in 2020. This is necessary to ensure that the development of such a remote and climatically harsh region with unique potential keeps pace with the times and corresponds to both Russia's internal needs and global trends. Among these measures, special attention should be paid to the introduction of a special economic regime in the Arctic zone, which will facilitate the transition to a closed-loop economy in the region. Current and planned geological exploration work requires private investments. The Russian Arctic has

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significant potential for the development of innovative industries and the creation of new industrial production facilities. The region's rich natural resources can be used to stimulate economic growth and improve the lives of the population if the necessary conditions are created for the effective development of oil and gas fields, the extraction of solid minerals and hard-to-reach hydrocarbon reserves, which will allow the region's potential to be maximized. It is important to expand oil refining and product manufacturing capacity, to maintain and increase the production of liquefied natural gas and gas chemical products [1]. The implementation of these ambitious goals and new economic projects is only possible with adequate state support in areas such as technology development, stimulating the use of Russian-made industrial products, and maintaining cooperation with Arctic states in order to protect national interests and achieve the best results through synergy. This article will examine projects that ensure the implementation of these measures, as well as the prospects for Russia's Arctic regions.

Advanced Social and Economic Development Area "Capital of the Arctic"

The Arctic has relatively recently become part of the Advanced Social and Economic Development Areas (ASEDA) project in the Russian Federation. In December 2019, a draft resolution was developed to establish an ASEDA in the Murmansk Oblast to implement the program for the construction of a center for large-tonnage marine structures [2]. NOVATEK's project to create a center for the construction of large-tonnage marine structures near Murmansk began in 2015. The plan was to create a line for the production, storage and shipment of liquefied natural gas, as well as for the repair and maintenance of equipment for Arctic oil and gas condensate fields.

In 2019, an important document was adopted that defined a new direction for the development of the Arctic and the Far East. According to this document, the Ministry of the Russian Federation for the Development of the Far East was renamed the Ministry of the Russian Federation for the Development of the Far East and the Arctic, and received new powers for the development of the Arctic region. In early 2020, a proposal was made to create a special economic zone, "Capital of the Arctic", in Murmansk. This became the ministry's first project implemented outside the Far East. A few months later, in April 2020, the Far East Development Corporation received the first applications from five companies that wanted to become residents of this ASEDA and build their businesses under the new conditions [3].

Today, the region's entrepreneurial appeal is growing, and people are paying more and more attention to the potential inherent of the harsh, yet beautiful and rich Arctic environment.

[1] Decree of the President of the Russian Federation "On the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035" dated October 26, 2020 No. 645. URL: http://www.kremlin.ru/acts/bank/45972 (accessed 11 December 2024).
[2] The Cabinet of Ministers approved the creation of the "Capital of the Arctic" advanced development area in Murmansk. URL: https://tass.ru/ekonomika/8459241 (accessed 20 January 2024).
[3] Resolution of the Government of the Russian Federation No. 656 "On the creation of the area of advanced social and economic development "Capital of the Arctic" dated May 12, 2020. URL: http://government.ru/docs/all/127875/ (accessed 13 September 2023).

New ideas and projects are emerging, created specifically with the characteristics and advantages that the North offers today. Innovative projects in the Arctic, specifically focused on fuel and energy development, are enabling the development of hard-to-reach deposits, reducing the risk of oil spills and leaks, and combating the negative impact of industry on the environment. This is undoubtedly in line with the main principle of Russia's chairmanship of the Arctic Council in 2021–2023 and the current values of our state: "responsible management for the sustainable development of the Arctic". Technological innovations are being developed and are already being used in a wide range of areas within the energy sector. "They cover areas such as generation, transportation, conversion, diagnostics, management, automation and digitalization. The decisive condition for the development of the industry in accordance with modern requirements and, in particular, the unique requirements of the Arctic is the level of implementation of research and development (R&D) and the level of scientific and technological progress (STP)," note V.I. Salygin and S.S. Vopilovskiy in their research [1; 2]. The Russian energy sector has entered a new phase of its development, characterized by a rapid pace of modernization through the introduction of advanced technologies that support Russia's status as a global leader. This allows the industry not only to respond more effectively to the needs and expectations of the population, including concerns about energy security in the medium and long term, the rational use of energy resources and risk minimization, but also to regulate the instruments for responding to global processes.

Practical examples of successful innovation and technology projects

Let us consider examples of how leaders in the Russian oil, gas and energy industry are actively involved in the modernization of the Arctic zone and contributing to its innovative development. "In St. Petersburg, PJSC Gazprom Neft opened a Production Control Center at the Prirazlomnaya oil platform on the Russian Arctic shelf. This is the only and unique hydrocarbon production project operating in Russia on the Arctic shelf, possessing the appropriate environmental characteristics," notes S.S. Vopilovskiy, Candidate of Economic Sciences, in his article. "Digital technologies and IT tools enable round-the-clock monitoring of key stages of oil production and shipment, control of equipment condition, and tracking of vessel movements taking into account ice conditions, which ultimately increases the speed and efficiency of decision-making for platform management in the Barents Sea. The main facility for the field's development is the Prirazlomnaya offshore ice-resistant oil production platform, which was created specifically for the development of the field of the same name. It handles all technological operations: drilling, production, oil storage, preparation, and shipment of finished products" [2]. S.S. Vopilovskiy also notes that "the characteristics and specific features of the Arctic region were taken into account when designing the Prirazlomnaya platform. It is designed for operation in extreme natural and climatic conditions and is capable of withstanding maximum ice loads. Furthermore, the equipment installed at the wells is aimed at preventing the possibility of uncontrolled oil or gas spills. The loading line for pumping oil to the tanker has an emergency shutdown and closure system that activates instantly."

[2] The Prirazlomnaya ice-resistant fixed offshore platform is equipped with a modern monitoring system, which includes more than 60 sensors. These sensors provide continuous monitoring of the equipment's condition and respond immediately to any deviations from normal operating conditions. As a result of the operation of this platform, it was possible to extract a new type of oil called ARCO (Arctic Oil), which is a unique product obtained as a result of work on the Arctic shelf.

It should also be noted that in Russia's Arctic zone, the priority is given to environmentally safe projects that primarily use clean energy with zero greenhouse gas emissions, such as wind energy projects. The Russian Federation calls on the international academic community to cooperate in the implementation of Arctic scientific and industrial programs. Cooperation with the BRICS countries serves as an example the implementation of such programs. Plans include active participation in the construction of an Arctic cargo fleet and cargo terminals in the ports of Murmansk and Arkhangelsk [3]. In August 2024, at the Moscow Forum on the Climate Agenda, the BRICS countries adopted a framework program on climate and sustainable development, which will enable the countries of the association to identify measures to combat climate change without compromising the economic well-being of their states [4].

Let us consider the following example of the practical implementation of green energy projects. In December 2022, the first phase of the Kola Wind Power Plant was launched in the Murmansk Oblast. It is the largest wind farm in Russia and has unique properties that enable it to operate in harsh natural conditions. According to data from the PJSC EL5-Energo portal, 57 wind turbines are located on a 257-hectare site, generating electricity. A power line approximately 70 km long was built to integrate the station into Russia's Unified Energy System. The wind turbine blades are equipped with special systems that automatically stop their rotation if there is a risk of icing. The project is being implemented by PJSC Enel Russia, with more than 65% of the equipment and work carried out by domestic factories and companies [2]. It is important to note that Russia is relying on its own resources in its development, and the Arctic is now an environment where innovative domestic solutions are needed more than ever.

There is no doubt that it is extremely difficult to ensure sustainable development in the Arctic if only one state is involved. This applies not only to the preservation of natural diversity and the prevention of global warming, but also to the accumulation of forces to realize the region's economic and logistical potential. International partnership is especially essential when cooperation is required to prevent emergencies. This means constantly sharing experience and technology to analyze the situation, predict unexpected changes, and deal with the consequences. In this regard, Russia prioritizes maintaining friendly relations with the leading economies of the Eastern world, in particular China, in order to create innovative competencies and technologies and apply them in practice [5]. "China, despite not being an Arctic state, plays a key role in the development of the Arctic region, which is determined by its economic and political goals. As the world's second-largest economy, China seeks to gain a foothold in this strategically important region," writes Li Yonghui. In his article, he also draws attention to the fact that "China is showing increasing in-

terest in liquefied natural gas. For China, Arctic mineral resources are a key factor in diversifying the geographical structure of its energy imports." The largest joint projects in this area belong to NOVATEK, namely the Yamal LNG and Arctic LNG 2 liquefied natural gas production and transportation complexes. These projects represent a striking example of innovative cooperation between Russia and China in the Arctic region in the energy sector. According to the Neftegaz.RU news agency, the rich resource base of the Yamal and Gydan peninsulas allows for the construction of new plants with a total production capacity of up to 50–80 million tons of LNG per year [4]. "The Yamal LNG project was largely implemented with the support of Chinese investment. Chinese companies made a significant contribution to the project, providing up to 60% of the required capital and up to 80% of the equipment, manufactured at Chinese shipyards. Furthermore, 20% of the project's shares are owned by CNODC, and 9.9% — by the Silk Road Fund. China has become the largest foreign investor in the Yamal LNG project. It is also noted that the plant's design capacity is 17.4 million tons per year, with CNPC contracted for 3 million tons per year, or approximately 20%." [5]

Thus, despite its significant remoteness from the center and harsh conditions, the Arctic attracts Chinese companies interested in creating promising enterprises and establishing cooperation in energy resource extraction. China's technological capabilities, combined with the natural resources of the Russian Arctic and the desire of domestic companies to build long-term cooperation, form the basis of existing and planned projects. China characterizes the relationship with the Russian Federation as "supporting healthy and stable development", which, together with the desire to expand external investment within the framework of the "One Belt, One Road" initiative, creates a solid foundation for future joint Arctic projects, which will primarily serve as examples of effective capital and research and development integration capable of revitalizing this cold and harsh region [6].

Taking into account the above facts, it is worth noting the role of the Northern Sea Route, which harmoniously complements projects such as Yamal LNG and Arctic LNG 2, as it is the route through which Arctic resources are increasingly being transported to Asia. Rosatom State Corporation's strategic goal is to transform the Northern Sea Route into an efficient transport artery connecting Europe, Russia, and the Asia-Pacific region. According to information presented in V.F. Pryakhin's article, "a federal project for the development of the "Great" Northern Sea Route is currently being elaborated, involving the creation of a transport corridor from St. Petersburg and Kaliningrad to Vladivostok". As part of the development of sustainable shipping along the Northern Sea Route and the Polar Silk Road, China has identified three main areas of activity: Arctic research to enhance navigation experience and understand the characteristics of these seas, China's

[4] Russia and China in the Arctic: Cooperation, Rivalry, and Implications for Eurasian Security. URL: https://russiancouncil.ru/analytics-and-comments/comments/rossiya-i-kitay-v-arktike-sotrudnichestvo-sopernichestvo-i-posledstviya-dlya-evraziyskoy-bezopasnost/?sphrase_id=35909425 (accessed 28 November 2024).
[5] Spivak V., Gabuev A. Ice Age: Energy Cooperation between Russia and China in the Arctic. URL: https://carnegiemoscow.org/2021/12/27/ru-pub-86088 (accessed 04 June 2023).

participation in Arctic shipping management (e.g., in the International Maritime Organization), and the pursuit of a balance between the economic and climatic components of shipping. In 2015, the Russian Ministry for the Development of the Far East and Arctic and the National Development and Reform Commission of the People's Republic of China signed a cooperation agreement on the Northern Sea Route. In 2019, an agreement was signed between NOVATEK, China COSCO SHIPPING Corporation Limited, Sovcomflot, and the Silk Road Fund to establish the Maritime Arctic Transport enterprise [7]. The company's activities are aimed at creating ice-class tankers and ensuring safe year-round transportation of LNG from the Yamal LNG, Arctic LNG 2, and other ongoing NOVATEK projects, as reported on the portal of Russian Council on International Affairs [6].

According to Rosatom, transit via the Northern Sea Route reached record levels in 2023, with oil being the main cargo, amounting to approximately 1.5 million tons. It is evident that summer navigation brings additional economic benefits from shipments via the Northern Sea Route compared to shipments via the Suez Canal. Furthermore, in 2023, Novatek, the main shareholder of Yamal LNG, delivered approximately 32 cargoes of liquefied natural gas to Asia via the Northern Sea Route, accounting for more than half of the total cargo flow of 36 million tons [8].

Deliveries to Asia via this route can be made not only by Novatek, but also under long-term contracts with other project shareholders, such as China's CNPC and SRF. The Northern Sea Route is also the most cost-effective route for shipping LNG from Yamal LNG to Asia, reducing delivery time to three weeks compared to the traditional five-week route around Europe.

Conclusion

The development of Russia's Arctic zone is a key strategic priority for the state. In order to achieve the goals set, it is necessary to increase the volume of cargo transportation along the Northern Sea Route. This can be ensured by establishing regular routes, building new nuclear-powered icebreakers, and modernizing the infrastructure supporting this logistics corridor. Undoubtedly, human resources are fundamental to securing and developing all stages of energy resource extraction, processing and transportation, and attracting them to such a harsh region is another strategic challenge. Therefore, innovations are primarily being introduced in the area of living and working conditions, since before building new advanced technological enterprises, it is necessary to prepare and attract highly qualified personnel to the region and provide comfortable conditions for the "creative process" of developing innovations and unique solutions. Although the oil and gas industry itself can be characterized as fairly traditional, when it comes to the Russian Arctic, the innovative aspect lies precisely in ensuring that such well-established processes are carried out in harsh climatic and landscape conditions at the usual competitive speed and with the required quality. Ensuring the year-round operation of the Northern Sea Route in the future is im-

[6] White paper: China's Arctic Policy: jan. 26, 2018. *The State Council Information Office of the People's Republic of China*. URL: http://english.www.gov.cn/archive/white_paper/2018/01/26/content_281476026660336.htm (accessed 02 June 2023).

possible without the continuous improvement of the icebreaker fleet through domestic technologies and cooperation with specialists from friendly countries.

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Risk Management in Planning and Implementation of Oil and Gas Field Development Projects in the Northern Seas

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Abstract. Onshore hydrocarbon reserves are becoming less significant every day due to their depletion and the increasing complexity of extraction. In this regard, more and more attention is being paid to offshore projects, which are becoming a key area of oil and gas industry development. Despite the complexities of offshore hydrocarbon field development, including high costs, environmental risks and technological challenges, oil and gas companies continue to actively invest in the development of offshore extraction techniques and technologies. All stages of offshore field development involve a number of risks, such as harsh climatic conditions, technical accidents and environmental threats. Experts are trying to identify the most effective options for development, further field exploitation and the design of production gathering and processing systems. This is especially true in northern regions, where the harsh climate and remoteness of infrastructure require a special approach. In such conditions, the probability of error should be minimized, which is why it is essential to analyze the potential risks of a shelf development project. This paper presents an assessment of existing global practices for evaluating and identifying the risks faced by oil and gas companies when selecting onshore and offshore field development projects.
Keywords: *risk, offshore, oil and gas fields, risk management*

Introduction

Currently, proven hydrocarbon reserves worldwide are depleting every year. Renewable energy sources and hydrogen energy are growing in popularity, but interest in offshore deposits remains at the same level. The global trend is towards the gradual shift of hydrocarbon production from the continent to the shelf, where large quantities of hydrocarbons are located [1, Avilova V.V., Gusarova I.A., Sagdeeva A.A. et al., pp. 328–330]. Offshore fields are characterized by excellent geological and filtration-capacity characteristics of reservoir rocks, as well as the physical and chemical properties of the fluids that saturate them, but the development and operation of such fields requires large capital investments due to the specific location and the peculiarities of the technologies involved. Despite these drawbacks, oil and gas companies are increasingly investing in the development of technologies for the operation of offshore fields.

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The goal of the study is to conduct a comprehensive analysis of risk management methods in the planning and implementation of oil and gas field development projects in the northern seas, taking into account technological, economic and environmental factors. The study aims to identify and systematize factors that could negatively affect the efficiency of field development, as well as to justify the need to develop and implement measures to minimize potential threats.

Within the framework of the defined objective, the following research objectives have been formulated:

- identify and classify the key risks arising during the development of oil and gas fields in the northern seas, including socio-environmental, production-technological, economic, and geological aspects;
- analyze methods of risk assessment and management in the oil and gas industry with a focus on the specifics of offshore projects, as well as identify the most effective methods and technologies for minimizing negative factors;
- substantiate the need to integrate a risk management system into the process of planning and implementing field development projects, thereby increasing the reliability and sustainability of capital-intensive offshore projects.

Research methodology

Offshore field development projects are more costly than onshore ones. Thus, there is increasing attention to potential risks, particularly during the exploration and construction phases, as the slightest oversight can significantly affect the project's profitability. In most cases, oil and gas industry projects are divided into smaller ones, which in turn consist of smaller tasks. By solving these tasks, companies are able to minimize or completely avoid most of the risks and increase the efficiency of the entire project [2, Mojarad A.A.S., Atashbari V., Tantau A., pp. 626–638].

The main methodological approach used in this work is system analysis, which makes it possible to consider the processes of developing offshore oil and gas fields in the northern seas as a complex system comprising technical, economic and environmental components. This approach allows for the identification of interrelations between various risk factors and the determination of the most significant ones.

Comparative analysis was used to evaluate global and domestic risk management practices in oil and gas field development, as well as to identify the optimal tools and strategies for minimizing risks in the northern seas.

In addition, the study relied on expert assessments and scenario analysis, which allowed for the modeling of potential risks and forecasting their impact on the economic and technological parameters of field development.

In order to describe the research methodology, the work process was divided into seven main stages:

- Stage 1 — the research goal and objectives were defined;

- Stage 2 — in order to define the scope of the study, a search for sources was conducted to examine risk management methods arising during the creation of oil and gas projects. The criteria for selecting articles during stage 2 are presented in Table 1;

Table 1

Criteria for selecting articles during stage 2

Search query criteria	Content
Database	Scopus
Article types	Scientific articles, conference proceedings, books
Search string	"Risk management" AND ("Oil" AND "Gas")
Search time limits	The criterion for most of the literature searched was the period from 2020 to 2025. Sources published before 2020 were also analyzed.
Selection procedure	Relevance was determined on the basis of keyword matching

- Stage 3 — based on the results of the literature search and analysis conducted in Stage 2, sources with the most frequently mentioned risk management methodologies in the oil and gas industry were identified;
- Stage 4 — a list of sources with information on existing risk management methods for oil and gas projects, identified in the literature in Stage 3, was compiled. Table 2 shows the criteria for selecting publications during stage 4;

Table 2

Criteria for selecting articles during stage 4

Search query criteria	Content
Database	Scopus
Article types	Scientific articles, conference proceedings, books
Search string	("Risk assessment" OR "Risk Analysis" OR "Risk management") AND "Offshore" AND ("Oil" AND "Gas")
Search time limits	The criterion for most of the literature searched was the period from 2020 to 2025. Sources published before 2020 were also analyzed.
Selection procedure	The highest number of citations

- Stage 5 — the main risk management methods for offshore oil and gas projects in the northern seas were identified. The most common risks faced by companies during project design were also identified;
- Stage 6 — the risk management methods used and the risks themselves were summarized (Table 3);
- Stage 7 — the experience of applying risk management methods was annotated, and ways to minimize the risks of offshore projects in the northern seas were proposed.

The analysis shows that the predominant group of risks is focused on the socio-environmental and technical aspects of offshore oil and gas field development. The frequency of risk mentions by category is shown in Figure 1.

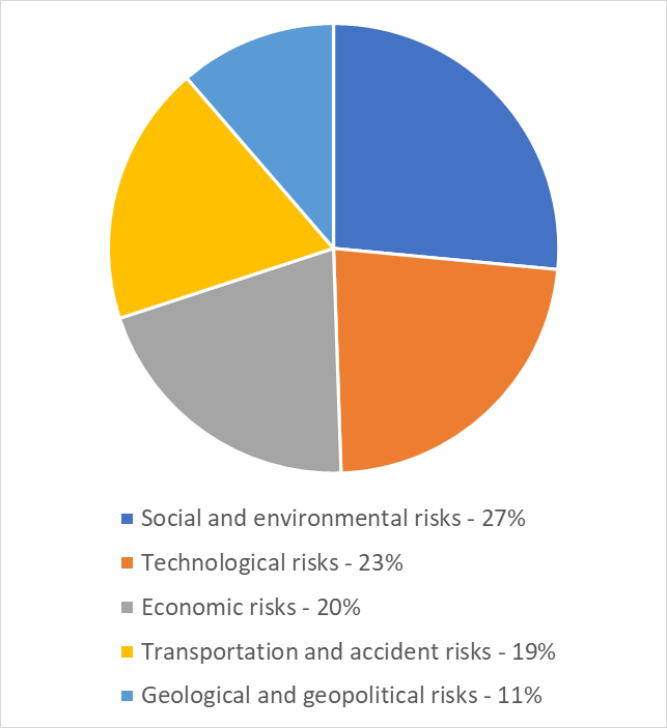

Fig. 1. Frequency of risk mentions in descriptions of offshore oil and gas projects.

As a result of the research, the main potential risks were divided into seven key groups. The results are presented in Table 3.

Table 3

Potential risks of offshore oil and gas field development

Area of risk occurrence	Potential risks
Social and environmental	• Possibility of indigenous settlements being located at the proposed site of production facilities; • Risk of various technogenic disasters; • Environmental pollution; • Loss of biodiversity; • Climate change
Production and technological	• impact of corrosion, erosion and biological fouling on equipment; • Problems with integrating new technologies and insufficient system reliability; • Equipment shutdown due to external factors (fish migration, earthquakes, weather conditions, etc.); • Shutdown of the technological process due to failure of high-tech underwater equipment modules
Collection and preparation	• Significant distance from the nearest settlements and roads; • Risk of disaster in areas with high seismic activity; • Risks of damage to the coastal section of pipelines by ice floes or exposure of pipelines due to erosion; • Significant impact of unstable climate on technological processes
Economic	• Significant increase in necessary investment due to poor analysis of factors affecting the project; • Probability of increased investment at each stage of oil and gas project implementation; • Instability of oil and gas prices; • High cost of accident response
Pipeline transport of	• Risk of technogenic disaster due to damage of pipelines;

products	• High hydraulic losses of pumped products; • Artificial threats caused by human activity (intentional and unintentional); • Probability of the pumped product solidifying
Water transport of products	• Risk of a technogenic disaster due to hydrocarbon spills; • Probability of product delivery after the deadline due to congestion or blockage of sea routes, ice conditions, etc.; • Lack of available vessels for transporting raw materials; • Risk of high wear and tear, breakdown of vessels due to harsh climate
Geological	• Errors in assessing the characteristics of extracted raw material reserves; • Inability to discover, develop and equip new economically promising deposits; • Probability of emergencies in the absence of information about hazardous external factors

Risk analysis

Social and environmental risks

Environmental risks can arise at any stage of a project, from continental shelf exploration to industrial hydrocarbon production. The threat of disrupting the ecological balance of the Arctic ecosystem includes a variety of effects that can be observed in the following areas:

- impact on the atmosphere, the main causes of which are exhaust emissions from ship engines and other equipment, gas burned in flare units, excessive heat release from technological installations, and oil vapor emissions during extraction and tanker loading [3, Årstad I., Aven T., pp. 114–121];
- impact on the hydrosphere is manifested in the risk of water pollution with fuel and lubricants during the installation and operation of equipment, field development and drilling of wells, as well as in emergency situations caused by pipeline leaks, or during the loading or unloading of hydrocarbon raw materials on tankers [4, Grubesic T.H., Nelson J.R., Wei R.];
- impact on marine flora and fauna: during the development of offshore fields, human intervention may cause disruption to the terrain due to the installation of fixed platforms with concrete foundations or any other hydraulic structures on the seabed; the discharge of waste, drilling fluids or other technical fluids into the water, leading to the death of marine life; physical impacts, such as temperature conditions unusual for these places, industrial noise and vibration [5, Barker V.A., Cowan J.H., pp. 153–166].

Potential sites for onshore facilities, such as coastal processing complexes or product preparation facilities, may be occupied by indigenous communities or their sacred sites. This could lead to conflicts of interest. In addition, emissions of pollutants into the environment could have a negative impact on the health and lives of indigenous peoples.

Thus, it can be concluded that any actions to develop and exploit offshore fields alter the natural state of the environment, which increases the likelihood of risks of unnatural socio-ecological conditions [6, Krausmann E., Girgin S., Necci A.].

Technological risks

Today, Russia's oil and gas industry is a technical complex with a high degree of risk. Raw materials are developed using modern and expensive technologies, in which oil and gas companies invest billions. This is especially true for offshore projects, where innovative solutions are required to meet all safety and efficiency standards for development and further production. That is why offshore projects are closely associated with significant technological risks [7, Zhang Y., Zheng M., An C. et al., pp. 789–803].

Various marine hydraulic structures are used to develop and equip offshore projects, such as fill areas and trestles, various types of platforms, and subsea production complexes (hereinafter referred to as SPC), which are capable of performing all necessary operations [8, Bondarenko L.A., Apollonskiy A.O., Tsunevskiy A.Ya.], as well as withstanding external weather and natural conditions.

In the current reality, the development of offshore fields located in the northern seas is complicated without the use of foreign equipment, since Russian companies do not have as much experience in the design and development of SPC as their Norwegian and American colleagues [9, Ilinova A., Solovyova V., Yudin S., pp. 1349–1355], or in the construction of platforms, compared to their Korean counterparts [10, Kim Y.H., Park J.S., Shin H.C. et al., pp. 208–216].

It is worth mentioning that during the development of fields whose operation involves the construction of offshore platforms, such as the Prirazlomnoe oil field or the Shtokman gas condensate field, foreign companies such as Baker Hughes, Halliburton, Schlumberger, and Aker Solutions participated in the supply of equipment [11, Baranov D.N., pp. 908–910; 12, Monokin E.N., pp. 451–464]. Currently, the only field in Russia that is being developed using the SPC is the Kirinskoe gas condensate field, which is located about 30 km from the coast and at a depth of about 100 m below the seabed. However, it should be noted that the main equipment for the development of the Kirinskoe field was supplied by the foreign company Food Machinery and Chemical Technologies (FMC Technologies, now TechnipFMC). The Yuzhno-Kirinskoe field, located about 60–70 km from the coast and at a depth of about 200 m, is also currently under development. The exploitation of this field similarly involves the use of SPC, but the introduction of sanctions against the Russian Federation and the departure of foreign companies complicated the development of the field. Extremely low temperatures, strong winds, snowfalls, fogs, frosts, polar nights — all these factors hinder the work of the oil and gas industry in the region and lead to problems in overcoming the impact of these harmful conditions [13, Kudelkin N.S., pp. 74–84].

Collection and preparation system

The design of hydrocarbon collection and preparation systems is an important part of oil and gas projects.

Offshore fields in the northern seas are located in areas with unfavorable weather and hydrometeorological conditions, which requires careful selection of the site at the planning stage of the collection and preparation system. Swampy areas, permafrost, and high seismic activity in the area under consideration significantly increase the cost of construction.

It is also important to note the high risk of disasters, which requires oil and gas companies to make additional plans for road communications, air transport infrastructure, etc.

Another significant factor is the risk of accidents due to human error. Low employee qualifications, disregard for safety procedures and rules for various types of work in production can lead to equipment failure or more serious consequences.

Economic risks

The development and exploitation of fields on the Russian Arctic shelf require significant investments due to the high capital intensity of the project, which is several times higher than similar costs for developing onshore fields. For example, the Prirazlomnoe field project, according to its technical and economic feasibility study, may require capital investments of up to 42% of the total cost of field development [14, Shkatov M.Yu., pp. 170–174].

Investing in such capital-intensive projects is associated with certain risks, which may be due to both natural factors and the specifics of geological exploration [15, Shigapova R.R., pp. 68–74]. The conditions for developing and constructing fields on the northern sea shelf also play a role. These risk factors influence various investment assessment elements: the amount of investment, the expected revenue, the project implementation timeframe, and the discount rate [16, Voronina E.P., p. 159–168].

Transportation risks

Transporting hydrocarbon raw materials from offshore fields is a significant challenge, as the considerable distance from populated areas, ice conditions (in the case of northern seas), and other weather and natural conditions create additional difficulties. It is also worth noting the insufficient armament of the Russian fleet, the lack or complete absence of tankers, as well as poorly developed transport routes and undeveloped ports. All of this is due to a lack of experience in this area of the industry.

When it comes to pipeline transportation of products, the main factors to consider are the terrain, depth of deposits, volume of expected product transportation, and other technological parameters determined at the field design stage [17, Sotoodeh K., pp. 210–219; 18, Seyyedattar M., Zendehboudi S., Butt S., pp. 2147–2189].

When exploiting northern offshore fields, pipeline transportation of extracted raw materials depends on another issue: the presence of thick ice at the interface between the water and land, which exerts varying compressive loads. The average duration of ice presence on the water surface in the Sakhalin shelf area is 160 to 210 days, and the maximum ice thickness reaches 314 cm [19, Bai Y., Bai Q., pp. 299–313]. Ice formation challenges are driving designers to improve strength and operational reliability by applying or creating innovative technologies and structural materials [20, Adumene S., Ikue-John H., pp. 153–168].

Geological risks

Currently, the geological and geophysical results of studies of Russia's Arctic shelf remain relatively low and very uneven. The oil and gas potential of the Arctic shelf can be divided into two groups: the first group includes hydrocarbon reserves and resources on the Western Arctic shelf (the Barents and Pechora seas, as well as the southern Kara seas), which are fairly well studied. The second group includes hydrocarbon resources in the northern Kara Sea and the East Arctic seas (the Laptev, East Siberian, and Chukchi seas), which are poorly studied [21, Grigorenko Yu.N., Margulis L.S., Novikov Yu.N. et al., p. 19].

Geological exploration of the region where the deposit is expected to be located is the basis for starting to design the development of the deposit. Insufficient geological research may be caused by complex natural and climatic conditions, as well as the high cost of work carried out in this area. These reasons explain the emergence of risks at one of the most important stages of offshore oil and gas project development [22, Longxin M.U., Zhifeng J.I.].

New deposits are most often discovered in regions that have already been well studied. In such areas, the characteristic sizes and features of the deposits are already known, a quantitative assessment of resources has been carried out, and the first commercial discoveries have been made. However, the necessary research is associated with increased labor costs and geological risks at all stages of exploration [23, Berdnik M.M., pp. 46–49].

Table 4 lists the potential causes and consequences of potential risks in oil and gas projects in the northern seas. These risks are primarily related to the environment or weather, which are beyond human control. However, a mitigation plan can be developed to reduce the damage from these risks.

Table 4

Potential causes and consequences of risks in oil and gas projects in the northern seas

Area of risk occurrence	Cause	Consequences
Social and environmental	• Emissions of pollutants into the atmosphere; • Disruption of ecosystems as a result of mass deforestation or landscape changes; • Possible presence of indigenous communities in the territory under consideration	• Long-term environmental consequences, such as ecosystem destruction; • Loss of biodiversity in the development area; • Environmental disasters (oil spills, water pollution);

		• Cultural and social changes in communities
Production and technological	• Harsh climatic and meteorological conditions for equipment operation in northern sea areas; • Insufficient technological capabilities; • Lack of standardization and a unified approach to equipment design	• Halting of the technological process due to equipment failure; • Interruptions in the production process due to external factors (fish migration, earthquakes, etc.); • Restrictions and unscheduled stoppages in work due to the presence of ice on the surface of the water area; • Increased frequency of scheduled equipment maintenance
Collection and preparation	• High seismic activity in the area; • Adverse weather and hydrometeorological conditions; • High equipment wear and tear; • Human factor; • Lack of modern technologies and technical solutions	• Destruction of facilities during earthquakes; • Failure to meet project deadlines for infrastructure construction contracts; • Increased costs for equipment repair and accident prevention; • Increased costs for equipment repair and modernisation; • Long-term downtime at facilities
Economic	• Instability of economic legislation; • Volatility of investment conditions; • Fluctuations in energy prices; • Changes in tax and fiscal policy; • Inaccessibility or high cost of credit; • Rising labor costs	• Decreased competitiveness; • Inability to attract necessary investments; • Increased financial costs; • Liquidity risks; • Increased project payback period
Pipeline transport of products	• Limited experience in offshore pipeline construction; • High dependence on local conditions; • Remoteness from populated areas; • Insufficient infrastructure for pipeline maintenance and repair in remote areas	• Damage caused by soil subsidence during freezing and thawing; • Probability of damage to pipelines by fishing vessels or ice floes; • Destruction of integrity due to high seismic activity; • Irreparable damage to the environment in the event of an accident; • Increased labor costs for the construction of main pipelines
Water transport of products	• Limited experience and high cost of developing offshore shipping infrastructure for hydrocarbon transport, including shortage of vessels; • Long ice period; • Low throughput capacity of ports and shipping routes	• Damage to vessels and structures due to ice impact; • Disruptions of product shipment and delivery within the specified time frame; • Seasonal maintenance of navigable waterways; • Emergencies and spills of transported products
Geological	• Insufficient geological research; • Inaccuracy of geological survey results; • Technological limitations in	• Lack of sufficient justification for the development of economically promising fields; • Emergency situations due to insufficient data on hazardous external

	geological exploration; • Inability to conduct detailed surveys due to difficult climatic conditions	conditions; • Delays in the design and implementation of development

Risk management methods

After identifying the most probable risks, a search was conducted for suitable preventive measures, management methods, and ways to eliminate and minimize the consequences. The results of the analysis of management methods are presented in Tables 5 and 6.

Table 5

Risk management methods that address the cause

Area	Cause	Management methods
Social and environmental	• Emissions of pollutants into the atmosphere; • Disruption of ecosystems as a result of mass deforestation or landscape changes; • Possible presence of indigenous communities	• Environmental damage liability insurance; • Legal regulation of environmental safety and corporate responsibility; • Introduction of environmentally friendly technologies; • Creation of zones for environmentally safe waste disposal; • Real-time monitoring of environmental changes
Production and technological	• Harsh climatic and meteorological conditions for equipment operation in northern sea areas; • Insufficient technological capabilities; • Lack of standardization and a unified approach to equipment design	• Insurance against technogenic accidents and disasters in areas such as construction and installation, equipment malfunctions and breakdowns, electronic equipment, mobile equipment (including drilling equipment), engineering structures (piers, dams); • Preventive measures to reduce external loads; • Transfer of risks to contractors and partners
Collection and preparation	• High seismic activity; • Adverse weather and hydrometeorological conditions; • High equipment wear and tear; • Human factor; • Lack of modern technologies and technical solutions	• Insurance of liability for damage to third parties and environment; • Seismic and weather monitoring and warning systems; • Modernization of equipment and staff training
Economic	• Instability of economic legislation; • Volatility of investment conditions; • Fluctuations in energy prices; • Changes in tax and fiscal policy; • Inaccessibility or high cost of credit; • Rising labor costs	• Insurance of investments against depreciation; • Choosing of stable investment areas; • Hedging to protect against currency fluctuations and inflation; • Long-term planning taking into account economic risks
Pipeline transport of products	• Limited experience in offshore pipeline construction; • High dependence on local conditions;	• Introduction of innovative technologies to improve the reliability and durability of pipelines, taking into account high seismic activity

	• Remoteness from populated areas; • Insufficient infrastructure for pipeline maintenance and repair in remote areas	and other natural hazards; • Training and recruiting specialists to work in difficult conditions; • Developing innovative pipeline condition monitoring systems
Water transport of products	• Limited experience and high cost of developing offshore shipping infrastructure for hydrocarbon transport, including shortage of vessels; • Long ice period; • Low throughput capacity of ports and shipping routes	• Transport insurance (casco, cargo) to cover losses from accidents and damage to vessels; • Construction and development of port and shipping infrastructure; • Cooperation with experienced contractors for the operation of transport infrastructure
Geological	• Insufficient geological research; • Inaccuracy of geological survey results; • Technological limitations in geological exploration; • Inability to conduct detailed surveys due to difficult climatic conditions	• Reduction of the tax base by the amount spent on geological exploration; • Compensation of investors' costs for geological exploration under the PSA regime; • State financing of geological exploration and setting the cost of licences for deposits; • Introduction of new technologies for geological exploration; • Coordination of regulations at the international level

Table 6

Risk management methods that address the consequence

Area	Consequences	Management methods
Social and environmental	• Long-term environmental consequences, such as ecosystem destruction; • Loss of biodiversity in the development area; • Environmental disasters (oil spills, water pollution); • Cultural and social changes in communities	• Investment in the clean-up and restoration of contaminated areas; • Development and implementation of ecosystem restoration programs; • Raising awareness and educating the public and employees; • Programs to support and engage with indigenous communities
Production and technological	• Halting of the technological process due to equipment failure; • Interruptions in the production process due to external factors (fish migration, earthquakes, etc.); • Restrictions and unscheduled stoppages in work due to the presence of ice on the surface of the water area; • Increased frequency of scheduled equipment maintenance	• Development and implementation of systems to monitor the condition of equipment and operating conditions; • Creation of backup capacity and equipment; • Investments in technological upgrades and modernization of equipment
Collection and preparation	• Destruction of facilities during earthquakes; • Failure to meet project deadlines for infrastructure construction contracts; • Increased costs for equipment	• Creation of funds or backup capacity for infrastructure restoration; • Use of earthquake-resistant structures and technologies; • Implementation of automatic control and diagnostic systems

	repair and accident prevention; • Increased costs for equipment repair and modernisation; • Long-term downtime at facilities	
Economic	• Decreased competitiveness; • Inability to attract necessary investments; • Increased financial costs; • Liquidity risks; • Increased project payback period	• State subsidies and incentives; • Financial restructuring; • Attracting strategic partners; • Regular adjustment of investment plans in response to changes in the economic situation
Pipeline transport of products	• Damage caused by soil subsidence during freezing and thawing; • Probability of damage to pipelines by fishing vessels or ice floes; • Destruction of integrity due to high seismic activity; • Irreparable damage to the environment in the event of an accident; • Increased labor costs for the construction of main pipelines	• Development of emergency plans and response systems; • Preparation of reserve capacity for rapid restoration of damaged areas; • Creation of ecosystem buffers to minimize environmental risks
Water transport of products	• Damage to vessels and structures due to ice impact; • Disruptions of product shipment and delivery within the specified time frame; • Seasonal maintenance of navigable waterways; • Emergencies and spills of transported products	• Limitation of risk sources through the development of an oil transportation scheme (from the field to the port); • Training and preparing crews to work in difficult climatic conditions; • Equipping vessels for operation in ice conditions
Geological	• Lack of sufficient justification for the development of economically promising fields; • Emergency situations due to insufficient data on hazardous external conditions; Delays in the design and implementation of development	• Transferring costs to other activities to diversify risks; • Creating consortia of several investors to spread risk; • Flexibility in design and planning; • Creating back up options and alternative plans

The risk management methods described above are applicable in the oil and gas industry, but their effectiveness depends on a variety of factors: companies' financial capabilities, technological level, regulatory environment, and staff training.

Insurance against environmental and technogenic risks, for example, is faced with high costs and a limited supply of insurance products for Arctic projects. Sanctions exacerbate the problem by narrowing the range of international insurers. Domestic alternatives are not yet able to fully replace imported counterparts, which slows down the implementation of innovations.

Environmental monitoring is technically feasible, but in remote areas it requires reliable communications and power supply. Programs for engaging with indigenous communities are often formal, which provokes conflicts.

Technological methods, including seismic-resistant structures or automatic equipment control, require expensive infrastructure. The icebreaker fleet and ports of the Northern Sea Route are developing, but they are insufficient for year-round operation.

Thus, most methods are applicable, but require adaptation. The key issues are dependence on imports, insufficient infrastructure funding, and a formal approach to social aspects.

Current situation

Today, Russian companies involved in the development of offshore fields in the northern seas face a number of specific problems and risks. The most obvious group of risks is environmental one, since offshore fields are located in special ecosystems, and the negative impact of production facilities can cause irreparable damage to the entire planet.

Russia has adopted a federal law regulating the liability of companies engaged in the exploration, production and transportation of oil and gas. It aims to reduce the risks of environmental pollution in the oil and gas industry. According to the law, offshore operators are required to develop plans to prevent and eliminate oil and petroleum product spills, as well as the necessary measures mitigate any negative impact on the environment [24, Sobol A.V., Gorodnichnaya A.N., Yumaguzina S.R., pp. 51–53]. This law stimulated companies to analyze potential environmental risks more thoroughly and to minimize the possibility of disasters.

It is also important to highlight the technological and operational areas of risk, as they are fundamental to the implementation of the enterprise's work process. The development of deposits in the northern seas requires the use of modern technologies and equipment designed to operate in the harsh conditions of the northern seas. Furthermore, operations involving transportation, equipment maintenance, personnel delivery to the work site, etc., are complicated by short ice-free period, as well as harsh weather and hydrometeorological conditions.

The withdrawal of foreign companies supplying and servicing SPCs, as well as those willing to cooperate in the creation or transfer of other hydraulic structures, has led Russian oil and gas companies to develop their own SPCs. It is currently known that Almaz-Antey Concern has prototypes of production subsea head and supplies some subsea equipment to Gazprom [1].

The current political situation, coupled with Russia's energy strategy until 2035 [2], necessitates integrating a risk management system into offshore field development projects in the northern seas. Correctly identified risks and methods of managing them will allow oil and gas companies to mitigate the impact of these risks on the economic performance of the project.

[1] Energy Offshore Gazprom and Almaz-Antey seal subsea equipment deal — Subsea World News, February 18, 2019 – November 13, 2024. URL: https://www.offshore-energy.biz/gazprom-and-almaz-antey-seal-subsea-equipment-deal/ (accessed 11 January 2025).

[2] Mitrova T., Yermakov V. Russia's Energy Strategy-2035: Struggling to Remain Relevant. 2019. URL: https://www.ifri.org/sites/default/files/migrated_files/documents/atoms/files/mitrova_yermakov_russias_energy_strategy_2019.pdf (accessed 11 January 2025).

Conclusion

The industrial development of offshore hydrocarbon deposits is associated with a number of specific risks, which, in turn, require comprehensive methods for their assessment, minimization and control. These risks range from technological and environmental to human factors, each with its own characteristics and consequences. One of the most challenging aspects is the impact of human factor, which remains one of the main causes of accidents, despite advances in automation and technology.

Based on the analysis of risks and their management methods in the context of offshore field development in the northern seas, the following conclusions can be drawn:

- Increased sanctions pressure and dependence on imported technologies require the accelerated development of domestic innovative solutions, including the creation of Arctic-resistant SPCs;
- Environmental risks, such as oil spills and biodiversity disruption, justify the need to integrate automated monitoring systems and expand programs for interaction with indigenous communities;
- Challenging climate conditions and transport restrictions highlight the importance of developing Arctic shelf infrastructure, including icebreaker fleets and port facilities. These measures will increase the reliability of projects in the face of growing geopolitical and natural challenges.

Reducing risks in offshore field development requires not only highly qualified specialists, but also the implementation of innovative technologies that will enable more accurate prediction and control of potential hazards. The most important risk management tools include a systematic approach to design, the use of modern modeling and analysis methods, and the continuous improvement of control and emergency response systems.

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Basic Income as a Measure of Social Support in the Arctic Regions of the Russian Federation: Statement of the Problem

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Abstract. The Arctic zone of the Russian Federation is one of the most promising resource and logistics regions of the state. A significant challenge to its development is the low population density, which hinders the development of necessary infrastructure and the implementation of such crucial geopolitical projects as the Northern Sea Route. The existing social support system in the Arctic regions appears to be insufficient to retain and attract people to permanent residence in the Arctic zone of the Russian Federation. One of the universal tools for expanding social support in the Arctic regions of Russia could be a universal social payment program, which is essentially similar to the concept of "basic income". The author examines the successful application of the basic income concept from a socio-demographic point of view in the US state of Alaska, where permanent residents receive annual payments from the Alaska Permanent Fund. The author proposes a mechanism for implementing universal social payments in the Arctic regions of Russia, as well as the legal conditions for receiving such payments. Among the conditions for receiving universal social payments, the author highlights the following: Russian citizenship, permanent residence in the Arctic regions, children attending schools at the place of registration in the Arctic regions, annual medical examinations, participation of unemployed able-bodied citizens in professional retraining programs, and participation of unemployed able-bodied citizens in socially useful activities. The author points out possible grounds for the deprivation of universal social payments, such as the commission of a criminal offense, repeated administrative violations related to the circulation and use of alcohol and drugs.
Keywords: *social support, basic income, universal social payment, labor resources, Arctic regions*

Introduction

The Arctic regions play a crucial role for modern Russia. The Arctic contains significant reserves of oil, natural gas, nickel, copper, diamonds and other minerals, making it strategically important for Russia's sustainable development. From the perspective of technological and economic cooperation with Asian countries, the development of the Northern Sea Route through the Arctic is a priority for Russia, as it is intended to serve as a national transport corridor between the world's major regions.

The Arctic regions are important for Russia from geopolitical, resource, transport, and economic perspectives, necessitating the development of these territories, including in light of their growing demographic potential. Currently, the Arctic regions, which cover 5.5 million km^2 (30% of the total territory), have a population of only 2.5 million people (1.6% of the total population) [1]. At

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[1] Ovcharova L.N. Demographic and social landscape of the regions of the Arctic zone: dynamics of key indicators and development reserves. URL: https://stratpro.hse.ru/social-policy/news/927512655.html (accessed 28 January 2025).

the same time, as noted in studies, the Arctic regions of Russia are characterized by spatial differentiation of economic activity, and harsh conditions and remoteness hinder their development [1, Baklanov P.Ya., Moshkov A.V., p. 49]; population migration to Russian Arctic regions, deprived of quality living conditions, is of crucial importance for the future development of the Northern Sea Route [2, Shaparov A.E., Sokolova F.K., Magomedov A.K. et al.]; attracting human capital to the Arctic regions of Russia requires significant government participation and the implementation of successful government programs [3, Simonchuk V.D., Nikulina A.Yu.].

In 2020, the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 was approved by Decree of the President of the Russian Federation [2]; in 2021, the Russian Government adopted the state program Socio-Economic Development of the Arctic Zone of the Russian Federation [3]. One of the program's implementation areas is the creation of conditions for the sustainable socio-economic development of the Arctic zone of the Russian Federation, including by improving the quality of life of residents of the Arctic regions. The program also envisages the creation of additional jobs in the Arctic, which requires attracting labor forces to the Russian Arctic.

Achieving these goals requires the implementation of broad social support measures for residents of Russia's Arctic regions. One such promising measure, which could cover the entire population of the Russian Arctic, attract new specialists and their families from other regions of the Russian Federation, and stimulate the socio-economic development of the Arctic zone, is a *basic income* as a universal social payment that does not depend on a citizen's participation in labor activity. As a scientific theory, the concept of *basic income* presents the following social model: every citizen of the state, regardless of whether they work or not, should be guaranteed a minimum monetary standard that will cover the costs of meeting basic physiological and social needs [4, Novikov D.A., p. 102]. In this study, we will attempt to determine the extent to which the concept of basic income is substantiated, tested, and applicable to implementation in a social support mechanism for residents of Russia's Arctic regions.

The concept of basic income: from utopia to practice

The first outlines of the concept of basic income can be found in the socio-political treatise "Utopia" (1516) [5] by the English philosopher and statesman Thomas More. Using the example of a fictional city-state, he justified the need to implement a minimum material support for citizens as a preventive measure against theft, which people without means of subsistence are forced to commit. Two and a half centuries later, the French mathematician and philosopher Marquis de Condorcet proposed a system of social insurance against the risks of poverty in his work "Sketch

[2] Decree of the President of the Russian Federation of October 26, 2020 No. 645 "On the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035". URL: http://www.kremlin.ru/acts/bank/45972 (accessed 28 January 2025).

[3] Resolution of the Government of the Russian Federation of March 30, 2021 No. 484 "On Approval of the State Program of the Russian Federation 'Socio-Economic Development of the Arctic Zone of the Russian Federation'". URL: http://pravo.gov.ru/proxy/ips/?doc_itself=&backlink=1&nd=602136938&page=1&rdk=0#I0 (accessed 28 January 2025).

for a Historical Picture of the Progress of the Human Mind" (1769) [6]. According to the author, technological progress should make it possible to level economic inequality, at least in terms of access to minimum benefits.

At the end of the 19th century, American researcher Edward Bellamy in his work "Looking Backward" (1888) [7] predicted that in 2000, people would receive a minimum subsistence allowance from the state, which would include food, protection, education and healthcare. French philosopher Charles Fourier in his book "The False Industry" (1836) wrote that the state is obliged to provide each citizen with a minimum income as compensation for the loss of direct access to natural resources [8, Scherer R.]. Fourier's follower, Belgian lawyer Joseph Charlier, in his study "The Solution of the Social Problem or a Humanitarian Constitution Based on Natural Law and Prior to the Statement of Reasons" (1948) [9], argued that the only way to equalize people's rights was to introduce a basic income paid quarterly or monthly to everyone, regardless of their need or ability to work. Fourier and Charlier were convinced that the introduction of a basic income should not weaken the motivation to work. According to Fourier, work should be made as attractive as possible, and only then one can be sure that the minimum income received by the poor will not contribute to their parasitism.

These authors present the concept of basic income as an element of an ideal social order, embodying ideas of equality and justice, largely social-utopian. It should be noted that in modern studies, the concept of basic income is sometimes presented in precisely this way. Greek economist Yanis Varoufakis pointed to the need for a universal right to income from capital through the implementation of unconditional payments, which would provide a new understanding of freedom and equality [4], while Belgian philosophers P. Parijs and Y. Vanderborght consider basic income as a means of achieving human freedom and justify the importance of providing each person with the resources to shape their life according to their own choice [10, Van Parijs P., Vanderborght Y.].

However, the concept of basic income can (and, given scientific methodology, should) be understood more realistically within a pragmatic paradigm. One of the first to describe the potential practical implications of implementing a basic income was the Anglo-American politician and philosopher Thomas Paine, who, in his work "Agrarian Justice" (1797) [11], proposed paying 15 pounds per year to every citizen who had reached the age of 21 and 10 pounds to every citizen over 50 years old. Paine linked the need for such payments to the landlessness of most US citizens, and their financing — to land rent, which landowners would have to pay into a single national fund.

In the 1920s, the British engineer Clifford Douglas proposed a social credit model, essentially similar to the concept of a basic income. In his study "Social Credit" (1924) [12, Douglas C.H.], Douglas developed the idea of social credit: instead of conventional lending, so-called social credit

[4] Varoufakis Y. The Universal Right to Capital Income. URL: https://www.project-syndicate.org/commentary/basic-income-funded-by-capital-income-by-yanis-varoufakis-2016-10/ (accessed 28 January 2025).

should perform the function of evenly distributing funds among all members of society. According to Douglas, national dividends should be distributed equally among all citizens in the form of interest-free loans to help bridge the gap between purchasing power and prices, and a new price adjustment mechanism, which Douglas called "just price", would reduce prices for consumers. This idea was continued by the English economist Joan Robinson, who in her book "The Economics of Imperfect Competition" (1933) [13] put forward the concept of a social dividend, which was viewed as a way to provide the poor with the opportunity to increase their purchasing power. The English socio-economist Robert Theobald, in his study "The Guaranteed Income: Next Step in Economic Evolution?" (1966) [14], also emphasized the need to support consumer demand and proposed the introduction of an "economic floor", that is, a basic income that all citizens should be provided with.

In the second decade of the 21st century, amid the rapid acceleration of global capitalism's problems, British economist G. Standing, in his book "Basic Income: And How We Can Make It Happen" (2017), offers a renewed understanding of the concept of basic income from a pragmatic perspective. The scholar writes that "in the modern world, wages — that is, the income a person receives in exchange for actual labor activity — are growing, if at all, extremely slowly. Meanwhile, income received through non-labor activity — such as rent, intellectual property, and financial assets — is growing steadily. This disproportion exacerbates the growth of inequality." [15, Standing G., p. 20] The scholar believes that the introduction of a basic income should change the situation. Among other things, he justifies the need to replace state social programs with a basic income by eliminating them, since the market economic model can no longer afford to support them in view of the increasingly frequent global financial crises. According to G. Standing, a basic income should become a universal tool for providing a minimally adequate living standard for a significant portion of the population who lost their ability to earn a living due to widespread automation and computerization of production.

A predominantly pragmatic approach was taken by the organizers of basic income experiments, which began in the second half of the 20th century. The aim was to find solutions for "adapting the capitalist system to the increasing difficulties of extracting increasing profits, that is, a new form of capitalism transformation (through its optimization, "buying off" workers by paying them a basic income)" [16, Bobkov V.N., Dolgushkin N.K., Odintsova E.V., p. 10]. Such experiments were conducted in Australia, Germany, India, Italy, Canada, Kenya, Namibia, New Zealand, the USA, Finland, South Korea, and other countries. Let us consider the most representative of them.

The first experiment with basic income was conducted by the Australian government in Melbourne from 1972 to 1975. People already receiving social benefits were given an amount equal to 106% of the established poverty level, while others received 50–71% of this level. Canada's basic income experiment, known as Mincome (short for "minimum income"), was conducted from 1974 to 1979 in Dauphin, Manitoba. During the experiment, initiated by the Canadian government, 30% of Dauphin residents received payments, the amount of which depended on the

family's total income and the employment of its members (the amount of payments decreased proportionally to earnings when employment was found). A similar experiment was conducted in the Canadian province of Ontario from 2016 to 2018. From 1998 to 2001, the New Zealand government launched a program of direct cash payments to all citizens of the country. The payment amounted to 123 NZD per week. The Finnish Social Insurance Institution initiated an experiment in which, from 2017 to 2018, 2,000 unemployed individuals aged 25 to 58 began receiving monthly payments of €560 (by the end of the project, 1,869 participants remained in the experimental group). A similar project to provide basic income to citizens participating in social programs was also underway in Italy during the same period. In African countries, such as Namibia (2008–2009) and Kenya (since 2017), as well as in the Indian state of Madhya Pradesh (2011–2013), basic income is paid in agricultural regions. Recent experiments aimed at studying the impact of basic income on social well-being include projects to pay basic income to small groups of citizens in Germany (2021–2024) [5], Scotland (since 2022) [6], and South Korea (2021–2022) [7].

The results of these experiments on the implementation of basic income show generally positive changes in the social well-being of the test subjects: crime rate and suicide rate decreased, physical and psychological health of the poor improved, poverty rate and mortgage repayment periods decreased, demand for local goods and services increased, and work motivation decreased slightly in favor of increased time for education and fulfilling family responsibilities. Moreover, even a small number of citizens participated in the experiment required significant financial investments. In New Zealand, the tax system had to be changed to finance the project, with income tax increasing from 33% to 39%. The Finnish basic income model increased the government deficit by approximately 5% of GDP. It is noted that a basic income, which can guarantee an acceptable standard of living, is "incredibly expensive"; either the level of the basic income is unacceptably low, or the cost of its provision is unacceptably high [17, Kislitsyna O.A., p. 36].

As we can see, the universal and unconditional implementation of a basic income at the national level is highly problematic while maintaining the traditional social security system and is only possible with its elimination or significant reduction. In fact, the payments made during the experiments were not basic, i.e. their nominal equivalent did not cover the minimum subsistence level. These are additional social support measures. An example of such payments can be seen in Iran, where in 2010 citizens began to receive payments as compensation for the cancellation of food and fuel subsidies. Monthly payments, set at 455 thousand rupees, amounted to 15% of the minimum wage. However, in subsequent years, due to sharply accelerating inflation, they lost about two-thirds of their initial purchasing power [18, Kapelyushnikov R.I., p. 13].

[5] Citizens' Basic Income replaces basic income benefits. URL: https://www.bundesregierung.de/breg-en/news/citizens-basic-income-2126300 (accessed 28 January 2025).
[6] Minimum Income Guarantee Expert Group: interim report. URL: https://www.gov.scot/publications/minimum-income-guarantee-expert-group-interim-report/pages/4/ (accessed 28 January 2025).
[7] Do South Koreans want a universal basic income? URL: https://mondediplo.com/2022/02/05korea-box (accessed 28 January 2025).

Thus, the concept of a basic income, initially utopian construct of social thinkers, has also come to be seen as a viable replacement or supplement to the traditional model of social support. Experiments with basic income payments have revealed significant practical challenges to its implementation, primarily related to economic factors (the lack of funds to cover all citizens with payments, as well as their low size, which excludes the characteristic of being basic). However, the impact on the social well-being of citizens receiving basic income as an additional social support measure is generally characterized as positive.

Basic income in the Arctic region of the United States (the example of Alaska)

For Russian Arctic regions, it is most relevant to consider the experience of regional payments in the Arctic region of the United States — the state of Alaska. Some researchers classify these payments as a basic income [19, Zelleke A.; 20, Berman M.; 21, Hoynes H., Rothstein J.; 22, Feinberg R., Kuehn D.].

The Alaska Statehood Act of 1958 granted the new state hundreds of thousands of acres of land previously owned by the US federal government, and the Alaska Constitution mandated the use and development of the state's natural resources for the maximum benefit of its people. The lands chosen by the state included vast oil reserves. In the mid-1970s, oil production began at Prudhoe Bay, the largest oil field in the United States, located on the northern slope of Alaska. Revenues from production, property taxes, and income taxes began flowing into the state budget. These revenues were supplemented by royalties (ownership fees) to the state, as the field was located on state lands acquired from the federal government when Alaska became the 49th state.

However, after the state government quickly spent nearly $900 million that had been allocated to the budget, Alaska's legislature became concerned, firstly, about the rational expenditure of the funds received, and secondly, that heavy dependence on oil revenues during the boom would lead to an undesirable shortfall in funds during the downturn [19, Zelleke A., p. 143].

The solution to the problem was formalized in the form of an amendment to the state constitution, which established the Alaska Permanent Fund (APF). According to the amendment, introduced in 1976, "not less than twenty-five per cent of all mineral lease payments, royalties, proceeds from the sale of royalties, federal mineral revenue sharing payments, and state bonuses shall be placed in a permanent fund, the principal amount of which shall be used only for those income-producing investments designated by law as eligible for investment in the permanent fund. All proceeds from the permanent fund shall be deposited in the general fund unless otherwise provided by law" (Alaska Constitutional Amendment, Article 9, Section 15) [8]. Thus, this amendment required that the fund receives at least 25% of the royalties collected from the sale of all natural resources owned by the state, that the fund invests only in income-producing assets, and that only the fund's revenues, not its principal, could be spent. In addition to the royalty de-

[8] The Constitution of the State of Alaska. The Constitution of the State of Alaska was adopted by the Alaska Constitutional Convention on February 5, 1956. URL: https://ltgov.alaska.gov/information/alaskas-constitution/ (accessed 28 January 2025).

ductions provided by the Constitution, the fund is replenished through legislative appropriations. Each year, funds are contributed to the fund to offset the impact of inflation on the real value of the fund (based on the purchase price rather than the current market value of the assets).

As noted by P. O'Brien and D. Olson, the general purpose of the fund was to diversify Alaska's revenue streams by investing a larger portion of royalties; to ensure that a portion of current revenues would be preserved for future residents; and to limit the discretionary spending of state government officials [23, O'Brien P., Olson D., p. 144]. However, the ultimate purpose of the fund was not clearly defined. The general purpose of the fund as a savings account to prevent all oil revenues from being spent as they are received was agreed upon. The question of what the savings would ultimately be spent on was hardly discussed or agreed upon [9]. In 1980, the Alaska Legislature created the Permanent Securities Corporation to manage the fund, whose assets were invested in a diversified investment portfolio designed to maximize returns rather than invest in Alaska's development.

In 1982, the Alaska Legislature approved the Permanent Fund Dividend Act, which established an annual payment to state residents. The payment is administered by a special department within the state government — the Dividend Division of the Department of Revenue.

The main conditions for receiving the payment are:

- the applicant must be a resident of Alaska for at least one calendar year prior to applying for the payment (green card holders and refugees are also eligible [24, Jones D., Marinescu I., p. 317]. Military personnel and students retain eligibility for the payment even if they were temporarily absent from the state);
- the obligation to submit a written intention to remain in Alaska for an indefinite period. For minor children, who are also eligible for the payment, such intention, as well as the application for the payment, must be submitted by parents or guardians;
- the applicant must not have been convicted of any criminal offences during the year preceding the application. The applicant must also not be incarcerated or serving a sentence for a criminal offence.

Each adult and child receives a separate annual payment, typically in September or October via direct deposit. Payments are subject to federal taxes, but not to Alaska state taxes. The payment amount depends on the Alaska Permanent Fund's revenues for the previous year and is approved by state law. The payment amount has varied over the years. The first annual dividend paid in 1982 was $1,000, the second was $386. Subsequently, the payment amount increased

[9] Goldsmith S. The Alaska Permanent Fund Dividend: An Experiment in Wealth Distribution: Report at the Ninth Congress of Basic Income European Network [BIEN] Geneva, Switzerland September 12-14, 2002. Geneva: Institute of Social and Economic Research, 2002. URL: https://webapps.ilo.org/public/english/protection/ses/download/docs/gold.pdf (accessed 28 January 2025).

nominally, reaching almost $3,000 in 2020. During the COVID-19 pandemic, the payment amount decreased, reaching $1,702 in 2024 [10].

It should be noted that the payment to Alaska residents is not fully universal, unconditional, or basic. Firstly, not all Alaska residents are eligible for the payment, only those who have had permanent residence in the state for a year. Secondly, a condition that disqualifies a state resident from receiving the payment is the imposition of criminal sanctions against the state resident during the year preceding the application. Employment or other income does not affect eligibility for the payment. Thirdly, as L. Kueng writes, the amount of the payment throughout its implementation has not been large enough to cover the basic needs of Alaska residents [11]. However, the Alaska Permanent Fund Dividend Program compensates for a significant portion of the cost of living for medium-sized and large families, reducing the risk of losses for potential entrepreneurs [22, Feinberg R., Kuehn D., p. 609].

The implementation of annual payments to Alaska residents over 42 years has led to positive socio-demographic results: the birth rate increased and the intervals between births decreased, especially among women in the 20–44 age group [25, Yonzan N., Timilsina L., Kelly I.]; reproductive inequality decreased, especially among socio-economically disadvantaged groups of the population, without affecting the abortion rate [26, Cowan S., Douds K., p. 1021]; poverty rate among rural indigenous families and the elderly decreased by 20–40% [27, Berman M., p. 138]; crime rate decreased [28, Dorsett R., p. 195]; the number of small businesses and self-employed increased [22, Feinberg R., Kuehn D., p. 618]. It should also be noted that Alaska's population has increased by 242 thousand people since 1982 (from 499 thousand to 741 thousand people) [12].

Thus, dividends in the form of annual payments from the Alaska Permanent Fund can be attributed to measures of additional social support for permanent residents of the region, which is provided by the state's resource revenues. This payment, made to residents of the state of Alaska, is a good illustration of the pragmatic understanding of the concept of basic income as a rent payment from the use and extraction of natural resources. Considering the significant value and prospects of the Arctic regions of Russia in terms of resources, as well as the need to improve socio-demographic indicators, the use of such a mechanism for redistributing income from mineral extraction and the development of the Northern Sea Route to the population seems to be the most appropriate solution.

Mechanism for implementation of basic income in Russia's Arctic regions

The existing social support mechanism in Russia's Arctic regions is comprehensive, covering various categories of individuals working and living in these regions, and provides a system of so-

[10] Permanent Fund Dividend. Tax Information 2024. URL: https://pfd.alaska.gov/payments/tax-information (accessed 28 January 2025).
[11] Kueng L. Explaining Consumption Excess Sensitivity with Near-Rationality: Evidence from Large Predetermined Payments. Working Paper 21772, National Bureau of Economic Research, 2015. URL: https://www.nber.org/system/files/working_papers/w21772/w21772.pdf (accessed 28 January 2025).
[12] Alaska Population Estimates. Population and Components of Change, 1945 to 2024. URL: https://live.laborstats.alaska.gov/data-pages/alaska-population-estimates (accessed 28 January 2025).

cial and labor guarantees and benefits established by Russian Federation law. These guarantees and benefits are aimed at compensating for living and working in challenging climatic conditions, as well as providing social protection, including for the indigenous populations of Russia's Arctic regions.

The following groups of basic guarantees and benefits applicable in the Arctic regions of Russia can be identified.

- Guarantees and benefits for those working in the Arctic regions of Russia (increased northern allowances and regional coefficients, additional leave, a one-time benefit upon conclusion of an employment contract for the employee and each member of his family arriving with him, paid leave for settling in a new location, compensation for travel expenses to and from the place of rest once every two years, compensation for relocation expenses, transportation of luggage and family members, reimbursement of travel expenses to the place of work and back for shift workers, as well as their provision of housing and meals during their shift, a shortened work week for women, special guarantees in the field of labor protection related to climatic conditions, limitation of tax deductions from severance pay, preferential retirement procedures).
- Guarantees and benefits for residents of the Arctic regions of Russia (preservation of the traditional way of life and economic activities of indigenous peoples, the "Arctic Mortgage" and "Arctic Hectare" programs, housing subsidies in other regions, free trips for children to Russian resorts and travel from their place of residence to the resort and back, free travel to medical facilities or compensation for its cost).

These guarantees and benefits for workers and residents of Russia's Arctic regions are targeted and provided on specific legal grounds.

Improving the demographic situation and social well-being in the Arctic regions of the Russian Federation requires additional social support measures. Following the example of the state of Alaska, such measure could be a basic income — a universal social payment (USP) program for all residents of the Arctic regions. It should be noted that, according to Russian scholars, the concept of basic income is gaining practical significance in Russia due to the urgent need to reduce income inequality and provide additional social support to the population [29, Bobkov V.N., Zolotov A.V., Odintsova E.V., p. 44]. Studies conducted in Russia have demonstrated the country's readiness to introduce transitional forms of basic income associated with mitigating (overcoming) the problem of poverty and ensuring a minimum standard of living for vulnerable groups of the population [30, Odintsova E.V., Chernykh E.A., Chashchina T.V., p. 29].

It would be reasonable to launch the USP program in several pilot regions (e.g., the Yamalo-Nenets Autonomous Okrug, Chukotka, Murmansk Oblast) with subsequent expansion to the entire Arctic zone of the Russian Federation. Financial support for this payment should be provided through the creation of a special fund (the Arctic Development Fund), which will be formed from revenues from mineral extraction (oil, gas, and rare metals) in Russia's Arctic regions. Part of

the profits of companies operating in the Arctic could also be directed to this fund. Additional funding is possible from the federal budget and through co-financing from regional budgets to support the USP program, especially in its initial stages.

It is advisable to link the amount of the universal social benefit to the subsistence minimum for an adult, which is subject to annual indexation taking into account inflation and the cost of living in the Arctic regions of Russia. Following the example of the state of Alaska, the USP could be paid annually and represent the sum of the monthly subsistence minimum multiplied by the number of months. The USP should be excluded from the taxation system.

The conditions for receiving the universal social payment are as follows:

- Citizenship of the Russian Federation;
- Permanent residence in Russia's Arctic regions. Payments should be provided only to those who have permanently resided in the Arctic regions for at least a certain period (e.g., two years). Recipients of the universal social payment must be registered as residents in one of the Russia's Arctic regions and undergo quarterly verification of their actual residence at their registered place of residence. Recipients, who move from one Arctic region to another, as well as students and military personnel stationed in other regions for duty or training but permanently registered in Russia's Arctic regions, cannot be excluded from the universal social payment program;
- Education of children in schools at their place of registration in the Arctic regions of Russia. If a child is studying in another region for objective reasons (for example, the lack of a specialized school in the Arctic), payments may be retained upon provision of supporting documents;
- Annual medical examination. Recipients of the USP must undergo an annual medical examination at local medical facilities. This ensures public health monitoring and disease prevention in the Arctic regions of Russia. However, for residents of remote settlements without medical facilities, alternative measures (for example, mobile medical teams) may be provided;
- Participation in professional retraining programs. Unemployed recipients of the USP must participate in professional retraining programs offered by the employment service with the aim of reducing unemployment and improving the skills of the population. This requirement may not apply to pensioners and individuals with disabilities;
- Participation in socially beneficial activities. Unemployed recipients of the USP must participate (e.g., 40 hours per year) in community service activities (e.g., volunteer programs or community service events). This condition may not apply to pensioners, individuals with disabilities, and other categories unable to participate in such activities.

Recipients are required to provide documents confirming they have met the USP eligibility requirements (e.g., school certificates, medical reports) one month prior to the next annual

payment. Failure to meet any of these requirements disqualifies them from receiving the USP for the calendar year.

Furthermore, USP payment is excluded if the recipient commits a criminal offense. Resumption of payments is possible only after the criminal record is expunged or expunged. Payments are also terminated in the event of repeated administrative offenses related to the sale and use of alcohol and drugs (e.g., appearing in public places while intoxicated, driving while intoxicated, or using drugs without a doctor's prescription). If a recipient of the universal social payment is undergoing treatment for alcohol or drug addiction, payments may be temporarily suspended, but not terminated.

To implement the USP program, it is necessary to create a unified database of recipients, which will be integrated with other government systems (the Ministry of Internal Affairs, the Ministry of Health, the Ministry of Education, and Gosuslugi) to prevent excessive use; regularly publish reports on the distribution of funds and the use of the Arctic Development Fund; and include local community representatives in the fund's supervisory boards.

Implementing the universal social payment program as an effective mechanism for redistributing funds received from Arctic mineral extraction and the development of the Northern Sea Route could become a powerful tool for social support for those living and working in Russia's Arctic regions and stimulating the development of these territories. It will also lay the foundation for creating conditions for the retention of the population, including young people and families with children. It will contribute to improving the standard of living of the population and reducing the outflow of population from the Arctic; it will encourage socially significant behavior (education, health, work); and it will reduce the level of crime, alcoholism, and drug abuse among the population.

It is important to note that the USP program is intended not to replace, but rather to complement existing targeted social support measures in Russia's Arctic regions. The universal nature of this payment will create a new incentive to attract and retain specialists and their families in Russia's Arctic regions without affecting other socio-economic and legal guarantees. This approach should confirm the social orientation of the Russian state and demonstrate that basic income can be used not only "to replace existing systems of state social guarantees and targeted social support, but also to shift the costs of education and healthcare onto citizens" [31, Bobkov V.N., p. 21].

Conclusion

Basic income, initially a utopian idea, has come to be seen as a possible alternative or supplement to traditional social support measures. However, experiments with its implementation have revealed practical difficulties associated with economic constraints: a lack of funds for payments to all citizens and their small size, which prevents them from being considered truly basic. Nevertheless, the impact of such payments on the well-being of citizens is assessed positively.

An example of the successful application of such a model is the annual payments from the Alaska Permanent Fund, which residents of the region receive from revenues from natural resource extraction. For Russia, especially for the resource-rich Arctic regions, the implementation of a similar mechanism could become an effective tool for social support. Such payments could contribute to the retention of the population, including young people and families, improve living standards, reduce the outflow of people from these areas, and also stimulate socially significant behavior (education, health, work) and reduce the level of crime and addiction [32, Wijngaarde I., Vinanchiarachi J., Readman J., p. 112]. Overall, the introduction of a basic income in the form of a universal social payment could be an important step in the development of Russia's Arctic regions and the improvement of their socio-demographic indicators.

The fundamental aspects of the universal social payment program and the legal conditions for receiving such a payment highlighted in the study require further discussion and interdisciplinary substantiation in academic circles.

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Analysis of Regional Development Management Tools in the Nordic Countries

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Abstract. One of the main goals of Russian Federation state policy at the present stage is the formation of prerequisites for sustainable socio-economic development, accompanied by improvement of the quality of life of citizens through the elimination of existing interregional disparities. These circumstances determine the high relevance and scientific and practical significance of analyzing the world's best practices in regional development. In order to carry out such an analysis, we selected countries with geographical, natural and climatic conditions similar to the regions of the North-West of the Russian Federation: Norway, Sweden, Finland, and Denmark. The fundamental documents and organizational mechanisms of sustainable development by international organizations of which the Russian Federation is a member (in particular, the United Nations) were also considered. The use of general scientific methods of cognition (deductive, comparative, synthesis, analysis, modeling of socio-economic processes) made it possible to ensure a high level of reliability of the results and conclusions obtained by the authors. The main instruments for implementing the state policy of regional development of the Nordic countries are established: consistent consolidation of municipalities in order to simplify administration; high level of social spending, especially in terms of human capital development (education, healthcare, social protection); high level of government spending on development of road and transport infrastructure in order to ensure the territorial coherence of the country; targeted government support for various sectors of the economy (taking into account the specifics of territorial localization) in the form of direct participation in corporate capital, provision of preferential tax regimes, administrative preferences; cluster approach to organizing regional development, implying the identification of the core of economic activity due to the optimal combination of available resources, creation of administrative, organizational and economic conditions for intensifying growth rates; stimulation of interregional (intercountry) integration economic processes. The results of the study can be used by the government bodies and constituent entities of the Russian Federation in forming the directions and activities of the state policy of socio-economic development.
Keywords: *sustainable development, world experience, region, planning, tools, public policy, economics*

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Introduction

Strategic planning documents for the Russian Federation [1] in general and for regional development [2] in particular outline the key targets for Russian state policy in the areas of socio-economic and territorial development for the medium and long term. Among the identified targets, the following can be highlighted: the formation of long-term factors for economic growth; the reduction of existing disparities in the socio-economic development of the Russian Federation's regions; the strengthening of the Russian Federation's competitiveness in global goods and services markets; the development of human capital; the strengthening of the connectivity of the Russian Federation's territory; and the improvement of the quality of life of Russian citizens.

Practical achievement of these targets implies improving the efficiency of public administration at the sectoral and regional levels, coordinating the efforts of the Russian Federation's state authorities and constituent entities in forming unified approaches to state policy on socio-economic development at the macro- and meso-levels. In view of the above, the relevance and scientific and practical significance of analyzing best international practices in organizing regional and macro-regional development management is undeniable. In the context of the research topic, countries with geographic and natural-climatic conditions similar to those in the north-western regions of the Russian Federation were selected for analysis: Norway, Sweden, Finland, Denmark, and Iceland. Fundamental documents and organizational mechanisms for spatial development of international organizations of which the Russian Federation is a member (in particular, the United Nations) were also considered.

Materials and methods

The use of general scientific methods of cognition, in particular deductive, comparative, synthesis, analysis, and modelling of socio-economic processes, ensured a high level of reliability of the results and conclusions obtained by the authors. The information basis of the study was formed by materials from the World Bank, the Organization for Economic Cooperation and Development (OECD), the United Nations (UN), as well as the results of scientific research. The works of A.V. Masolygin [1] and A.O. Podoplekin [2, pp. 297–302] interpret the experience of socio-economic development in the Arctic regions of Canada, Norway, and the United States. M.E. Monastyrskaya and O.A. Peslyak [3, pp. 50–51] examine the specific features of urban development

[1] Decree of the President of the Russian Federation of July 21, 2020 No. 474 "On the National Development Goals of the Russian Federation until 2030". URL: http://publication.pravo.gov.ru/Document/View/0001202007210012 (accessed 21 June 2025); National Security Strategy of the Russian Federation, approved by Decree of the President of the Russian Federation of July 2, 2021 No. 400 "On the National Security Strategy of the Russian Federation". URL: http://publication.pravo.gov.ru/Document/View/0001202107030001 (accessed 21 June 2025).

[2] State Program "Socio-Economic Development of the Arctic Zone of the Russian Federation" approved by Government Resolution of March 30, 2021 No. 484. URL: http://publication.pravo.gov.ru/Document/View/0001202104020037 (accessed 21 June 2025); National Program for Socio-Economic Development of the Far East for the Period up to 2024 and for the Future up to 2035, approved by Order of the Government of the Russian Federation dated September 24, 2020 No. 2464-r. URL: http://publication.pravo.gov.ru/file/pdf?eoNumber=0001202009280027 (accessed 20 June 2025); Strategy for Socio-Economic Development of the Siberian Federal District until 2035, approved by Order of the Government of the Russian Federation of January 26, 2023 No. 129-r. URL: http://government.ru/docs/all/145780/ (accessed 21 June 2025).

management in the urbanized regions of the Scandinavian countries. Administrative and organizational-economic instruments for the development of Norwegian regions are analyzed by Amdam R. [4, pp. 104–106], Nakken K. [3], Stein J. [5, p. 101]. The scientific works of Halkier H. [4], Conigrave B., Hemmlings P. [6, pp. 12–14], Cornett A.P., Soerensen N.K. [7, p. 15] investigate the mechanisms of managing the socio-economic development of Northern European countries. Finland's experience in creating infrastructure for interregional socio-economic cooperation, including cross-border interaction, is discussed in the works of Ahokas J. [5], Häyrinen-Alestalo M., Pelkonen, A., Teräväinen T., Waltari S-T. [8, pp. 18–21]. The organizational and economic tools for stimulating various sectors of the Swedish economy in the context of achieving sustainable development goals are analyzed in the works of Lundmark L, Demiroglu O, Nesterova I. [9, pp. 238–240], Sobha P., Krook-Riekkola A. [10, pp. 330–332], Zetterberg L., Eriksson M., Ravry C., Santosa A., Ng N. [11, pp. 807–810]. The analysis of pan-European integration mechanisms in relation to the conditions of the Nordic countries is presented in the works of Sotarauta M., Suvinen N., Jolly S., Hansen T. [12, pp. 99–105], Duhs L. [13, pp. 580–583], Garbis Z., McCarthy E., Orttung R.W. [14].

Results and discussion

In 2015, the UN General Assembly (UNGA) approved the 2030 Agenda for Sustainable Development, developed with the participation of representatives of the Russian Federation. It defines the key goals related to sustainable development (the so-called Sustainable Development Goals (SDGs)). The creation of organizational, economic, administrative and legal conditions at the state level in UNGA member countries to ensure the achievement of the UN SDGs will make it possible to intensify socio-economic development on a global scale and mitigate the severity of environmental threats, mainly in the form of climate change.

According to the scientific perspective of the authors of the article, Sustainable Development Goal No. 11 — make cities and human settlements inclusive, safe, resilient, and sustainable [6] — including related objectives, best defines regional development priorities. The application of UN Sustainable Development Goals at the country level obliges states to ensure integrated territorial development, including through effective planning of urban, transport, logistics, and utility infrastructure, public spaces in cities and towns, the preservation of cultural and natural heritage, the use of scientific and engineering solutions to minimize the risk of natural disasters, and the preservation of interracial, interethnic, and interreligious peace.

[3] Nakken K. Regional development policy in Norway — Helsinki, 27 November 2019, ESPON: European Territorial Observation Network. Luxembourg. URL: https://policycommons.net/artifacts/3326630/regional-development-policy-in-norway-helsinki-27/4072519/on 03 May 2024. CID: 20.500.12592/5vcq5s (accessed 21 June 2025).
[4] Halkier H. Policy Developments in Denmark: Regional Policy, Economic Crisis and Demographic Change. KatPlan. URL: https://vbn.aau.dk/ws/portalfiles/portal/18793928/EoRPA_Denmark__16_July_2009_HH_1_.pdf (accessed 21 June 2025).
[5] Ahokas J. A comprehensive view of regional economic development in Finland. *50th Congress of the European Regional Science Association "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden*, European Regional Science Association (ERSA), Louvain-la-Neuve. URL: https://www.econstor.eu/bitstream/10419/118887/1/ERSA2010_0469.pdf (accessed 21 June 2025).
[6] United Nations. URL: hhttps://www.un.org/sustainabledevelopment/ru/cities/ (accessed 25 February 2025).

In order to achieve Sustainable Development Goal No. 11, UN experts have developed International Guidelines on Urban and Territorial Planning [7] (approved in 2015 by the Governing Council of the UN Human Settlements Programme). These International Guidelines present the distribution of planning and management functions between the decision-making levels of the extended state (hereinafter, the extended state is understood as the totality of state and municipal government bodies with the authority, established by national legislation, to regulate (manage) spatial (territorial) development):

- national (country) level (in particular, the creation of an interconnected and balanced system of agglomerations specializing in various types of economic activity), managing the movement of goods and capital flows, including cross-border ones; creating conditions for the involvement of macro- and meso-regions in the international division of labor and world trade [8];
- interregional level (for example, the formation of a management (regulatory) framework for the socio-economic development of a region (group of regions), establishing links between rural and urban areas, protecting natural ecosystems from excessive (i.e., exceeding the natural capacity of natural ecosystems to regenerate) technogenic and anthropogenic impacts)[9];
- municipal (local) level (e.g., designing and improving citywide public space systems or developing similar spaces in the interests of residents of several municipalities, creating conditions for investing in the modernization and development of urban life-support infrastructure, forming a unified approach to planning decisions on the territorial location of facilities and networks of facilities; developing a unified municipal (inter-municipal) balanced transport system; effective planning of municipal development of residential buildings and public infrastructure facilities taking into account the characteristics of a specific area, ensuring transport accessibility, minimizing social inequality, etc. [10]).

The relevant sections of the International Guidelines on Urban and Territorial Planning present modern concepts, theoretical and methodological approaches, and tools for developing territorial socio-economic structures and regional development configurations, as developed by UN experts. At the same time, the practical implementation of the ideas set out in the International Guidelines at the state level of UN member states implies the formation of a mechanism for delegating administrative and managerial powers between regulatory levels in order to create a toolkit for maximizing various components of the unique potential (natural and climatic, cultural, human, agricultural, industrial, transport and logistics, etc.) inherent in each specific region (group of regions), as well as taking into account factors that determine territorial specificity.

[7] International Recommendations for Urban and Territorial Planning (UN). URL: http://unhabitat.ru/assets/files/publication/Brochure_IG-UTP_Russian_small.pdf (accessed 21 February 2025).
[8] Ibid.
[9] Ibid.
[10] Ibid.

The practical implementation of the aforementioned approaches to management at the micro-, meso-, and macro-levels allows for maximizing the advantages inherent in large territories, expanding the scope of synergy effects, and minimizing the limitations inherent in overpopulated regions.

In the context of this article, it is interesting to study the experience of regional development in Norway. Currently, the country's area is 355,200 km^2. Among the distinctive features of Norway's geographic location, it is necessary to highlight its northern location (between 57 and 72 degrees north latitude), as well as its unique north-south "elongation", determined by the topography of the Scandinavian Peninsula (Chile has a similar territorial configuration). Norway has a population of about 5 million people [11], with the south-eastern region of Østlandet being the most densely populated.

Norway's natural and climatic conditions are similar to those of other Russian regions, such as the Leningrad, Murmansk, and Arkhangelsk Oblasts and the Republic of Karelia.

Norway is one of Europe's largest producers of hydrocarbon raw materials. Natural gas and oil are mainly extracted from deposits on the North Sea shelf. The country also supplies iron ore, lead and nickel to the world market. For many years, a significant portion of the revenues from hydrocarbon exports has been accumulated in Norway's sovereign wealth funds, the main activities of which are presented in Table 1.

Table 1

Main activities of Norway's sovereign wealth funds [12]

Name	Main activities
Government Pension Fund — Norway (formerly Government Insurance Fund)	Invests in domestic assets and is a major holder of securities of companies listed on the Oslo Stock Exchange. In the 2010s, the Fund was used to stimulate the development of green economy sectors by acquiring shares and bonds of Norwegian companies that meet environmental and profitability criteria (e.g., in the renewable energy sector). As of June 2023, the value of the Fund's assets was 15.7 trillion Norwegian kroner.
Government Pension Fund — Global (Norwegian: Statens pensjonsfond utland, SPU)	Invests in assets abroad. As of September 2017, the Fund's assets exceeded 1 trillion US dollars. The Fund's portfolio primarily consists of securities of infrastructure companies (port, airport, and railway operators), as well as government bonds of various countries.

The key advantages of the model of operation of Norway's sovereign wealth funds presented in Table 1 are as follows: specialization in external and internal investments within independent structures contributes to improved management quality; a focus on direct participation in corporate capital increases business efficiency (in particular, it reduces the need for bank lending, thereby minimizing loan servicing costs, etc.); diversification of capital investments within the country and abroad reduces the risks associated with market fluctuations.

Among the key trends in the socio-economic development of Norway's regions in the period 1999–2019, which were due to the significant amount of funds and assets accumulated by sovereign wealth funds, it is important to note measures to diversify the economy, aimed at reducing depend-

[11] OECD Economic Surveys: Norway 2022. OECD Publishing, Paris. URL: https://read.oecd-ilibrary.org/economics/oecd-economic-surveys-norway-2022_df7b87ab-en#page1 (accessed 10 March 2025).
[12] Source: compiled by the authors.

ence on commodity revenues, as well as large-scale investments in human capital development. These were the main goals of most of the additional revenues generated during the period of rising world oil prices (from a minimum of $9.8 per barrel (December 1998) to a maximum of $133.9 per barrel (July 2008)) [6, Conigrave B., Hemmlings P., pp. 10–12].

The structural transformation of the Norwegian economy was accompanied by a reduction in the share of the extractive sector in the country's GDP, a gradual increase in the share of the service sector, mainly due to an increase in the purchasing power of citizens as a result of growth in real incomes (including pensions). As Masolygin points out, Norway's exports had undergone changes: 75% of the oil and 95% of the natural gas produced in the country were supplied to foreign consumers, while the share of the oil and gas sector in the trade structure for the period 2000–2022 decreased from 75% to 62% [1, Masolygin A.V.].

One of the areas of Norwegian state policy is to stimulate non-energy, non-resource exports. The practical implementation of this involves creating favorable institutional and administrative conditions for companies organizing the production of various electronic devices (both household and industrial) from imported or domestically produced components and electrical circuits for further export. In addition to favorable administrative and tax regimes, additional factors that enhance competitiveness include the availability of qualified personnel and the relatively low cost of electricity. These circumstances make this model attractive to investors. Such a policy avoids the risk of deindustrialization of the country and reduces dependence on fluctuations in global prices for exported raw materials.

Due to natural and climatic factors, the leading sectors of Norway's agro-industrial complex are forestry and fisheries. One of the main centers for fishing and fish processing is the port city of Kirkenes, located beyond the Arctic Circle, on the shores of the Barents Sea. The Kirkenes regional fisheries cluster includes economic entities operating in the Arctic regions of Norway, Finland and Sweden, in particular companies engaged in servicing fishing vessels, accommodating seafarers, organizing their leisure activities, providing medical care between voyages, processing fish and transporting the products to consumers by rail, sea and road. The successful functioning of this type of regional economic cluster is due to the following factors: firstly, a unified approach to the formation of administrative conditions for doing business, developed by the Nordic countries (this will be discussed below); the ability to access capital from the State Pension Fund (Norway); accumulated experience in fisheries activities; the availability of qualified personnel. It is worth noting that the Murmansk Oblast of the Russian Federation, bordering Norway near Kirkenes, has not yet fully realized its competitive advantages associated with the presence of an ice-free port and access to the bio-resources of the Barents Sea.

One of the priorities of Norwegian government policy in the period 1995–2020 was the development of the social sphere, which is closely linked to the service sector. A significant portion of sovereign wealth fund revenues was invested in the development of human capital, including in the Arctic region of the country. This process contributed to the formation of one of the attributes of Norway's socio-economic development — a high level of social spending, which, according to various estimates, accounts for 55 to 70% of consolidated budget expenditures (of which the larg-

est shares are education (up to 15%), medical care (up to 20%) and social protection (up to 35%)) [13].

Among the advantages of the above-described model of government spending, the following should be noted: a consistently high level of domestic effective demand by households for goods and services produced in the country, which, firstly, allows for the implementation of stable medium- and long-term socio-economic policies; secondly, ensures a certain level of employment and production; thirdly, minimizes the country's economic dependence on changes in global market conditions; fourthly, provides the economy with skilled personnel, which is one of the most important factors for its stable development.

As a result of the implementation of the above-mentioned government policy measures in Norway, despite the country's geographical location, there is no significant regional differentiation in terms of citizens' quality of life (the wage supplements for citizens living in northern regions, which had been in effect for many years, were abolished in 2003).

Among the Nordic countries, Denmark, Finland (including the Åland Islands), and Sweden are member states of the European Union (EU). Finland abandoned its national currency in favor of the single European currency, while Denmark and Sweden retained their own currencies. Iceland and Norway are members of the intergovernmental association EFTA (European Free Trade Association) [14]. This international organization currently includes four countries. The EFTA and the EU have concluded an agreement on the free movement of goods, services, capital and labor across the national borders of the member countries of these international organizations. In order to facilitate the movement of citizens and reduce transport costs, Denmark (including the Faroe Islands), Iceland, Norway, Sweden and Finland have created the Nordic Passport Union [15], which allows citizens of these countries to move freely and reside in the territories of the member states of the agreement. These countries have formed a system of intergovernmental coordination bodies [16] that ensure the development of integration projects and the formation of a unified state policy in the areas of migration regulation, the labor market and regional economic development.

The development of world trade and globalization processes has contributed to the intensification of state-level efforts in the Nordic countries to ensure economic competitiveness and social sustainability. In this regard, administrative reforms were carried out during the period 2000–2020, the need for which was determined by two global challenges affecting the Nordic countries.

The first challenge is related to increasing pressure on the social security systems of the Nordic countries due to aging of population, which is leading to two parallel processes: a reduction

[13] World Bank (2022). World Development Indicators. URL: https://databank.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators (accessed 21 March 2025).
[14] European Free Trade Association. URL: https://www.ce-certification.lv/ru/ce/evropejskaya-associaciya-svobodnoj-torgovli (accessed 26 January 2025).
[15] URL: https://www.norden.org/en/information/nordic-agreements-and-legislation (accessed 26 June 2025).
[16] Agreement on the legal status of the Secretariat of the Nordic Council of Ministers and the Secretariat of the Nordic Council. URL: https://www.norden.org/en/information/nordic-agreements-and-legislation (accessed 26 June 2025).

in the number of working-age citizens in the labor market and an increase in demand for healthcare services. These processes are accompanied by a reduction in tax revenues for budgetary systems, as the number of taxpayers is declining.

The second challenge is associated with the increasing pressure on the social security systems of the Nordic countries exerted by migrants from Africa and the Middle East.

One of the important aspects of public reflection on these challenges was the large-scale reform of public administration in the Nordic countries. The main elements of this reform include: consolidation of administrative-territorial units at the municipal and regional levels; development of a flexible mechanism for the prompt redistribution of state powers between levels of government, depending on various social, environmental, and economic factors.

One of the most illustrative examples of such a reform of the public administration system is the experience of Denmark. In this country, the number of municipalities was reduced by more than half during the administrative reform: from 270 independent municipalities to 98 ones. The fundamental decision on the implementation of the administrative reform and its timing was made at the government level, but its practical implementation, i.e. decisions on which municipalities should be merged, were delegated to local communities (local government bodies elected by citizens). At the same time, on 1 January 2007, 13 administrative-territorial units — districts (amts) — were abolished. They were replaced by five new, larger regions, whose governing bodies have a clearly codified (in their charters) set of powers. One of the results of the administrative reform in Denmark was the strengthening of the political authority of the level of government closest to the citizens — the municipal level. At the same time, a number of powers that were previously at the regional level (for example, in the area of taxation) were distributed between the municipal and national levels of government. This approach has facilitated the concentration of regional governments' efforts and resources on achieving their statutory objectives, the main ones in Denmark being the organization of healthcare services for citizens, public transportation, and the coordination of the distribution of EU structural and sectoral funds. Following the completion of administrative reform in Denmark, a two-tier management model was established, implying that the main flow of administrative interactions takes place within the framework of "enlarged municipality — national government". In Denmark, this format is entirely justified, as the relatively small size of the main, most densely populated part of the country, as well as modern communication technologies, make it possible to organize such administrative interaction without forming numerous state bodies at the regional level, which, firstly, reduces the budgetary system's expenses on maintaining the administrative apparatus; secondly, speeds up the exchange of information, preparation and decision-making; and thirdly, reduces the burden on the administrative apparatus and minimizes the risks of errors, distortions and data loss. At the same time, this format of administrative organization allows for the country's territorial specifics to be taken into account. For example, Denmark's largest agglomeration — the Copenhagen metropolitan area — has a special status, combining the powers of a municipality, a region, and, in some cases, the national govern-

ment at a single level of administration. The metropolitan area is the only region in Denmark with a state-level, legally approved development plan. The island of Greenland, which belongs to Denmark, is its largest overseas territory. In order to optimize governance, a significant portion of state powers was transferred to the local level; in 2009, the administrative-territorial division of the island underwent changes, and the number of municipalities was reduced from 18 to 4. However, due to the small number of citizens living in Greenland, the formation of an independent region on the island was deemed impractical. Thus, governance in Greenland is represented by two levels: local (municipal authorities) and national (the Danish government).

Administrative reform was carried out in a similar manner in other Nordic countries. In Finland, the reform was implemented in two stages. The first stage involved the formation by the national government of administrative, institutional, organizational, and economic preconditions motivating municipalities to voluntarily merge, with decisions on this being made in local referendums. The second stage included the direct implementation of the reform. Between 2000 and 2020, the number of municipalities in Finland gradually decreased from 452 to 311 units, which made it possible to achieve administrative and socio-economic effects similar to those in Denmark. At the same time, according to Finnish experts, one of the shortcomings of the reform is the relatively small number of citizens living in Finnish municipalities (on average, about 7 thousand residents) [17] [12, Sotarauta M., Suvinen N., Jolly S., Hansen T., pp. 99–105]. The peculiarities of the country's territorial location have prompted the expert community and the political establishment to focus on finding optimal models of regional development. Currently, Finland's administrative division includes 19 counties (regions), which in turn consist of districts. During the administrative reform, a significant amount of authority, resources, and responsibility for organizing various spheres and sectors (for example, the healthcare system) was delegated from the national to the regional level of government. Regional authorities in Finland are responsible for regional development, including various sectors of the economy. The broad scope of powers delegated from the national level allows regions to implement economic and transport policies that take regional characteristics into account. The counties have directly elected political leadership (regional councils), but a significant amount of authority regarding taxation remains at the municipal level. As in Denmark, certain territories in Finland have independent governance models. In particular, the Åland Islands are governed by the Åland Islands Government and comprise 16 municipalities, including very small ones. Some of them have fewer than 500 residents, while the municipality of Sottunga has fewer than 100.

In 2017, the Norwegian parliament, Stortinget, decided to implement administrative reform in the country. During the transformation of the public administration system, the number of regions (fylkeskommuner) was reduced from 18 to 11 administrative-territorial units, and the

[17] Ahokas J. A comprehensive view of regional economic development in Finland. *50th Congress of the European Regional Science Association «Sustainable Regional Growth and Development in the Creative Knowledge Economy», 19–23 August 2010, Jönköping, Sweden*, European Regional Science Association (ERSA), Louvain-la-Neuve. URL: https://www.econstor.eu/bitstream/10419/118887/1/ERSA2010_0469.pdf (accessed 26 June 2025).

number of municipalities decreased from 428 to 354. In 2020, the first stage of the reform, which involved delegating resources (primarily financial), authority, and responsibility to the municipal and regional levels of government, was completed. One of the distinctive features of the Norwegian governance model is that the healthcare system is organized by the government at the national level and its operations are managed centrally. Regional governments have the authority and resources to plan and implement socio-economic development measures, including those related to transport and logistics. At the Norwegian government level, strategic coordination of regional and sectoral development is carried out through representatives of the scientific community.

In 2020, the Kingdom of Sweden developed and adopted the National Strategy for Sustainable Regional Development for 2021–2030 [18]. Key targets outlined in the document include creating conditions for the socio-ecological and economic sustainable development of the country's regions, contributing to Sweden's transformation into a "modern and sustainable welfare state" [19]. Practical achievement of this goal involves the implementation of a set of measures aimed at stabilizing ecosystems, reducing climate impacts, and modernizing the energy sector using resource-saving technologies. The regulatory framework for the implementation of the National Strategy for Sustainable Regional Development consists of the current versions of legislative acts adopted at various times, regulating urban development, natural resource use, road and transport infrastructure development, etc., in particular: the Planning and Building Act (2010), the Act on the Administrative Division of the Kingdom of Sweden (Regional utveckling och regional samhällsorganisation, 2007), the Environmental Code (1999), the Roads Act (1971), the Public Water and Wastewater Act (1999), and the Real Property Formation Act (1970) [20].

Researchers [3, Monastyrskaya M.E., Peslyak O.A., pp. 50–51; 10, Sobha P., Krook-Riekkola A., pp. 330–332] point to the historically established autonomy of municipalities in the Kingdom of Sweden, whose authorities have significant powers both in solving local community problems and in organizing inter-municipal socio-economic cooperation. The central government coordinates such key areas of state policy for regional development as:

- rural development;
- creating conditions for sustainable urban development;
- environmental policy.

Swedish municipalities are responsible for education, road, transport, housing and utilities infrastructure, urban planning, organization of public transport, and the state of environment within the municipality. Municipal authorities have powers of tax regulation, which allows them to implement measures to stimulate various sectors of the economy at the local level. An additional

[18] Nationell strategi för hållbar regional utveckling i hela landet 2021–2030. URL: https://www.regeringen.se/contentassets/53af87d3b16b4f5087965691 ee5fb922/nationell-strategi-for-hallbar-regional-utveckling-i-hela-landet-20212030/ (accessed 26 June 2025).
[19] Ibid.
[20] URL: https://www.oecd.org/en/publications/land-use-planning-systems-in-the-oecd_9789264268579-en.html (accessed 26 June 2025).

source of funding for local development programs is specialized grants provided by the EU on a competitive basis.

The reform of Sweden's administrative-territorial management was carried out as part of a unified approach among the Nordic countries to gradually reduce the number of administrative units. During the reform, their number in the country was reduced from 1,000 to 290. The Swedish model is unique in its focus on the region and the expanded powers of enlarged municipalities. Sweden is currently divided into 21 counties (län), but there are discussions about reducing the number of regions to 6.

Unlike most other Nordic countries, Iceland has only two levels of government: national and local. The administrative reform, based on the models of the Scandinavian countries, has led to a reduction in the number of municipalities from 196 to 89. In recent years, the number of municipalities has been further reduced to 74 through voluntary mergers, which were decided by local referendums [21]. The Icelandic government creates conditions for municipal cooperation to address the pressing issues of local communities, including through the formation of inter-municipal authorities, with some of the national government's powers being transferred to them [13, Duhs L., pp. 580–583].

Table 2 summarizes the main tools and practices in the field of regional development management in the Nordic countries.

Table 2

Tools and practices for developing the Nordic countries [22]

Country	Directions/tools of public policy	Socio-economic effect
Sweden, Finland, Norway	Consistent reduction in the number of administrative-territorial units through amalgamation of municipalities; formation of new regions with expanded powers and resources to implement them; stimulation of interregional economic integration; creation of a mechanism for the prompt delegation of powers between levels of government.	Reducing budgetary expenditures related to the maintenance of municipal administrative apparatus; increasing the efficiency of administrative apparatus by reducing the workload on officials; accelerating document flow, minimizing the risk of errors, loss, and distortion of data; reducing disparities in the quality of life of citizens in different regions of the country.
Iceland, Denmark	Formation of institutional conditions for inter-municipal cooperation, including inter-municipal governing bodies; creation of a mechanism for the distribution of powers, resources and responsibilities from the national government to municipalities	
Norway	Formation of a mechanism for the equitable distribution of resource rents; gradual reduction in the number of administrative-territorial units through the amalgamation of municipalities; creation of a mechanism for the prompt delegation of powers between levels of government	

In addition to the information presented in Table 2, it should be noted that the Nordic countries (Denmark, Iceland, Norway, Finland, Sweden), by joining international integration associations (e.g., the European Union, the European Free Trade Association), have partially renounced

[21] State of the Nordic Region 2018. URL: http://norden.diva-portal.org/smash/get/diva2:1191016/FULLTEXT01 (accessed 21 June 2025).
[22] Source: compiled by the authors.

their sovereignty in favor of supranational governing bodies. This approach has both advantages, such as the formation of uniform administrative rules applicable throughout the territory of the member states of the integration association, and disadvantages, the main one being the complication of the mechanism for responding to changes, challenges and threats in the modern world. Summarizing the above, we can highlight the main tools for implementing the regional development policy of the Nordic countries:

- consistent consolidation of municipalities to simplify administration;
- high levels of social spending, especially in terms of human capital development (education, healthcare, social protection);
- high level of government spending on the development of road and transport infrastructure to ensure the country's territorial connectivity;
- targeted government support for various sectors of the economy (taking into account the specifics of territorial localization) in the form of direct participation in corporate capital (e.g., Norwegian sovereign wealth funds), preferential tax regimes, and administrative preferences;
- cluster approach to regional development, which involves identifying the core of economic activity based on the optimal combination of available resources and the creation of administrative and organizational-economic conditions for intensifying growth rates;
- stimulation of interregional (intercountry) integration economic processes (e.g., the Nordic countries).

In our opinion, regional development measures are most effectively implemented in Northern European countries such as Norway, Finland, and Sweden, which are engaged in intercountry economic integration, coordinating state management of border areas and forming a unified transport infrastructure. This contributes to maximizing natural competitive advantages, minimizing the negative impact of the aforementioned factors limiting socio-economic progress, and gradually eliminating significant disparities in regional development between sparsely populated northern and densely populated southern territories.

Conclusion

In conclusion, we would like to formulate the following:

1. One of the main trends in modern regional development, both in the Russian Federation and in countries with similar geographical and natural and climatic conditions, is the gradual erosion of regions as separate territorial entities. The boundaries of administrative-territorial units are becoming increasingly arbitrary due to the rapid development of communications and transportation technologies, which is contributing to a sharp acceleration in the exchange of information, goods, capital, etc. This, in turn, is a powerful driver of regional economic diversification and the formation of interregional development clusters, the areas of which may include territories (or parts of territories) of various administrative units. Various regions of the Russian Federa-

tion are undergoing a trend towards the development of agglomerations: both diversified and specializing in one or several priority areas of economic activity. As practice shows, in the process of development, an agglomeration may include elements that are administratively part of different municipalities and/or regions, which complicates state regulation of economic, environmental, social processes, etc.

Taking into account such processes, the mechanism of state management should be sufficiently flexible to act as a stimulus for strengthening competitiveness both within the socio-economic system of the region and at lower levels, including in the context of agglomeration development.

2. Our study of regional development tools in Northern European countries has identified effective public administration practices that could be applied in the Russian Federation to create favorable conditions for the socio-economic development of its constituent entities, namely: the creation of administrative procedures in the public administration system that allow for the prompt delegation of powers between levels of government in the "federation – constituent entities of the Russian Federation – municipalities" system; gradual reduction of budgetary expenditure associated with financing the administration system by consolidating municipalities and reducing the number of municipalities through the merger of sparsely populated ones; taking into account factors that determine the specific characteristics of regions and the targeted transfer of certain state powers for implementation at the regional level; formation of tools for state stimulation of structural diversification of the economy in resource-rich regions.

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Bio-Economy as a Key Lever for Improving the Performance of the Agro-Food Complex in the Northern Arctic Regions (On the Example of the Republic of Sakha (Yakutia))

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Abstract. Bio-production and waste-free technologies in Russia are becoming an integral part of the modern economy. These processes are facilitated by political sanctions and the need to ensure food security and food independence for the country. The growth in the number of processing enterprises and other forms of business with a complete closed production cycle is also of considerable importance to this process. This is particularly true for large enterprises that can develop and implement innovative waste-free biotechnologies in production. All this helps to overcome import dependence and, most importantly, ensures environmental protection and ecological measures. Population growth and rising consumption levels, as well as the demand for environmentally friendly food, require the rational and economical use of resources. In turn, in order to increase the efficiency of the use of biological resources, especially in regions with difficult natural and climatic conditions, such as the Northern Arctic regions, with insignificant volumes of agricultural raw material production, their careful and efficient use is particularly important. This requires waste-free and closed-loop technologies that ensure maximum use of valuable raw materials and prevent damage to the environment from production waste. The subject of the study is to identify factors that directly influence the level and efficiency of bio-resource use for food production and ensuring food security and food independence of the country and regions, especially those with complex natural and climatic conditions for agro-industrial production. The aim is to identify the characteristics and assess the impact of food technologies used in the agro-industrial complex on the level of food self-sufficiency. Studies confirm the insufficiency of the measures taken to transition to deep processing of agricultural raw materials and bio-resources and the need to develop new standards for their industrial processing. The research results were based on a systematic analysis and an economic and statistical method of processing information obtained from the State Statistics Service and executive authorities on the state and problems of the agro-industrial complex.

Keywords: *bio-economy, agro-food complex, sustainable development, biotechnology, biomass, innovative technologies, environmentally friendly product, agriculture, renewable sources*

Introduction

In recent years, Russia's agro-industrial complex has been characterized by a shift toward organic farming in order to produce environmentally safe raw materials and food products, as well as using by-products from all agricultural sectors [1, Antonova I.A.].

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Biological and food security requires a systematic approach to organization, which implies a whole range of measures, including legislative ones at the international level [2, Kartskhia A.A., pp. 13–35].

The bio-economy covers all sectors of the economy that utilize biological resources. Agriculture is one of such sectors. Taking into account the specific features of agriculture, namely, the inefficient use of natural resource potential in most cases, the bio-economy is an extremely promising direction for achieving the goals of the Sustainable Development Strategy for agriculture and the country's Food Security Doctrine [3, Gordeeva I.V., pp. 16–21].

April 2025 has been designated as the initial stage for the launch of the national project for the development of the bio-economy in the Russian Federation. The project should not only ensure the transition to waste-free production and new technologies, but also make up for lost time and minimize dependence on imported technologies, which currently accounts for 26% of the total market in the agro-industrial complex [4, Kartskhia A.A., pp. 216–224]. Therefore, the transition to a bio-economy, i.e. the efficient use of raw materials and waste-free production, can lead to the development and, accordingly, sustainability of agriculture and rational use of natural resources. This is especially important for Russia's regions, as the development of the agricultural sector based on bio-economy will contribute to the increase of one of the key indicators of regional development — gross agricultural production, and will ensure increased food self-sufficiency, environmental preservation, employment, and, consequently, improved quality of life.

Agriculture and bio-economy in Yakutia: key indicators, problems, solutions

The current state of the agro-industrial complex of the Republic of Sakha (Yakutia) is characterized by instability and a lack of dynamic development. Over the past four years, the agricultural production index has fluctuated between 99% and 101.4% (Fig. 1).

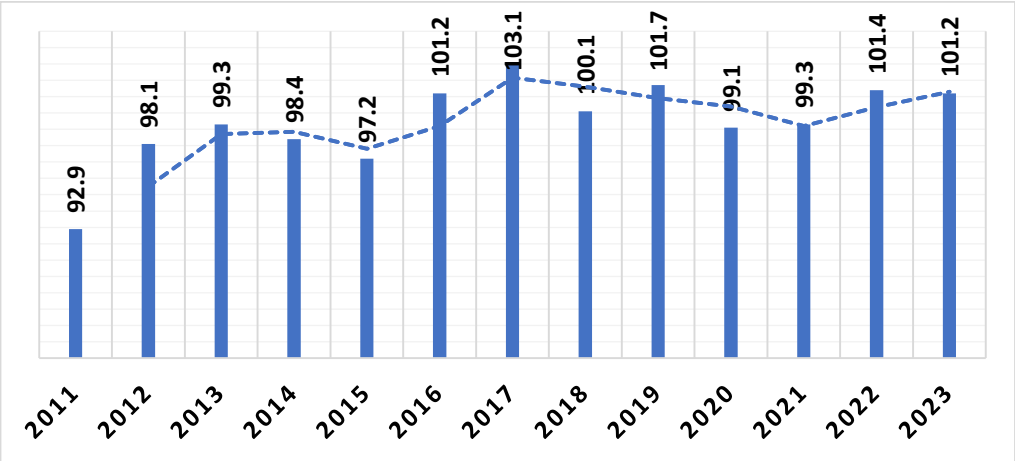


Fig. 1. Agricultural production indices in the Republic of Sakha (Yakutia).

The main agricultural producers in the Republic of Sakha (Yakutia) are private household farms, which account for up to 49% of all agricultural output. This is the only category in which the production index (2023 to 2010) exceeded 100%, reaching 100.5%. Agricultural organizations,

peasant (farmer) households, and individual entrepreneurs experienced a continued decline (80.8% and 88.7%, respectively) [1].

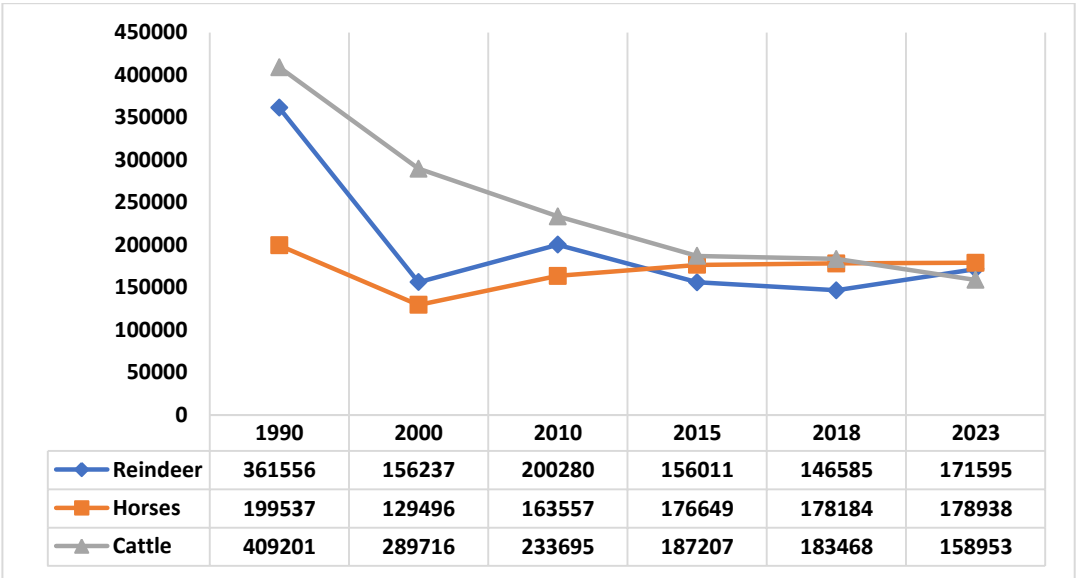
Despite high depreciation and the lack of high-performance equipment, farmers managed to slightly increase agricultural production per hectare of farmland. Thus, according to data from the Office of Rosreestr in the Republic of Sakha (Yakutia), agricultural output per hectare increased by 85.6% from 2012 to the end of 2023, while crop and livestock output per hectare of arable land and hayfield increased twofold and by 75.7%, respectively (Table 1).

Table 1

Agricultural output per hectare of agricultural land in the Republic of Sakha (Yakutia) in 2023 according to data from the Office of Rosreestr in the Republic of Sakha (Yakutia), thousand rubles

Agricultural output per hectare of agricultural land			Crop output per hectare of arable land			Livestock output per hectare of hayfields		
2012	2018	2023	2012	2018	2023	2012	2018	2023
11.1	15.7	20.6	52.8	75.9	109.1	17.7	24.7	31.1

Agriculture in the Republic of Sakha (Yakutia) is focused on livestock farming, primarily dairy farming. However, in most regions of the republic, due to the outflow of the working-age population from rural areas, there has been a significant decline in the number of certain livestock species. For example, since 1990, the number of horses in the republic has decreased by 11%, while the number of domesticated reindeer has decreased by 53%. The number of cattle in the region has declined particularly significantly (by 2.5 times) (Fig. 2). As a result, according to data as of 1 January 2024, the dairy herd has decreased from 145.4 to 67.6 thousand head, or by 2.2 times, and the number of cows per 1,000 people has decreased by 1.9 times (Table 2).



	1990	2000	2010	2015	2018	2023
Reindeer	361556	156237	200280	156011	146585	171595
Horses	199537	129496	163557	176649	178184	178938
Cattle	409201	289716	233695	187207	183468	158953

Fig. 2. Number of traditional livestock species in the Republic of Sakha (Yakutia).

[1] Information and analytical collection "Individual sectoral indicators of agriculture for 1990, 2000, 2010, 2012–2023 in the context of municipal districts and urban okrugs of the Republic of Sakha (Yakutia)". Yakutsk, State Public Institution "Center for Resource Provision of the Agro-Industrial Complex of the Republic of Sakha (Yakutia)", December 2024.

Table 2

Cow population in the Republic of Sakha (Yakutia) at the end of the year

	1990	2000	2010	2015	2018	2023
Cows, heads	145367	109020	87805	75302	70255	67557
Number of cows per 1,000 population, heads	130	114	92	79	73	68
Gross milk yield, tons	267400	164599	191606	164572	166055	153170
Milk production per capita, kg (standard: 322 kg/year)	239.8	171.5	199.9	172.2	172.3	153.2

The volume of agricultural production in the livestock sector depends primarily on such factors as the average annual livestock population and productivity. In the harsh conditions of livestock farming in the republic, it is very difficult to increase milk yield per cow. Therefore, agricultural producers are faced with the challenge of adopting biotechnology to effectively manage available resources, particularly by influencing processes that maximize production per ton of raw materials, such as milk.

Dairy products are a source of vitamins and minerals without preservatives or artificial additives, which makes them much more expensive to produce than dairy products containing artificial and plant-based additives. This situation can be improved by developing and implementing technologies that ensure more thorough milk processing and the efficient use of secondary raw materials — essentially, production wastes, which is comparable to whole milk in terms of its biological characteristics.

At the same time, one of the important problems in the formation of effective dairy production remains the low level of use of secondary raw materials. The issue of full and rational use of milk is relevant for almost all countries. This production is particularly challenging for countries and regions where the main agricultural producers are farms and the population. The problem stems from traditional dairy production technologies and its inefficiency, and in some cases, the complete absence of innovative waste-free technologies. In the Republic of Sakha (Yakutia), this problem also remains unresolved. Moreover, the problem concerns not only cow's milk, but also mare's and deer's milk. Despite the fact that industrial technologies have been developed for the production of certain types of products from secondary milk raw materials, including mare's and deer's milk, the wear and tear of equipment at most producers, as well as the remoteness and inaccessibility of certain areas where these herds are located, prevent their full utilization. At the same time, the state has set a strategic goal for the agro-industrial complex to ensure a sustainable and guaranteed supply of high-quality, safe and sufficient food products to the population.

Raw milk is one of the most expensive commodities. In market conditions, as well as in conditions of insufficient supply, all efforts should be directed towards preserving the raw milk that has already been produced through its full and rational use, applying waste-free technologies and preserving all useful components. For example, whole and skimmed milk (including buttermilk) contain 3.2% protein, 4.7% lactose, and 0.7% minerals, while milk whey contains 0.8%, 4.8%, and 0.5%, respectively. All these secondary raw materials, including milk fat, carbohydrates, vita-

mins, enzymes and organic acids, are part of a set of vital compounds and are contained in whole milk. In turn, all of these components — enzymes, phospholipids, and vitamins — are biologically active substances found in skimmed milk, buttermilk, and whey, which play an important role in human health. Although they are inferior to milk in terms of energy value (buttermilk — by almost 2 times, and whey — by almost 3.5 times), they have practically the same biological value [5, Makarenko V.V., Drannikov D.D., pp. 112–115].

The use of secondary raw materials is possible by including them in the recipes of manufactured products, which will not only expand the range, but also improve the taste properties due to buttermilk and whey. This is especially true for whey, which usually accounts for up to 70% of the total volume of processed milk [6, Kremyanskaya E.V.]. As for the Republic of Sakha (Yakutia) specifically, dairy plants process an average of up to 3 tons of milk per day. The production of cream, butter (traditional technology), curd products and sour cream results in secondary raw materials. Thus, the production of 1 ton of butter yields up to 20 tons of skimmed milk and up to 1.5 tons of buttermilk, while the production of 1 ton of cheese and 1 ton of curd cheese yields up to 10 tons and 8 tons of whey, respectively [7, Stepanov K.M., Darmaeva G.G., Khankhaldaeva S.G.-D. et al., pp. 43–45].

In Yakutia, whey is used for food purposes in insignificant volumes. In most cases, it is poured out or fed to calves [8, Darmaeva G.G., 256]. However, whey-based beverages are cost-effective and can be produced in a wide variety of forms, including through the addition of various components, such as fruits or, for example, flower honey [9, pp. 241–246].

Another problem specific to Yakutia is the need to improve the efficiency of raw material use in traditional agricultural sectors, such as herd horse breeding and northern domestic reindeer husbandry.

Thus, advanced processing is required in the production of reindeer products. This will improve the efficiency of reindeer herding. Therefore, it is necessary to address the issue of the most complete and waste-free use of all reindeer products, not just meat, but also antlers, blood, endocrine-enzyme, and other raw materials. Currently, secondary products from reindeer herding are largely wastes, negatively impacting the environment. However, the biologically active substances in reindeer blood, when thoroughly processed, can be used as food supplements and human pharmaceuticals, while endocrine-enzyme and other raw materials are very useful for the pharmaceutical industry in the production of hormonal, enzymatic, and biologically active drugs, numbering already more than 30 [10, Maksimov A.A., pp. 110–118].

In general, deep processing of secondary raw materials increases the profitability of production, as it expands the range of products beneficial to human health and reduces the level of environmental pollution. At the same time, the biotechnological processing of secondary raw materials and waste from traditional northern industries, such as reindeer herding, horse breeding, and hunting, makes it possible to increase the profitability of these industries by 25–40%. The cre-

ation of high-tech jobs, in turn, will increase the profitability of production and improve the quality of life of the rural population [2].

Bio-economy: focus on efficiency of the agro-industrial complex

Back in 2012, the European Commission's strategy and action plan defined the creation of an innovative economy based on a balanced agriculture and its sectors while simultaneously preserving the environment and its biodiversity as its main goal. The plan included provisions such as development of technological bio-economic processes, development of market and competitive relations in economic sectors, and ensuring cooperation between all participants in bio-economic processes [11, Eugeniusz K.Kh., Ostrowski J., pp. 2–7].

Russia has been addressing issues related to the development of the bio-economy and bioenergy for a long time. However, to date, the Russian Federation has not adopted a unified bioeconomic strategy for transforming the linear economy into a bio-economy. Despite the fact that the Russian President identified Russia's transition to an environmentally sustainable development model as one of its key goals back in 2017, and the Government was instructed to pay special attention and establish indicators characterizing the maximum use of renewable energy sources, a fragmented approach to the closed-loop economy persists, and the transition to an environmentally sustainable development model has not yet taken place.

Current agricultural activity in the country and regions is influenced by internal and external factors, as well as other barriers that negatively affect the development of bio-economic processes (Fig. 3).

Disadvantages	Barriers
Lack of sufficient competencies for professional supervision and research	Slow transformation of bio-economic regulatory systems (organizational and legal, financial and fiscal, economic and administrative)
Lack of initiative in training professionals for work in the relevant field	Difficulties in identifying priority bio-economic research projects taking into account the economic and production needs of businesses
Lack of funding for research and implementation	Insufficient interest in new bio-economic approaches and other environmentally friendly technological innovations and solutions
Lack of a unified approach to implementing biotechnology innovations across various industries and sectors of the economy	Slow implementation of existing innovative developments and solutions in the field of waste-free technologies
Lack of financial resources for bio-economic activities, especially those associated with risk	Weak and underpowered scientific and technological base, lack of programs to create infrastructure for the development of the bio-economy
Lack of industrial facilities and infrastructure	Lack of technological leadership

Fig. 3. Factors and barriers hindering the transition to bio-economy.

[2] Kershengolts B.M. On the prospects for the development of bio-economy in the Arctic and Sub-arctic regions. URL: https://porarctic.ru/ru/comments/boris-kershengolts-o-perspektivakh-razvitiya-bioekonomiki-v-arkticheskikh-i-subarkticheskikh-regiona/ (accessed 28 January 2025).

Business plays a major role in the development of a closed-loop economy. However, the bio-economy requires significant investments in innovation and other areas. Environmental design and research aimed at developing technologies for the rational use of resources with waste minimization are costly, and mandatory synchronization across all production sectors is also required.

The bio-economy cannot develop without government regulation and management of biotechnological processes, as well as government support, as it is a rather expense-intensive process. This requires not only advanced funding for R&D, but also privileges in resolving issues of preferential state procurement of bio-products and regulation of the creation of new markets at the initial stage.

In turn, the bio-economy model can be considered effective when the natural resources extracted are largely replenished by the wealth created in the process of their development [3].

There are two main tasks in this regard. Firstly, it is the training of qualified personnel with multidisciplinary knowledge and skills, especially in the use of applied ICT. Secondly, it is the reduction of dependence on external supplies of components and know-how. Investments in production will ensure increased productivity and quality of manufactured products, while investments in environmental protection measures will have a positive impact on nature by reducing anthropogenic pressure [12, Samarina V.P., pp. 72–96].

In turn, the low investment attractiveness of the agro-industrial complex leads not only to a decline in the level of technical modernization across all its sectors, but also to a decline in the effective use of its full potential and resources. At the same time, it is necessary to take into account the role of the agro-food complex in import substitution to provide the population with food [13, pp. 5–9] and achieve food independence for the country.

Meanwhile, the bio-economy goes far beyond the boundaries of the agro-industrial complex and agribusiness and adheres to new views on innovation processes, taking into account changes in both production and the environment.

The basic concept of bio-economy can be summarized in three parts. Firstly, it involves the use of advanced genetic and cellular knowledge, which is necessary for the development of products and processes. Secondly, it includes biological processes aimed at renewing resources and creating conditions for sustainable production. Thirdly, it involves conducting biotechnological research, developing and implementing innovative technologies in economic sectors [14, Wang T., Ahmad R., Riaz S., et al.].

All of the above will create conditions for the transition from a production-based economy to an economy based on renewable resources and care for the environment. A closed-loop economy will ensure the reuse of resources, taking into account their renewability and waste-free nature. As a result, a new technological paradigm is inevitable. These issues should be addressed in the near future. Otherwise, there will be even greater depletion of biosphere resources, causing

[3] Abramov A.L., Matvienko L.L. Bio-economy as a model for the development of the Far East. URL: http://biotech2030.ru/bioekonomika-kak-model-razvitiya-dalnego-vostoka/ (accessed 20 January 2025).

irreparable damage to humanity [15, Akkanina N.V.]. Thus, the bio-economy can be represented as a bridge between the economy, technological processes, and ecology [16, Zhemkov A.I., pp. 48–50].

As applied to agriculture and the agro-industrial complex, innovations should concern changes in both production and product sales processes, especially in the context of current sanctions pressure. Food security is a key focus of state policy and requires the intensification of innovation processes in agriculture and the processing industry, playing a significant socio-economic role [6, E.V. Kremyanskaya, pp. 361–366].

When developing a closed-loop economy, it is rational to act cohesively, maintaining ties with developed countries without creating technological dependence. The crisis state of national economies requires modeling the sustainability of global systems. In turn, the bio-economy should become the foundation for this and shape mechanisms aimed at development.

Understanding the enormous importance of implementing a closed-loop economy has necessitated the development and implementation of another National Project in the country. It is currently known that the project will include five federal projects based on scientific and technical support for the development of biotechnologies, the creation of infrastructure, the training of highly qualified personnel in this field, the development and implementation of biotechnological equipment, and the creation of microbiological production facilities. Five biotechnology product groups will be formed, including:

- for agriculture and food production (starch products and sugars, starter cultures and ferments, animal and plant proteins);
- for human health (raw materials for vaccines, hormones, and antibiotics);
- for the production of component bases (amino acids, vitamins, enzymes);
- for the energy sector (liquid, solid and gaseous biofuels);
- for waste disposal and recycling (composting, wastewater treatment, bioremediation of contaminated land) [4].

As for agriculture and rural areas, the bio-economy can solve such problems as reducing energy costs, increasing production efficiency and ensuring the restoration of land resources. Another important factor is the possibility of creating additional jobs and ensuring employment for the rural population, which will lead to an improvement in their standard of living and quality of life. Furthermore, it is important to understand that the socio-economic and cultural growth of the region's districts is entirely dependent on the state of agriculture and the agro-industrial complex.

Conclusion

The transition to a closed-cycle economy requires the creation of new policy documents for the development of the bio-economy at both the national and regional levels. Program activities

[4] Kiseleva A., Kryukov V. What will the new national project on bioeconomy include? URL: https://www.vedomosti.ru/economics/articles/2024/10/11/1067981-chto-budet-vklyuchat-novii-natsproekt-po-bioekonomike?from=copy_text (accessed 20 January 2025).

should take into account all the specific characteristics of production sectors: from their organization to the types of enterprises, as well as opportunities for international cooperation.

The transition from a linear economy to a bio-economy will solve many problems, especially in the agricultural sector of Russia's northern Arctic regions, and a closed-loop economy will become a key component of the future agro-food industry.

At the same time, the implementation of waste-free and closed-loop technologies requires not only significant financial investment, but also the development of new educational standards and programs to promote biotechnologies and train not only agricultural producers, but also scientific staff in innovative technologies, so that more advanced developments and technologies could be implemented in the future.

There should be an understanding — both among agribusiness and among leaders at all levels of government — of the need to take into account the barriers they face and their impact on the development of an effective bio-economy.

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Conceptual Model of the Ontology of the Russian Arctic Zone in the Context of Logistics and Digital Infrastructure Development

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Abstract. The Arctic region has significant potential for the extraction of mineral and energy resources. However, effective resource development requires careful and balanced decisions that minimize environmental impact and ensure sustainable resource management. This article discusses the development of a conceptual model of the ontology of the Arctic zone of the Russian Federation, focused on logistics and digital infrastructure. Ontology is a powerful tool for organizing areas of knowledge, providing a formal representation of concepts and their interrelationships. The main classes, relations, attributes and rules of functioning of the ontological model are defined. The significance of digitalization and logistic routes in the extreme climate of the Arctic is demonstrated. The proposed ontology systematizes information about logistics and digital components of the Arctic region of Russia. It allows creating a structured knowledge base that will enable stakeholders to analyze complex interdependencies, develop effective management strategies and make informed decisions that contribute to sustainable development in this vulnerable ecosystem. In developing the ontology, we aim to provide a unified view of the Arctic's logistics and digital sphere, which helps stakeholders better navigate the complex system of challenges and opportunities.
Keywords: *regional ontology, Arctic, logistics infrastructure, digital infrastructure*

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Introduction

The harsh climate, unpredictable weather conditions, and permafrost pose significant technical and logistical obstacles to the development of Arctic resources, including the region's abundant energy resources [1–4]. These challenges, combined with growing concerns about envi-

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ronmental impact and the need to pay attention to the rights of indigenous peoples, require the creation of a reliable and adaptable management structure. In their research, the authors of the article consider the development of key communication subsystems — logistics and digital — as drivers of the Arctic zone management system [4–8]. These subsystems enable the movement of people, material assets, and information, thereby providing key channels for the movement of value within the region. This makes them key elements of the region's management and development system and poses the task of systematizing knowledge about these subsystems.

Ontologies are a powerful tool for structuring and organizing knowledge areas. They provide a formal representation of concepts and their interrelations, facilitating information exchange, knowledge integration, and informed decision-making. In the context of the Arctic oil and gas industry, ontology serves as a critical roadmap guiding sustainable development [9]. The creation of ontology for the Russian Arctic zone will provide a clear understanding of the multifaceted aspects of Arctic logistics and digital infrastructure, which, in turn, will be the first step towards effective analysis of data on the state of the region. Establishing relationships between the key entities of the system(s) under consideration creates the preconditions for a more in-depth analysis and identification of opportunities for implementing new types of connections. Ontology will also create a common language for information exchange between various industry stakeholders — governments, researchers, and indigenous communities, enabling effective interaction and collaborative decision-making.

The aim of this article is to develop a conceptual ontology model for the Arctic zone of the Russian Federation in the context of the development of logistics and digital infrastructure.

In order to achieve this aim, two objectives were formulated, which form the basis of this article:

- compiling a glossary of terms for the subject area;
- defining key elements of the ontology.

This study consists of several structural parts, each of which performs its own function in the process of scientific analysis. The first part, methodology, covers the definition of the fundamental approaches on which the study is based, as well as the development of a glossary of key concepts in the subject area. The second part, results, is a review of current scientific literature in the field of ontology development, followed by a presentation of the proposed ontology, as well as its refinement and adaptation in the context of logistics and digital infrastructure. The final part of the study is devoted to summarizing the results of the analysis and formulating conclusions based on the results obtained.

By creating this ontology, we aim to promote a common understanding of the Arctic logistics and digital sector, enabling stakeholders to navigate a complex system of challenges and opportunities. This knowledge infrastructure will facilitate informed decision-making, ensuring the sustainable, responsible, and balanced use of the Arctic's enormous energy potential, taking into account the region's unique environment and the rights of indigenous peoples.

Materials and methods

The ontology lifecycle is built around prototype refinement. It goes through separate stages, each of which corresponds to specific actions provided for by the chosen approach. As a result, the ontology enters a maintenance state, during which knowledge is collected, evaluated, and documented throughout the entire lifecycle. [10]

In order to standardize the conceptual framework of the article, a glossary of key terms is provided:

- ontology — a formalized representation of knowledge in the form of classes, attributes, and relationships between them;
- Arctic zone of the Russian Federation — the territory of the Russian Federation, including northern regions, sea routes, and island formations;
- logistics infrastructure — a set of transport routes, terminals, and storage facilities that ensure the movement of goods and passengers;
- digital infrastructure — technological solutions, including data centers, telecommunications networks, and digital services;
- indigenous peoples — ethnic groups traditionally living in the Arctic region and practicing traditional economic activities;
- environmental risks — potential negative impacts of logistics and industrial projects on the environment;
- regulatory impact — legislative and regulatory measures governing logistics and digital activities in the Arctic;
- stakeholders — interested parties involved in the planning, implementation, and management of infrastructure projects.

Developing the ontology in the context of the logistics and digital industries of the Arctic Zone of the Russian Federation is a complex, multi-stage process that cannot be implemented without a clearly structured algorithm of actions. In this case, the ontology serves as the basis for a deeper understanding and organization of knowledge, as well as for the effective implementation of new technologies and processes in this specific geographic and economic environment. To successfully create the ontology for the logistics and digital industries in the Russian Arctic, it is necessary to divide the entire process into five clear and logically sequential stages, each with its own goals and objectives. This approach will ensure systematic and structured work, as well as enable the effective integration of knowledge and innovation in these areas (Fig. 1):

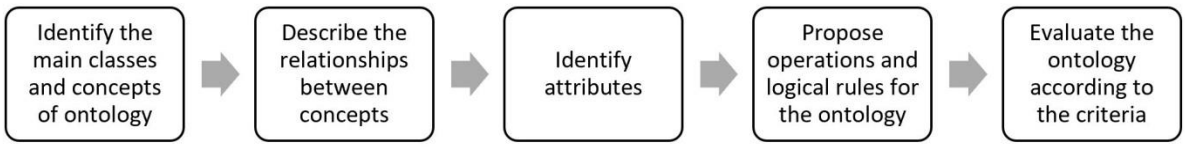

Fig. 1. Ontology description algorithm (compiled by the authors).

While the first four stages are limited by the functional capabilities of certain software tools, the criteria used in the last stage can be individually selected in accordance with the purpose of using ontology. Thus, the criteria for evaluating ontology can be both general [11–12] and new, defined for a specific ontology. The evaluation of the ontology for the logistics and digital sectors of the Arctic requires consideration of various aspects covering its structure, content, and relevance for specific applications. We propose using the following criteria:

- Coverage and completeness: Does the ontology cover the scope of relevant concepts, from geological formations and extraction methods to environmental regulations and socio-economic impacts? Does it provide sufficient detail for specific applications? Does the ontology address the unique challenges and opportunities presented in the Arctic environment, such as permafrost, extreme weather conditions, and indigenous communities?
- Structure and organization: Is the ontology structured logically and consistently, with clear definitions and relationships between concepts? Does the ontology use a clearly defined hierarchy to organize concepts, allowing for efficient navigation? Is the ontology modular, allowing specific modules to be added or removed to suit different applications?
- Accuracy and validity: Are the definitions and relationships in the ontology based on scientific knowledge and industry standards? Does the ontology accurately reflect real concepts and relationships in the Arctic logistics and digital sectors?
- Usability and applicability: Is the ontology accessible and understandable to both technical and non-technical users? Does the ontology meet the specific requirements of different applications, such as exploration and production planning, environmental impact assessment, or policy development?
- Ethical and social considerations: Does the ontology respect the rights and interests of indigenous peoples? Does the ontology include concepts and relationships relevant to minimizing the sector's impact on the Arctic environment?
- Maintenance and evolution: Is the ontology designed to accommodate future changes and updates in the sector and the Arctic environment? Are academic stakeholders and relevant communities involved in the development and maintenance of the ontology?

Analysis of the ontology according to the proposed criteria will provide a comprehensive assessment of its quality, suitability, and potential for the Arctic logistics and digital sector.

Results

The creation of the ontology for the Russian Arctic zone is an important task for systematizing knowledge and developing effective strategies in the fields of logistics, ecology, and digital technologies. The scientific literature presents various approaches to constructing ontologies in the Arctic context.

The study [7] examines the creation of ontology for the Russian Arctic zone, as well as the development and advancement of a knowledge base in this area. Furthermore, the article [13] analyzes the environmental aspects of the Arctic zone, including greenhouse gases and ice melt, which also requires the creation of specialized ontologies for assessing and managing environmental risks. The research [14] discusses various approaches to classifying regions of the Arctic zone and the need to develop appropriate ontologies for the effective management and development of these regions.

However, these studies do not propose a specific ontology for the Arctic zone. In contrast, this study proposes the development of the ontology that will serve as a basis for a deeper understanding and organization of knowledge, as well as for the effective implementation of new technologies and processes in this specific geographic and economic environment. The Arctic logistics and digital sectors are complex systems in which stakeholders compete for influence and benefit. However, these systems cannot be considered in isolation from their environment. The Arctic zone offers diverse potential benefits to stakeholders, but it is important to recognize the region's complex and sensitive nature.

Let us define the main classes of the ontology (Fig. 2):

- logistics infrastructure;
- stakeholders;
- indigenous peoples and their interests;
- economic entities;
- legal and regulatory aspects;
- digital infrastructure;
- natural and climatic factors;
- geographical objects.

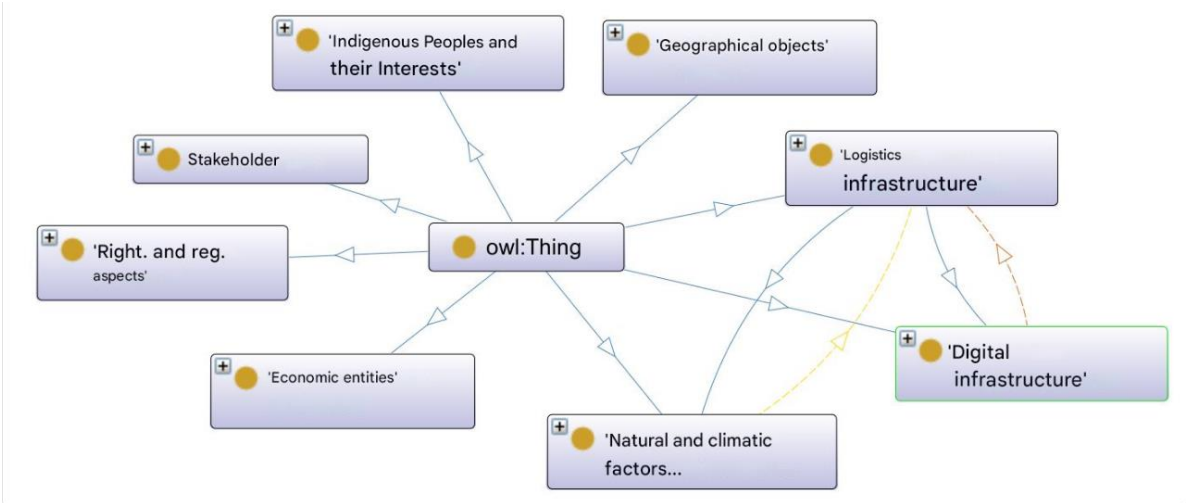

Fig. 2. Upper level of the ontology (compiled by the authors).

The conceptual model of the Arctic zone ontology includes the following main classes:

- geographical objects: regions, sea routes, ports, transport hubs, climatic zones;
- logistics infrastructure: sea, river, air, road, and rail routes, warehouses, terminals, and transshipment points;
- digital infrastructure: data centers, satellite communications, 5G networks, fiber optic lines, and IoT devices;
- economic entities: transport companies, industrial enterprises, government agencies, and international partners;
- natural and climatic factors: ice conditions, shipping seasonality, meteorological conditions, and environmental risks;
- legal and regulatory aspects: international agreements, public policy, regulations, and safety standards;
- indigenous peoples and their interests: traditional economic practices, ecosystem services, and ethno-cultural aspects;
- stakeholders: public and private organizations, local communities, investors, international organizations, and research institutes.

The proposed ontological model takes into account the following key relationships (Table 1):

Table 1

Key relationships in the ontology developed

Name	Description of relationships
Logistics connectivity	Routes connect transport hubs and ports
Digital integration	Digital infrastructure supports logistics infrastructure
Regulatory impact	Regulations govern logistics and digital infrastructure
Environmental impact	Economic actors influence environmental risks
Impact on indigenous peoples	Logistics and digital infrastructure impact local communities
Role of stakeholders	Interaction of various stakeholders in the planning and implementation of infrastructure projects
Accessibility of facilities	Natural and climatic factors influence logistics infrastructure

Thus, Fig. 3 shows not only the basic classes of ontology, but also the relationships between them. The figure highlights two classes, which we will discuss in detail below.

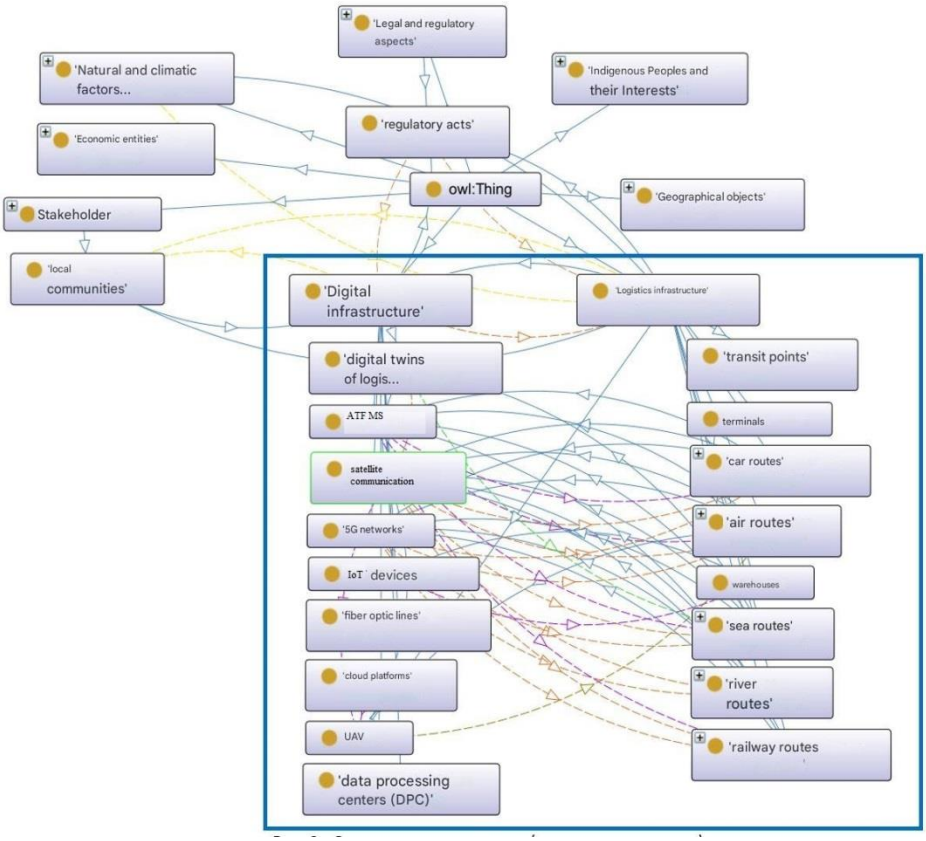

Fig. 3. Relationships in the ontology (compiled by the authors).

Let us consider the classes of digital infrastructure and logistics infrastructure.

The logistics infrastructure of Russia's Arctic zone is a complex system of transport routes, warehouse complexes, and terminals that ensure the delivery of cargo and passengers in harsh climatic conditions. The development of this infrastructure plays a key role in the development of the region, supporting local communities and the economic development of the country [15–18].

Sea transport is the primary means of cargo transporting in the Arctic [16–17]. The main transport artery is the Northern Sea Route (NSR), connecting the European part of Russia with the Far East. The advantages include the ability to transport large consignments of cargo, independence from road conditions, and a shorter route between Europe and Asia. However, the seasonality of shipping due to ice conditions and the high cost of icebreaker support are limitations in this area.

Rivers play an important role in the Arctic transport system, especially in the summer, when they become navigable. The main types of transportation include the delivery of fuel, food, and building materials to remote regions. These are limited by the short navigation season and the need to transfer cargo to other modes of transport at ports.

Air transport provides efficient connections between regions, especially in conditions of permafrost and the absence of year-round roads. Passenger transportation, mail delivery, medical evacuation, and supplying remote settlements are the main uses of air transport in the Arctic region. However, there are challenges including high transportation costs, limited airport capacity, and dependence on weather conditions.

Roads in the Arctic consist of winter roads (temporary winter roads) and permanent highways, but their length is extremely limited. They are characterized by poor road surface quality, challenging climatic conditions, and high maintenance costs.

Rail transport provides freight and passenger transportation between major logistics hubs [19]. Projects to expand the Arctic railway network are accompanied by high construction and operating costs and the need to adapt to permafrost conditions.

An important part of the logistics infrastructure is cargo storage and transshipment facilities, such as terminals and hubs in major ports (Murmansk, Sabetta) and at railway junctions (Vorkuta, Labytnangi).

Logistics centers provide cargo distribution, containerization, and servicing of ships and vehicles.

Transshipment hubs are used to transfer cargo between different modes of transport, for example, from rail to ships or from sea transport to aviation.

Digital infrastructure is the foundation for efficient transport management, climate change monitoring, and support for communities in remote areas. Its development is critical for the digitalization of the Arctic economy [20–22].

Data centers (DCs) are key elements of the digital infrastructure, providing data storage, processing, and analysis. Their functions include supporting cloud services, processing data from monitoring sensors, and ensuring the operation of government and corporate services. Data centers contribute to improving the stability of information systems, developing remote administration, and reducing data transmission delays. However, high operating costs due to climatic conditions and the need for autonomous power supply are key challenges that need to be addressed.

Satellite communications play a vital role in ensuring communication in remote areas. Gonets, Yamal, Roscosmos projects, and private companies provide internet connections, environmental monitoring, and communications with sea and air vessels. The disadvantages are signal delays and the high cost of satellite data transmission.

The development of high-speed communication networks provides high bandwidth for digital services and the Internet of Things (IoT). Experimental zones in large cities (Murmansk, Norilsk) support autonomous transport, infrastructure monitoring and remote control of industrial facilities.

IoT enables automated monitoring of infrastructure assets, including sensors for monitoring ice conditions, systems for monitoring the condition of pipelines and transport routes, devices for tracking the movement of ships, aircraft and motor vehicles, and smart weather stations for forecasting weather conditions.

Each of the presented classes has a number of attributes:

- for logistics infrastructure: length, seasonality, throughput capacity;
- for digital infrastructure: reliability level, coverage area, cyber security level.

The logistics and digital infrastructures of the Arctic zone of the Russian Federation are closely interrelated, as digital technologies enable the optimization of transport flows, monitoring of route conditions and management of logistics facilities in extreme climatic conditions. The main types of interrelationships between these infrastructures are as follows:

- *supports* — digital infrastructure ensures the operation of logistics systems;
- *implements* — digital technologies enable the implementation of automated logistics processes;
- *can duplicate* — alternative digital solutions (e.g., unmanned aerial vehicles) can replace or complement traditional logistics routes.

In this context, it is necessary to introduce new elements and connections, such as:

1. Automated and robotic warehouses
   1.1. Connectivity "*implements*": IoT devices enable the automation of warehouse operations.
   1.2. Connectivity "*supports*": satellite communications and 5G networks ensure the uninterrupted operation of remote logistics centers in the Arctic.
2. Unmanned aerial vehicles (UAVs) for cargo transportation
   2.1. Connectivity "*can duplicate*": UAVs can replace traditional air routes, especially in hard-to-reach areas.
   2.2. Connectivity "*implements*": satellite navigation systems, cloud platforms, and artificial intelligence enable autonomous drone control.
3. Intelligent transport corridors
   3.1. Connectivity "*supports*": digital twins of routes allow for ice conditions to be predicted and vessel routes to be adjusted.
   3.2. Connectivity "*implements*": automated traffic management systems (ATMS) reduce costs and delivery times.

Figures 4–14 show the relationships between the ontology entities.

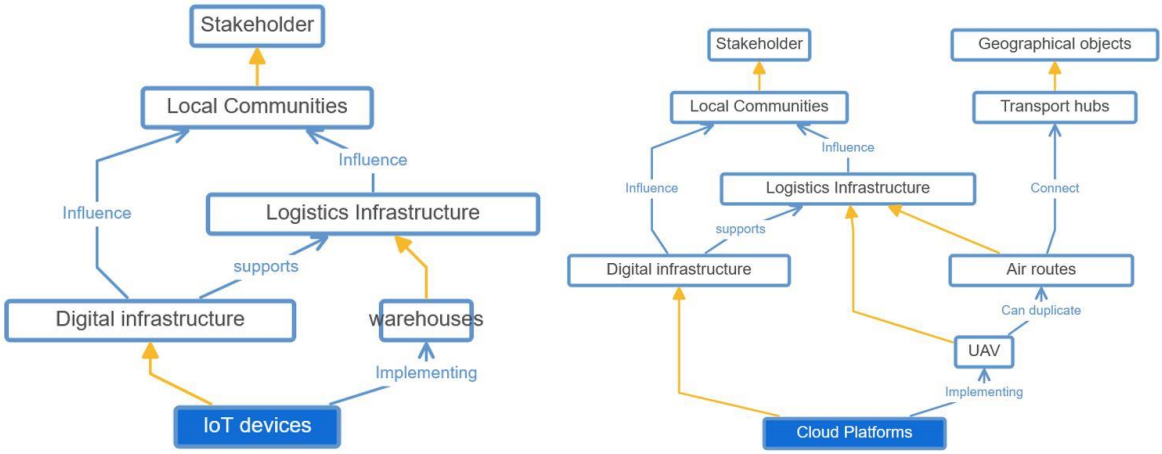

Fig. 4. Relationships between entities of the ontology's digital infrastructure: IoT devices, cloud platforms (compiled by the authors).

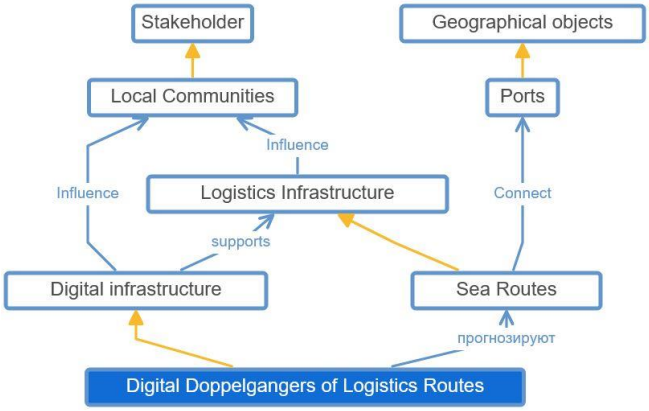

Fig. 5. Relationships between entities of the ontology's digital infrastructure: digital twins of logistics routes (compiled by the authors).

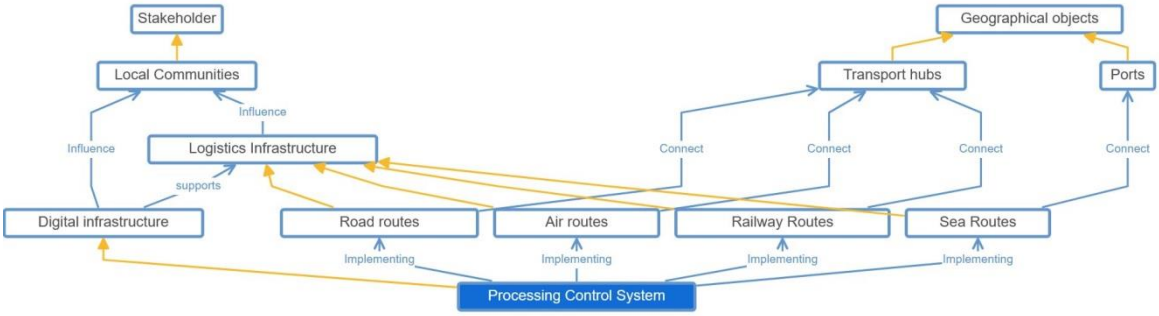

Fig. 6. Relationships between entities of the ontology's digital infrastructure: automated process control systems (compiled by the authors).

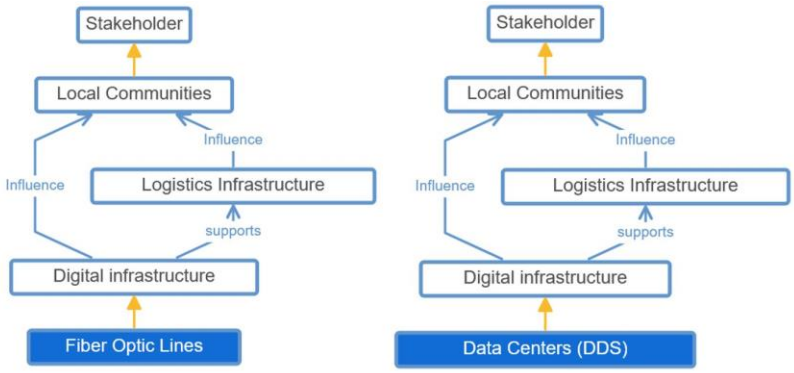

Fig. 7. Relationships between entities of the ontology's digital infrastructure: fiber optic lines, data centers (compiled by the authors).

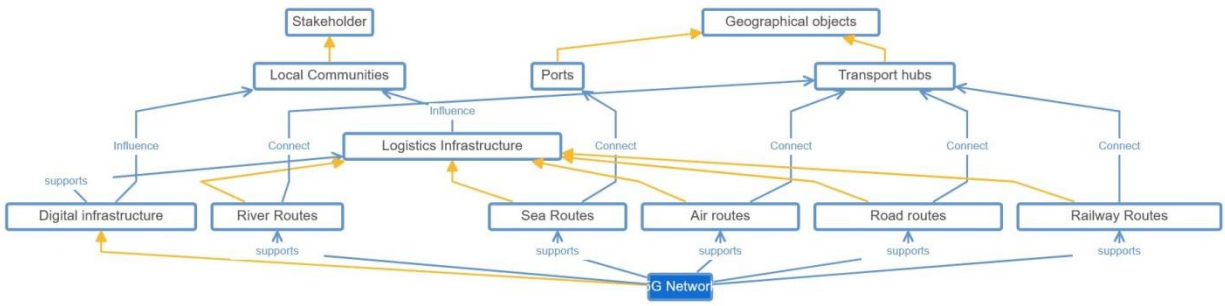

Fig. 8. Relationships between entities of the ontology's digital infrastructure: 5G networks (compiled by the authors).

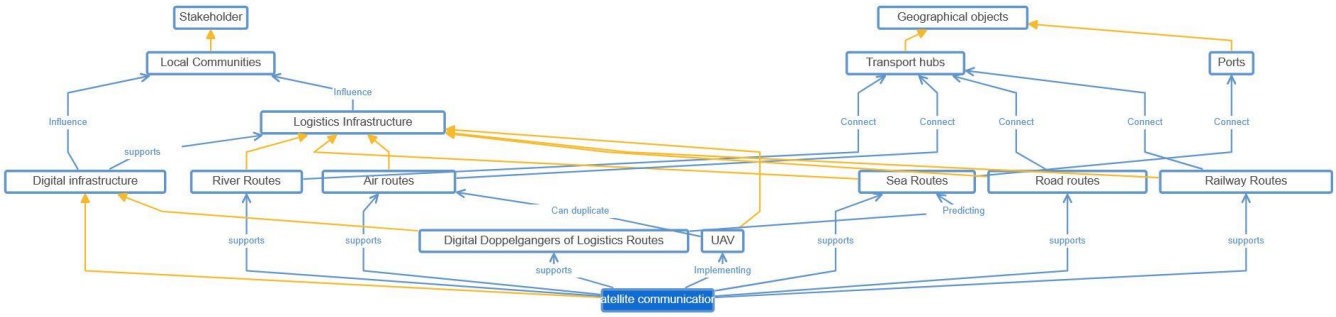

Fig. 9. Relationships between entities of the ontology's digital infrastructure: satellite communications (compiled by the authors).

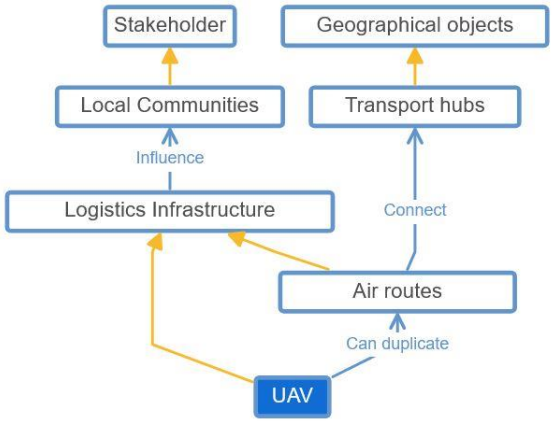

Fig. 10. Relationships between entities of the ontology's logistics infrastructure: UAVs (compiled by the authors).

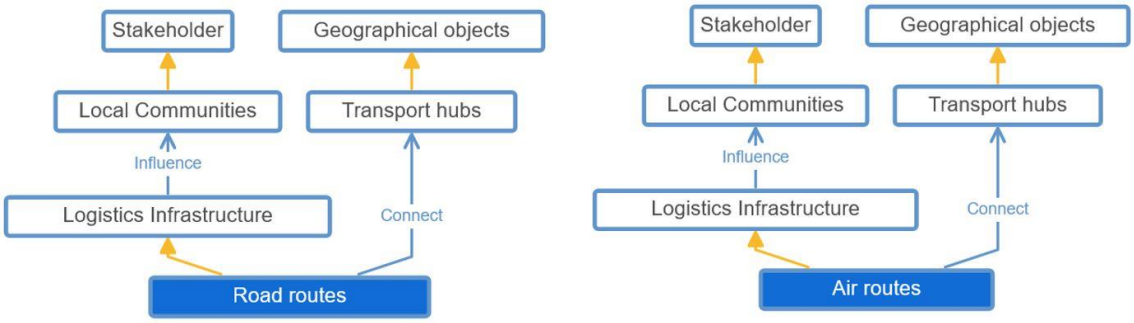

Fig. 11. Relationships between entities of the ontology's logistics infrastructure: road routes, air routes (compiled by the authors).

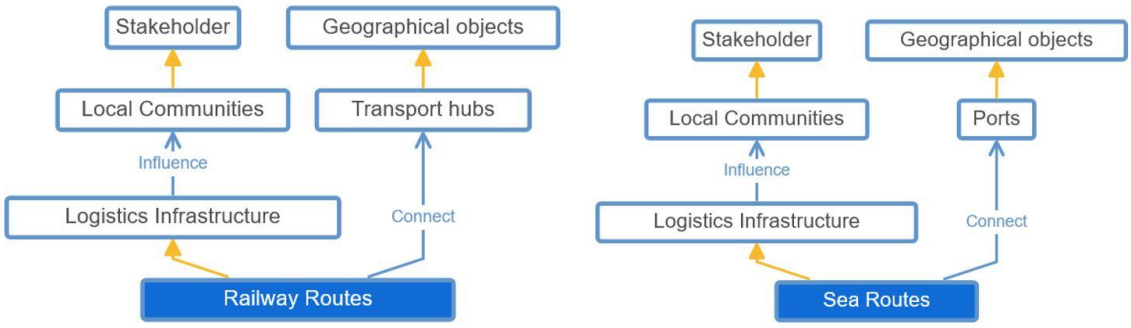

Fig. 12. Relationships between entities of the ontology's logistics infrastructure: rail routes, sea routes (compiled by the authors).

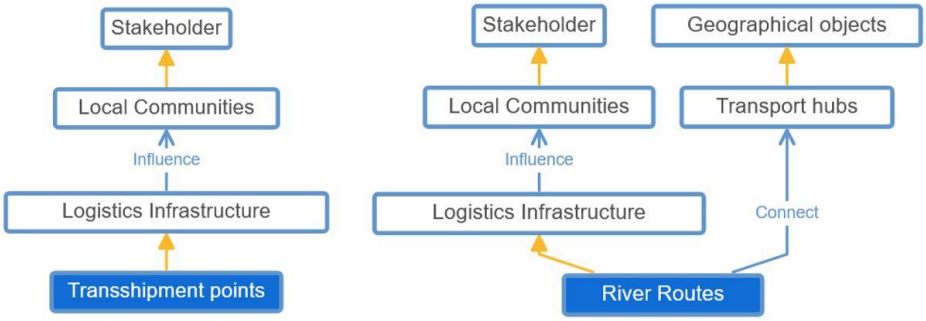

Fig. 13. Relationships between entities of the ontology's logistics infrastructure: transshipment points, river routes (compiled by the authors).

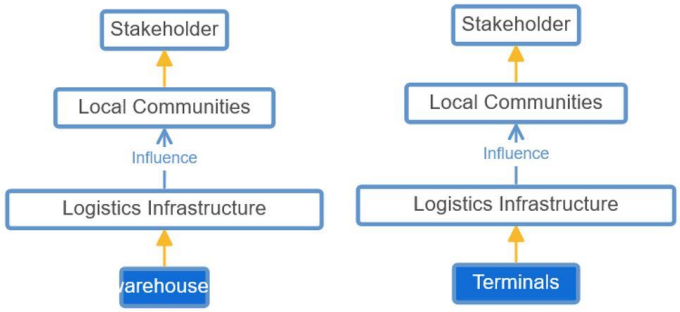

Fig. 14. Relationships between entities of the ontology's logistics infrastructure: warehouses, terminals (compiled by the authors).

The following logical rules are proposed for the effective use of the ontology:

- optimization of logistics flows based on digital data;
- forecasting climate and ice conditions for shipping;
- analysis of the level of infrastructure digitalization and its impact on transport processes;
- automated risk assessment of logistics routes based on historical data;
- assessment of the impact of infrastructure projects on the traditional practices of indigenous peoples;
- development of mechanisms for compensating damage to indigenous peoples and their involvement in regional planning and development processes;
- management of interactions between stakeholders to coordinate economic, environmental, and social aspects.

The proposed ontology combines the scope of relevant concepts and provides sufficient detail for specific applications. It covers the unique challenges and opportunities presented in the Arctic environment, such as permafrost, extreme weather conditions and indigenous communities. The ontology is structured logically and consistently, with clear definitions and relationships between concepts, using a strict hierarchy to organize concepts for effective navigation. It is modular, allowing specific modules to be added or removed according to different applications. The definitions and relationships in the ontology are based on scientific knowledge and industry standards. The model accurately reflects real concepts and relationships in the Arctic logistics and

digital sectors. The ontology is easily understood by both technical and non-technical users and meets the specific requirements of various applications. It respects the rights and interests of indigenous communities and includes concepts and relationships relevant to minimizing the sector's impact on the Arctic environment. Stakeholders in the sector, academia and relevant communities involved in the development and maintenance of the ontology can make the necessary changes and updates.

Conclusion

The development of logistics and digital infrastructure in Russia's Arctic zone is a strategically important area. The logistics system includes sea, river, air, road, and rail routes, as well as warehouses, terminals, and transshipment points. Digital infrastructure, represented by data centers, satellite communications, 5G networks, and IoT devices, plays a key role in managing these processes. Its development will improve the economic efficiency, safety, and resilience of transport and industrial systems in the extreme Arctic climate.

The development of the ontology for the Arctic zone of the Russian Federation in the context of logistics and digital infrastructure allows for the systematization of knowledge and improved management of transport flows and digital assets in the region. The implementation of digital technologies and ontological models contributes to more efficient use of resources, risk reduction and increased competitiveness in the Arctic region. An important aspect is the consideration of the interests of indigenous peoples, which will ensure a balance between economic development and the preservation of their traditional way of life. Involving stakeholders in the decision-making process contributes to more sustainable and balanced development of the region.

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Arctic Sheep Breeding in Russia: History and Prospects

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Abstract. The article analyzes the phenomenon of Arctic sheep breeding in Russia. In pre-Soviet times, sheep farming spread across the vast territory of the Arkhangelsk province, up to the coasts of the Barents and White Seas. Interest in sheep breeding in the North was shown not only by the immigrant population, but also by the indigenous Sami people. New information about the use of sheep in the farms of the Kola Peninsula in the early 20th century, obtained from the State Archives of the Murmansk Oblast, is being introduced into scientific circulation. Local features of animal husbandry and feeding, as well as market prices for sheep products, are presented. For a long time, this branch of animal husbandry was tied to the needs of the household. During the Soviet era, this experience was rethought, as a result of which sheep breeding became one of the priorities of agricultural production in the Murmansk Oblast. However, in the 1950s and 1960s, as a result of a shift towards cattle, pigs and poultry, the sheep population in the region declined. The transformations of the 1990s led to stagnation and almost complete loss of this branch of animal husbandry. Historical experience is important in modern conditions for the revival of sheep farming in the Arctic territories.
Keywords: *Arctic, Murmansk Oblast, Far North, agriculture, livestock, sheep*

Introduction

The consequences of the 1980s–1990s crisis led to the disappearance of entire branches of animal husbandry in certain regions of Russia. In particular, one of the destructive results was the loss of sheep breeding in the Arctic zone of the Russian Federation, where it had existed for a long time.

Currently, in order to assess the prospects and choose the right path in the face of modern challenges, it is important to refer to historical experience.

There is a widespread opinion among experts that sheep farming in the Far North has proven its potential to become a “traditional branch of animal husbandry” [1, p. 4]. This approach, however, is not universally shared. In the specialized literature, there are assessments that cast doubt on this fact, declaring sheep farming in the Far North to be “completely insignificant” as it was allegedly decided here to “keep sheep usually as an addition to cattle” [2, p. 1; 3, p. 224]. The-

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se judgements are obviously based on the application of general criteria to northern and southern regions, which is inherently incorrect. Arctic ecosystems are more vulnerable, and humans are more dependent on them. The introduction of sheep into the households of the Far North can already be considered a phenomenon or an achievement that helps people to develop the territory. Therefore, it is inappropriate to substitute the northern reality with the southern one.

It is important to substantiate the need to refer to historical experience in the process of developing new regional strategies for the revival of Arctic sheep breeding in Russia.

In the course of their research, the authors used methods developed by modern science: statistical analysis, zootechnical assessment of sheep productivity, and extrapolation. The main sources were documents from the State Archives of the Murmansk Oblast (SAMO), as well as statistical yearbooks and compilations. In order to understand the current situation in the Arctic, an analysis of the "Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035" was conducted.

One of the areas of the Arctic zone of the Russian Federation where sheep breeding became a popular form of domestic farming even before the 1917 revolution is the Murmansk Oblast. Its territory occupies the Kola Peninsula, which lies almost entirely above the Arctic Circle and is washed by the waters of the Barents and White Seas. The unique natural location of this region is determined by the warm Gulf Stream, which prevents the sea bays on the northern Murmansk coast from freezing in winter, making the Arctic climate milder. Administratively, it was the Kola district, and since 1899 — the Aleksandrovskiy district of the Arkhangelsk province.

Sheep breeding as an element of the economy in the Far North of Russia

Statistics can dispel any doubts about the importance of sheep breeding for the northern regions of Russia. According to Table 1, in 1913, the Arkhangelsk province had the smallest number of sheep in the Aleksandrovskiy district, i.e. in the Kola North (3,865 head), which, given the vast area of the region, creates the illusion of the "insignificant" role of sheep farming in the local economy [4, pp. 62, 82; 5, p. 47]. However, when considering the number of sheep per rural inhabitant, it turns out that the Kola North occupied a significant position in the province: there were 36 sheep per 100 rural residents, which was higher than, for example, the Kholmogorskiy, Arkhangelskiy, and Shenkurskiy districts, which traditionally focused on cattle. Sheep adapt well to various climatic zones, including the Far North, which explains their spread in such remote areas as the Mezen, Pechora, and Aleksandrovskiy districts. Moreover, the number of sheep per 100 rural inhabitants in these extreme locations was only slightly lower than the average for the Russian Empire (51.0).

Table 1

Number of sheep by districts of the Arkhangelsk province in 1913 (excluding cities and towns), heads

Districts	Number of sheep	Number of sheep per 100 rural inhabitants	Number of sheep per 100 head of cattle
Shenkurskiy	25 616	25.9	95.7
Pechorskiy	22 181	47.5	113.6
Kemskiy	19 411	41.8	176.8
Onegskiy	18 847	41.2	137.8
Mezenskiy	18 057	55.6	143.6
Pinezhskiy	15 101	39.5	171.3
Kholmogorskiy	4 430	9.5	36.8
Arkhangelskiy	4 300	8.9	38.6
Aleksandrovskiy (Kola Peninsula)	3 865	36.1	214.0
Total	131 808	31.8	112.4
For reference: The Russian Empire	-	51.0	≈140–144

The already mentioned view of northern sheep farming as “supplementary” to other branches of animal husbandry also requires a critical approach. Calculating the number of sheep per 100 head of cattle reveals that in 1913, the highest rate of the Arkhangelsk province was in the Aleksandrovskiy district —there were two sheep per head of cattle, which was higher than the average for the Russian Empire (see Table 1). This shows that sheep farming was being transformed into a basic element of the household economy more actively in the Kola North than in other districts of the province. Perhaps it was easier to keep sheep than reindeer. On the other hand, the opinion of Professor N.N. Pelekhov, who, in 1925, assessing the prospects for the development of sheep breeding, suggested that in the North “sheep could replace pigs in many places” [6, p. 4], can be considered correct.

Regarding the adaptation of sheep to the Far North, it should be emphasized that the spread of these animals affected not only continental territories, but also those directly bordering the Barents Sea. The warm Gulf Stream current penetrating here created quite viable conditions on the Murmansk coast, where, during the “government colonization” of 1868–1917, numerous domestic animals, including sheep, appeared on private farms. For example, the family of Pechenga colonist Alexander Ivanovich Ananyin owned three cows, nine sheep, and six reindeer, while the family of Teriberka colonist Nikolay Konstantinovich Apodosenkov kept three cows, five sheep, and four reindeer [7, pp. 136, 157]. There were many such examples.

During a statistical survey of Murman in 1899–1902, sheep were found in various coastal areas [8, pp. 4–5, 112–113, 175, 183].

Table 2

Number of sheep on the Murmansk coast of the Barents Sea in 1899–1902

Area	Number of sheep, heads	Cost of all heads, rub.
Eastern Murman	152	459
Kola Bay	60	206
Western Murman	535	1802

Table 2 shows that sheep were numerically more prevalent in Western Murman compared to Kola Bay and Eastern Murman. This could be due to both the milder natural and climatic conditions in this area and the proximity of the state border. Sheep were brought to Murman not only by the population from the regions of the Russian North, but also by immigrants from Finland and Norway, who settled most actively in Western Murman during the period of "government colonization".

Sheep breeding on the Kola Peninsula in pre-Soviet times

Sheep farming began to develop among the Sami, the indigenous population of the Kola Peninsula, in the 18th century. As Professor I.F. Ushakov noted, "winter headgears and clothing were made from sheepskins, while wool was used to make varegs and pisyags (blankets-capes)" [9, p. 179]. It can be assumed that sheep farming was adopted by the Sami from the Russian population, inhabiting the Kola Peninsula since the 15th century. However, I.F. Ushakov expressed a different opinion — that it spread from northern Norway, since the Sami had "Danish breed" sheep [10, p. 42].

There is relatively little information in the scientific literature on the state of sheep breeding in the Aleksandrovskiy district of the Arkhangelsk province. An unknown document that sheds light on this issue was discovered in the State Archives of the Murmansk Oblast (SAMO) [1].

In December 1910, the Department of Agriculture and State Property of the Arkhangelsk Province sent a questionnaire on the state of sheep farming to the volost administrations. We have obtained a document with answers compiled in the Kuzomenskaya volost of the Aleksandrovskiy district (the southern part of the Kola Peninsula, covering the Terskiy coast of the White Sea).

By 1911, there were 582 sheep in the households of the Kuzomenskaya volost, which accounted for 12.7% of the total number of sheep in the Aleksandrovskiy district [11]. As noted in the questionnaire, there were approximately two sheep per household. This explains the exclusively domestic use of sheep products, without any claim to profitability. It was not customary to build special sheepfolds here: in winter, the sheep were kept in barns near the house without special bedding, and during the rest of the year they were left to graze freely, "without supervision". Shearing of sheep in the summer was uncommon. In addition to hay, the questionnaire indicates reindeer moss (white moss) as food. Feed and water were given to the sheep twice a day while they were in the barn. There was no special diet for ewes during pregnancy and after lambing. The "suckling period" of a lamb was defined as "six months or more". The questionnaire asked, "What is the first food a lamb eats after its mother's milk?" The answer was, "They are not fed anything special." A shortage of feed is indicated, especially in the spring.

The questionnaire contains data on the weight of animals: rams — up to 2 poods, ewes — up to 1 pood 20 pounds, half-year-old lambs — 20 pounds.

[1] SAMO. F. I-1. Invt. 1. Arch. 260. Sh. 7-8.

There is also information on the productivity of the animals. Each sheep produced from 30 pounds to 1 pood 20 pounds of meat and up to 10 pounds of "good quality" lard. Wool was sheared three times a year, from 1.5 to 3 pounds per animal.

The questionnaire contains information on skin processing. Sheepskin is not tanned, but is processed "at home" for personal use. Most of the sheepskin sold is untanned. No felted footwear is produced. Yarn is prepared for personal use.

The prices at which sheep products were sold are also listed: meat — from 3 rubles 50 kopecks to 4 rubles per carcass; lard — 15 kopecks per pound; wool — 60 kopecks per pound; sheepskin — up to 60 kopecks per piece.

The questionnaire noted that "local conditions prevented" full-scale sheep breeding.

In the second half of the 19th century, sheep farming spread to the northern coast of the Kola Peninsula — the Murmansk coast, which had been the main fishing base in the Russian Arctic (Barents Sea) for four centuries. As part of the "government colonization", which began during the reign of Alexander II, the Murmansk coast transitioned from seasonal to year-round settlement, resulting in the growth of colonies with permanent residents [12, pp. 212–222]. Similar to the Terskiy coast, fishermen began to acquire livestock, including sheep [7].

Despite harsher natural conditions (and perhaps because of them), the level of sheep farming here was even higher than on the Terskiy coast. Participants in Murman's statistical study of 1899–1902, modeled on zemstvo statistics, noted that in households keeping only sheep, they encountered special "sheep barns", which they nevertheless did not call "sheepfolds": "small and low, unheated; walls are made of boards, sometimes covered with turf to protect against the cold (waste in such sheds does not freeze); inside — wooden flooring; these sheds are kept clean, and manure is thrown out twice a day". Common barns for cows and sheep were built under the same roof as the house; the entrance to the barn was from the seni (entryway). The careful arrangement of the barn was explained by the long winter: the animals had to be kept in the stall for up to six or seven months of the year.

Interestingly, the sheep were also fed seafood: seaweed, cod and haddock heads, and sometimes fresh and salted fish, cod liver, and discarded seal carcasses. A recipe for making a common feed for cows and sheep is described: "Hay and reindeer moss (or hay alone), as well as dried and salted fish heads, and sometimes fish entrails, are placed in a cast-iron cauldron, which is usually built into the stove in the barn. Everything is covered with water and boiled until the bones are cooked and become soft." Before giving it to the cattle, the feed is sometimes sprinkled with flour [8, pp. 191–193].

The main area of sheep breeding on the Murmansk coast was domestic farming. Even the wealthy Trifono-Pechenga Monastery, located on Murman, which had considerable capital and developed advanced technologies of its time on its territory, did not dare to engage in entrepreneurial practice in the field of sheep farming: according to the "cattle breeding" records, the monks ac-

quired a small flock of sheep (22 heads in 1898), but after a few years they abandoned their breeding, retaining reindeer and cattle as their livestock priorities [2].

None of the descriptions mention the breed of sheep in the Kola North in the early 20th century, which can obviously be explained by the absence of livestock breeding specialists in these areas at that time.

Arctic sheep breeding and the metamorphosis of modernization

In the 1920s, the scale of sheep farming was quite modest. Analyzing the state of the Murmansk province, economist and statistician V.K. Alymov wrote in 1925: "There are approximately 3,900 sheep in the volosts; local sheep produce 5-6 pounds of wool per year; we will assume 4 pounds; the value of raw wool is approximately 1 ruble per pound. Thus, sheep farming will generate an income of 15,000 rubles per year." [3]

Positive experience in sheep farming on the Kola Peninsula developed later, when Soviet modernization spread to the Far North and agricultural production appeared in the region alongside household farms.

An unprecedented experiment was carried out in the Murmansk Oblast to transform the polar region not only into an industrial, but also an agricultural complex. However, the agrarization of the Arctic was not a self-sufficient goal, but served the purpose of urbanization. The common perception that the Far North during the first five-year plans was a "total Gulag" is fundamentally incorrect. The Murmansk Oblast became the first Arctic region where voluntary labor was used alongside forced labor, and camp settlements were replaced by full-fledged cities, towns, and villages. The cultivation of an agricultural landscape around industrial cities pursued an economic goal: could this reduce the expense of supplies by eliminating or at least reducing the cost of northern deliveries? The transformation of sheep farming into one of the priority areas of agricultural production corresponded to this goal.

By 1940, there were already 15,100 sheep and goats on farms in the Murmansk Oblast; a decade later, this number had increased to 16,200 [13, p. 55]. As was stated in 1952 by P.I. Pirogov, Chairman of the Terskiy District Executive Committee, a sheep farm had been established on every collective farm in the district [4].

The achievements of the Murmansk Oblast in the field of sheep breeding were noted in the Resolution of the Main Committee of the All-Union Agricultural Exhibition, approved by the Coun-

[2] SAMO. F. I-1. Invt. 1. Arch. 7. Sh. 116; Ibid. Arch.14. Sh. 61.
[3] Alymov V.K. How does the rural population of Murmansk province live? (About their income and earnings). *Polyarnaya pravda*, 1925, March 10, no. 31, p. 2.
[4] Pirogov P. A story about the past and present of the Terskiy Pomor fishermen. *Polyarnaya Pravda*, 1952, October 19, no. 250, p. 2.

cil of Ministers of the USSR and the Central Committee of the Communist Party of the Soviet Union in Resolution No. 624 of 3 April 1954 [5].

The project for large-scale sheep breeding on the Kola Peninsula seems not only bold, but also, in a sense, voluntaristic. It is a generic product of national policy aimed at developing sheep farming throughout the country. Meanwhile, if the specific characteristics of the northern territories had been taken into account, the implementation of this decision would have required separate clarifications and additional investments. Therefore, it is not surprising that some leaders in the Murmansk Oblast believed that sheep breeding in the region was unprofitable.

On 30 July 1952, the newspaper Polarnaya Pravda published an anonymous article entitled "Anti-State Attitude to an Important Matter", which criticized the position of opponents of sheep breeding on agricultural enterprises in the Murmansk Oblast. The head of the regional agricultural department, N.V. Trusov, and the chief livestock specialist, E.V. Bystryakova, mentioned in the article, believed that it was more promising to invest in other areas of animal husbandry — dairy and poultry. The article noted that a number of collective farms in the Murmansk Oblast did not have necessary conditions for keeping sheep, leading to the death of animals. In 1951, almost a quarter of all lambs and more than 20% of adult sheep died. The article considered this situation not simply as negligence, but as "anti-state attitude" on the grounds that the number of sheep in the personal use of collective farmers was steadily increasing. One of the problems was related to breeding. It was noted that discussions about breeding a "local semi-coarse-wool sheep" better suited to the conditions of the Kola Peninsula "have been going on for many years" [6].

Meanwhile, the position against the development of sheep breeding in the region gained new supporters over time. In the 1950s and 1960s, the Murmansk Oblast saw a diversification of livestock farming: while maintaining the level of traditional reindeer husbandry, there was a shift from sheep to cattle, pigs and poultry (Table 3) [13, p. 55].

Table 3

Livestock and poultry in the Murmansk Oblast in 1940–1990, thousand heads

Groups of farm animals	1940	1950	1960	1970	1980	1990
Cattle	7.0	9.7	14.1	15.9	31.0	40.6
Pigs	5.7	7.3	15.9	32.6	78.6	126.7
Sheep and goats	15.1	16.2	11.8	5.8	3.4	2.6
Birds	…	1.9	154.2	562.9	1934.0	2585.9
Deer	70.3	53.9	74.2	81.8	66.0	77.3

By the early 1980s, the sheep population in the region had fallen to the level of 1913. Subsequently, according to the data in Table 4, it declined even further, amounting to about 400 heads (including goats) in 2022 [14, p. 80].

[5] From the Resolution of the Main Committee of the All-Union Agricultural Exhibition, approved by the Resolution of the Council of Ministers of the USSR and the Central Committee of the CPSU of April 3, 1954, No. 624. *Polyarnaya Pravda*, 1954, April 20, no. 93, p. 3.
[6] Anti-state attitude towards an important matter. *Polyarnaya Pravda*, 1952, July 30, no. 179, p. 2.

Table 4

Livestock and poultry in the Murmansk Oblast in 2018–2022, thousands heads

Groups of farm animals	2018	2019	2020	2021	2022
Cattle	7.1	6.6	6.2	6.0	5.6
Pigs	8.0	6.9	6.7	1.8	2.4
Sheep and goats	0.6	0.5	0.5	0.5	0.4
Birds	28.7	32.7	2.0	11.6	1.7
Deer	58.2	58.3	58.7	58.9	57.1

In fact, it can be said that sheep farming has been lost from the agricultural production system of the modern Murmansk Oblast. It is hard to believe, but in the pre-revolutionary economy of the region, with a population of no more than 15,000 people, there were more opportunities for sheep breeding than there are now. The Soviet agricultural experience above the Arctic Circle has also been forgotten.

Conclusion

Developing new regional strategies for the revival of Arctic sheep breeding in Russia is not only possible, but also necessary, taking into account historical experience. However, the situation with sheep farming in the Murmansk Oblast remains challenging. There is no interest in reviving this industry either on the part of the region, or on the part of agribusiness, which is partly due to the lack of a specialized experimental and scientific institution of the agro-industrial complex capable of addressing issues such as selection and feed supply.

Currently, existing sheep farming practices are being monitored in the Arctic territories of the Komi Republic. A gene pool herd of Pechora semi-fine-wool meat-wool sheep has been created at the Pechora experimental station. Various crossbreeding options are being tested here using gene pools adapted to the Far North [1; 15].

Yakutia has also recognized that “all the necessary conditions are available in the republic for the long-term development of this industry, including vast territories with a sufficiently rich feed base, practically unused by other livestock industries, and positive experience in acclimatizing sheep”. The Yakutsk Agricultural Academy has conducted experiments on the hybridization of domestic Buryat sheep with wild snow sheep [16].

One of the measures in the “Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035” is to provide state support for projects to create livestock farms. There is an urgent need for a comprehensive assessment and coordination of scattered efforts to revive Arctic sheep breeding.

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Analysis of the Effectiveness of Urban Planning Solutions for the City of Nadym in a Half-Century Retrospective

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Abstract. The process of urbanization of the oil and gas production complex in the north of Western Siberia in the 1960s–1980s was marked by the active introduction of scientifically based approaches designed to minimize the negative effects of the Arctic and sub-Arctic climate on residents of new cities under construction. One of the serious problems in implementing project approaches to the formation of the urban environment in the Arctic was that they were only capable of predicting the specifics of the economic, social and environmental development of the new city in the relatively short term. The main aim of this article is to analyze the effectiveness of the urban planning theory developed by the LenZNIIEP team on the case of the city of Nadym, founded in the early 1970s. The study is based on the research work of LenZNIIEP. In order to obtain subjective assessments of the development and use of the urban environment of Nadym, a series of thematic interviews were conducted with experts and residents of the city. In addition, recent scientific literature on the topic of research has been analyzed. During the study, the features of design solutions and the evolution of the development of four urban planning subsystems of Nadym were considered. The task of urban planning physics was to minimize the discomfort caused to the city's population by the harsh landscape and climatic conditions. An important result of the development of urban ecology was the successful greening of open urban spaces in the Arctic climate. The main task of urban planning psychology was to create color schemes for buildings that are comfortable for Arctic conditions. The tasks of urban planning sociology included the adaptation of the urban environment to the demographic and socio-economic characteristics of the young Arctic city. The case of Nadym demonstrates that effective implementation of all urban planning subsystems can mitigate the effects of the harsh Arctic climate on the city residents and improve quality of their life. At the same time, due to the paradigm change in urban development of the Russian Arctic, the development of an "adaptive" approach is becoming increasingly relevant, as it was designed to identify and implement individual strategies for organizing a comfortable urban environment, taking into account the characteristics of local natural and climatic conditions.
Keywords: *socio-environmental problems, urban planning theory, design approaches, efficiency analysis, LenZNIIEP, Arctic cities, Nadym*

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Introduction

The process of urbanization of the oil and gas production complex in the north of Western Siberia in the 1960s–1980s was marked by the active introduction of scientifically based approaches designed to minimize the negative effects of the Arctic and sub-Arctic climate on residents of new cities under construction. Applied researches related to this issue were actively conducted in a number of specialized industry institutes. Among them, the Leningrad Zonal Research and Design Institute for Standard and Experimental Design of Residential and Public Buildings (LenZNIIEP), established in 1963 under the USSR State Construction Committee (Gosstroy), made a significant contribution to the development of individual and standard urban planning solutions for regions of the Far North. The comprehensive nature of the approaches developed by the institute was well characterized by the head of its scientific department, architect A.V. Yakovlev, who defined urban planning as "the organization of the environment and, thereby, the organization of human life (as a biological organism) and society (as a collective of people — from the family to the city)" [1, p. 5]. The urban planning theory developed by A.V. Yakovlev and his colleagues during those years included such subsystems as urban planning physics, urban planning ecology, urban planning psychology, and urban planning sociology (Fig. 1). Yakovlev justified the interdisciplinary nature of urban planning theory by the need to shift from a subject-oriented to a problem-oriented approach, in which the urban development of the North is a major theoretical and practical issue [1, Yakovlev A.V., p. 12].

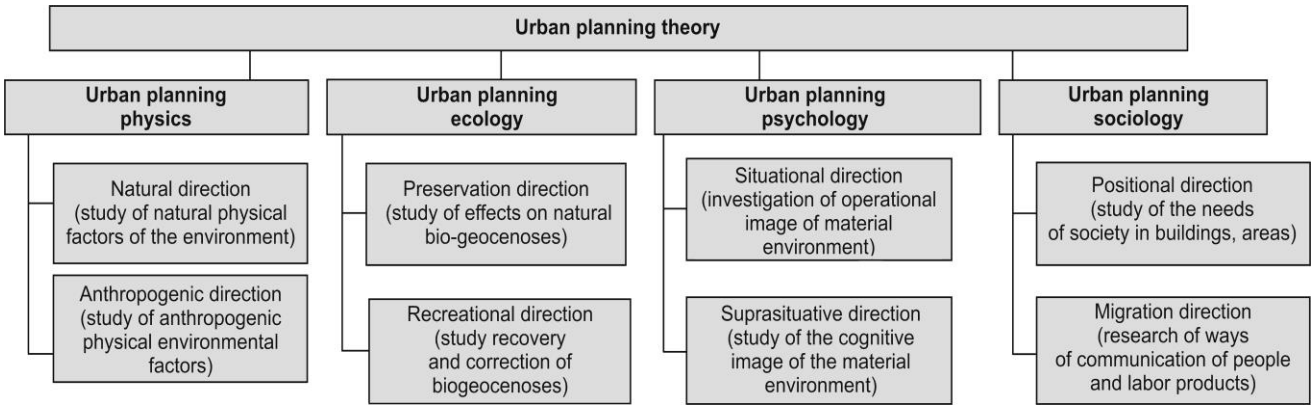


Fig. 1. Structure of urban planning theory (based on [1, Yakovlev A.V., p. 12]).

One of the serious challenges in implementing project-based approaches to urban development in the Arctic was their ability to predict the specifics of the economic, social and environmental development of a new city in the relatively short term, often only a few decades. Such factors as the depletion of natural resources, which are linked to the extractive industries served by the city, changes in the principles and priorities of the state's economic development, climate change and transport accessibility, as well as migration processes, in most cases require significant adjustments to the development of the urban environment, which was originally designed with other historical realities in mind. Taking this problem into account, it is highly relevant to review

the design approaches that have been implemented in the context of assessing their effectiveness in terms of individual criteria for sustainable development and the viability of a particular city.

Over the past decades, new approaches to understanding the urbanization of Arctic regions have been developed in Russia. Conceptual frameworks for the study of frontier urbanization and the anthropology of zonality in the Russian Arctic were developed and successfully tested by N.Y. Zamyatina, A.N. Pilyasov, and R.V. Goncharov [2; 3; 4]. A.A. Medvedkov studied the geo-ecological factors of the viability of Arctic cities in the cryolithozone [5]. In foreign science, the study of the socio-ecological problems of Arctic cities is reflected in a number of research areas, among which the works devoted to the concept of the "winter city" (Winter City Urban Design) and climate-sensitive Arctic design (Climate-Sensitive Urban Design) should be highlighted. These studies were widely presented in the publications of N. Pressman, D. Chapman, E. Sanborn and others [7; 8; 9, Costamagna F., Lind R., Stjernström O.]. Based on examples of cities in the Russian Arctic, over the past decade, foreign research teams have studied the impact of climate change, as well as individual social and economic factors, on the transformation of the urban environment [10, Esau I., Miles V.; 11, Laruelle M., Esau I., Miles M. et al.; 12, Orttung R.W., Anisimov O., Badina S. et al.], etc. However, despite the steady growth of publications devoted to the problems of urbanization in the Russian Arctic, the analysis of the socio-ecological aspects of the implementation of project-based urban planning approaches in its territory has not yet become an independent area of research.

The main aim of this article is to analyze the effectiveness of the urban planning theory developed by the LenZNIIEP team on the case of the city of Nadym, founded in the early 1970s, in the context of its evolution amid the socio-economic transformations of the late 20th and early 21st centuries (Fig. 2). Nadym was chosen as the object of this study because it was built in the Russian Arctic "from scratch", in accordance with a pre-developed and scientifically based urban planning concept. This circumstance, as well as the "young" age of the city, which celebrated its 50th anniversary in 2022, made it possible to trace the socio-ecological history of Nadym in detail and provide a reliable assessment of the effectiveness of the urban planning solutions implemented there.

Fig. 2. General view of residential development in Nadym (photo by O.S. Sizov, August 23, 2020).

Materials and methods

The source material for this study is based on an analysis of research papers and reports by LenZNIIEP, stored in the Central State Archive of Scientific and Technical Documentation of St. Petersburg and the Municipal Archive of the Nadym District Administration of the Yamalo-Nenets Autonomous Okrug. To study subjective assessments of the characteristics of the urban environment in Nadym, a series of thematic interviews was conducted with experts and residents of the city. During the study, we also interpreted and reviewed previous research conducted by us and other authors on the environmental, geotechnical, and social aspects of the development of the urban environment in Nadym. Most of them were devoted to assessments of the state of the urban environment [13, Kirilyuk L.I.; 14, Krasnenko A.S., Pechkin A.S., Kobelev V.O. et al.; 15, Pechkin A.S., Pechkina Yu.A., Krasnenko A.S. et al.]. Geotechnical problems of stability of civil engineering structures in the context of geocryological conditions of the area where Nadym is built are considered in the work [16, Osokin A.B., Bomkin S.V.]. I. Esau, V. Miles, A.V. Soromotin, M.I. Varentsov and P.I. Konstantinov studied the microclimatic features of the development of the city of Nadym [10; 11; 17]. Sociocultural aspects of the development of the urban environment of Nadym were touched upon by V.A. Kibenko [18]. In the period from 2020 to 2022, as part of the RFBR grant “Open urban spaces as a factor in ensuring sustainable development in the Arctic in the context of climate change”, the socio-ecological aspects of the development of green, blue and white spaces of Nadym were studied [19, Fedorov R, Kuklina V, Sizov O. et al.; 20, Fedorov R.Yu., Sizov O.S., Kuklina V.V. et al.; 21, Sizov O.S., Fedorov R.Yu., Pechkina Yu.A. et al.; 22, Kuklina V., Sizov O., Fedorov R., Butakov D.]. However, despite the existence of these works, no attempts have been made to systematically study the effectiveness of design approaches in the formation of the urban environment of Nadym. The only exception to this is our recent publication devoted to the analysis of the effectiveness of wind protection measures in the city of Nadym [23, Sizov O.S., Fedorov R.Yu., Soromotin A.V.].

Research results

Urban planning physics. According to the definition given by A.V. Yakovlev, "urban planning physics studies the physical factors of the urban environment, the laws of its emergence and change under the influence of the city, and develops ways to optimize them in relation to human requirements using urban planning tools" [1, Yakovlev A.V., p. 8]. Specific tasks of urban planning physics in the Russian Arctic include correcting background climatic conditions to reduce their discomforting effects on humans, as well as ensuring the stability of buildings and elements of urban infrastructure built on permafrost.

The area chosen for the construction of Nadym was located in the Yamalo-Nenets Autonomous Okrug, approximately 100 km south of the Arctic Circle, and was characterized by unfavorable natural and climatic conditions. In order to minimize the impact of harsh climatic conditions on future city residents, during the process of developing the planning concept for Nadym, the LenZNIIEP team focused on creating a compact urban environment, the layout of which was intended to minimize outdoor movement and improve thermal comfort through the active use of the wind protection functions of multi-storey buildings (Fig. 3). According to the proposed project, the radius of service for schools was not to exceed 400 m, for kindergartens — 250 m, and for public transport stops — 320 m [1].

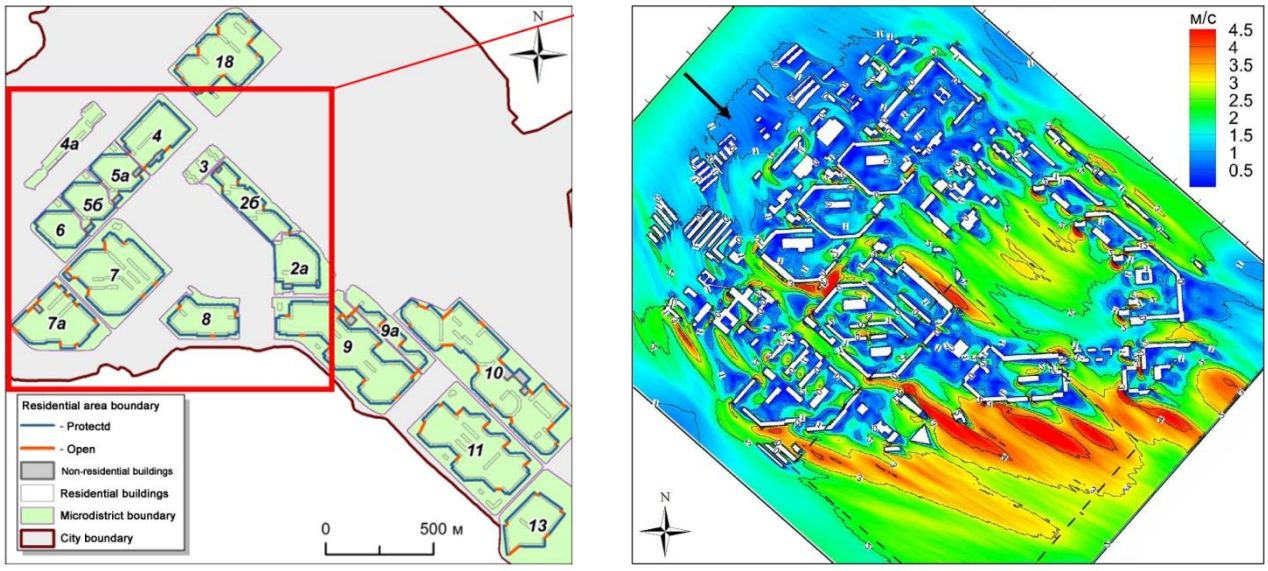
a) b)

Fig. 3. Master plan projects for the city of Nadym: a) approved (developed by LenZNIIEP) [2]; b) final city development (OpenStreetMap).

It should be noted that compactness was directly linked to the tasks of optimization of microclimatic conditions, including wind and snow protection. Aerodynamic complexes combining public and residential buildings, as well as open urban spaces permanently accommodating 4 to 8 thousand people, were considered as an optimal solution capable of adjusting the microclimatic characteristics of a separate small settlement or microdistrict of the city [1, Yakovlev A.V., p. 144].

[1] Ibid. F. 19. Invt. 3. Arch. 11. Sh. 19.
[2] Ibid. F. 19. Invt. 3. Arch. 11. Sh. 22

In accordance with this approach, residential development in Nadym was implemented in the form of semi-closed planning units acting as aerodynamic groups (Fig. 4). In 2023, we conducted a study on the effectiveness of the wind protection measures developed by LenZNIIEP for Nadym 50 years after the start of construction [23, Sizov O.S., Fedorov R.Yu., Soromotin A.V.]. As a result of the study, which was based on an interdisciplinary approach that included analysis of scientific and technical documentation, interviews with local residents, meteorological measurements and remote sensing data, it was established that about 90% of the perimeter of the microdistricts built in 1970–1980 is protected from the wind by the outer walls of buildings. Furthermore, meteorological data showed a significant decrease in average wind speeds within the city limits compared to background conditions. In residential areas, wind speeds decrease by 1–1.3 m/s. Overall, it can be concluded that the wind protection measures proposed during the design of the city's master plan were successfully implemented and achieved the intended effect [23, Sizov O.S., Fedorov R.Yu., Soromotin A.V.]. Unlike residential areas, not all public spaces popular for walking and recreation have been equally protected from wind exposure. This situation is most noticeable on the embankment of Lake Yantarnoe.

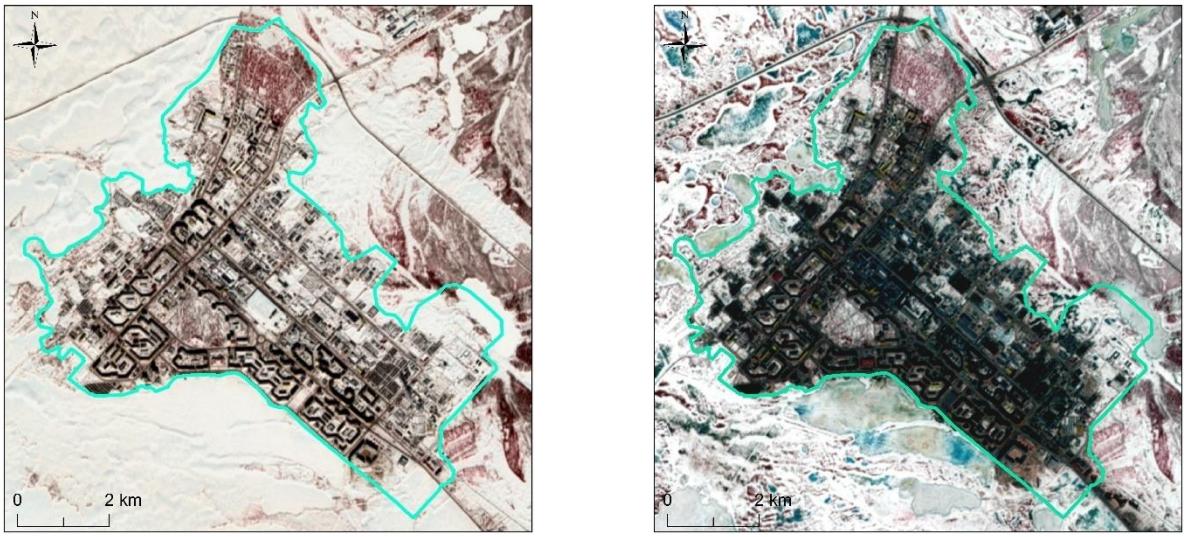


a) b)

Fig. 4. Implementation of the concept of aerodynamic groups: a) assessment of the closeness of residential areas within the microdistricts of Nadym; b) results of numerical vortex-resolving modelling in the western part of the residential area of Nadym [17, Varentsov M.I., Repina I.A., Glazunov A.V., et al.].

The relatively dense multi-storey development of Nadym has given rise to another well-defined microclimatic phenomenon associated with surface temperature inversions, which in modern scientific literature is commonly referred to as the urban heat island. From 2016 to 2022, under the leadership of I. Esau, the long-term dynamics of the urban heat island intensity in Nadym was studied. For comparison, observation data from other cities — Salekhard, Novy Urengoy, and Apatity, where long-term observations were also conducted — were used. For all cities, the average monthly values of heat island intensity (the difference in temperature between the stationary city weather station and the suburban weather station of Roshydromet) were calculat-

ed. According to the results of the study, in winter, the atmospheric air temperature in Nadym, compared to background areas, can be 3–4 degrees higher. In Salekhard and Novy Urengoy, where the compactness and density of development is lower, these indicators are lower [10; Esau I., Miles V.]. As an observable indicator of the heat island, city residents note that snow begins to melt earlier in Nadym than in the surrounding area (Fig. 5). Some city residents suggest that the urban heat island and wind protection measures have a beneficial effect on the condition and height of trees growing within the city limits. This assumption has been confirmed by recent geobotanical studies [21, Sizov O.S., Fedorov R.Yu., Pechkina Yu.A., et al.].



a) b)

Fig. 5. Impact of the heat island in Nadym on snowmelt: a) image from April 17, 2019; b) image from May 9, 2019.

In Nadym, a plot of land consisting of sandy upswell formed from thawed alluvial soils with thin permafrost lenses (Fig. 6) was allocated for the urban development that took shape in the 1970s and 1980s. This factor made it possible to avoid the use of expensive thermal stabilization methods for the building foundations and the airfield runway, unlike a number of other cities and towns in the Yamalo-Nenets Autonomous Okrug, which were built in areas of continuous permafrost. In the late 1980s and 1990s, new development sites shifted to the edge zones of the first floodplain terrace and to the high floodplain of the Nadym River, which were characterized by the spread of permafrost lenses of significant thickness, with the inclusion of clayey soils of the Salekhard suite in the frozen zone, in some cases having a high ice content due to ice inclusions. This period coincided with a decline in the quality of survey work, one of the reasons for which was the closure of LenZNIIEP. The situation that developed led to critical deformations of a number of buildings constructed during this period [16, Osokin A.B., Bomkin S.V., p. 332]. In general, the example of Nadym clearly demonstrated that the sandy upswell, on which the main part of the city was built, surrounded by a zone of permafrost, can be considered as a kind of “arctic oasis”. At the same time, unlike desert zones, where sand is often a limiting factor for the development of many life-support practices implemented in other natural and climatic zones, in Arctic conditions it can

be considered a factor that can significantly improve the quality of life of the urban population [22, Kuklina V., Sizov O., Fedorov R., Butakov D.].

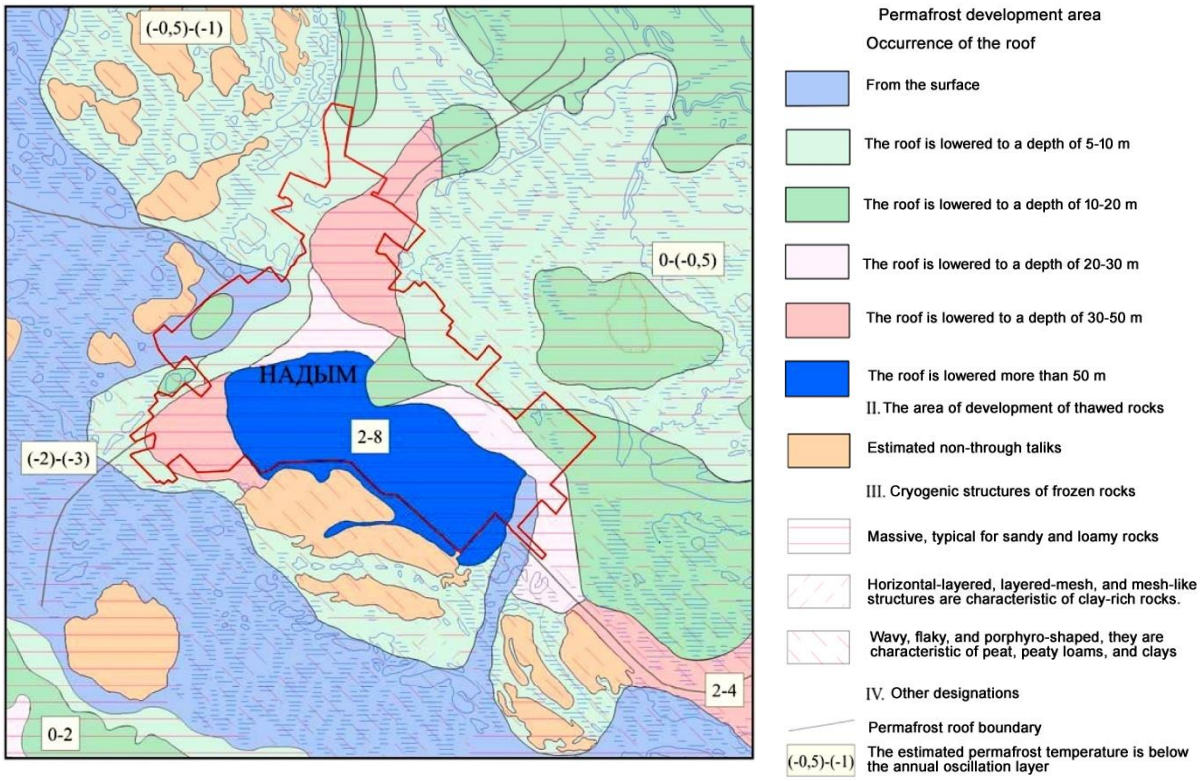


Fig. 6. Geocryological map of Nadym and its surroundings [24, Gryaznov O.N., Abaturova I.V., Petrova I.G.].

Urban planning ecology. In the Arctic, urban planning ecology has a number of specific areas of focus. The first of these is related to the fact that the harsh and sometimes extreme natural and climatic conditions require the transformation of the local natural environment to make it as comfortable as possible for city residents. As a rule, this task includes urban greening, improving water bodies located on their territory, and creating ecological buffer zones and recreational facilities. The second area is related to the development of measures to minimize environmental pollution from industrial enterprises, transport, and various types of anthropogenic activities.

Apparently, even within a single research team, there were different opinions regarding the optimal approaches to urban greening in the Far North. The most comprehensive and consistent study of the problem of greening Arctic cities was conducted by E.N. Pomazkova. The author concluded that “there are no insurmountable obstacles to the greening of populated areas in all northern vegetation zones” [3]. At the same time, in a 1971 research report on “Recommendations for the Design of Greening and Winter Gardens in Residential and Public Buildings for the Northern Zone of the Country”, authored by N.N. Khomutetskaya, a largely opposite conclusion was made, according to which, in Arctic cities, “greening in open ground cannot play a major role due to the short growing season of plants, as well as a number of technical difficulties associated with planting and caring for green spaces” [4].

[3] Central state archive of scientific and technical documentation of St. Petersburg. F. 17. Invt. 2-9. Arch. 452. Sh. 26.
[4] Ibid. F. 17. Invt. 2-7. Arch. 1298. Sh. 6.

Initially, the general plan for Nadym, developed by LenZNIIEP, did not include a park. However, due to the proactive approach of the First Secretary of the Nadym City Committee of the CPSU, E.F. Kozlov, during the development of Nadym, an area of natural vegetation located in the city center was preserved and transformed into a park, which was subsequently named after him [20, Fedorov R.Yu., Sizov O.S., Kuklina V.V., et al.]. In addition to the Park named after E.F. Kozlov, a cedar grove was also preserved on the outskirts of Nadym. Over time, these two green spaces have become important ecological and recreational areas for the city's residents (Fig. 7). From the first years of Nadym's existence, targeted work was carried out to green its streets. Despite the low survival rate of a number of woody plant species, the experience of greening Nadym can be considered successful [21, Sizov O.S., Fedorov R.Yu., Pechkina Yu.A. et al.]. Overall, the 50-year history of the development of green spaces in Nadym has clearly demonstrated the following pattern: if the natural and climatic conditions of an Arctic city allow for the use of at least a limited number of tree and shrub species in greening, the value of publicly used open green spaces will always be higher than that of growing plants indoors. In particular, a study of the practices of using green spaces in Nadym has fully confirmed their specific socio-ecological functions, which were identified as early as the 1960s by E.N. Pomazkova. These included improving the microclimate by mitigating temperature fluctuations, reducing wind speed, protecting against snow and dust, and increasing the humidity of excessively dry air in the North [5]. In addition, the author considers vegetation cover to be a kind of protective layer that prevents permafrost soils from thawing in summer and protects against the spread of quicksand, ravines and the blowing away of the dried soil layer [6].

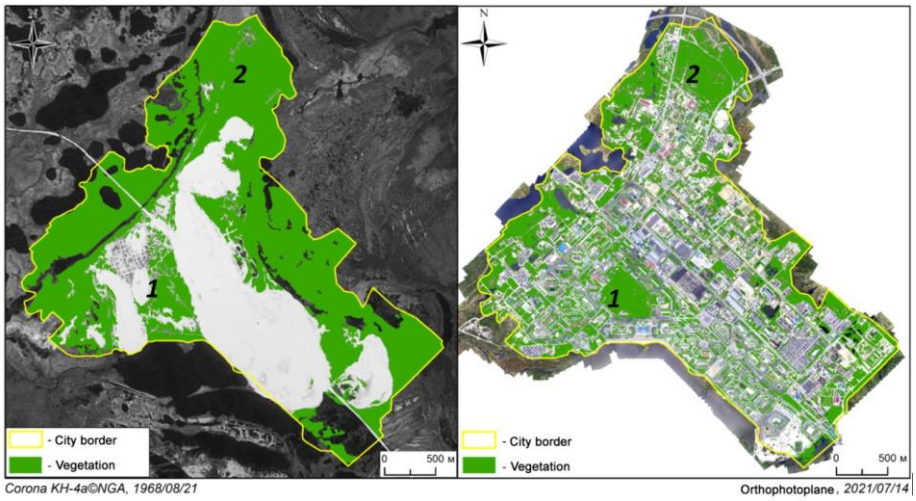


Fig. 7. Changes in vegetation cover in the city of Nadym from 1968 to 2021: 1) Park named after E.F. Kozlov; 2) cedar grove.

Unlike green spaces, water bodies play a less important role in the ecological needs of Nadym residents. The city is surrounded by a system of oxbow and thermokarst lakes, the largest of which is Lake Yantarnoe, which is about 2 km long and covers an area of 0.8 km^2 (Fig. 8). Despite the limited recreational opportunities of Lake Yantarnoe, it is currently actively used for cat-

[5] Ibid. F. 17. Invt. 2-9. Arch. 452. Sh. 3
[6] Ibid. F. 17. Invt. 2-9. Arch. 452. Sh. 4.

amaran rides in the summer, and Reindeer Herders' Day is held on the frozen surface of the lake in early spring. After renovation, the embankment of Lake Yantarnoe has become one of the centers of attraction for walks and recreation for the residents of Nadym.

Fig. 8. Main water bodies near Nadym: 1) Lake Yantarnoe; 2) Lake Yantarnoe-2; 3) Lake Prodolgovatoe.

Currently, the main source of pollution in the urban environment is motor vehicles. Maximum concentrations of surface lead distribution (3.3±0.11 mg/kg) were recorded near major highways, intersections, car parking areas, as well as near enterprises that have their own vehicles or operate vehicles [13, Kirilyuk L.I., p. 88]. Returning to the analysis of the effectiveness of design solutions in the urban planning physics in the context of its environmental impact, it is worth noting one of the problems that arose during the development of the city, which the LenZNIIEP team could not foresee. When designing the urban environment of Nadym, it was assumed that most of the city's residents would travel on foot or by public transport. This assumption was correct until the second half of the 1990s. Later, the number of cars owned by Nadym residents began to grow steadily. At the same time, cars were often parked in the courtyards of residential buildings, which, due to wind protection measures, were prone to air stagnation. Residents of multi-storey buildings began to complain about exhaust fumes penetrating their apartments. This situation was exacerbated by the fact that in winter, cars parked in the courtyards of apartment buildings could be left running for long periods of time to warm up.

Urban planning psychology. Interviews with Nadym residents who moved from other regions indicate that one of the most significant psychological challenges during the first years of living in the city was adapting to the short winter daylight hours and white nights. In Nadym, the annual duration of sunshine is 1,500 hours, while, according to an estimate, the average winter sunshine duration is no more than 25 hours per month. At the end of December, daylight duration is approximately 3 hours, while at the end of June, it reaches 23 hours [7]. In this situation, during winter, the visual dominants of the urban environment should be adapted to the prevailing twi-

[7] Municipal archives of the Nadym District administration. F. 19. Invt. 3. Arch. 11. Sh. 5.

light for most of the day, the abundance of snow, and the occasional snowstorms and blizzards. At the same time, in summer, city residents often lack night twilight.

In the process of designing new settlements adapted to the conditions of the Far North, the LenZNIIEP team tried to pay attention to the specific aspects of urban planning psychology. This primarily involved searching for the optimal visual imagery of an Arctic city, in particular, the color of buildings. The authors of a 1962 research project entitled “The Use of Color in Urban Development in the Northern Regions of the Country as a Means of Enhancement of the Architectural, Artistic, and Functional Value of Buildings” tended to believe that light tones, close to white, are most appropriate for cladding buildings in northern cities. According to the authors, white is justified for northern cities by artificially creating the impression of greater illumination and enriching the overall environment with light tones. This phenomenon was called “light enrichment” or “light compensation”. Over time, this approach has undergone significant revision. Thus, in a monograph published in 1987, A.V. Yakovlev noted that the recommended color scheme should be maintained within the yellow-red tones. Moreover, according to the author, blue, light blue, and green tones are “cool” and difficult to distinguish during fog or snowstorms, while yellow, orange, and red tones are psychologically “warm” and act as good landmarks and visual dominants in winter [1, Yakovlev A.V., p. 161].

Residents of Nadym note that, in their subjective opinion, grey tones, close to the natural color of concrete slabs, predominated in residential buildings of the 1970s and 1980s, which primarily consisted of multi-storey panel buildings constructed according to standard designs. Since the early 2000s, due to the increased availability of modern facinf materials, the use of original color schemes has become widespread in the construction and renovation of buildings in Russian Arctic cities. Bright colors are most often preferred. During a survey we conducted in 2020–2022 among residents of Nadym, it was found that most of them consider warm tones, including shades of yellow, orange, green and red, to be the most comfortable. At the same time, many local residents noted that the blue shade used in the cladding of residential buildings in the Yubileiny microdistrict reminded them of winter. The use of dark colors in building cladding was also perceived negatively by most respondents. Thus, public opinion generally coincided with the recommendations formulated in the late 1980s by A.V. Yakovlev. However, it should be noted that not all city residents were unanimous in their opinions. Some of them noted that in certain cases they experienced psychological fatigue from overly bright building cladding, while the use of light colors, in their opinion, sometimes made the perception of architectural volumes more aesthetic.

Urban planning sociology. In the 1960s and 1970s, the LenZNIIEP team focused on studying specific aspects of urban sociology in the North. An important distinguishing feature of a significant number of cities in the Russian Arctic, including Nadym, was their insular location surrounded by hundreds of kilometres of uninhabited space. Nadym was designated as a base city for the development of the Medvezhye gas field and a number of other elements of industrial infrastructure created for the extraction and transportation of natural gas. According to the classification

adopted in the USSR, base cities were created to service industrial facilities within a radius of 150–200 km on a rotational basis. The estimated daily commute distance for their residents was 20–50 km, and in some cases could reach 150 km [8]. The distance from Nadym to the regional capital, Tyumen, located on the "mainland", was about 1,000 km by air. In addition to air transport, during the navigation period, the city was connected to the outside world via the Nadym River, a tributary of the Ob River. However, with the exception of winter roads and causeways designed for off-road trucks, Nadym had no developed land transport links with other cities.

In order to begin designing a new Arctic city, it was important to have a "social profile" of its average future resident in order to select the optimal types of residential buildings and social and service facilities. One of the common features of the social profile of the inhabitants of the new Arctic cities built at that time was that the overwhelming majority of their population was of working age. In the centers of new development, the proportion of the urban population of retirement age could be no more than 1–3%. The gender structure of the population of the new cities was characterized by a predominance of men (up to 52–55%), and in some cases, up to 70% [9].

Let us consider the evolution of the demographic characteristics of the population of Nadym.

Table 1

Data from the All-Union Population Censuses in Nadym [10]

Year	Men	Women	Total
1979	13504	12554	26058
1989	26589	25997	52586
2002	22389	23554	45943
2010	22534	24077	46611
2020	22173	23800	45973

By 1980, the population of Nadym had reached 30,400 people. Only 500 people were above working age, while the rest were either of working age (21,100) or children: 500 under one year old, 3,800 aged 1–6, and 4,500 aged 7–15 [18, Kibenko V.A., Ryabkova O.V.]. As of 2023, the population of Nadym was 44,845 people, including children under 7 years old — 4,485 people, adolescents from 8 to 18 years old — 5,292 people, young people aged 19 to 30 — 5,381 people, adults aged 31 to 60 — 19,283 people, elderly people aged 60 and over — 9,776 people, and Nadym's centenarians aged over 80 — 628 people [11]. Since the 1990s, the number of women living in Nadym has exceeded the number of men. While in 1979 men accounted for 51.8% of the total population of Nadym, in 2020 they accounted for 48.2% (Table 1). This situation can be explained by the stabilization of the city's population in the 1990s, a decline in the influx of young professionals, and the general process of "settling" in the city by a significant portion of people who arrived in the 1970s and 1980s. It should be noted that, from the very beginning of Nadym's existence, there was a heated debate about the optimal length of stay for specialists working there. In the 1970s, most researchers be-

[8] Ibid. F. 29. Invt. 2-1. Arch. 8. Sh. 59.
[9] Ibid. F. 29. Invt. 2-1. Arch. 8. Sh. 36.
[10] Demoscope Weekly. URL: http://www.demoscope.ru (accessed 23 January 2025).
[11] Population of Nadym. URL: https://awdb.ru/yamalo-neneckiy-avtonomnyy-okr/nadym/ (accessed 23 January 2025).

lieved that the rapid and effective adaptation of most newcomers to Arctic cities was greatly hampered. Furthermore, the optimal length of stay for people in uncomfortable areas was considered to be 5–7 years [12]. However, in practice, a significant number of people began to consider Nadym as a permanent place of residence. This situation was most often associated with more attractive career opportunities compared to other regions, as well as the desire to maintain the family and social ties formed during their residence in the city. The increasing average age of Nadym residents and the growing number of families with children are placing new demands on the urban environment. In our interviews, city residents most frequently noted a need for the development of individual housing construction, as well as the creation of new public spaces for family recreation.

The development of Nadym's transport links with the outside world has become an important factor in improving the social well-being of its residents. In this regard, the most significant event was the opening of the bridge across the Nadym River in 2015, which provided the city with road transport links with the outside world (Fig. 9). This contributed to increased spatial mobility of the city's residents and reduced the cost of supplying them with food and essential goods. In particular, the arrival of chain supermarkets and online shopping pick-up points in the city, according to residents, has significantly improved the quality of life of Nadym residents.

Fig. 9. Pontoon crossing and the start of construction of the road bridge across the Nadym River (photo by O.S. Sizov, 2012).

Discussion

The example of Nadym demonstrates that, in Arctic conditions, the effective and coordinated development of all four urban planning subsystems outlined above enables the city's population to gradually approach certain quality-of-life standards and indicators characteristic of more southern and developed regions. In the case of Nadym, from an urban planning physics perspective, this situation was reflected in the creation of compact buildings with wind protection functions, which made the urban microclimate more comfortable for residents. The preservation of natural vegetation and successful greening played a positive role in Nadym's urban planning ecol-

[12] Central state archive of scientific and technical documentation of St. Petersburg. F. 29. Invt. 2-1. Arch. 8. Sh. 22.

ogy. From the point of view of urban planning sociology, the development of ground communications and the arrival of federal retail and consumer services networks in the city were of great importance in improving the quality of life of Nadym's residents. Attention to urban planning psychology has only begun to grow in recent decades. Despite attempts to create a more psychologically comfortable visual image of the city for its residents, much work remains to be done to give it a unified, well-thought-out style.

All the urban planning subsystems analyzed above are closely interconnected, but they are characterized by different transformation dynamics. In this regard, urban planning physics, which is related to the specifics of development, as well as the functional and microclimatic parameters it has formed, has the least dynamic changes. In Nadym, this situation has been particularly evident, as the city has maintained a trend toward a low volume of new residential and public buildings since the 1990s. Moreover, due to the fact that most of the city's buildings are located within the distribution of thawed sandy soils, the deformation of buildings as a result of the degradation of permafrost rocks was insignificant, unlike in most other cities built in the Russian Arctic.

The urban planning ecology has experienced more rapid transformations. These changes were driven by significant anthropogenic transformations of the city's landscapes and environment, characterized by an increase in the share of green spaces due to artificial landscaping, as well as the emergence of new sources of environmental pollution.

Unlike the two previous subsystems, not all of the LenZNIIEP team's design concepts in urban planning psychology and sociology were implemented in the urban environment of Nadym during the Soviet era. As in many other young Arctic cities, the social and cultural spheres in Nadym lagged behind the production sector in the first decades of the city's existence, failing to fully meet the needs of its residents. Furthermore, these subsystems proved to be significantly more dependent on external influences associated with changes in the formational and socio-economic principles of society's development that occurred as a result of the collapse of the USSR and the subsequent formation of a market-type economy. At the same time, social factors such as the growth of consumer and recreational demands of the population, the diversification of the structure of social and domestic services, the increase in the number of cars, etc., had a noticeable impact on urban ecology: on the one hand, contributing to the growth of anthropogenic pressures on the environment, and on the other hand, increasing the urban population's demand for ecosystem services.

Conclusion

Summing up the study, it is important to note that over the half-century history of Nadym, the paradigms of urbanization in the newly industrialized areas located in northern Western Siberia have changed significantly several times. At the time of the design and construction of Nadym, the prevailing approach of the USSR was to create base cities intended to become multifunctional centers for the development of major oil and gas fields. However, at the turn of the 1970s and 1980s, the creation of base cities began to be abandoned in favor of more compact organizational

and economic centers. Starting in the 1990s, the construction of new cities in the Tyumen North was ceased. The question of the prospects for previously built cities was repeatedly raised due to the fact that their original role as frontier settlements — springboards for industrial development — was gradually being lost. At the same time, the socio-ecological aspects of Arctic urbanization have changed dramatically over the past fifty years. While in the late 1960s and early 1970s, production functions dominated in newly constructed cities, with social development and environmental protection measures lagging behind, in the first decades of the 21st century, a peculiar inversion of the basic functions of northern Western Siberian cities can be observed. Their direct involvement in oil and gas production has declined, while the population's demand for high-quality social infrastructure and recreational facilities in urban areas has grown significantly. Moreover, as our previous research has shown, the "colonial" approach, aimed at reproducing the standards and principles of urban organization characteristic of the "mainland" in Arctic conditions, is increasingly replaced by the "adaptive" approach, aimed at identifying and implementing individual strategies for organizing a comfortable urban environment, taking into account the specific features of local natural and climatic conditions [20, Fedorov R.Yu., Sizov O.S., Kuklina V.V., et al.].

Since the early 1990s, after the closure of LenZNIIEP, which monitored and adjusted the municipal infrastructure it had designed, the factor of spontaneity has become more prominent in the development of the urban environment in Nadym. However, by that time, the city's population had stabilized and subsequently stopped growing. In this regard, as noted above, the volume of subsequent housing construction was small, and the originally designed basis for urban development continued to dominate. This situation necessitated the integration of new functional elements of urban infrastructure into its rigid foundation, designed to meet the changing utilitarian and recreational needs of the population. Therefore, an analysis of the initial urban planning approaches implemented in Nadym, along with a retrospective study of the evolution of their implementation in the context of the shifting paradigm of Arctic urbanization, is of great practical importance for the subsequent scientifically based adjustments to urban development concepts. This approach is equally relevant for other cities in the Russian Arctic built in accordance with design methods established in the USSR. Therefore, such a revision of urban planning solutions is essential for developing optimal strategies for adapting urban infrastructure elements to dynamically changing social, economic, and environmental realities.

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Sizov O. S. — study concept; data collection; data analysis; preparation of illustrations

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Economic Security of Russia's Northern and Arctic Territories: Problems and Solutions

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Abstract. In the context of modern geopolitical instability and increasing competition for Arctic resources, ensuring the economic security of the northern and Arctic regions of the Russian Federation is of strategic importance for strengthening the country's defense capability and protecting its national interests. This research is aimed at a comprehensive analysis of the factors determining the dynamics of the gross regional product as a key indicator of sustainable growth and competitiveness of the economy, as well as the level of economic security of the northern and Arctic territories of Russia. The purpose of the work is to identify the main problems hindering the sustainable development of the region and to develop scientifically based recommendations aimed at increasing the effectiveness of government support measures and strengthening the economic potential of the region. The research used methods of system and statistical data analysis, as well as expert assessments. An assessment of the effectiveness of existing government support measures was carried out and key factors influencing the economic security of the region were identified. Promising areas for increasing the economic potential of the northern and Arctic territories were identified, including the development of innovative industries, modernization of production and social infrastructure, intensification of entrepreneurial activity, increasing the level of development of entrepreneurial structures and creating conditions for the use of alternative sources of financing entrepreneurship. Based on the results obtained, recommendations have been developed to improve the assessment of the effectiveness of state support measures, and elements of a regional economic security program have been proposed, adapted to the specific conditions and challenges facing northern and Arctic territories. The results obtained can be used by government authorities in developing additional regional measures aimed at stimulating GRP growth and strengthening the economic security of northern and Arctic territories. The materials of the article can also be used in further scientific research devoted to studying the role of the state, development institutions and business in ensuring the economic security of the region.
Keywords: *economic security, gross regional product, northern and arctic territories, state support, economic diversification, regional economic security program*

Introduction

In the context of modern geopolitical instability and increasing competition for natural resources, ensuring the economic security of the northern and Arctic territories of the Russian Federation is of paramount importance for the military-economic support of the country's defense and security. These territories, with their colossal resource potential and strategically important geographic location, are a key element of national sovereignty, requiring a comprehensive ap-

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proach to management and development. At the International Arctic Forum in Murmansk, Russian President Vladimir Putin noted that "the role and significance of the Arctic for Russia and the world is growing, which is leading to intensification of the geopolitical struggle for positions in this region" [1].

Identifying long-term priorities and thoroughly developing and coordinating mechanisms for their implementation are particularly important in these territories. This necessity is driven by the specific conditions of economic activity, characterized by increased costs and long implementation periods for investment and infrastructure projects, labor shortages, seasonality of work, transport isolation of the territories, and a high dependence on imported equipment and technology [1–3].

Strategic documents of the Russian Federation, such as the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 [2], the National Security Strategy of the Russian Federation [3], and the Economic Security Strategy of the Russian Federation [4], emphasize the need to ensure sustainable socio-economic development of the northern and Arctic territories, strengthen their economic potential, and improve the standard of living of the population [4]. Particular attention is paid to issues of economic diversification, the development of innovative industries, the creation of a favorable investment climate, and the strengthening of international cooperation in the Arctic region.

Ensuring economic security, understood as the state of protection of the country's economy from external and internal threats, is of paramount importance. Key indicators defined in the Economic Security Strategy of the Russian Federation until 2030 serve as an important tool for assessing the level of economic security. These indicators include the index of physical volume of gross domestic product (hereinafter referred to as GDP), GDP per capita (at purchasing power parity), the share of Russian GDP in global GDP, the share of investment in fixed capital in GDP, the degree of depreciation of fixed assets, the industrial production index, and the labor productivity index. In this regard, and given that GDP is a key macro-economic indicator reflecting the state and dynamics of the national economy, it can be argued that GDP dynamics are the determining factor reflecting the level of economic security of the country.

At the regional level, the analogue of GDP is gross regional product (hereinafter referred to as GRP), which characterizes the economic security of a particular constituent entity of the Russian Federation.

The importance of GDP for ensuring economic security is manifested in the following:

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[1] Putin: The Arctic is becoming an arena of intensified geopolitical competition. URL: https://tsargrad.tv/novost/putin-arktika-stanovitsja-arenoj-usilennoj-geopoliticheskoj-konkurencii_1199798 (accessed 08 February 2025).

[2] The Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 was approved by Decree of the President of the Russian Federation No. 645 of October 26, 2020. URL: https://www.consultant.ru/document/cons_doc_LAW_366065/ (accessed 12 February 2025).

[3] The National Security Strategy of the Russian Federation until 2030 was approved by Decree of the President of the Russian Federation No. 400 of July 2, 2021. URL: https:// consultant.ru (accessed 12 February 2025).

[4] The Economic Security Strategy of the Russian Federation until 2030 was approved by Decree of the President of the Russian Federation No. 208 of May 13, 2017. URL: https://www.consultant.ru/document/cons_doc_LAW_216629 / (accessed 12 February 2025).

- indication of economic progress: GDP growth indicates economic growth, which, in turn, contributes to an increase in the well-being of the population and a decrease in unemployment;
- structural analysis of the economy: an analysis of the GDP structure allows identifying imbalances in the country's economy, which is important for ensuring economic and defense security;
- determination of the level of foreign economic security: the ratio of external debt to GDP is an important indicator of a country's foreign economic stability.

GDP is the main indicator that reflects the country's overall economic potential and combines the performance of the entire socio-economic system.

One of the main factors determining GDP growth is investment in fixed assets. Global practice shows that in order to ensure sustainable economic growth, the share of investment in fixed capital should be at least 25% of GDP. Otherwise, only simple reproduction is possible, and resources are insufficient for expanded reproduction.

During the Soviet period, when gross fixed capital formation accounted for 35–40% of GDP, the economy demonstrated steady growth. During the transformation crisis of 1991–1998, fixed capital investment fell by a factor of 4.8, reaching 16% of GDP. During the recovery period of 1999–2008, largely due to rising oil prices, fixed capital investment increased by a factor of 2.8, reaching 22% of GDP. In subsequent years, this indicator fluctuated between 20–22%, while visible fixed capital investment fell to 17–19% [5].

It should be noted that the effective use of fixed capital investment requires a sufficient level of human capital development. Investments in education, healthcare, and workforce development are important factors contributing to GDP growth.

The Economic Security Strategy of the Russian Federation until 2030 stipulates that state and local government bodies, the Central Bank of the Russian Federation, state corporations, companies with a majority stake held by the Russian Federation, and other organizations ensure the implementation of the economic security strategy in accordance with their respective competencies [5]. It should be noted that, despite the adoption of the Economic Security Strategy of the Russian Federation until 2030, many of its provisions are not being fully implemented. Thus, no threshold values have been defined for the main economic security indicators, without which the strategy cannot be fully implemented. Furthermore, federal subjects are not fully engaged in the implementation of the economic security strategy [6].

Thus, the development of a regional plan for the implementation of the economic security strategy, including a clear definition of key indicators, their threshold values, the appointment of

[5] The Economic Security Strategy of the Russian Federation until 2030 was approved by Decree of the President of the Russian Federation No. 208 of May 13, 2017. URL: https://www.consultant.ru/document/cons_doc_LAW_216629 / (accessed 12 February 2025).
[6] Decree of the President of the Russian Federation of May 13, 2017 No. 208 "On the Economic Security Strategy of the Russian Federation until 2030". URL: http://www.kremlin.ru/acts/bank/41921 (accessed 10 February 2025).

responsible officials and the establishment of measures of accountability for achieving results, will make it possible to:

- firstly, increase the effectiveness of management decisions taken by state and local authorities;
- secondly, introduce a system for evaluating the effectiveness of heads of ministries and departments based on the achievement of established threshold values for economic security indicators, which will allow for informed personnel decisions and determine the degree of responsibility;
- thirdly, increase the level of responsibility of development institutions for achieving the goals and objectives defined in the economic security strategy;
- fourthly, improve the system for training management personnel, which is particularly necessary for effective management in the complex conditions of the North and the Arctic.

Literature review and research materials

Currently, there are a significant number of definitions of “economic security”, differing in their methodological approaches, including substantive, functional, and axiological. This diversity, while entirely justified from a scientific perspective, is due to the differences in the objectives of researchers seeking fundamental or applied, scientific or empirical, and subject-specific or interdisciplinary solutions.

One of the first to introduce the concept of “economic security” was J.M. Keynes during the Great Depression of the 1930s. He emphasized the imperfections of the market economy and related problems such as inflation, economic recession, and unemployment [6].

Representatives of a broader approach to the interpretation of “economic security” consider this concept from different angles. In scientific literature, considerable attention is paid to issues of economic security in the northern and Arctic regions, which is reflected in a variety of approaches to identifying key threats and developing sustainable development strategies [7, pp. 39–40].

G.V. Ivanov focuses on the resource component of economic security, considering the effective development of the mineral resource base as a key factor in increasing the economic sustainability of the region and ensuring the country’s energy security. His works pay particular attention to the introduction of innovative technologies for the extraction and processing of minerals, as well as the creation of a logistics infrastructure to transport resources to domestic and foreign markets [8].

The importance of diversifying the economies of northern and Arctic regions, as well as strategies for developing alternative industries such as tourism, renewable energy and high-tech manufacturing, is emphasized in the work of P.V. Druzhinina and O.V. Potasheva. The authors note that excessive dependence on the extraction and export of natural resources makes the region vulnerable to fluctuations in world prices and creates risks for sustainable development [9].

Another group of researchers focuses on the social aspects of economic security, in particular on issues of food security, improving the standard of living of the population, developing education and healthcare systems, and preserving the cultural heritage and traditions of the indigenous peoples of the North. It is emphasized that achieving economic security in the region is impossible without taking into account the interests and satisfying the needs of its inhabitants.

The development of small and medium-sized businesses in the Arctic, which are an important element in ensuring the region's economic security, is complicated by various social and natural constraints. Therefore, issues of Arctic urbanization in the context of ensuring sustainable economic activity and a comfortable living environment, unlike the viability and sustainability of cities in the temperate zone, require the development of new concepts and vectors of public policy aimed at minimizing risks, maximizing opportunities for entrepreneurship, and improving the population's standard of living [10].

Thus, scientific research in the field of economic security in the northern and Arctic regions is characterized by a diversity of approaches and emphases, reflecting the complexity and multifaceted nature of the challenges faced by the region. However, all authors agree that ensuring economic security is a key factor for the sustainable development of the region and the strengthening of national security and defense capabilities.

An analysis of scientific works shows that economic security is understood as the state of protection of the country's economy, its individual regions and industries from external and internal threats, ensuring sustainable economic growth, social stability, and maintaining the necessary level of defense capability. In the context of the northern and Arctic territories, this concept is particularly relevant, as the region is vulnerable to the impacts of climate change, man-made disasters, and geopolitical risks.

The study of economic security is an important and multifaceted area of research, to which international authors have also made significant contributions. Their works highlight various aspects of the interaction between economics, politics, and global processes.

In his research, W. Hager focuses on the relationship between economic security and global economic processes. He provides an in-depth analysis of how international trade, investment, and financial flows influence national security. The author emphasizes the importance of economic security for sustainable development and social well-being, calling for the integration of these aspects into public policy [11].

H. Machovski examines economic security through the prism of national security, highlighting the threats arising in the context of globalization and technological change. His works emphasize the need to create effective mechanisms to protect the state's economic interests and formulate recommendations for improving national policy in this area [12].

H. Maull examines the concept of economic security in the context of international relations and foreign policy. He analyzes the influence of economic factors on the strategic decisions of states and the use of the economy as an instrument of external economic pressure. He also em-

phasizes the importance of integrating economic security into an overall national security strategy, which allows for a more effective response to global challenges [13].

C. Murdock focuses on economic security in the context of sustainable development and the environment. His research highlights how environmental threats and climate change can negatively impact the economic stability of countries, especially in vulnerable regions. He proposes strategies for adapting to these challenges, emphasizing the need to ensure the resilience of economic systems [14].

J. Yong examines the specifics of economic security in developing countries, with a particular focus on China. He analyzes the impact of internal and external factors, such as corruption and inequality, on economic stability. J. Yong offers recommendations for strengthening economic security through reforms and international cooperation [15].

These authors represent only a small part of the vast field of research in the area of economic security, and each of them makes a unique contribution to understanding the complex interrelationships between economic, political and social factors.

Despite a significant number of scientific studies and strategic documents, issues related to ensuring the economic security of northern and Arctic territories remain underdeveloped. In particular, further study is needed on the assessment of threats to economic security, the development of effective mechanisms to neutralize them, and the formation of a risk management system for activating the region's potential, taking into account the specific characteristics of northern and Arctic territories.

Study of the main factors ensuring the economic security of the region (using the Republic of Komi as an example)

In order to assess the prospects for GRP growth as a key indicator of the region's economic security, we will analyze the forecast for the socio-economic development of the Republic of Komi until 2027, presented in Table 1.

Table 1

GRP dynamics for the period 2025–2027

Indicator	2025	2026	2027
Gross regional product, billion	1 154.1	1 234.3	1 277.3
Gross regional product growth rate, %	100.2	100.9	100.5
Fixed capital investment, billion	137.9	135.5	140.3
Fixed capital investment growth rate, %	96	94	99
Share of investment in GDP, %	13	12	15

Overall, the forecast for socio-economic development for 2025 and the period up to 2027 is quite favorable. However, in our opinion, the GRP growth rates are not high enough for a region with enormous economic potential. The projected GRP growth as an indicator of economic security is unrealistic due to the fact that planned investments in fixed capital are insufficient to ensure expanded reproduction and, consequently, GRP growth. According to the forecast for 2025–2027, investments in fixed capital will average only 13% of GRP. It can be concluded that with this level of

investment in fixed capital, it will be difficult to ensure not only expanded reproduction and GRP growth, but even simple reproduction. Certainly, there is hope that a high-quality regional investment standard will be implemented and that infrastructure opportunities will be created for the implementation of new, including large-scale, investment projects, as well as an increase in the number of project-oriented enterprises in the region. It is also hoped that opportunities will be created to transform household savings into investment, including through the growth of small and medium-sized enterprises.

It is essential to qualitatively improve all factors influencing GRP growth, as well as to identify areas for activating the region's potential.

The study conducted by the authors (Fig. 1) shows that the key factors affecting competitiveness, GRP growth and economic security in the region are:

- state of the financial system;
- quality of infrastructure;
- level of entrepreneurial activity;
- investment activity of the government and business;
- political stability.

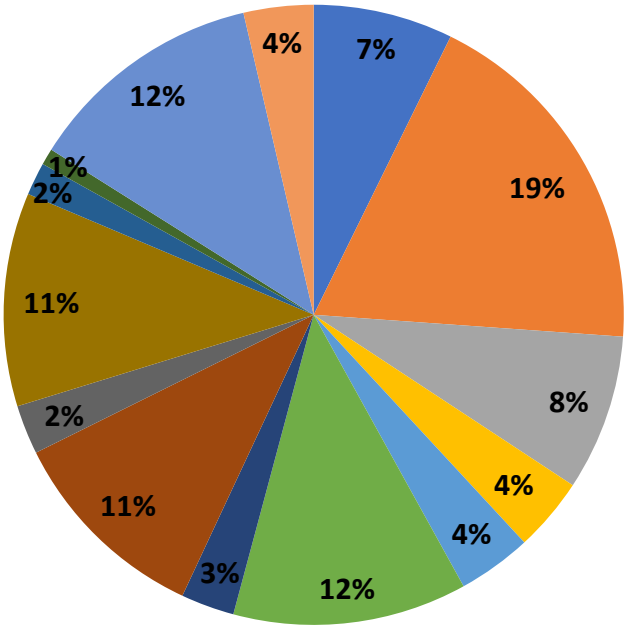

Fig. 1. Key factors influencing the growth of GRP and economic security of a region: 19% — state of the financial system, 12% — quality of infrastructure, 12% — political stability, 11% — investment activity of the state and business, 11% — level of entrepreneurial activity, 8% — accessibility and development of the national credit system, 7% — quality of infrastructure, 4% — existing taxation system, 4% — tariff regulation system, 4% — overcoming corruption, 3% — national education system, 2% — nature of innovation activity, 2% — characteristics of national culture, 1% — volume of research and development work [7].

An analysis of the identified factors affecting the economic security of the northern and Arctic regions reveals the following key issues.

[7] Source: compiled by the authors.

1. The state of the financial system and the availability of financing for entrepreneurship. The business sector faces limited alternative sources of financing, exacerbated by the high cost of credit. The development of the stock market as an effective mechanism for attracting long-term investment is an objective necessity, especially relevant for capital-intensive projects implemented in the northern and Arctic regions.

2. The level of entrepreneurial activity and the state of the business support infrastructure. The development of existing businesses and the creation of new ones are hampered by the ineffectiveness of entrepreneurship infrastructure, support mechanisms and business development institutions. Existing and potential entrepreneurs face problems related to imperfect law enforcement practices and entrepreneurship policies.

3. Investment activity of the state and businesses and internal factors in the development of entrepreneurial structures. It is important for legislative and executive authorities to identify promising investment projects, including innovative ones, taking into account the potential of the region.

In this regard, it is necessary to:

- develop incentive mechanisms for cooperation between large and small businesses in the fuel and energy sector;
- ensure incentives for public-private partnership mechanisms to create project-oriented business structures and attract investment resources for the development of entrepreneurship in the region;
- intensify support for innovative projects, including start-up projects, and the creation of technology transfer centers;
- develop and implement effective tools to stimulate entrepreneurship in the creation of innovative projects and increase the social and environmental responsibility of businesses;
- change the approach to the development of investment activity, viewing entrepreneurship as a driver of economic and defense security for the state.

Along with measures aimed at stimulating investment activity, it is important to improve the development of entrepreneurial structures in the region. An analysis conducted by the authors [16] identified the following key factors hindering the development of entrepreneurial structures:

- non-compliance of the corporate governance system with international and national standards;
- low level of professionalism of personnel, including management, resulting in a lack of innovative ideas and projects, as well as an insufficiently high percentage of project-oriented business structures;
- uncertainty in information about the marketing situation in priority markets for goods and services both domestically and internationally;

- ineffective interaction with government agencies, entrepreneurship development institutions, and other stakeholders [8];
- lack of competencies in risk management, ensuring employee loyalty, improving labor productivity, and creating project-oriented companies;
- insufficient competence of management personnel in the field of financial management and increasing the value of the company;
- insufficient understanding of opportunities to leverage the company's innovative potential, including by encouraging a creative approach to developing innovative projects within the company;
- difficulties in ensuring conditions for expanded reproduction.

Given the importance of stimulating investment activity, it should be noted that achieving these goals in the region requires not only the creation of favorable external conditions, including increasing the effectiveness of government support, but also improving the quality of internal factors influencing business development, which requires the active participation of both businesses themselves and development institutions.

Another important aspect for the development of entrepreneurship and growth of investment in fixed capital is the analysis of key areas for activating the region's potential, which can have a positive impact on the development of entrepreneurship and, as a result, on the growth of GRP (Fig. 2).

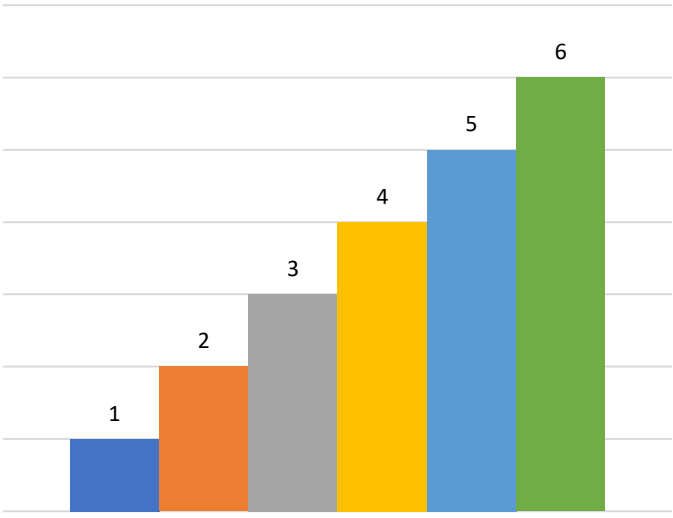

Fig. 2. Vectors for activating the region's potential: 1 — Restructuring of the existing production base, 2 — Improvement of infrastructure: roads, social sphere, energy, 3 — Increasing the creative activity of the population, 4 — Improving access to information and training for project implementation, 5 — New projects on local, regional and federal assets, 6 — Mechanisms for overcoming barriers: legislation, financial, organizational [9].

The analysis shows that the main areas for activating the region's potential are:

[8] Factors in the development of small and medium-sized businesses in the Arctic. URL: https://www.syktsu.ru/about/nd/sno (accessed 03 April 2025).
[9] Source: compiled by the authors.

Modernization and restructuring of the existing production base in the region. Restructuring, as a process of structural change, creates conditions for more efficient use of all factors of production in order to improve the financial security of the economic entity and the economic security of the region. Modernization, as a process aimed at qualitatively changing all components of the production process in a broad sense, provides the conditions for expanded reproduction and increased profitability. Restructuring and modernization of production are a complex economic category, and given the importance of these processes for the sustainable development of the region, they should be given priority attention.

Improving the social and industrial infrastructure as a general condition for development. The importance of industrial infrastructure as a sector that creates the general conditions for primary production was noted by Karl Marx. Clearly, the insufficient development of these general conditions hinders not only the development of entrepreneurship, but also the effective use of the region's potential, which, in turn, negatively impacts the growth of GRP and, consequently, the region's economic security.

Ensuring the growth of creative activity among the region's residents. For this purpose, it is important to develop a creative environment and infrastructure for the creative industry in the region. The creative industry, as a synthesis of creativity, culture (including corporate culture), economics, and technology, drives the economy [10].

Preparing residents of the region for creativity and implementation of business ideas through various educational programs. Various educational and acceleration programs for business creation are actively implemented in the region. However, without the proper infrastructure for entrepreneurship development, various training courses are ineffective. In order to realize the region's potential, it is necessary to intensify the activities of project offices established at the municipal and government levels, aimed at developing and implementing new promising projects that meet the needs of the regions and contribute to their development.

Creating tools to overcome administrative barriers. It is important to monitor the main causes of such barriers. In this regard, it is objectively necessary to improve efforts to balance the interests of entrepreneurs and government agencies, taking into account the state's interests in ensuring defense security.

It is also important to improve the efficiency of all development institutions, including the Chamber of Commerce and Industry, which is authorized to protect the rights of entrepreneurs. All these institutions are involved in the development of entrepreneurship as a driver of the economy, ensuring the growth of GRP and the economic security of the region.

Ensuring personnel stability in the region is an important task. A key factor is not only the retention of qualified personnel, but also the availability of competent leaders in sectoral ministries with a deep understanding of the region's economic and human potential. It is desirable that

[10] UN Conference on Trade and Development. URL: https://www.un.org/ru/documents/decl_conv/decl_trade (accessed 10 February 2025).

these leaders hold their positions for at least five years, which will allow them to fully realize their potential and make a significant contribution to the region's development.

Conclusion

The study, which included a comprehensive analysis of socio-economic processes in the Komi Republic as a strategically important territory in the North Arctic zone of the Russian Federation, identified systemic problems that hinder the growth of the gross regional product and pose threats to the sustainability of the region's economic security. They include: crisis in the financial system, characterized by limited access to credit resources and their high cost; shortage of alternative sources of financing for business initiatives; insufficient investment in fixed capital necessary to ensure expanded reproduction; low level of entrepreneurial activity, exacerbated by the inefficiency of the business support infrastructure; weak implementation of innovation policy, which does not contribute to the modernization and restructuring of the outdated production base; low level of creative activity among the population, lack of a developed creative environment and infrastructure for creative industries; and systemic crisis of personnel stability, which hinders long-term development.

Based on the empirical data obtained and theoretical analysis, a set of strategic recommendations is proposed, aimed at implementing the priority tasks set out in the Economic Security Strategy of the Russian Federation until 2030. In particular, it seems appropriate to develop a regional economic security plan with clearly defined key indicators, thresholds and accountability mechanisms for officials, which will enable rapid risk management and ensure a sustainable path of economic growth. At the same time, it is advisable to initiate the transformation of household savings into productive investments by revitalizing the regional stock market and creating favorable institutional conditions. The revitalization of public-private partnership mechanisms is a key tool for mobilizing investment activity on the part of both the state and business.

The proposed program pays particular attention to stimulating innovation through the development of a comprehensive program for regional innovative development, including the creation of a modern innovation support infrastructure, effective fiscal and non-financial incentive mechanisms, and priority support for youth entrepreneurial initiatives and start-up projects. In this regard, it is advisable to establish regional technology transfer centers with annual monitoring of the needs of large businesses for innovative solutions. Improving the effectiveness of the regional investment standard requires assigning personal responsibility to the region's top leader, which will emphasize the strategic priority of this area. In addition, it is necessary to improve the effectiveness of business support funds and development institutions — the Chamber of Commerce and Industry, Opora Rossii, Delovaya Rossiya, My Business centers, and business incubators — by involving them in the development of interregional economic ties, the exploration of new markets, and the protection of the interests of business structures.

Finally, a strategically important area is the reform of the management training system, taking into account the specific characteristics of the northern and Arctic territories. It is necessary to implement a targeted program of continuing education covering schoolchildren, students and active entrepreneurs, with an emphasis on the development of critically important competencies: strategic risk management; modern management methods for attracting venture and stock investments; effective approaches to personnel management that ensure loyalty, productivity growth and information security; the formation of a high corporate culture and social responsibility to adequately respond to external challenges; as well as the skills of an effective business owner in an extreme geo-economic environment.

The scientific significance of this study lies in its comprehensive, interdisciplinary approach to diagnosing the factors that determine GRP growth and the level of economic security in the region, taking into account the unique territorial specifics of the Arctic latitudes. The methodological novelty lies in the development of an integrated set of state regulation measures proposed for practical testing within the framework of federal and regional policy. The results obtained have significant applied potential, contributing to the development of additional measures to modernize the production base, develop infrastructure, increase innovation activity and provide human resources for the sustainable economic development of the Komi Republic, and can also serve as a methodological basis for further research in the field of regional economic dynamics and security.

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"Murmansk Initiatives" by M. Gorbachev and Their Implementation in the Arctic Region as an Element of the "New Thinking" Policy

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Abstract. This article, based on a wide range of sources, some of which are being introduced into scientific discourse for the first time, attempts to provide a comprehensive analysis of the implementation of Mikhail Gorbachev's "Murmansk initiatives", studying their assessments and impact on the formation of a new type of the international cooperation in the Arctic in the short-term historical period from October 1987, when they were proclaimed, to 1990. The authors came to the following conclusions: it was no coincidence that Mikhail Gorbachev chose the Arctic as an arena for the implementation of the "new thinking" policy. The "Murmansk initiatives", having become a regional reflection of the "new thinking" policy, were not perceived unambiguously in the West. The dividing line was drawn both in terms of the content of the initiatives themselves and the favorable perception of them by the Arctic countries. The authors positively assess the "non-military" component of the "Murmansk initiatives". Despite the traditionally recognized failure of the component related to arms limitation, they nevertheless played a role in the development of the international relations in the region. At the same time, it is clear that during that period, the country's leadership often acted to the detriment of national interests, making unilateral concessions in the name of reaching an agreement. The concept of neoclassical realism, which forms the basis of this study, explains this line of foreign policy behavior by the USSR as a complex combination of a number of factors: the inability to pursue the state's previous foreign policy, which was characterized by an arms race in a bipolar world, the internal socio-economic crisis in the country, as well as the personal characteristics of Mikhail Gorbachev himself.
Keywords: *foreign policy of the USSR, new thinking policy, Murmansk initiatives, Arctic region, M.S. Gorbachev*

Introduction

The foreign policy of the late Soviet Union in the end of the 1980s is of considerable academic interest due to its implications for humanity as a whole, for regions around the world, and for our country. The collapse of the bipolar system, the disintegration of the global socialist sys-

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tem, and subsequently of the USSR, created a fundamentally new geopolitical situation in the world. Whether these processes had objective grounds and what their consequences were remain a subject of heated debate in socio-political and academic discourse. The "Murmansk initiatives" were a regional manifestation of Mikhail Gorbachev's "new thinking" concept in foreign policy in the Arctic region in the second half of the 1980s. There is a view that the Arctic was not chosen by the Soviet leadership for the implementation of these initiatives by chance: the need to reduce the degree of militarization of the region, combined with the global prioritization of the climate and environmental agenda, became one of the specific features of the late USSR's foreign policy in the Arctic. In this regard, the authors consider it significant to study the implementation of the "Murmansk initiatives" and their impact on the development of international processes in the region.

The degree of study of the topic under consideration can be represented by at least two layers of research literature. The first, which is quite extensive, contains an assessment of Mikhail Gorbachev's "new thinking" policy; the second focuses on its specific manifestation in the Arctic — the "Murmansk initiatives". The systematization of the research literature on this topic can be based on the assessment of these foreign policy phenomena of the USSR by authors representing opposing points of view. Thus, the "new thinking" policy is often assessed positively by those who were in power at that time, as well as by foreign researchers [1, Adamishin A.L.; 2, Brown A.; 3] [1]. The works of the Russian researcher M.F. Polynov play a significant role in the development of the "new thinking" concept. He considers the end of the Cold War to be a positive outcome of the "new thinking" policy, though this occurred due to the USSR's refusal to continue the struggle for spheres of influence in the world [4; 5; 6; 7; Polynov M.F.]. The reasons for this refusal are examined in detail both by Polynov himself and by other Russian authors [8; 9, Barsenkov A.S.]. Thus, the overwhelming majority of modern Russian authors, when assessing the policy of "new thinking", proceed from the realistic view that the USSR was no longer in a position to pursue a foreign policy characteristic of a superpower and was seeking a way out of the growing confrontation.

The second layer of research is devoted specifically to the study and assessment of the "Murmansk initiatives". It should be noted that they are generally mentioned in a broader context, as a starting point for the formation of a new type of international relations in the Arctic. A number of studies by foreign authors analyze the reaction of Arctic countries to these initiatives, assessing them in terms of their significance and feasibility. In general, the authors positively evaluate this foreign policy step of the Soviet leadership, though they note that the implementation of initiatives related to military security aspects was hardly feasible under the prevailing geopolitical conditions [10, Purver R.G.; 11, Åtland K.; 12, Janes R.W.]. Russian researchers also give cautious assessments of the "Murmansk initiatives", noting contradictions among the political elites [13, Fokin Yu.E., Smirnov A.I.; 14, Shtol M.V.]. At the same time, academic research has not fully ad-

[1] The Gorbachev Era — Through the Eyes of Contemporaries. On the 100th Anniversary of Academician G.A. Arbatov's Birth. *The Gorbachev Foundation.* URL: https://web.archive.org/web/20231023184610/https://www.gorby.ru/presscenter/news/show_30397/ (accessed 24 June 2025).

dressed topics related to the place and role of the Arctic in the formation of M.S. Gorbachev's "new thinking" concept, as well as its consequences for the development of international processes in the region, which makes this study particularly relevant.

The aim of this article is to analyze the implementation and impact of M.S. Gorbachev's "Murmansk initiatives" on the development of a new format of cooperation in the Arctic. The lower chronological framework of the study is defined as October 1987, when the "Murmansk initiatives" were formulated by M.S. Gorbachev. The article examines events prior to 1990. It was important for the authors to analyze the initial impact of this foreign policy step of Soviet diplomacy, the reaction of the international community to it, and the first steps towards its implementation.

The theoretical basis of the study is represented by the concept of neoclassical realism, which assumes that the foreign policy behavior of each state is determined primarily by its power and position in the international system, in particular, by the relative share of its material capabilities [15, Ripsman N.M., Taliaferro J.W., Lobell S.E.; 16, Rose G.]. As V.N. Konyshev notes, the influence of the international system on the state is exerted "not directly, but indirectly, through the complex interaction of the international structure with the diverse internal attributes of the state" [17, p. 105]. The latter include the political and economic situation in the country, as well as the personal characteristics of the political leader. The study involved the use of general scientific and historical research methods, which enabled the reconstruction of the events that took place, as well as the drawing of key conclusions and generalizations based on critical analysis.

The source base of the study consists of three groups of documents. The first group comprises unpublished sources, introduced into academic circulation for the first time. These include materials from the Archive of the Foreign Policy of the Russian Federation (hereinafter — AFPRF), among which the documents from Fund 116 — "Reference on Norway" (hereinafter — F. 116) — occupy a central place for this study. The Fund contains analytical materials from employees of the USSR Ministry of Foreign Affairs, detailing the reactions and subsequent actions of foreign countries in response to the "Murmansk initiatives". It is interesting to note that the materials include studies of initiatives by Western and Northern European countries, as well as the Warsaw Pact states. The second group of sources is represented by media materials, in particular the Pravda newspaper from 1987–1988, as well as video materials from the Russian Central Film and Video Studio of Documentary and Educational Films, which depict official visits of high-ranking Soviet officials to Scandinavian countries. An analysis of bilateral treaties concluded between the USSR and the Nordic countries, which constituted the third group of sources, was significant in developing the research topic.

The "new thinking" policy: the origins of formation

Researchers who examine the reasons for the change in Soviet foreign policy in the 1980s consider the impossibility of continuing the rivalry with the United States for global dominance to

be a key factor. This manifested itself in the long-standing arms race, which resulted in disproportionate economic growth: in the 1980s, over 60% of mechanical engineering output consisted of military goods [5, p. 52]. Moreover, the Strategic Defense Initiative program, implemented by the United States since 1983, made it impossible for the USSR to continue a military standoff on equal terms. The USSR's Minister of Foreign Affairs, E.A. Shevardnadze, recalled that after assessing the prospects of establishing this system, "Gorbachev and I finally decided: we need to find common ground with the Americans at any cost" [5, p. 38]. In addition, the USSR was drawn into a struggle for political influence in the "Third World" countries and provided them with economic support: by November 1, 1989, the amount of debt of developing countries to the USSR amounted to 420.4 trillion rubles [5, p. 52]. In essence, the rules of the Cold War forced the USSR to operate under constant pressure from external factors, which the state withstood as long as it had sufficient resources to implement an adequate foreign policy. This logic of interaction in the international arena often did not correspond to the national interests of the USSR and undermined its potential. The policy of the R. Reagan administration, aimed at exacerbating the USSR's internal problems, set a specific goal: to achieve fundamental changes in the political system of its adversary. Thus, the secret directive of the US Department of Defense, "US Relations with the USSR", dated January 17, 1983, stated that one of the US objectives was "to facilitate the process of transforming the USSR into a pluralistic economic and political system in which the power of privileged elites is significantly reduced" [2].

It is important to note that representatives of the Soviet school of foreign policy thinking were not united in their views on the development of the state's foreign policy. As A.P. Tsygankov notes, three main ideological groups were distinguished: pro-Westerners, who emphasized democratic consolidation with the West and a policy of détente; a more nationalistic group within the Soviet establishment — statists — who advocated limited reforms and the implementation of the concept of "balance of power" between socialism and capitalism; and ardent supporters of continuing the ideological struggle, who did not believe in the possibility of détente and rapprochement with the aggressive "imperialist" West [18, pp. 34–35].

The provisions of the "new thinking" concept were not new; they had been expressed by various government and public figures since the 1960s. Under M.S. Gorbachev, they manifested themselves in various formats: at a meeting with US President R. Reagan in Geneva in November 1985, at a meeting of the Politburo of the Central Committee of the CPSU on January 23, 1986, at which the draft report of the General Secretary to the 27th Congress was discussed, as well as at the Congress itself in February 1986 [6, p. 85].

The concept of "new thinking" is defined as a socio-philosophical, ideological theory based on the idea of a global and fundamentally indivisible world, which, as M.S. Gorbachev asserted,

[2] NSD Directive Number 75, US Relations with the USSR. Department of Defense. URL: https://archive.org/details/NSDDirectiveNumber75USRelationswiththeUSSR/page/n7/mode/2up (accessed 20 May 2025).

was under threat of destruction. According to the official doctrine, "new thinking did not emerge overnight, but it did not arise without reason... The core of new thinking was the thesis on the priority of universal human interests and values in an increasingly integrated, interdependent world. New thinking does not deny national, class, corporate, and other interests. But it prioritizes the interests of preserving humanity, saving it from the threat of nuclear war and environmental catastrophe." [3] According to the authors of the article, it is difficult to assess the real reasons for the integration of such an ideological approach into the foreign policy of the late USSR. However, the authors believe that in this case, there was a complex combination of factors: the internal economic crisis in the country, the impossibility of pursuing the previous foreign policy, and the role of M.S. Gorbachev himself. In his opinion, identifying a common threat — global problems — for former geopolitical adversaries was intended to reduce tensions in relations and change approaches to mutual perception. Thus, the Soviet leader was proposing to base foreign policy on a neoliberal approach.

The change of the head of the USSR's Foreign Ministry (E.A. Shevardnadze was appointed as the new Minister of Foreign Affairs in July 1985, replacing A.A. Gromyko, who had held the post for over 30 years), the restructuring of the Foreign Ministry and the creation in 1986 of the Department for Arms Control and Disarmament, as well as the strong analytical support for the ideas of "new thinking" from the country's leading academic institutions and scientific community — all these indicated the beginning of accelerated preparations for the implementation of a "peaceful offensive" policy with the goal of creating a new, attractive image of the USSR and its foreign policy.

On March 13, 1985, brief meetings were held in the Kremlin between M.S. Gorbachev and the heads of delegations from the USA, the UK, France, West Germany, Japan and China, during which the Soviet leader repeatedly emphasized the need to resume dialogue and overcome tensions in international relations. He stated that the USSR intended to pursue a responsible and constructive foreign policy that took into account the interests of each state and would not seek military superiority [8, p. 43]. Overall, this was an attempt to overcome the established stereotypes of the Cold War and, at the same time, a tendency to rethink its conceptual and ideological foundations, as well as a desire to build relations with the West on the principles of equal partnership in the name of achieving common goals. Thus, the policy of "new thinking" — a fundamentally new approach to the country's foreign policy — laid the foundation for the implementation of regional initiatives, which, against the backdrop of and in conjunction with the core idea of disarmament, were intended to transform both the essence of the state's foreign policy and its international image.

[3] Understanding Perestroika, Defending New Thinking. M.S. Gorbachev. *Russia in Global Affairs*. URL: https://eng.globalaffairs.ru/articles/perestroika-and-new-thinking/ (accessed 24 June 2025).

The "Murmansk initiatives" and their impact on international processes in the Arctic

The Arctic, in essence, was the first region where the concept of "new thinking" was put into practice. Researcher R.G. Perver notes that such proposals by the Soviet leader to ensure regional security in areas bordering the USSR can be seen as a distinctive feature of the "new thinking" policy [10, p. 147]. Indeed, the speech in Murmansk was preceded by a similar speech in Vladivostok on July 28, 1986, which addressed security issues in the Asia-Pacific region. In March 1988, M.S. Gorbachev visited Belgrade, where, at a meeting with delegates of the Socialist Federal Republic of Yugoslavia, he put forward initiatives to ensure security in the Mediterranean region [19, Guskova E.Yu.]. These three foreign policy initiatives share certain similarities, emphasizing measures for the control of naval armaments — an issue that was becoming increasingly important in Soviet diplomacy during the period under review.

During an official visit to the Arctic's largest city from October 1 to 3, 1987, General Secretary of the CPSU Central Committee M.S. Gorbachev awarded the city of Murmansk the Order of Lenin and the Gold Star medal. In his ceremonial speech, dedicated to domestic socio-economic reforms, he focused on the international situation and outlined his vision of the Arctic through the "idea of universal cooperation" [4].

Speaking about the Arctic not only as a "weather workshop" influencing the climate of the entire planet, but also as a region of geopolitical confrontation, M.S. Gorbachev noted that "submarines and surface vessels represent a huge potential for nuclear destruction, which affects the political climate of the entire world" [5]. In his speech, the Soviet leader offered the Arctic states "to discuss the long-standing security issues here … through both bilateral and multilateral cooperation" [20, Panikar M.M., p. 19]. His proposals were based on the idea of establishing a nuclear-free zone in Northern Europe, restricting naval activity in the seas adjacent to Northern Europe, and opening the Northern Sea Route to foreign vessels with "our provision of icebreaker escort" [6]. The Soviet leader also drew particular attention to the need for countries to join forces on environmental protection, as well as to the development of international cooperation in the field of Arctic scientific research, proposing the creation of a joint Arctic scientific council and the holding of a conference of Arctic states in 1988 to coordinate scientific research in the region [7]. An analysis of M.S. Gorbachev's "Murmansk speech" allows determining the role the USSR desired to play in Northern Europe. Based on the concept of a "common European home", which recognized the unity of Europe despite the countries' different socio-political systems and their membership of various military-political blocs, the Soviet leader, deliberately emphasizing the achievements of Northern European political leaders, emphasized the common interests of the USSR and the

[4] Speech at the ceremonial meeting dedicated to the presentation of the Order of Lenin and the Gold Star medal to Murmansk. October 1, 1987. URL: http://historic.ru/books/item/f00/s00/z0000235/st050.shtml (accessed 18 May 2025).
[5] Ibid.
[6] Ibid.
[7] Ibid.

Northern European countries, contrasting them with the "chilling breath of the Pentagon's 'polar strategy'" [8].

Before assessing the international reaction to the "Murmansk initiatives", it is important to note that they also had a domestic political resonance. Following M.S. Gorbachev's visit to Murmansk on March 10, 1988, the Central Committee of the CPSU and the USSR Council of Ministers adopted the Resolution No. 338, "On Measures to Accelerate the Economic and Social Development of the Murmansk Oblast in 1988–1990 and for the Period up to 2005" [9]. Researcher M.V. Shtol, citing historical documents, notes that a number of issues raised within the framework of the "Murmansk initiatives" caused concern and even criticism among officials in Soviet departments at various levels. For example, the State Commission for Arctic Affairs under the USSR Council of Ministers expressed concern over the final point of these initiatives, regarding the status of the Northern Sea Route (NSR), which was still considered a national transport artery. The commission instructed the Ministry of Justice to "develop proposals to protect the interests of the USSR" in the event of the NSR being opened to foreign vessels. The USSR Ministry of Justice also noted that a number of countries possessed icebreaker fleets, and their use of the NSR could undermine the USSR's position and lead to a reconsideration of the ownership of this transport artery [14, p. 191]. In response to this situation, the Supreme Soviet of the USSR developed and adopted a number of legal documents that regulated the use of the NSR and established control over it, using environmental concerns, perhaps largely as a pretext for strengthening the USSR's position [10]. These examples clearly demonstrate that not all Soviet officials shared the foreign policy approaches of the new General Secretary of the CPSU; many of them were rightly concerned about protecting the country's national interests and maintaining its defense capability.

The authors also believe that the analysis of the "Murmansk initiatives" by foreign researchers deserves special attention. Thus, R.G. Perver emphasizes that the USSR sought to expand cooperation in scientific research and mineral extraction in the Far North in order to "gain access to Western technologies, know-how, and capital" [10, p. 147]. He also clearly distinguishes between "non-military" and "military" initiatives, rightly pointing out that the latter were hardly feasible and even failed [10, p. 149]. K. Otland, discussing the theory of securitization, argues that Gorbachev's emphasis on ensuring security in the non-military (social, economic, environmental) sector was an important means by which security in the military sphere could be achieved [11, p. 290]. Regarding the assessment of these foreign policy initiatives from the standpoint of neoclassical realism, the authors believe that, on the one hand, it was becoming increasingly difficult for the USSR to support "hard" security economically; on the other hand, the opportunities for coopera-

[8] Ibid.
[9] Izvestia, March 11, 1988
[10] For example: Resolution of the Council of Ministers of June 1, 1990 No. 565 On measures to ensure the implementation of the Decree of the Presidium of the Supreme Soviet of the USSR of November 26, 1984 "On strengthening environmental protection in the regions of the Far North and marine areas adjacent to the northern coast of the USSR". URL: https://docs.cntd.ru/document/901807366 (accessed 19 May 2025).

tion and joint high-tech development of the Arctic with the countries of the region seemed promising. The initiation of international dialogue in non-military spheres — environmental, economic and scientific research — could contribute to the formation of trust for solving more complex security problems in the region.

According to the authors, R. Janes's assertion that the interdependence and traditional stability of Northern Europe made it "an excellent arena for Soviet foreign policy of 'new thinking'" is justified [12, p. 163]. Firstly, the environmental agenda and the issue of protecting the Arctic environment were in line with the key message of M.S. Gorbachev's foreign policy concept itself, aimed at prioritizing universal human values in order to harmonize international relations. Secondly, these areas of interaction, in contrast to the issue of disarmament in the region, were the most "suitable" for initiating international cooperation. On the one hand, they did not require significant financial expenditure; on the other, they were conducive to overcoming the foreign policy stereotypes of the Cold War. This can be explained by the fact that the issues of research and environmental protection in the Arctic were mainly developed by representatives of the scientific community, who were interested in combining common efforts to achieve scientific results and were not guided by political motives in their actions.

Researchers believe that the components of the "Murmansk initiative" relating to arms control can be explained as a direct response to a number of specific threats and opportunities in the field of security [10; 12]. These were explicitly outlined in the Soviet leader's speech, in which he referred to the deployment of a new radar station in Greenland in violation of the 1972 Treaty on the Limitation of Anti-Ballistic Missile Systems, the Canadian government's development of a program to build up military forces in the Arctic, and the general increase in "US and NATO military activity in areas directly adjacent to the Soviet Arctic" [11]. This was also largely linked to the announcement of the Forward Maritime Strategy of the U.S. Navy in 1987 and the increase in the number of American submarine operations in the Arctic. The Soviet Union also viewed the expansion of NATO infrastructure on its northern flank as a threat in the Arctic, specifically the deployment of heavy Alliance weapons in Norway and the intensification of NATO surface warship exercises in the Norwegian and Baltic Seas [12]. However, the immediate impetus for the proclamation of the "Murmansk initiatives" may have been the planned signing of the Intermediate-Range Nuclear Forces Treaty. On the one hand, its implementation could have led to NATO compensating for the loss of the missiles specified in the treaty by increasing the number of long-range air- and sea-launched cruise missiles with nuclear warheads in and over northern waters. On the other hand, the USSR could have expected the restoration of a nuclear-free zone in the Arctic if all mis-

[11] Speech at the ceremonial meeting dedicated to the presentation of the Order of Lenin and the Gold Star medal to Murmansk. October 1, 1987. URL: http://historic.ru/books/item/f00/s00/z0000235/st050.shtml (accessed 18 May 2025).

[12] O'Donnell H.K. Northern Flank Maritime Offensive. *US Naval Institute,* September 1985, Vol. 111/9/991. URL: https://translated.turbopages.org/proxy_u/en-ru.ru.cb834a67-67b10250-993d0e36-74722d776562/https/www.usni.org/magazines/proceedings/1985/september/northern-flank-maritime-offensive (accessed 15 May 2025).

siles were completely dismantled. Overall, issues of security and demilitarization in the Arctic were crucial for establishing dialogue at a new level; however, the "Murmansk initiatives" did not provide a reliable foundation for resolving them. Moreover, many of Moscow's unilateral arms reduction initiatives were often viewed with ambivalence even in the West and were seen as a sign of the USSR's weakness.

It should be noted that the "Murmansk initiatives" were generally viewed positively by the international community. A few days after M.S. Gorbachev's "Murmansk speech", the newspaper Pravda published a review of the reactions of representatives of several Nordic countries. For example, Norwegian Prime Minister G.H. Brundtland noted that "the Murmansk speech raised important and complex issues that should be carefully studied... We regard M.S. Gorbachev's proposals as further evidence of the Soviet Union's growing desire for mutually binding international cooperation, including in regions and spheres that affect sensitive national interests." [13] Similar statements were made by representatives of other Nordic countries: Swedish Foreign Minister S. Andersson, Chairman of the Communist Party of Finland A. Aalto, Danish Foreign Minister U. Ellemann-Jensen, and others [14]. The proposals outlined by M.S. Gorbachev in Murmansk provoked a mixed reaction in Washington. The United States assumed a cautious approach, citing the fact that it had not yet received the full text of the speech, "and therefore prefers to refrain from detailed comments" [15]. Nevertheless, White House spokesperson Philip Oakley added: "We note, however, that the Soviet Union has long sought to limit Western freedom of navigation in international air and maritime spaces in such strategically important regions as the Baltic, Arctic, Norwegian and Greenland Seas." [16] Based on this statement, the authors of the review concluded that the Reagan administration was not yet ready to engage in discussions on the issues raised by Gorbachev [17].

Summarizing the Western countries' reactions to the "Murmansk initiatives", it can be concluded that the possibility of cooperation in non-military spheres received a positive assessment, which cannot be said of the initiatives concerning the creation of a nuclear-free zone and disarmament in the Arctic. On this issue, the countries were conditionally divided into three groups: Finland and Sweden, not being NATO members, responded to these ideas with the greatest enthusiasm; the Nordic countries and Canada, NATO members, were more reserved and cautious in their assessment, while the United States actually rejected the proposed initiatives [10]. Despite the fact that the Nordic countries began to discuss this issue on a regular basis in the second half of the 1980s, it was obvious that the creation of a Nordic Nuclear-Weapon-Free Zone could not be viewed as an isolated process, but should be perceived as part of disarmament negotiations. Further developments undoubtedly depended on relations between the great powers as a whole [21, Broms B.]. According to American analysts of that period, the implementation of the concept of a

[13] Pravda, 1987. No. 277. P. 4.
[14] Ibid.
[15] Ibid.
[16] Ibid.
[17] Ibid.

nuclear-free zone in Northern Europe was destined to fail, regardless of how strongly Moscow sought to achieve it. The United States opposed this idea, the implementation of which did not meet the national interests of Western countries [22, Lumsden C.A.]. At the same time, the discussion process itself could have been beneficial, raising awareness and reducing tensions, and therefore the potential for a nuclear war in the region. It can be assumed that the USSR largely used these debates as a tool for political détente.

A significant event in the development of the "Murmansk initiatives" was the official visit of the Chairman of the Council of Ministers of the USSR, N.I. Ryzhkov, to Sweden and Norway in January 1988. During a formal dinner at the Swedish Ministry of Foreign Affairs, Ryzhkov reaffirmed that "the "Murmansk initiatives" open up enormous opportunities. They point the way to the successful development of mutually beneficial relations." [18]

As part of this visit, a ceremonial dinner was held on 15 January in honor of the head of the USSR government on behalf of the Norwegian government, at which N.I. Ryzhkov outlined detailed initiatives to further M.S. Gorbachev's Murmansk speech. In particular, the northern countries were invited to send observers to one of the Soviet Navy's exercises in 1988, as well as to hold consultations between NATO and WP military experts. The latter could be aimed at developing solutions to limit the number of large-scale naval and air force exercises to one every two years; establishing agreed zones in the North and West Atlantic for the USSR and the USA respectively, within which the activities of anti-submarine forces and assets of military-political alliances would be prohibited; refraining from conducting naval exercises in the areas of the main oceanic and maritime trade routes of the North Atlantic; preventing the concentration of naval force groupings in international straits and their approaches, as well as defining the maximum parameters of these groupings in terms of numbers, classes of ships and other characteristics; including the Baltic Straits (Great and Little Belts, Sound, Skagerrak), the Danish and English Channel straits, and the Iceland – Faroe Islands – Scandinavia area in the restriction zones [19]. Major General Y.V. Lebedev, a representative of the Soviet General Staff, publicly expressed the approval of the "Murmansk initiatives" by Soviet military circles in the Moskovskie Novosti newspaper, supplementing them with initiatives for "joint discussions with Northern European countries of possible regional confidence-building measures at a lower level, as envisaged by the decisions of the Stockholm Conference", as well as "the signing of bilateral or multilateral agreements on the prevention of incidents at sea and in the airspace above it, which could extend to all of Northern Europe" [10, p. 152].

In a report by I. Aboimov, Deputy Minister of Foreign Affairs of the USSR, to D.K. Zotov, Deputy Chairman of the State Committee for Arctic Affairs under the Council of Ministers of the USSR, regarding the progress made in implementing the directives on the "Murmansk initiatives",

[18] Northern Europe – Cooperation and Security (1988). Film No. 9510. 2 parts. URL: https://www.net-film.ru/film-9510/ (accessed 19 May 2025).
[19] Pravda, 1988. No. 16. P. 4.

reference was made to the involvement of socialist countries in resolving this issue. At the Warsaw Pact (hereinafter WP) meeting of foreign ministers in Sofia on December 18, 1988, E.A. Shevardnadze outlined the objectives of efforts in the northern direction. A special group on the military aspects of the Murmansk program was established within the WP. At the first meeting of experts, held in Moscow, the idea of creating a "Baltic core" was proposed, within the framework of which the Polish side began actively promoting a plan to establish sub-regional cooperation in non-military fields [20]. Among the WP countries' initiatives, the efforts of the GDR, which had shown interest in disarmament in the Baltic, were noted, as well as Bulgaria's proposals to sign a memorandum between WP and NATO member states on flank issues, including the North [21].

The report noted that the main obstacle to implementing restrictions on naval activity in the North was the commitment of Norway, Denmark, and Iceland to NATO values, the "wait-and-see" approach of Sweden and Finland, and the need to consider the positions of all parties [22]. At the same time, a number of states in the region began exploring the possibility of reducing military and political tensions in the Northern European region at the expert level, creating special working groups. For example, Norwegian experts concluded that "it is both appropriate and desirable to take confidence-building measures in the maritime areas off the coast of Northern Europe" [23]. In March 1989, the Norwegian Parliament's Military Committee visited the Kola Peninsula, after which work began on concluding an agreement to prevent incidents at sea and in the airspace above it. Finland proposed submitting proposals on confidence-building measures at sea to the UN Disarmament Commission. In April 1989, an informal exchange of views on the "Murmansk issue" took place at the Royal Institute of International Affairs in London, as a result of which British experts agreed on the need to establish mechanisms for bilateral and multilateral consultations between diplomatic and military experts in order to develop methods and formats for future negotiations on naval issues [24].

Iceland's proposal to hold an international conference to prepare for negotiations on naval force reductions in Northern Scandinavia did not receive the support of Iceland's NATO partners, primarily the United States: no progress could be achieved with regard to the military-political aspect of the Murmansk program, and their stance remained negative [25].

Cooperation between the Supreme Soviet and the parliaments of the Arctic countries on issues of military security and disarmament in the region was also unsuccessful. For example, the foreign affairs committees of the parliaments of Sweden, Denmark, and Norway rejected a Soviet invitation to Moscow in 1988 on the grounds that participation in foreign policy negotiations was not within their constitutional mandate. Representatives of the Arctic countries also declined the

[20] AFPRF. F. 116. Invt. 73, Arch. 10, P. 117. Sh. 38-39.
[21] Ibid. Sh. 39.
[22] Ibid.
[23] Ibid. Sh. 40.
[24] Ibid. Sh. 40-41.
[25] AFPRF. F. 116. Invt. 73, Arch. 10, P. 117. Sh. 42.

Soviet invitation and did not send military observers to the military exercises in the north-eastern part of the Baltic Sea, which took place from September 6 to 8, 1988 [10, p. 153].

However, despite the lack of progress on the "Murmansk initiatives" concerning arms control and naval force reduction, a fairly productive dialogue was established in other areas of cooperation. This dialogue was particularly intensified at the parliamentary level. The year 1988 was marked by a series of such events: in April, a Soviet-Finnish inter-parliamentary seminar on the implementation of the Murmansk program was held in Helsinki, along with a trip by Supreme Soviet deputies to the Scandinavian countries. In October, Moscow hosted a delegation from the Northern European Parliamentarians on the Study of the Prerequisites for the Creation of a Regional Nuclear-Weapon-Free Zone (the Jørgensen Committee). During the meeting, the issue of establishing contacts between the Supreme Soviet of the USSR and the Nordic Council was discussed [26].

The Soviet-Finnish "Kola Project" was launched, aimed at modernizing existing mining operations, establishing recycling of secondary waste, and creating new facilities for the development of raw materials on the Kola Peninsula [27]. In the area of environmental cooperation, Finland proposed convening a conference of Arctic states on environmental protection in the Arctic, which marked the beginning of the "Rovaniemi Process". Contacts between the indigenous peoples of the North and the Arctic Circle Inuit Association were expanding. International scientific cooperation was further developed through the creation of the first non-governmental international organization in the Arctic — the International Arctic Science Committee (IASC).

In November 1989, Canadian Prime Minister B. Mulroney made an official visit to the USSR. Despite the extensive agenda, some items focused exclusively on the Arctic. The importance of this area in relations between the two countries was underlined by the Canadian Prime Minister's visit to the Arctic and Antarctic Institute in Leningrad on November 24. B. Mulroney expressed Canada's interest in bilateral cooperation with the USSR in the region, primarily in the areas of environmental protection and climate change. A new Arctic cooperation agreement was signed [28].

One of the tools used by the USSR in its foreign policy to initiate international dialogue in Northern Europe was the issue of delimiting the maritime boundaries between the USSR and the Arctic states, a matter that had remained unresolved during the Cold War. This primarily concerned demarcations in the Baltic Sea with Sweden, in the Barents Sea with Norway, in the Bering and Chukchi Seas with the USA, as well as the USSR's activities on Spitsbergen.

[26] AFPRF. F. 116. Invt. 73, Arch. 10, P. 117. Sh. 37-38.
[27] Protocol between the Government of the Union of Soviet Socialist Republics and the Government of the Republic of Finland on cooperation on the Kola Peninsula. October 26, 1989. URL: https://www.mid.ru/ru/foreign_policy/international_contracts/international_contracts/2_contract/57999/ (accessed 20 May 2025).
[28] USSR-Canada official visit of Prime Minister Mulroney. November 1989 // CANADA DECLASSIFIED, File № 20-CDA-9-PM-EUR. MF-7866. URL: https://declassified.library.utoronto.ca/exhibits/show/mulroney-in-moscow--kyiv--and-/mulroney-in-moscow--kyiv-and-l (accessed 20 May 2025).

The first steps towards resolving the issue of maritime delimitation were taken as early as January 1988 during the aforementioned visit by N.I. Ryzhkov to Sweden and Norway. During this visit, an Agreement on the Principles of Delimitation of Maritime Areas and Zones in the Baltic Sea between the Kingdom of Sweden and the USSR was signed. According to this agreement, the disputed territory between Sweden and the Soviet Union was to be divided so that 75% of the total area belonged to Sweden and 25% — to the Soviet Union [29]. Assessing the signing of the agreement, Swedish Prime Minister I. Karlsson called it "a product of perestroika" [30]. Undoubtedly, such steps by Soviet diplomacy indicated a policy of concessions in an attempt to establish interstate dialogue.

In April of the same year, another agreement was signed in Moscow with Sweden, concerning the delimitation of the continental shelf and fisheries zone of Sweden and the Soviet economic zone in the Baltic Sea [31]. This agreement established a line delimiting the maritime areas of Sweden and the USSR in the area of Gotland Island, which, after the collapse of the USSR, were transferred to Estonia, Latvia, Lithuania, and the Kaliningrad Oblast of the Russian Federation. Furthermore, on June 30, 1989, a trilateral agreement was signed between the governments of the Kingdom of Sweden, the People's Republic of Poland, and the USSR on the common delimitation point of their maritime borders in the Baltic Sea [32].

"An unconventional attempt", as A.K. Krivorotov describes it, "to cut the Gordian knot of the territorial issue" [23, p. 70] was undertaken by the Soviet side in Norway, which N.I. Ryzhkov visited during his tour of Scandinavia from January 14 to 16, 1988. The problem of delimiting the exclusive economic zone and the continental shelf in the Barents Sea had been discussed by the parties since 1970. Ryzhkov, avoiding direct action on delimitation, proposed creating a "special zone of Soviet-Norwegian partnership" in the southern part of the Barents Sea, the shelf of which would be studied and developed by a joint venture of the two countries on a parity basis. However, this initiative was rejected by the Norwegian side due to "a sincere fear of joint management mechanisms with the USSR" [23, p. 70]. According to A.K. Krivorotov, another Soviet initiative followed in late 1988, when an unnamed high-ranking Soviet diplomat arrived in Oslo and announced the USSR's readiness to cede to Norway the northernmost section of the disputed area, comprising 5% of its total area [23, p. 71]. Through these actions, the USSR demonstrated a willingness to make concessions, moving away from the principle of dividing maritime areas along

[29] Agreement on Principles for the Delimitation of the Sea Areas in the Baltic Sea between the Kingdom of Sweden and the Union of Soviet Socialist Republics, 13 January 1988. URL: https://faolex.fao.org/docs/pdf/bi-5121.pdf (accessed 20 May 2025).
[30] Northern Europe – Cooperation and Security (1988). Film No. 9510. 2 parts. URL: https://www.net-film.ru/film-9510/ (accessed 19 May 2025).
[31] Agreement on the delimitation of the continental shelf and of the Swedish fishery zone and the Soviet economic zone in the Baltic Sea (with nautical charts and protocol). Signed at Moscow on 18 April 1988. URL: https://www.marineregions.org/documents/volume-1557-I-27075-English.pdf (accessed 20 May 2025).
[32] Agreement between the Government of the Kingdom of Sweden, the Government of the Polish People's Republic and the Government of the USSR concerning the Common Delimitation Point of their Maritime Boundaries in the Baltic Sea, 30 June 1989. URL: https://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/TREATIES/SWE-POL-RUS1989MB.PDF (accessed 20 May 2025).

sectoral lines. During extensive consultations, the parties reached an agreement regarding the northern part of the "grey zone" by 1991, leaving only its southern section undemarcated [24, Zaretskaya O.V., p. 93].

Another example of the implementation of the policy of delimiting maritime spaces in the Arctic was the issue of delimitation in the Bering and Chukchi Seas, as well as in the Arctic and Pacific Oceans between the USSR and the USA. This issue was the subject of a meeting of the USSR Ministry of Foreign Affairs, represented by E.A. Shevardnadze, and US Secretary of State J. Schultz in September 1988, where the development of common approaches to resolving this problem was discussed [33]. The signing of the agreement between the USSR and the USA on the delimitation line of maritime spaces on June 1, 1990, became the subject of conflicting assessments both from Soviet politicians and researchers, including specialists in international law. Thus, A.N. Vylegzhanin notes that the agreement of the USSR and the USA to delimit maritime spaces along the lines of the Russo-American Convention of 1867 was consistent with general international law, but it was economically more beneficial for the USA than for the USSR [34]. In George Bush's letter to the US Senate for ratification of this agreement on September 26, 1990, the US President noted that "the agreement fully meets the interests of the United States" [35]. Moreover, its "provisional application" from June 15, 1990, until ratification by both parties also raised many questions. As V.K. Zilanov (Deputy Minister of Fisheries of the USSR in 1988) noted, "the US leadership was confident that Gorbachev, Shevardnadze, and then Yeltsin, would push the unfair Agreement... through the country's highest bodies — the Federal Assembly — and ratify it" [25]. However, this did not happen: the deputies of the Supreme Soviet of the USSR, and later the deputies of the RSFSR, were unable to reach a unanimous decision and ratify the agreement.

It should be noted that this Agreement did not serve the interests of the USSR. However, in the context of a comprehensive examination of the formation of foreign policy in the Arctic during the period under review, the desire to resolve all the aforementioned disputes over maritime delimitation in the Arctic primarily served as a means of achieving the goals of the "new thinking" policy, although it ran counter to the country's national interests. It is important to note that all of these disputes had a long history of resolution, often spanning decades. On the one hand, the delimitation undoubtedly had a positive effect and contributed to increased stability in the region. For example, the conclusion of the traditionally criticized Baker–Shevardnadze Agreement prevented third-party fishing and generally contributed to the regulation of fishing in the area. On the other hand, virtually all of these agreements led to territorial concessions and were economically

[33] AFPRF. F. 116. Invt. 73, Arch. 10, P. 117. Sh. 46.
[34] Vylegzhanin A.N. The 1990 Agreement between the USSR and the USA on the Maritime Delimitation Line: Different Assessments of its "Provisional Application". Expert Opinion. URL: https://mgimo.ru/about/news/experts/124210/?utm_source=yandex.ru&utm_medium=organic&utm_campaign=yandex.ru&utm_referrer=yandex.ru (accessed 17 May 2025).
[35] Message from the President of the United States transmitting the Agreement between the United States of America and the Union of Soviet Socialist Republic on the maritime boundary, with annex, signed at Washington, June 1, 1990. URL: https://marineregions.org/documents/125431.pdf (accessed 20 May 2025).

disadvantageous for the USSR, given the potential of the ceded areas for fishing and hydrocarbon production. In this sense, it can be assumed that the signing of these agreements may have had a largely symbolic significance — a demonstration of the USSR's determination to improve relations with the West by all available means. This also includes M.S. Gorbachev's unprecedented disarmament initiatives. As M.F. Polynov notes, "the policy of ending the arms race was becoming vital for the USSR... to implement the concept of accelerating the country's socio-economic development" [26, p. 15].

Conclusion

In conclusion, it should be noted that the concept of "new thinking" in Soviet foreign policy from 1987 to 1990 was essentially an attempt to overcome the acute geopolitical confrontation between the two superpowers. It was conditioned by both objective (external and internal) and subjective (personal) factors. These included: the USSR's inability, due to limited resources, to resist the powerful military-technical, political, economic, and ideological pressure from the United States; insufficient funds to support its spheres of influence in the world; the international community's emphasis on global human problems, the resolution of which was possible through joint efforts; the escalation of economic and social crises in the country; the ideological differentiation of the socio-political elites, among which, along with traditionalists with Marxist-Leninist views and representatives of moderate views who understood the need for reform, there were groups oriented toward liberal Western European values; the personal ideological preferences of the country's political leader, oriented toward neoliberal approaches to foreign policy.

According to the authors, it was no coincidence that Northern Europe was chosen by M.S. Gorbachev as a region for the implementation of the "new thinking" policy. The geographical proximity of the countries, the high geostrategic significance of the region, the status of the Scandinavian countries (small countries, the neutral status of Sweden and Finland), the presence of a common environmental agenda that required joint efforts, the development of conceptual provisions for the emerging Soviet image of Europe within the framework of the concept of a "common European home" — all these factors made the Northern European region optimal for demonstrating the foreign policy intentions of the USSR in the second half of the 1980s.

The "Murmansk initiatives", a regional manifestation of the "new thinking" policy, were not received equally well in the West. A dividing line was drawn both in the content of the initiatives themselves (military and non-military in nature) and in the degree to which they were received by the Arctic countries themselves, which was largely determined by their involvement in the bipolar world bloc system.

The authors positively assess the development of the "non-military" component of the "Murmansk initiatives". Archival materials attest to the successful implementation of joint activities in environmental protection and scientific research, which received institutional formalization and support at the highest level. The process of international economic partnership proceeded

somewhat more cautiously, apparently due to the challenging socio-economic situation in the USSR. However, the countries had a mutual interest: the USSR was interested in the advanced technologies of the northern countries, the latter — in the opportunity to profit from joint energy projects being implemented in the USSR's Arctic territories. Apart from the practical benefits of these initiatives, they had a significant "psychological" effect — cooperation in "non-military" spheres could foster an atmosphere of trust, laying the foundations for resolving more complex military-political issues. Undoubtedly, ties in "non-military" areas between the USSR and the Scandinavian countries and Finland had existed before, even during the height of the Cold War. However, a new multilateral level of interaction was only possible as a result of a paradigmatic shift in Soviet foreign policy. To demonstrate the seriousness of its foreign policy intentions, the USSR also used the policy of delimiting maritime spaces with Arctic countries. Apparently, in the view of the Soviet political leadership, agreements with Sweden and the United States, for example, which often did not serve the interests of the USSR, were intended to demonstrate good intentions in Soviet foreign policy.

Despite the traditionally recognized failure of some of the initiatives concerning arms limitation, reduction of naval activity, and the creation of a nuclear-free zone in Northern Europe, they nevertheless played a certain role in the development of the international situation in the region. During his visit to Finland in October 1989, M.S. Gorbachev, assessing the interim results of the implementation of the "Murmansk initiatives", presented the signing of the Intermediate-Range Nuclear Forces Treaty as an achievement that contributed to stability and trust in the region (tactical nuclear weapons could no longer reach the territories of northern European countries). This was complemented by a declaration on the elimination of sea-based nuclear weapons in the Baltic, as well as a unilateral reduction in the total number of troops in the European part of the USSR [14, p. 11]. The opinion that the disarmament rhetoric of the Soviet leadership could also be used as an instrument of political détente is not without foundation.

Thus, the regional dimension of the USSR's new foreign policy in the Arctic region was formalized in specific policy decisions only in the autumn of 1987. Two of Mikhail Gorbachev's six "Murmansk initiatives" envisaged the development of cooperation among the region's states in the fields of Arctic scientific research and environmental protection. Compared to other initiatives concerning the complex processes of changing the Arctic security, these two reflected the already-underway process of establishing a mechanism for multilateral scientific cooperation in the Arctic region, which had begun in 1986 with the preparatory stage of the creation of the IASC. During this period, a multi-level framework for international cooperation began to take shape, which was further developed with the signing of the Arctic Environmental Protection Strategy (1991), the establishment of the BEAR Council (1993), and, finally, the Arctic Council (1996) — the leading intergovernmental forum in the region. All of this contributed to the broad development of international cooperation in the Arctic, involving not only states, but also subnational regions and non-state actors in international relations. For almost three decades, the Arctic has been associated in

the public and political consciousness with a region of dialogue and cooperation. At the same time, it is obvious that during these years, the country's leadership has often acted to the detriment of its national interests, making unilateral concessions in the name of reaching consensus. The belief that Western countries were sincerely striving to create a truly democratic Russian state and were not pursuing their own national interests prevented the early signs of a different attitude toward Russia from being recognized in a timely manner, which was clearly expressed in the Western countries' reluctance to jointly address the problems of ensuring military security in the region. The emphasis in international cooperation on issues of the environment, culture, and the democratization of Russia and its regions indicated that mechanisms of "soft influence" on Russia had been set in motion, a fact that only became apparent decades later.

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Labor Markets of the Northern Territories of Russia in 2019–2023

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Abstract. The paper analyses the processes taking place in the local labor markets of Russia's northern territories in 2019–2023. A review of the results of empirical studies showed that the northern territories of the Russian Federation differ in terms of economic development, sectoral structure and labor market characteristics. This work aims to identify and show changes in the main characteristics of employment and labor markets of the northern territories over the five-year period 2019–2023, characterized by a high frequency of exposure to external macro-shocks. The analysis was conducted using Rosstat data aggregated by regions and territories of the Far North and equivalent areas and/or the Arctic zone of the Russian Federation. The work analyzed the dynamics of migration growth of the population, the number and structure of employment, wages and indicators of tension in the regional labor markets of the northern territories. The study showed that, despite the continuing heterogeneity of the labor markets of the northern territories in many indicators, positive dynamics were observed in some of them, even in depressed regions. In terms of the aggregate positive changes in indicators, the Khanty-Mansi Autonomous Okrug — Yugra was in the lead, while the Komi Republic showed negative changes. The results of the analysis can be used in implementing demographic, migration and social policies, as well as in developing programs aimed at regulating regional labor markets in northern and Arctic territories.
Keywords: *employment, labor market, Far North, Russian Arctic, labor demand*

Introduction

The northern territories of Russia [1] occupy approximately 70% of the country's territory, about 7% of the Russian Federation's population lives there. In scientific and business literature, living in the North is associated with extreme natural and climatic conditions, infrastructure problems, remoteness from the centre of the country, and population outflow [1, Pilyasov A.N.; 2, Kryukov V.A.; 3, Trofimov S.E.; 4, Giltman M.A., Obukhovich N.V., Larionova N.I.]. At the same time, issues of differentiation in the development of the northern territories are rarely given prior-

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[1] Hereinafter, unless otherwise specified, we use it as a general name for the territories of the Russian Federation belonging to the Far North and equivalent areas and/or the Arctic zone of the Russian Federation.

ity, although the problems of uneven economic and social development in settlements in the Far North are very acute. Even without referring specifically to statistical data, any reader interested in the problems of the North and the Arctic can say that the standards of living, for example, in Vorkuta and Salekhard, the Republic of Tyva and the Khanty-Mansi Autonomous Okrug — Yugra differ significantly. The Russian North is very diverse: it includes old industrial northern regions such as the Murmansk and Arkhangelsk oblasts; the ethnic republics of Sakha (Yakutia), Komi, Tyva, and Karelia; the rich extractive autonomous okrugs of Yamalo-Nenets, Khanty-Mansi — Yugra, and Nenets; other groups of regions [4]. The Russian Arctic occupies a special place among all the northern regions of the Russian Federation, where less than 2% of the country's population lives and about 6–7% of GDP is produced. The development of the Arctic territory is identified as one of the major challenges and priorities of the Strategy for Scientific and Technological Development of the Russian Federation until 2035. The importance of the Arctic's geopolitical position and its rich reserves of natural resources explain the active position of the state in regulating the development of this territory. Recent state support initiatives worth noting include the "Arctic Hectare" and "Arctic Challenge" programs, aimed at attracting people to the Arctic and creating favorable living conditions there, including for highly qualified personnel. Russia's largest investors and employers, including Gazprom, Rosneft, Lukoil, Norilsk Nickel, Severstal, and Alrosa, operate in the Arctic mining regions, attracting skilled workers and providing them with decent wages. At the same time, even in the less populous regions of the Arctic zone of the Russian Federation, compared to the Far North, the difference in regional average monthly wages is quite significant — up to 2.5 times.

One of the characteristics of living in the Far North is the high importance of employment, except for indigenous ethnic groups. Therefore, in order to retain and attract people to the northern territories, it is necessary to understand the employment opportunities available in each region and how their labor markets function. Modern investment projects are highly technological, and the demand for different numbers and qualifications of workers is extremely variable at different stages of their implementation. This variability of labor demand reduces the economic necessity for the population to reside permanently in the Far North and Arctic regions, with temporary forms of employment becoming increasingly widespread [5, Zamyatina N.Yu., Pilyasov A.N.; 6, Pilyasov A.N.; 2, Kryukov V.A.]. As a result, there has been a decline in labor demand and a reduction in the population of northern cities and regions [7, Khoreva O., Konchakov R., Leonard C. et al.]. In recent years, labor markets in all regions have been impacted by various external factors: both global shocks (e.g., the COVID-19 pandemic) and changes affecting their (labor markets) functioning, such as a reduction in the labor force. In these rapidly changing conditions, the functioning of labor markets in northern territories had to become even more flexible and adaptive. The aim of this work is to identify changes in the main characteristics of employment and labor markets in the northern territories over the five-year period of 2019–2023. At the time of writing, 2023 is the year with the most recent available data, and the functioning of labor markets in the

period prior to 2019 has already been studied in sufficient detail, as will be discussed in the next section.

Labor markets in the northern territories: a review of research

There are different approaches and levels of analysis of northern territories. A number of researchers consider the North and the Arctic as a single macro-region, highlighting common features for the countries, regions, and cities within it. According to this approach, Russian territory is viewed as an integral part of the Arctic, and its similarities and differences with Arctic regions and cities in other countries are compared. Common trends include population aging (despite the fact that, on average, the population of the northern territories of most countries is younger than in other regions), gender ratio balancing (previously, the male population predominated), population concentration in large cities with depopulation of small settlements, high migration activity, largely determined by labor demand [8, Carson D., Carson D., Nordin G. et al.; 9, Emelyanova A.; 10, Hamilton L., Wirsing J., Saito K.; 11, Kadenic M.; 12, Rolfe J., Miles B., Lockie S. et al.; 13, Suopajärvi L., Poelzer G., Ejdemo T. et al.; 14, Tano S., Pettersson O., Stjernström O.; 15, Wilson E., Stammler F.; 6, Pilyasov A.N.; 16, Heleniak T.].

The main specific feature of the northern and Arctic territories of all countries that affects the labor market is the high migration activity of the population [17, Sokolova F.H.; 18, Howe E.]. This can be explained by the fact that a large proportion of Arctic settlements are small in terms of population and size, so migration has a significant impact on overall population and human capital changes in the North and the Arctic [16]. Internal mobility in the northern and Arctic regions is characterized by an outflow of young people from peripheral areas to urban centers [16; 19, Lundgren A., Randall L., Norlén G. et al.]. The main reasons for this trend are more developed labor markets and educational opportunities [19; 4]. Moreover, a higher level of education increases the likelihood of settling in large cities, which occupy a central place in the labor market [20, Glaeser E.]. Since young workers and women tend to achieve higher levels of education, they mainly move from small northern towns to large cities [7; 21, Huskey L., Howe E.]. In addition to migration, the labor markets of the northern and Arctic regions are influenced by the high level of urbanization, which is often explained by concentration of labor demand in cities [22, Larsen J.N., Fondahl G.; 21]. Zamyatina and Goncharov [23] emphasize that the Arctic is the most urbanized part of Russia: as of early 2016, 89% of the population in the Arctic zone of the Russian Federation lived in cities. Other Russian scientists have also noted the high proportion of urban population in northern and Arctic labor markets [24, Smirnov A.V.]. Zamyatina and Goncharov [23] identified the following types of Russian Arctic cities: a few key multifunctional centers; peripheral administrative centers; port centers; and industrial inland centers.

Different types of settlements, uneven distribution of natural resources, varying distances from the country's central cities and other features give rise to regional differences between northern territories, which are often the subject of independent research. For example, studies on

the Russian Arctic note that some regions are only partially included in the Arctic Zone of the Russian Federation (AZRF), which causes certain difficulties for analyzing the economic processes taking place there. The Vorkuta and Usinsk districts, for instance, are located very close to each other and have very similar socio-economic processes, but the latter is not formally part of the AZRF [25, Fauzer V.V., Smirnov A.V., Lytkina T.S., et al.]. There are only four regions that are fully included in the AZRF (Murmansk Oblast, Nenets, Chukotka and Yamalo-Nenets Autonomous Okrugs). All other regions may experience trends that are not unique to the Arctic.

From the perspective of labor market analysis, it is interesting to note that, despite Russia being the leader in terms of GRP produced in the Arctic, there is a significant differentiation in household incomes between the poles of poverty and wealth in the Arctic region of Russia [1]. As a rule, this refers to the “rich” Nenets and Yamalo-Nenets Autonomous Okrugs and other AZRF entities. The share of the primary sector exceeds 50% in only two leading regions (Nenets and Yamalo-Nenets Autonomous Okrugs). The GRP of the Nenets Autonomous Okrug is one of the highest in the Arctic and exceeds the GRP of, for example, Karelia by 15.6 times. Such a high level of differentiation in economic development is not typical for other Arctic countries [26, Giltman M.A.]. Segregation into progressive and regressive poles is more characteristic of Russian Arctic territories than of any other northern territories in the world [27, Tsykalov A., Goncharov R., Koptseva N. et al.]. The uneven economic and social development of the northern and Arctic regions leads to the emergence of many geographically isolated local labor markets in the Russian North, which are formed in separate municipalities. The largest number of workers in the Arctic is concentrated in Yamalo-Nenets Autonomous Okrug (33.2%), Murmansk Oblast (24.6%) and Arkhangelsk Oblast (20.4%). The smallest number is in the Republic of Sakha (Yakutia) (0.9%) [28, p. 172]. The Arctic labor markets are evenly distributed between the European and Asian parts [16]. Mixed labor markets predominate (32.8%), followed by extractive markets (22.4%), with manufacturing markets being the least common (8.6%). The European part of the Russian Arctic has more manufacturing and closed labor markets. Extractive and infrastructure labor markets are mainly located in the Asian part [25]. The highest employment rate is characteristic of the Chukotka Autonomous Okrug (75.4%), the lowest — in the Arkhangelsk Oblast (56.1%). At the same time, there has been a change in the structure of employment. In 2000, workers with secondary (general and vocational) education were most in demand, whereas in 2018, the largest share of the labor market was occupied by workers with secondary vocational education (45%) and higher education (34.2%). Among the unemployed, workers with secondary general education (29.4%) and secondary vocational education (39.4%) predominate [29, Romashkina G., Skipin D., Yukhtanova Y. et al.].

The decrease in labor potential and the deformation of the age structure in the northern regions are largely due to the decline in the population of the Russian North (from 1989 to 2020, it decreased by 22.6%) [24]. The largest share of the working-age population was in those regions of the Russian Arctic and Far North, where a high proportion of employment is linked to the extraction of natural resources, such as oil, gas and minerals [30, Jungsberg L., Wang S.]. Thus, the pro-

portion of the working-age population exceeded 75% in the municipalities of Chukotka, the urban settlements of the Yamalo-Nenets Autonomous Okrug, and the city of Norilsk in the Krasnoyarsk Krai. The socio-demographic characteristics of the northern and Arctic regions are also influenced by the ethnic composition of the population. Representatives of the indigenous peoples of the North are less inclined to interregional and international migration; they have higher birth rates and lower life expectancy [10]. The highest birth rates are observed in the national republics of Sakha (Yakutia) and Komi, as well as the Nenets, Yamalo-Nenets, and Chukotka Autonomous Okrugs [31, Fauzer V.V., Smirnov A.V.]. However, previous studies have documented lower educational and employment outcomes for indigenous peoples compared to the rest of the population [32, Anderson I., Robson B., Connolly M. et al.]. For example, only 4.9% of the Chukchi have completed higher education, compared to 15.7% of the total population. In northern and Arctic ethnic territories, the lack of education among indigenous peoples is partly explained by the lack of local infrastructure, particularly, higher education institutions [16], which ultimately leads to decreased competitiveness in the labor market and a reduction in employment opportunities.

The spatial distribution of migrants across the Arctic Zone of the Russian Federation is determined by the structure of the regional economy and employment patterns, as well as the standard of living and quality of life of the population. One of the recent studies at the settlement level was conducted in 2019. It covered 177 settlements in the Russian Arctic. More than 75% of them experienced population decline, primarily due to migration outflow [16]. The Nenets and Yamalo-Nenets Autonomous Okrugs showed strong positive growth. The sharpest demographic decline occurred in Komi, where Vorkuta lost almost 40% of its population. The eastern part of the Russian Arctic also declined. The Magadan Oblast and Kamchatka experienced significant population losses due to negative natural growth and migration outflow [33, Skrupskaya Y.]. The Krasnoyarsk Krai and the Republic of Sakha (Yakutia) are large territorial entities of the Russian Federation, so internal migration is quite intense there. In the Arkhangelsk Oblast and the Komi Republic, population flows mainly move from villages and small towns to large cities with a higher standard of living. The rapidly developing and economically prosperous autonomous okrugs (Yamalo-Nenets, Nenets, Chukotka) attract large flows of commuter migrants — “shift workers” [17]. In the modern Russian Arctic, population outflow and population decline are more significant in the eastern regions, especially in regions that are traditional for the indigenous population of the Arctic [16]. The population left the republics of Sakha (Yakutia) and Komi most actively. The migration growth rate was negative: from -15.7 to -24.4 people per 1,000 inhabitants, respectively [31]. The highest population outflow was demonstrated by regions with monopsony, i.e., non-diversified labor markets [25]. Many researchers agree that solving the problems of uneven development in the northern and Arctic regions and ensuring their sustainable development depends on expanding and developing the functions of large cities as bases for comprehensive interregional development [27]. At the same time, there is a noticeable differentiation among Arctic cities and a need

for a transition to a more locally-oriented policy that is more adequate in the context of existing differences [23].

Thus, the state of labor markets, the size and structure of the workforce in northern and Arctic regions are determined by the dynamics of the population's demographic characteristics and migration processes. Northern local labor markets are highly differentiated in terms of structure and employment opportunities, depending on the region's economic specialization and resource cycles. In addition to general factors at the supranational, national, regional and local levels, a number of researchers emphasize that, for example, the decision to migrate is influenced by individual and household characteristics [34, Hamilton L., Mitiguy A.], as well as employment conditions in other regions of the country [4].

Migration growth and employment

In previous studies, we have already noted that the labor markets in Russia's northern territories, compared to those in the rest of the country, are characterized by a higher concentration of younger workers, as well as a predominance of workers with secondary vocational education [26]. An important conclusion of another study was that the migration decline in the Far North is linked to higher wages in the European part of Russia [4]. The period 2019–2023 was characterized by several exogenous macro-shocks (COVID-19, external sanctions, geopolitical instability), which inevitably affected the functioning of labor markets, including those in the northern territories. For our analysis, we focus on this period, using Rosstat data from three compilations: "Regions of Russia. Socio-Economic Indicators", "Economic and Social Indicators of the Far North Regions and Equivalent Areas", and "Statistical Information on the Socio-Economic Development of the Arctic Zone of the Russian Federation". Unfortunately, the statistical information contained in the latter two collections is incomplete, so we have to refer to regional collections as well. The difficulty arises from the fact that some constituent entities of the Russian Federation are only partially included in both the Arctic zone of the Russian Federation [4] and the list of areas of the Far North and equivalent areas. Therefore, using general regional statistics, it is impossible to isolate indicators relating only to northern territories. For the reasons mentioned above, we refer to Rosstat information on indicators of socio-economic development in northern territories where possible. In other cases, we use data for the constituent entities of the Russian Federation whose territories are fully or largely included in the list of Far North regions and equivalent areas, as their number is higher than the number of territories included in the Arctic zone of the Russian Federation, and the territory of the Arctic zone of the Russian Federation is largely part of the territory of the Far North and equivalent areas.

Let us begin with an analysis of the migration growth of the population in the northern territories in 2019–2023, as migration in the North and the Arctic is closely linked to employment opportunities. As can be seen in Fig. 1, in 2021 and 2023, there was positive growth in the territories

of the Far North and equivalent areas, and in 2023, even in the Arctic zone of the Russian Federation.

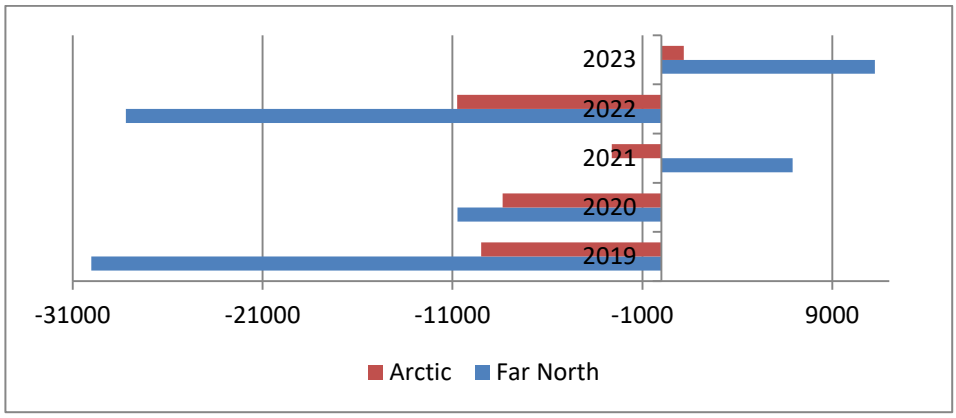

Fig. 1. Migration growth (+), (-), people [2].

It is important to note that, despite the positive migration growth in the northern territories as a whole, it was primarily driven by a few regions where a positive net migration had been observed previously. However, in 2021 and 2023, the absolute net migration growth in the recipient territories became so high that it outweighed the net migration loss from other regions. The Khanty-Mansi Autonomous Okrug — Yugra is the absolute leader in terms of positive net migration growth — it is the only region among those considered to have recorded a positive net migration throughout the entire period 2019–2023 (Fig. 2).

[2] Source: compiled by the authors based on Rosstat data. Here and below, the term “Arctic” refers to the Arctic zone of the Russian Federation, and the “Far North” refers to the regions of the Far North and equivalent areas.

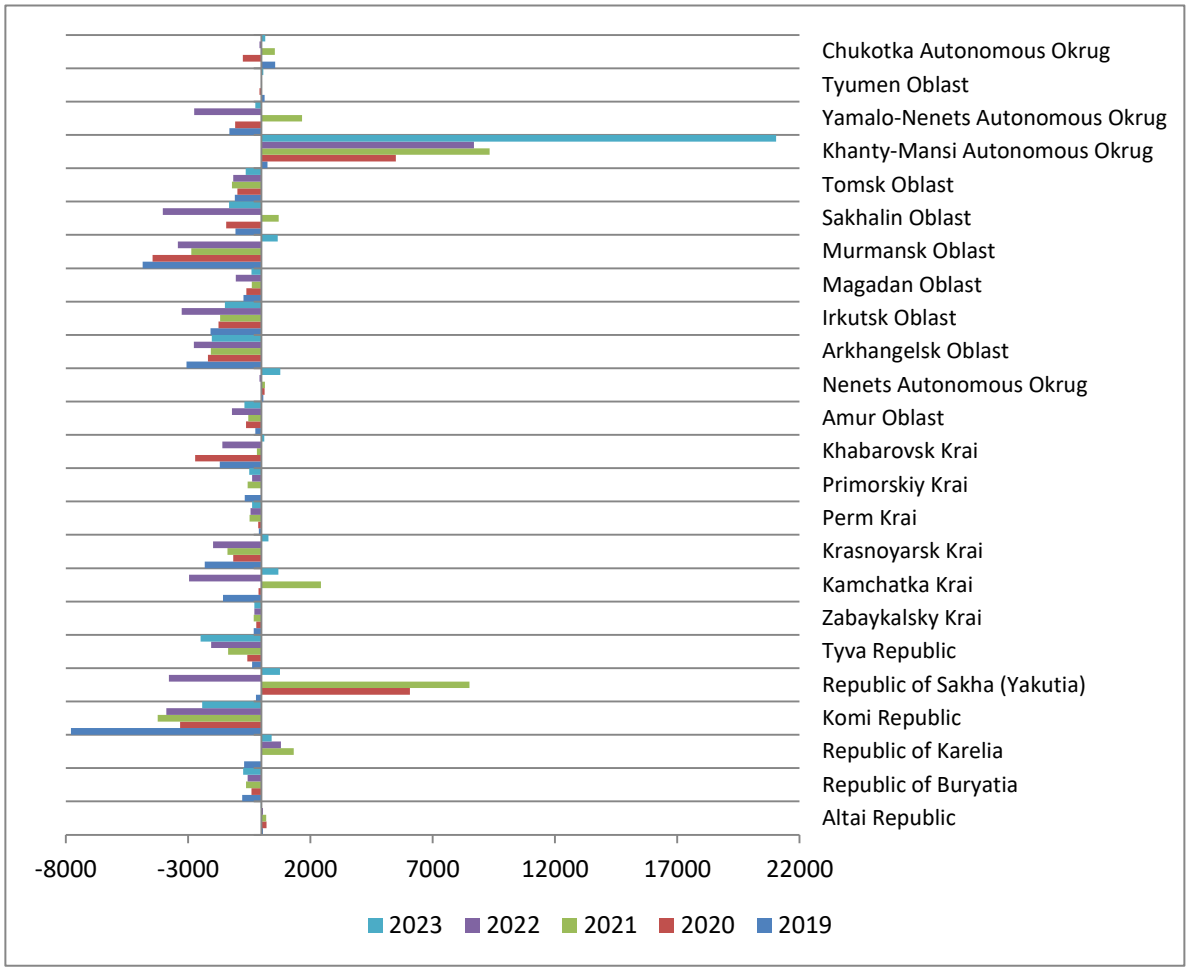

Fig. 2. Migration growth (+), (-) in the Far North regions and equivalent areas of the corresponding constituent entity of the Russian Federation, people [3].

Positive net migration is an atypical situation for the northern territories of the Russian Federation, as shown in the literature review. It was also noted above that the main reason for moving to the North and the Arctic is better employment opportunities, so an overview of the main changes in the labor markets of Russia's northern territories is an interesting and important task. It should be noted that the number of people employed in the northern territories of the Russian Federation in 2019–2023 also increased, with this growth beginning even earlier in the Arctic zone of the Russian Federation than in the Far North and equivalent areas, which also seems rather unusual (Fig. 3).

[3] Source: compiled by the authors based on Rosstat data.

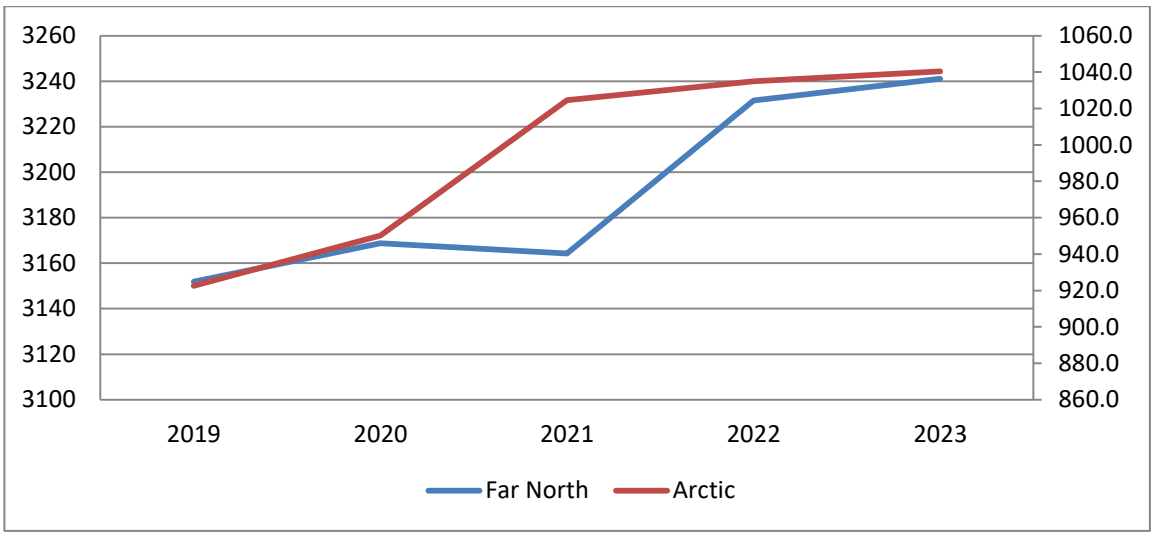

Fig. 3. Average number of employees of organizations operating in the Far North and equivalent areas (left axis) and in the Arctic Zone of the Russian Federation (right axis), thousands people.

However, the employment structure remained practically unchanged over the period under review (Figs. 4 and 5). It is important to note that more than 40% of all those employed in the Far North and equivalent areas in 2019–2023 were engaged in extractive industries, including almost 30% in the autonomous okrugs of the Tyumen Oblast (Khanty-Mansi AO – Yugra and Yamalo-Nenets AO).

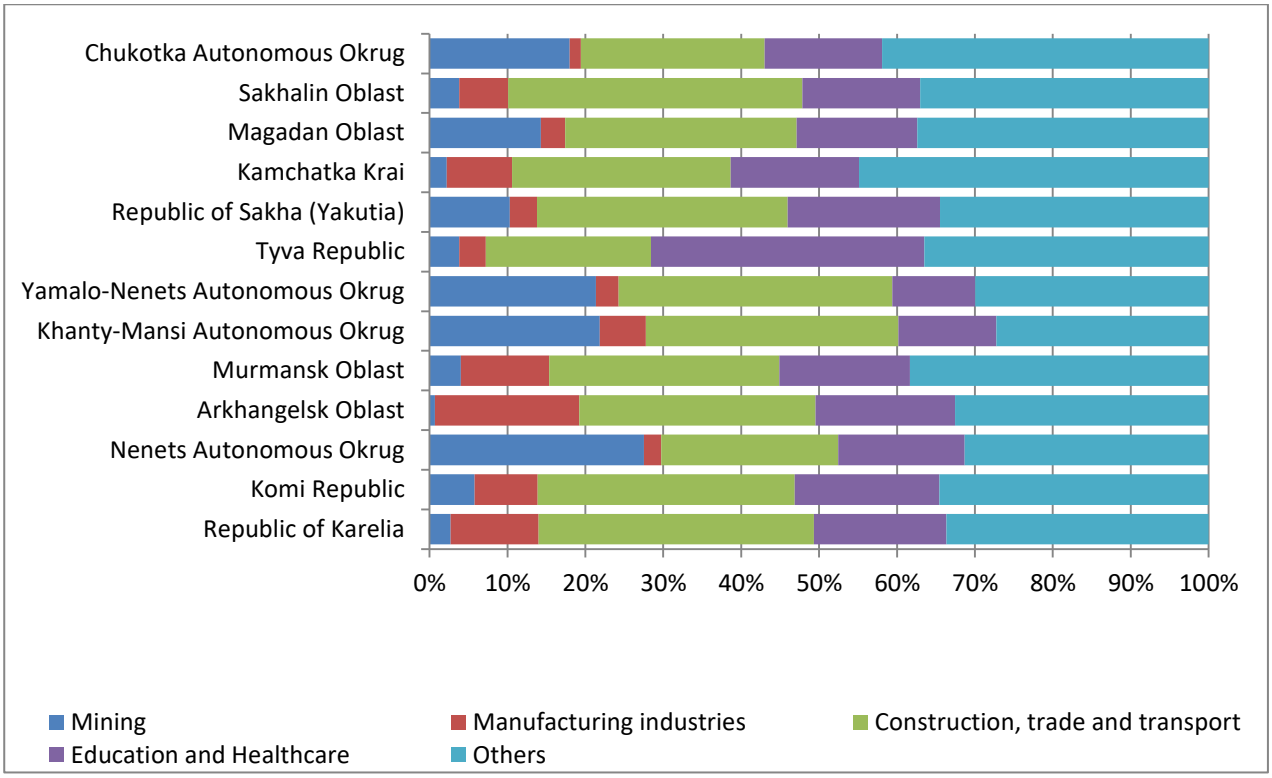

Fig. 4. Distribution of employed people by type of economic activity in 2019, % of total number of employees [4].

[4] Source: compiled by the authors based on Rosstat data.

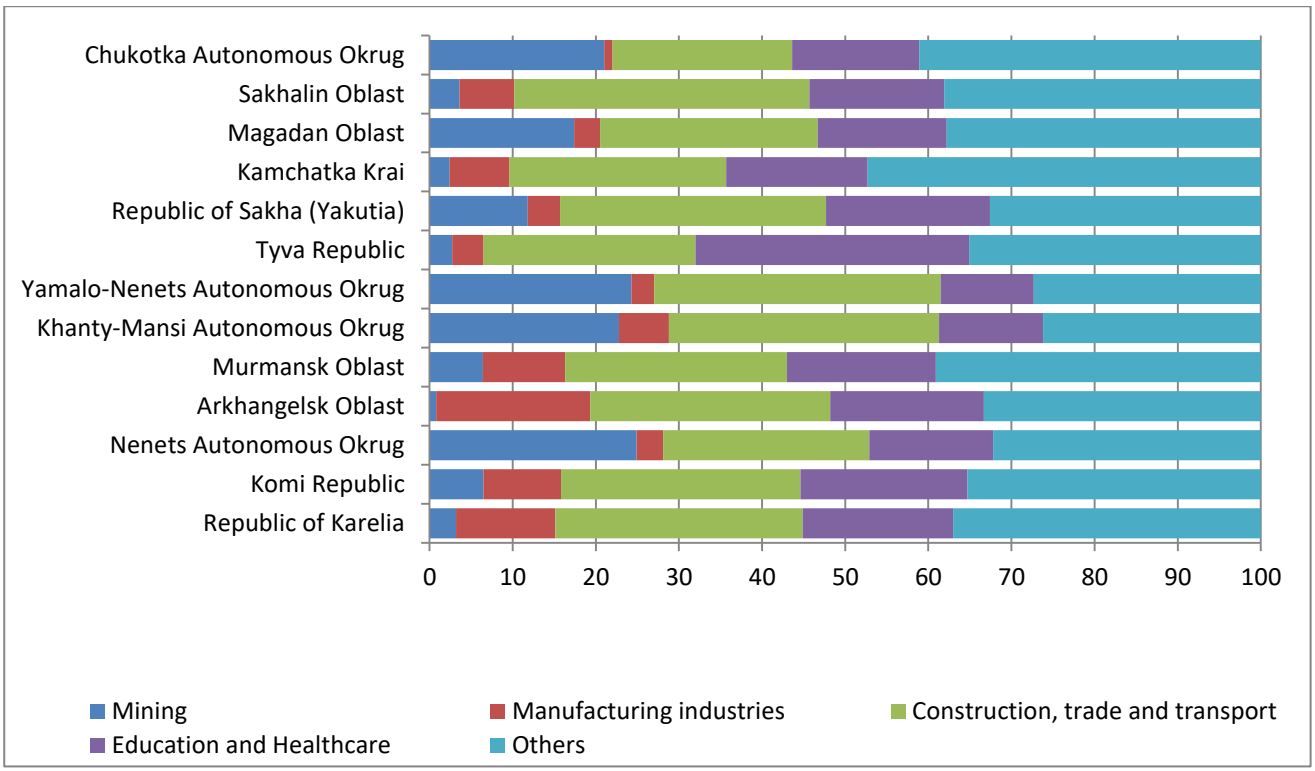

Fig. 5. Distribution of employed people by type of economic activity in 2023, % of total number of employees [5].

As noted above, the age and educational composition of the labor force in the northern territories has its own characteristics, in particular, a younger age compared to other territories of the Russian Federation. In 2019–2023, changes in the age composition of the labor force shifted from younger to older age groups (Table 1). In all constituent entities of the Russian Federation presented in Table 1 (except for the Chukotka Autonomous Okrug), the share of employees aged 15–29 decreased, while the shares of employees in other age groups, including the oldest (60+), increased.

Table 1

Age composition of the employed in the corresponding constituent entity of the Russian Federation in 2019 and 2023, % of total number of employees

	15–29 years old			30–59 years old			60 and older		
	2019	2023	change, p.p.	2019	2023	change, p.p.	2019	2023	change, p.p.
Republic of Karelia	18.4	14.4	-4	75.3	77.6	2.3	6.4	8	1.6
Komi Republic	17.5	13.1	-4.4	76.2	80.4	4.2	6.3	6.4	0.1
Nenets AO	16.3	15	-1.3	77.6	77.9	0.3	6	7.1	1.1
Arkhangelsk Oblast (excluding NAO)	18.5	14.5	-4	75.5	79.5	4	6	6.1	0.1
Murmansk Oblast	18.7	14.3	-4.4	74.1	79.3	5.2	7.2	6.4	-0.8
Khanty-Mansi AO – Yugra	16.7	15.2	-1.5	80.7	81.9	1.2	2.5	2.9	0.4
Yamalo-Nenets AO	14.8	14.6	-0.2	83.2	80.8	-2.4	1.9	4.6	2.7
Tyva Republic	21.1	18.3	-2.8	74.3	77.9	3.6	4.6	3.8	-0.8
Sakha Republic (Yakutia)	21.2	19.6	-1.6	71.1	72	0.9	7.7	8.4	0.7
Kamchatka Krai	17.5	14.5	-3	73.9	76.2	2.3	8.6	9.3	0.7
Magadan Oblast	14.8	13.1	-1.7	75	76.3	1.3	10.2	10.6	0.4

[5] Source: compiled by the authors based on Rosstat data.

Sakhalin Oblast	16	14	-2	73.1	74.9	1.8	10.8	11.1	0.3
Chukotka AO	12.8	16.9	4.1	78.5	77.7	-0.8	8.7	5.4	-3.3

The educational composition of employed people in 2019–2023 showed a trend toward an increase in the share of those with lower levels of education (Table 2). As previously [26], in 2019–2023, the largest share of employed people (with the exception of the Yamalo-Nenets Autonomous Okrug) consisted of workers with secondary vocational education. However, there was also a noticeable trend toward a decrease in the share of employees with higher education and an increase in the share of workers with education below secondary vocational level. Only three of the regions under consideration demonstrated positive dynamics in the employment structure toward higher levels of education: Murmansk Oblast, Kamchatka Krai, and Sakhalin Oblast (Table 2).

Table 2

Educational composition of the employed in the corresponding constituent entity of the Russian Federation in 2019 and 2023, % of total number of employees

	higher			secondary vocational			secondary general and below		
	2019	2023	change, p.p.	2019	2023	change, p.p.	2019	2023	change, p.p.
Republic of Karelia	27.5	26.8	-0.7	53.7	52.5	-1.2	18.8	20.7	1.9
Komi Republic	28.5	31.6	3.1	54.1	50.3	-3.8	17.4	18.1	0.7
Nenets AO	36.9	31.5	-5.4	48.5	54.6	6.1	14.6	13.9	-0.7
Arkhangelsk Oblast (excluding NAO)	28.3	27.9	-0.4	54.3	54.2	-0.1	17.4	17.9	0.5
Murmansk Oblast	36.3	37.4	1.1	45.8	46	0.2	17.9	16.6	-1.3
Khanty-Mansi AO – Yugra	37.9	32.2	-5.7	45.3	48.7	3.4	16.8	19.1	2.3
Yamalo-Nenets AO	46.4	45.5	-0.9	38.4	38.4	0	15.2	16.1	0.9
Tyva Republic	35.4	34.6	-0.8	44.3	42.5	-1.8	20.3	22.9	2.6
Sakha Republic (Yakutia)	36.2	35.8	-0.4	41.9	41.8	-0.1	21.9	22.4	0.5
Kamchatka Krai	37.3	39.2	1.9	41.2	46	4.8	21.5	14.8	-6.7
Magadan Oblast	41.3	35.7	-5.6	39.4	47.2	7.8	19.3	17.1	-2.2
Sakhalin Oblast	27.3	31.8	4.5	44.6	46.5	1.9	28.1	21.7	-6.4
Chukotka AO	35.3	25.6	-9.7	48.4	67.9	19.5	16.3	6.5	-9.8

Wages and labor market tension indicators

The migration growth and employment figures mentioned above indirectly characterize labor markets. Direct indicators of the labor market state are wage dynamics and a number of indicators that provide an idea of how easy or difficult it is to find a job in a given local labor market. These include the overall unemployment rate, the average job search time, and the share of long-term unemployed in the total unemployed. If we consider local labor market indicators in terms of migration, we can say that when deciding to move to a new city or region, workers focus on how easy it is to find a job there and how much they can earn compared to labor markets in other regions. Therefore, migration and employment rates are consequences of individual decisions based on their perception of the state of labor markets; they reflect the state of labor demand in the lo-

cal labor market. Since living in and/or relocating to northern territories with challenging natural and climatic conditions requires significantly better employment conditions compared to other local labor markets, we will not analyze the dynamics of labor market indicators as such, but will compare them with the average Russian values.

High wages have been a factor attracting workers to northern cities and regions since Soviet times, but for over twenty years, the ratio between wages in the northern and other regions of the Russian Federation has been shifting in favor of the latter [4]. Fig. 6 shows the ratio of the average monthly nominal accrued wages of workers in organizations in the Far North and equivalent areas and the Arctic zone of the Russian Federation to the same indicator for the Russian Federation as a whole.

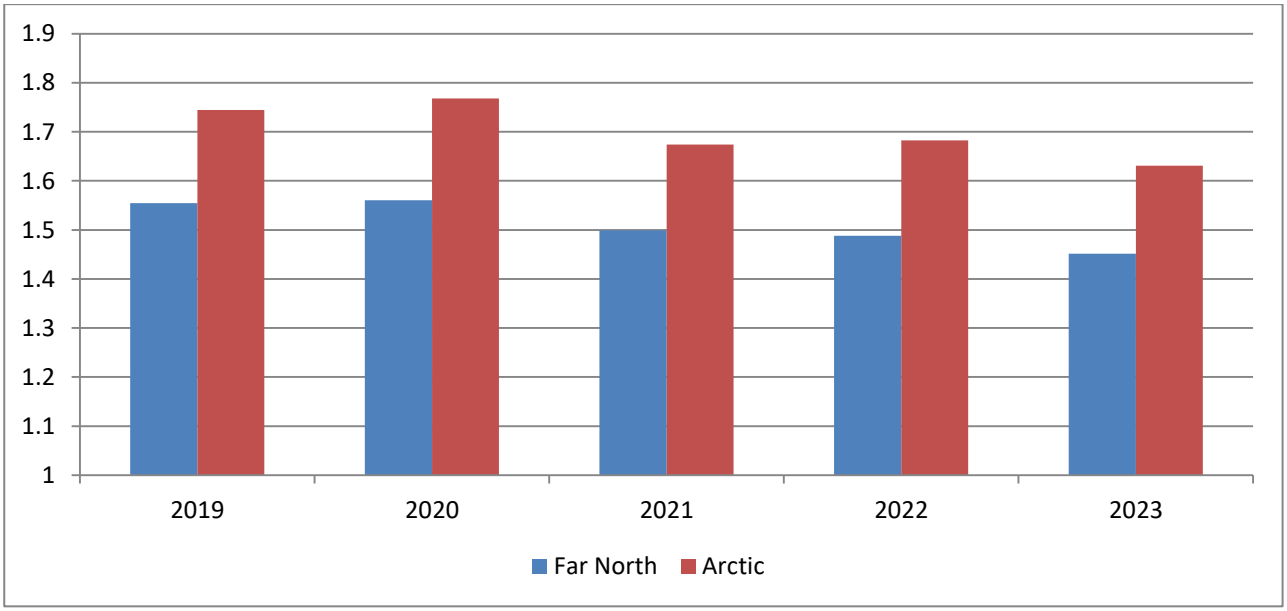

Fig. 6. Ratio of the average monthly nominal accrued wage of employees in organizations in the corresponding constituent entity to the same indicator for the Russian Federation as a whole [6].

It can be seen that during the period 2019–2023, average wages in the North and the Arctic have become even closer to the national average. We compared the ratio of the average monthly accrued wage in the respective constituent entity of the Russian Federation to the national average (Table 3) and the ratio of the average monthly accrued wage in the respective constituent entity of the Russian Federation to the regional subsistence minimum for the working-age population (Table 4). It is worth noting that in three constituent entities of the Russian Federation (Arkhangelsk Oblast (excluding NAO), Republic of Karelia, and Republic of Tyva), the average wage in 2023 was below the national average (in 2019, this was only the case in the Republic of Tyva). Overall, in 2023, the average wage increased relative to the national average compared to 2019 only in the Chukotka Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Magadan Oblast, Sakhalin Oblast, and Khanty-Mansi Autonomous Okrug – Yugra. In the remaining regions, this indicator decreased (Table 3), meaning these regions have become less attractive for employment than others. If we normalize the average regional wage by the subsistence minimum for the work-

[6] Source: compiled by the authors based on Rosstat data.

ing-age population (Table 4), then, conversely, in 2023 compared to 2019, this ratio increased in most regions, with the exception of Sakhalin Oblast, Nenets Autonomous Okrug, and Chukotka Autonomous Okrug. The results described can be interpreted as follows: in terms of wage dynamics, most northern regions have become less attractive to migrants, while the standard of living of those already residing there has improved. In three regions — the Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs and the Magadan Oblast — both analyzed indicators increased (Table 3, Table 4).

Table 3

Ratio of average monthly accrued wages in the corresponding constituent entity of the Russian Federation to the national average

Place	2019		2023	
1	Chukotka AO	1.93	Chukotka AO	2.13
2	Kamchatka Krai	1.83	Yamalo-Nenets AO	1.94
3	Nenets AO	1.78	Magadan Oblast	1.80
4	Magadan Oblast	1.76	Kamchatka Krai	1.60
5	Sakha Republic (Yakutia)	1.54	Nenets AO	1.59
6	Murmansk Oblast	1.48	Sakhalin Oblast	1.53
7	Yamal-Nenets AO	1.44	Sakha Republic (Yakutia)	1.47
8	Khanty-Mansi AO – Yugra	1.38	Khanty-Mansi AO – Yugra	1.44
9	Sakhalin Oblast	1.33	Murmansk Oblast	1.32
10	Republic of Karelia	1.26	Komi Republic	1.04
11	Komi Republic	1.25	Arkhangelsk Oblast (excl. NAO)	0.97
12	Arkhangelsk Oblast (excl. NAO)	1.17	Republic of Karelia	0.87
13	Tyva Republic	0.92	Tuva Republic	0.77

Table 4

Ratio of average monthly accrued wages in the corresponding constituent entity of the Russian Federation to the regional subsistence minimum for the working-age population

Place	2019		2023	
1	Yamalo-Nenets AO	5.92	Yamalo-Nenets AO	6.36
2	Sakhalin Oblast	5.55	Sakhalin Oblast	5.37
3	Chukotka AO	4.70	Khanty-Mansi AO – Yugra	5.05
4	Khanty-Mansi AO – Yugra	4.61	Magadan Oblast	4.94
5	Magadan Oblast	4.57	Sakha Republic (Yakutia)	4.66
6	Nenets AO	4.19	Kamchatka Krai	4.16
7	Sakha Republic (Yakutia)	4.03	Nenets AO	4.08
8	Kamchatka Krai	3.72	Komi Republic	4.08
9	Murmansk Oblast	3.64	Chukotka AO	4.06
10	Tuva Republic	3.64	Arkhangelsk Oblast (excl. NAO)	3.99
11	Komi Republic	3.62	Murmansk Oblast	3.86
12	Arkhangelsk Oblast (excl. NAO)	3.57	Tuva Republic	3.65
13	Republic of Karelia	2.89	Republic of Karelia	3.32

Next, let us examine how easy it has become to find work in the labor markets of the northern territories. The overall unemployment rate (measured using ILO methodology) in 2023 decreased compared to 2019 in all analyzed constituent entities of the Russian Federation (Fig. 7), with this trend being particularly pronounced in Republic of Tyva, Sakhalin Oblast, Chukotka Autonomous Okrug, Karelia and Komi Republics. The highest unemployment rate in both 2019 and 2023 was in Republic of Tyva, followed by Nenets Autonomous Okrug.

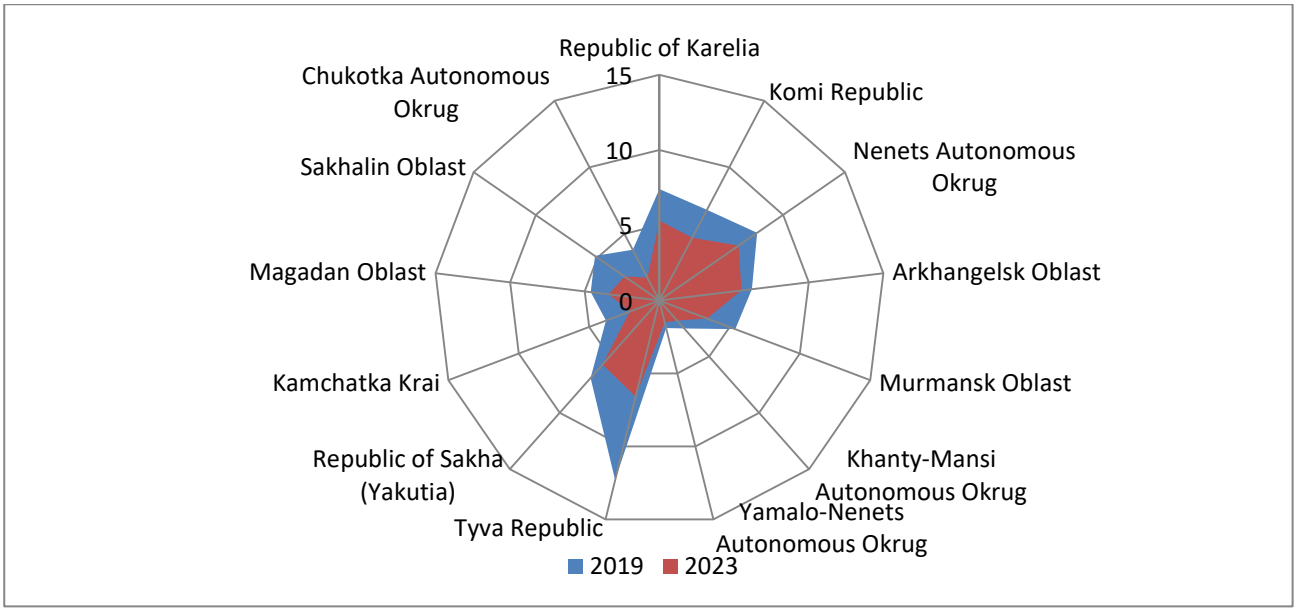

Fig. 7. Overall unemployment rate, % [7].

In terms of the "proportion of unemployed people looking for work for 12 months or more" indicator, the situation in 2023 changed significantly compared to 2019 in many of the Russian regions analyzed (Fig. 8). In 2019, this indicator exceeded the national average in seven regions (Arkhangelsk and Murmansk Oblasts, Nenets Autonomous Okrug, Republics of Sakha (Yakutia), Karelia, Tyva, and Komi), while in 2023 — only four (Republics of Karelia, Tyva, and Komi, and Magadan Oblast). In 2023, unemployed people began finding work more quickly in almost all of the regions analyzed, except for Yamalo-Nenets Autonomous Okrug, Magadan Oblast, and Komi Republic. The share of unemployed people seeking work for 12 months or more was less than 10% in 2019 only in Yamalo-Nenets Autonomous Okrug, and in 2023, it was the same in Yamalo-Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug – Yugra, and Sakhalin Oblast (Fig. 8).

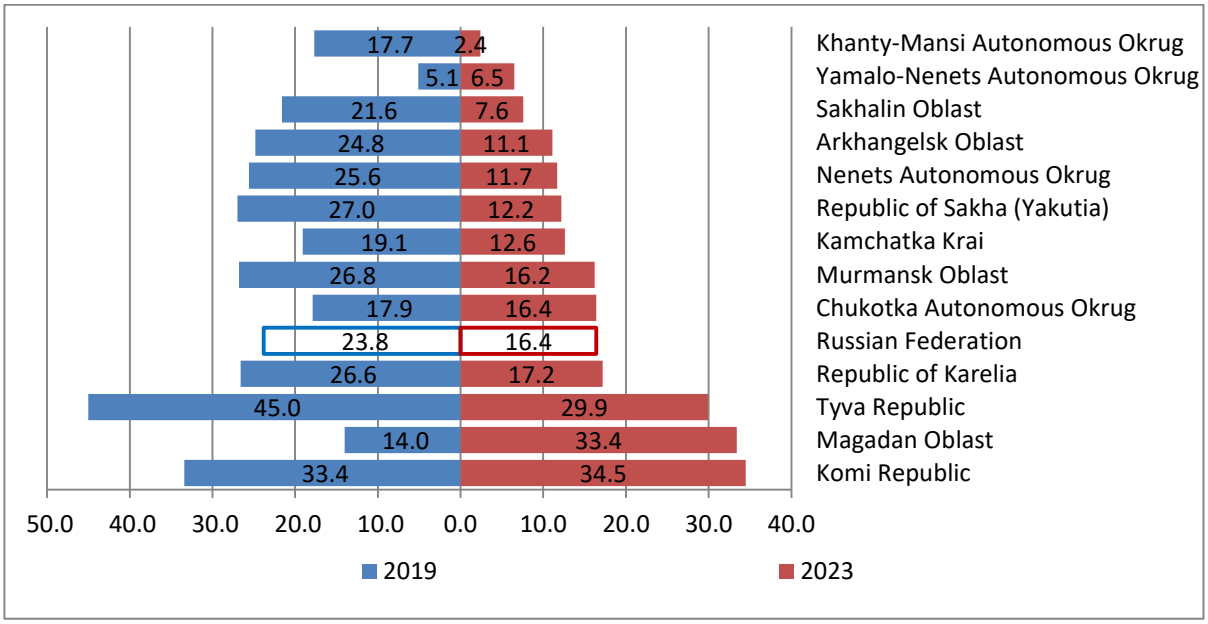

Fig. 8. Share of unemployed people looking for work for 12 months or more, % [8].

[7] Source: compiled by the authors based on Rosstat data.

The average job search time for unemployed people in most of the analyzed regions also decreased in 2023 compared to 2019 (Fig. 9), with the exception of Yamalo-Nenets Autonomous Okrug, Kamchatka Krai, Chukotka Autonomous Okrug, Komi Republic, and Magadan Oblast. The shortest average job search time for unemployed people in both 2019 and 2023 was in Yamalo-Nenets Autonomous Okrug and Khanty-Mansi Autonomous Okrug – Yugra. It is worth noting that the average job search time for unemployed people in 2023 also decreased across the Russian Federation as a whole compared to 2019, which could be caused, for example, by labor shortages. Moreover, while in 2019 the job search lasted longer than the Russian average in five regions (Sakhalin Oblast, Nenets Autonomous Okrug, Republics of Sakha (Yakutia), Tyva, and Komi), in 2023 this figure had increased to eight regions: Republics of Karelia, Tyva, Komi, Kamchatka Krai, Murmansk and Magadan Oblasts, and Chukotka and Nenets Autonomous Okrugs. The absolute values of this indicator also varied significantly between the northern regions in both 2019 and 2023 — the ratio of the highest to the lowest value was approximately three times (Fig. 9).

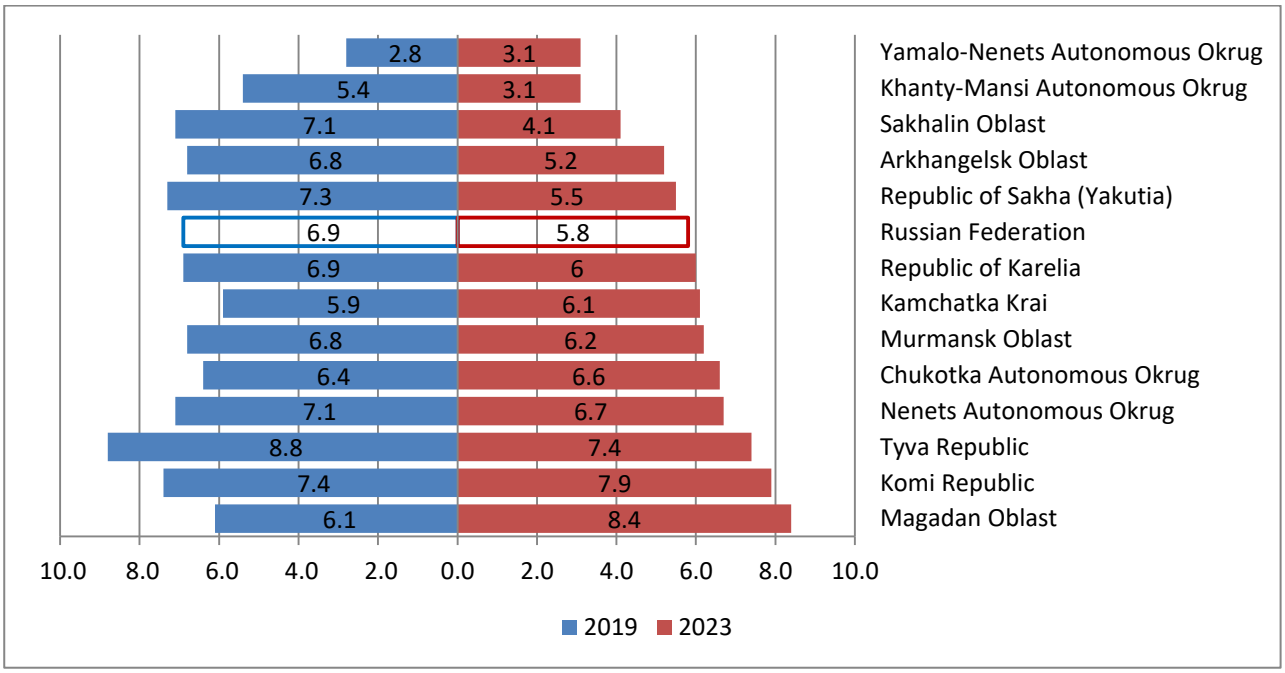

Fig. 9. Average job search time for unemployed people, months [9].

Thus, from 2019 to 2023, the labor markets of the northern territories remained highly heterogeneous by many indicators. A positive trend can be seen in the reduction of overall unemployment in all regions analyzed and the average job search time for unemployed people in most of the labor markets. The most favorable labor markets are in the autonomous mining okrugs — Khanty-Mansi AO – Yugra, Yamalo-Nenets AO, Chukotka AO, and Nenets AO. The Khanty-Mansi Autonomous Okrug – Yugra is the absolute leader in terms of aggregate indicators and their dynamics. It is also the largest northern labor market by capacity — over 20% of all workers in the Far North and equivalent areas were employed there during the period under review. The labor

[8] Source: compiled by the authors based on Rosstat data.
[9] Source: compiled by the authors based on Rosstat data.

market in the Yamalo-Nenets AO is also functioning consistently well, but some negative dynamics in job search indicators should be noted. The labor markets of the Chukotka and Nenets Autonomous Okrugs are small in size, but they are of great importance for the development of the northern territories and showed positive dynamics across most indicators, resulting in increased net migration. The old northern industrial regions of Murmansk and Arkhangelsk Oblasts demonstrated small absolute values, but positive trends. In the Murmansk Oblast, the educational and age structure of the employed population improved. The Republic of Tyva, which has historically demonstrated extremely low values and negative trends, deserves special mention. In 2019–2023, although the Republic of Tyva remained one of the economically depressed regions, it showed positive dynamics across a range of indicators, including a reduction in labor market tensions. Meanwhile, the Komi Republic, on the contrary, worsened its position across almost all indicators. The Magadan Oblast also showed some negative trends: while wages remained relatively high compared to other regions, the period of job search increased here in 2019–2023.

Conclusion

The relatively short but very important period of 2019–2023 was characterized by high instability in the economies and labor markets of many regions and countries. The labor markets of the northern territories are quite flexible at any given time; employment there is highly variable and depends on labor demand, both in the North and in the rest of the country. In 2019–2023, there were periods of migration-driven population growth in the Far North and equivalent areas, as well as in the Arctic zone of the Russian Federation, which indicates that these territories are sufficiently attractive, primarily in terms of labor markets and employment conditions. A more detailed analysis of regional labor markets in the northern territories revealed that, despite persistent large gaps in the indicators describing their functioning, the trends in these indicators were positive in many regions. Positive changes primarily concern indicators of labor market tension: overall unemployment and the time it takes for the unemployed to find work. The only exception is the Komi Republic, where both the proportion of unemployed people looking for work for 12 months or more and the average time it takes for the unemployed to find work increased.

Negative trends in terms of the functioning of labor markets in the northern territories include a decline in the ratio between the average wage in the North and the national average. This trend has been ongoing for several decades and is one of the main reasons for the outflow of population from northern and Arctic regions. It may also be the reason for the deterioration in the educational and age structure of the workforce in most of the regions under consideration, which reduces their labor potential. At the same time, in the vast majority of northern regions, the ratio of the average monthly accrued wage in the respective constituent entity of the Russian Federation to the regional subsistence minimum of the working-age population has improved, indicating a slight increase in the standard of living of the population living there.

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Formation of an Institutional Basis for Increasing the Social Attractiveness of the Arctic Territories of Russia

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Abstract. This study examines the phenomenon of social attractiveness of the Arctic territories of Russia, its institutional basis, current and prospective development mechanisms. The authors propose a theoretical and methodological approach to the social attractiveness of regions as a system of socio-economic mechanisms for state regulation of the development of the North and the Arctic. A retrospective review of the formation and development of the social attractiveness of Arctic territories made it possible to analyze the evolution of state and legal approaches to the object of study over a century of history. In total, the authors identified five stages of the implementation of the Arctic agenda (from the 1930s to the current stage of human development in the North), taking into account the strategic planning horizon until 2030. The existing and emerging state, market and corporate mechanisms for regulating social attractiveness, which have a significant impact on the social potential of the Russian Arctic, are systematized. The need to transform the institutional approach to the formation and development of the social attractiveness of the Arctic territories on the basis of an indicative feature is substantiated. The results of the study can form the basis for adjusting state policy on social development of the Arctic in terms of a targeted systemic transition to promising social attractiveness for the accelerated development of the macro-region.
Keywords: *Arctic, institutional framework, social attractiveness, social infrastructure, social policy, systematization of mechanisms*

Introduction

The growth of geopolitical tension in the Arctic, linked to the possible and actively discussed inter-state reallocation of certain Arctic territories, as well as changes in the military-political landscape [1, Petrovskiy V.E.] are forcing some states, and Russia in particular, to seek new ways of protecting their state borders, rights and interests in the region. Classical state theory proclaims a triad of its elements: “territory — people — power”, with the presence of a permanent population on the territory being the key argument for establishing state borders and

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sovereignty. The relevance of the well-known Latin expression terra nullius ("no man's land") [2, Balakleyets N.A.] increases when territories are "depopulated". The Russian Arctic has been characterized by stable negative trends in the reduction of the permanent population over the last few decades, primarily due to migration outflow [3, Fauser V.V.]. The factors of migration in the northern and Arctic territories have been studied in sufficient detail and published in the works of leading Russian and foreign demographers [4, Ukhanova A.V.; 5, Rudenko D.Yu.; 6, Heleniak T.]. Summarizing the results of these and related studies, it can be concluded that the social group of factors is the determining one. This means that, in order to maintain and increase the permanent population in the Arctic zone, it is necessary to create comfortable living conditions and enhance the social attractiveness of the territory, a phenomenon that has not yet been fully studied.

Russia's Arctic territories are highly differentiated in terms of their level of socio-economic development, meaning that they all differ in their social attractiveness parameters. This ultimately has a direct impact on demographic processes in the Arctic, whose population has declined by 37.5% between 1989 and 2021 according to census data, and this trend continues [7, Fauzer V.V.]. The problem is recognized and addressed at the state level, but its solution requires finding new mechanisms and tools to enhance social attractiveness and changing the approach to forming public motivation for living and working in Arctic territories.

At present, Russia is forming and implementing a new institutional framework for the spatial and territorial development of the state for the period 2025–2030 (until 2035). This is confirmed by the adjustment and adoption of important strategic planning documents — the Spatial Development Strategy until 2030, the National Security Strategy, the National Development Goals (National Projects until 2030), and others. For example, the main goal of spatial development is to create a balanced system of settlement and territorial organization of the country's economy, including through the creation of a network of key settlements where accessible and high-quality social infrastructure will be concentrated. The Arctic macro-region is assigned a special geostrategic role as a center of future economic growth, while the imbalance between economic and social development in the territory remains. Therefore, it is becoming clear that preserving and enhancing the region's social potential is a priority strategic national objective, the solution of which requires not only various types of resources but also adjustments to state policy.

A preliminary analysis of the emerging institutional framework suggests that a structural shift in emphasis from industrial to social development is currently underway in the Arctic. People are recognized as the main driver of the socio-economic development of these territories. In order to retain the permanent population and attract qualified specialists, the state is already introducing a system of support measures, such as the "Arctic Mortgage" to address housing issues, the "Arctic Concession" — compensation for construction costs to create social infrastructure, and the presidential "Unified Subsidy" for Arctic and Far Eastern regions. It is worth

noting the approval of the list of key settlements in the Arctic zone of the Russian Federation [1]. The government has identified 16 key Arctic settlements where a new standard of comfort and attractiveness for living is being tested. Special development master plans are being prepared for these key areas, thereby forming a belt of economic growth centers in the Arctic.

The aim of this study is to systematize key mechanisms for increasing the social attractiveness of Arctic territories by generalizing them according to regulatory impact criteria and to justify the need to transition to managing the prospective social attractiveness of macro-regions as a state policy priority for the accelerated development of the Arctic.

Theoretical approaches to studying the social attractiveness of a territory

For decades, economic research on northern and Arctic territories has focused primarily on studying investment attractiveness for the purpose of economic development of the macro-region. Economic priorities have also been decisive in the development and implementation of state policy, reflected in program and project documents on the development of Arctic spaces. The studies of the Arctic's investment attractiveness have been the subject of research by V.A. Tsukerman, V.N. Myakshin, O.M. Gizatullina, N.A. Serova, S.Yu. Kozmenko, I.I. Matvienko, and others. The approach of "the Arctic as a storehouse of resources and a guarantee of the state's economic sovereignty" still prevails today, but increasing attention is being paid to issues of social development of the territory.

Scientists have been studying the economic essence of the social attractiveness of the territory for a long time. Among the most relevant studies of the modern period, we can highlight the works of the Ural State University of Economics (Academician A.I. Tatarkin, E.V. Popov, I.S. Katz, E.N. Sidorova), the fundamental works on the social attractiveness of the regional territorial-sectoral socio-economic system by V.A. Ruban, the concepts of territorial competitive attractiveness by scientists from the Institute for Regional Economic Studies of the Russian Academy of Sciences (B.M. Grinchel, E.A. Nazarova), and the strategic directions for developing territorial marketing as a basis for increasing the social attractiveness of regions (G.V. Dvas, Yu.I. Busheneva, V.G. Karvitskaya, B.M. Khasbulatova, E.I. Charushina).

For the purposes of this study, a comparative analysis of the approaches of northern studies scholars to the social attractiveness of northern and Arctic territories was conducted. Economists typically apply an actor-based approach to studying the functional (or organizational) role of a territory's social attractiveness and assess it for two main actors: population and businesses. In the first case, social attractiveness is characterized as "a set of factors determining the degree of comfort of a given territory for the population to live in" [8, Popov E.V., p. 58]. For business, social attractiveness is considered as "the ability of the region's socio-economic systems to meet the demand of social services market participants" [9, Ruban V.A., p. 128], assessing not

[1] Order of the Government of the Russian Federation No. 3377-r of November 28, 2023 (as amended on August 13, 2024) "On approval of the list of key settlements (municipalities) of the Arctic zone of the Russian Federation". URL: https://www.garant.ru/products/ipo/prime/doc/408019009/ (accessed 10 February 2025).

only the physical availability of the necessary labor resources to solve economic tasks, but also their quality and skill level. The author of five conceptual provisions for the socio-economic development of the Russian North, V.N. Lazhentsev, highlights the importance of social infrastructure in developed Arctic territories as a specific challenge for the future development of territorial and economic systems [10]. V.N. Leksin notes the imbalance between social and corporate development and argues that the social development of the Arctic is an adequate model for Russia's immediate future [11, pp. 15–23]. Sociological approaches to social diagnostics of Arctic regions are fundamentally aimed at studying the perceived social attractiveness of a territory for living and conditions for life activities. For example, V.V. Markin and A.N. Silin, analyzing the social potential of neo-industrial development of Arctic regions, apply their own methods of sociological research in settlements of the Arctic frontier, which allows forming the contours of direct and indirect characteristics of the quantity and quality of people who expressed a desire to live and work in the Arctic. [12] The results of studies by sociologists G.V. Zhigunova and E.N. Sharova confirm the growing relevance of creating more comfortable social conditions for the population in the Arctic Zone of the Russian Federation (AZRF), and their respondents highlight the underdevelopment of the service sector and the insufficient social conditions for residence as one of the main problems [13]. Specialists in economic geography of the Arctic A.N. Pilyasov and N.Yu. Zamyatina note the unconditional dependence of social development in the Arctic on the location of productive forces, which is confirmed by the theory of localized growth poles [14]. However, in developing and testing a new theory of development of the North and the Arctic, they focus primarily on the key role of local grassroots communities, which, "by engaging and connecting with objects and projects of regional and national significance, create other levels of development" [15, pp. 16–17].

The following researchers are studying individual elements of the social attractiveness of Arctic territories: social infrastructure (E.E. Toropushina, N.P. Veretennikov, A.V. Grigorishchin, L.V. Voronina, T.B. Skripkina), life expectancy (A.A. Provorova, O.V. Gubina, V.P. Toichkina), unemployment and the labor market (A.G. Korovkin, E.A. Korchak, T.P. Skufina, V.P. Samarina), climate (A.G. Granberg, B.N. Porfiryev, L.A. Ryabova, E.M. Klyuchnikova), social partnership (E.P. Bashmakova, M.V. Ivanova, U.E. Yakusheva, E.E. Toropushina), etc. The central component of social attractiveness is the formation and development of territorial social infrastructure. The level of development of social infrastructure has a direct impact on the quality of the regional labor force [16, Grigorishchin A.V.]. Underestimating the importance of social infrastructure in Arctic territories leads to a decrease in the region's attractiveness, increased social tension, and a loss of labor force [17, Toropushina E.E., p. 102].

The term "social attractiveness of a territory" is broader than, for example, "standard of living", "quality of life", "territory image", or "human development", as it takes into account the level of development of territorial infrastructure. The social attractiveness of a territory can be classified as a complex and multidimensional subject category. To clarify its economic basis, it is

necessary to decompose and study its individual elements. The authors of the study propose an approach to studying the social attractiveness of Arctic territories as a system of socio-economic mechanisms, which consist of two fundamental characteristics: social potential of the territory and social risk protection.

Materials and methods

In addition to general scientific methods, systems analysis and systematization techniques were extensively utilized in the study. To determine the extent to which the problem was studied, a comparative analysis of the scientific literature was used in the context of theoretical approaches to the subject of research. When studying the institutional basis of the social attractiveness of Arctic territories, methods of content analysis of strategic planning documents and project-targeted financing programs for Arctic development were applied.

The information base included data from the Federal State Statistics Service; publicly available data on the corporate social responsibility of economic entities operating in the Arctic macro-region; strategic and program documents for the development of the Arctic Zone of the Russian Federation; and regulatory acts establishing new mechanisms for enhancing the social attractiveness of the Arctic. Particular attention was paid to the decisions of relevant ministries and agencies of the Government of the Russian Federation and committees of the Federal Assembly of the Russian Federation responsible for the development of Arctic territories.

An analysis of the evolution of state and legal approaches to the formation and development of the social attractiveness of Arctic territories has made it possible to offer the authors' view on the necessity and directions of transformation of state policy on social development in the Arctic.

Evolution of institutional approaches to the formation and development of the social attractiveness of the Arctic

Despite the fact that Russia's strategic objectives for the Arctic undergo periodic changes in terms of priorities, tasks and instruments used, the need for labor resources remains unchanged. This determines the need for a well-founded answer to the main economic questions:

- who are these labor resources (quantitative and qualitative composition);
- how to attract these labor resources (motivational mechanisms).

An analysis of state regulatory and legal documents defining individual elements of the social attractiveness of northern (Arctic) territories made it possible to conditionally identify:

- stages of implementing the Arctic agenda;
- vectors (objects of management);
- priorities (subjects of management).

The main principles of the evolution of state and legal approaches to the formation and development of the social attractiveness of Arctic territories are presented in Figure 1. At the first

stage — the 1930s–1950s — the Arctic region was designated as a key resource base for the country, which determined its subsequent socio-economic development. The labor shortage issue was addressed in two ways. On the one hand, a system of high northern wages was formed, which attracted able-bodied workers willing to perform the most difficult, dirty and non-prestigious jobs. On the other hand, part of the workforce was formed through the Soviet system of forced settlements, with this phenomenon reaching its peak during this period. It should be noted that, in terms of productivity and efficiency, forced labor lags significantly behind voluntary labor. At the same time, the issue of labor accommodation had to be addressed; affordable and quickly constructed housing was needed, which later changed its status from temporary to permanent. Social infrastructure was supposed to meet only essential basic needs; no additional requirements were imposed on it.

The 1960s–1980s are associated with the rapid construction of new cities and settlements in the developing northern territories. The economies of northern cities diversified, and large-scale complex projects were implemented, which could be ensured by additional labor with specific training and qualifications. The development of an appropriate regulatory framework, the finalization of the list of Far North territories, and the legislative establishment of regional coefficients and northern allowances contributed to the attraction of qualified personnel to the Arctic regions.

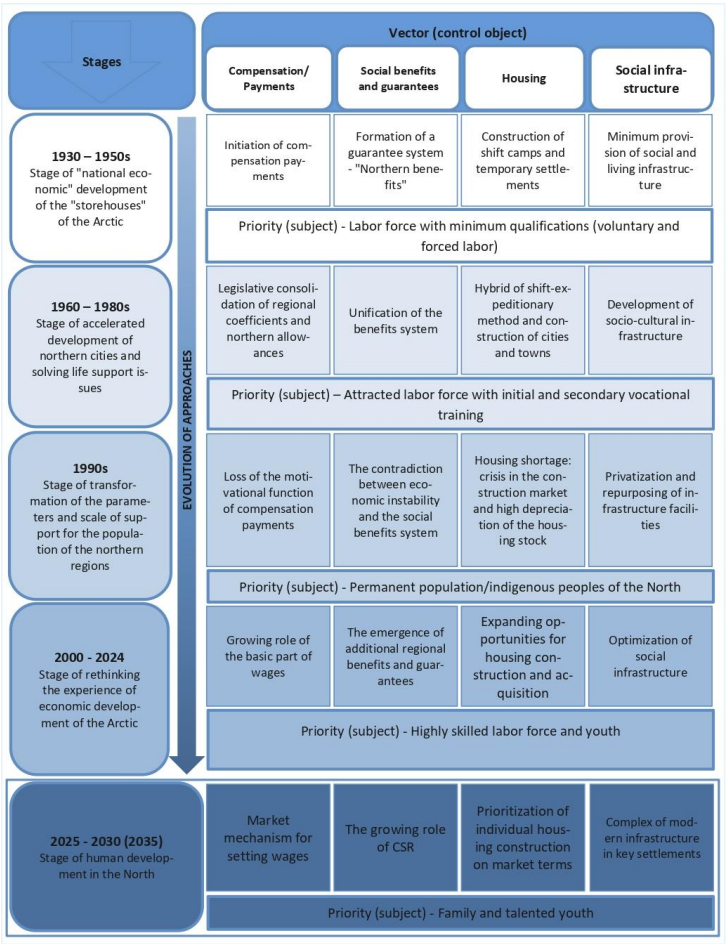

Fig. 1. Evolution of state and legal approaches to the formation and development of the social attractiveness of Arctic territories (compiled by the authors).

More educated and qualified workforce placed higher demands on infrastructure, not only in terms of basic necessities, but also in terms of social, cultural and leisure facilities. It can be argued that at this stage, state policy was approaching its target of improving the quality of life of the population in the northern territories.

During the 1990s, economic reforms were accompanied by transformation of the social role of the state, with market rules and norms replacing the usual measures of support for the population. Against the backdrop of price liberalization, inflation, and ruble volatility, “northern” wages, despite compensation payments, became uncompetitive, leading to the loss of the motivational function of the wage system in the Arctic territories of the Far North. Economic instability negatively impacted the construction market, which, combined with the high depreciation of the housing stock (mostly built as temporary), led to an acute housing shortage. The transfer of social infrastructure facilities from state to private ownership during privatization led to their inefficient use, with some of them being repurposed and transferred to more commercially attractive segments. Economic entities, having analyzed their assets, abandoned non-core assets, which were mostly elements of social infrastructure. By the early 2000s, the standard of living and quality of life of residents of the northern territories had declined not only relative to the previous period, but also compared to the Russian average. A distinctive feature of this period was the policy towards the indigenous peoples of the North, which was determined by the State Committee for the Socio-Economic Development of the North, established in 1990 and abolished in 2000. This institution supervised federal target programs, including those providing social support to the indigenous peoples of the North. Separately, we can highlight the federal target program “Children of the North”, aimed at the comprehensive and harmonious development of children living in the North. The problem of funding shortages prevented the full implementation of initiatives to address the pressing social development issues in the Arctic territories.

The 21st century has set new benchmarks for determining the vectors of development of the Arctic regions and justifying new growth points which, in line with the Millennium Development Goals, are socially sustainable and enable not only the use of labor capital, but also the development of human potential. In the new reality, Arctic territories are interested in highly qualified people with developed skills and unlimited potential. The issue of increasing the social attractiveness of northern territories, characterized by negative natural and migration growth rates, has become increasingly pressing. It has become clear that a critical analysis and revision of federal incentive instruments is necessary, as well as the development of additional regional benefits and guarantees. The possibilities for material incentives depend directly on the effectiveness of the development of regional socio-economic systems, rather than on state policy regarding the organization of wages in the North. At this stage, a search is underway for new, effective forms and tools for shaping and enhancing the social attractiveness of territories, primarily through expanding opportunities for the construction and purchase of housing, as well

as extending the list of social infrastructure facilities in quantitative and qualitative terms.

Since the development of Arctic territories in the context of modern challenges attracts close attention from the state and the business community, a broad list of mechanisms has been formed to address the social challenges specific to the North. There is a pressing need for a critical analysis of existing regulatory mechanisms in order to correct poorly developed or missing elements.

Systematization of modern mechanisms for increasing the social attractiveness of Arctic territories

According to the criterion of regulatory impact, all mechanisms for increasing the social attractiveness of Arctic territories are divided into state, market, corporate and supranational. The authors of the study systematized only the key mechanisms that have a significant systemic impact on the attractiveness of Russia's Arctic regions. To maintain the unity of the research object and the consistency of the authors' approach, the vectors (objects of management) chosen were the same as those used in the analysis of the evolution of state and legal approaches to the formation and development of the research object: compensation/payments, social benefits and guarantees, housing, and social infrastructure (Fig. 2).

A comprehensive analysis of the institutional environment revealed that, despite the active development of market and corporate mechanisms to increase the social attractiveness of the Arctic, a systemic imbalance persists in this macro-region: state mechanisms have a decisive influence on the object of this study. This is explained by the special conditions of life of the population and the weak economic development of the territory. Social processes taking place in the North and the Arctic are extremely vulnerable and require constant monitoring, analysis and corrective actions by the state through the implementation of policies aimed at social protection of citizens.

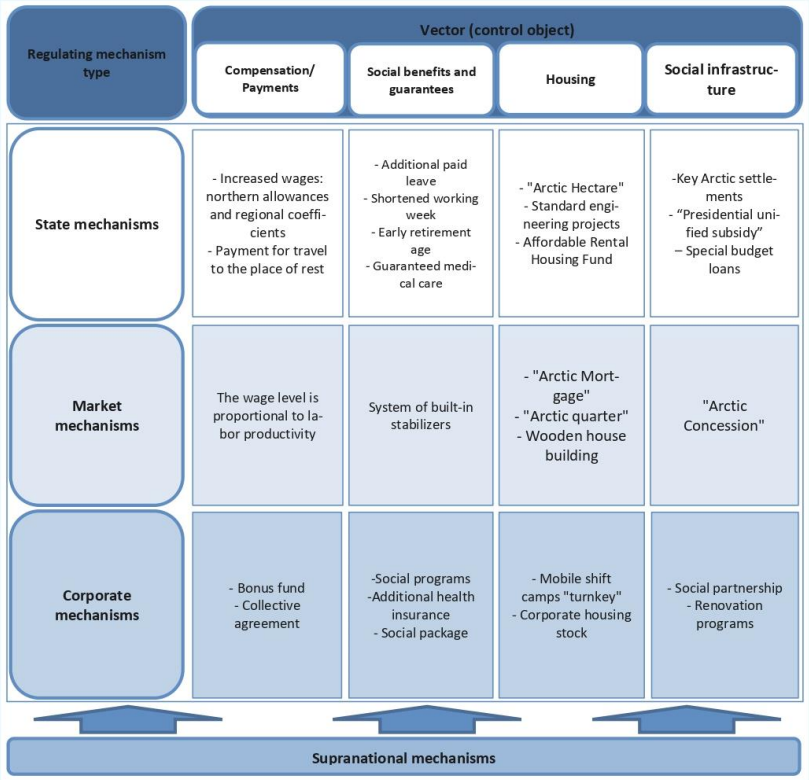

Fig. 2. Key (current and emerging) mechanisms for regulating the social attractiveness of Arctic territories (compiled by the authors).

All state mechanisms for regulating social attractiveness can be divided into traditional ones, i.e. those that have evolved over time (and are perceived by society as a social imperative), and new mechanisms, developed and implemented by the state in response to emerging modern challenges and threats. The former group includes compensation payments, social benefits, and guarantees that are enshrined in the Labor Code of the Russian Federation and other regulatory acts in the Far North and equated regions. For public sector employees, these include increased wages, including northern allowances and regional coefficients, reduced working week, additional paid vacation and travel expenses to the vacation destination, early retirement age, and more. Many experts note that traditional mechanisms for enhancing the social attractiveness of northern and Arctic territories have lost their motivational function over time and do not provide comparative competitive advantages. Therefore, in order to retain the population in the Arctic territories and attract new specialists, it is necessary to search for special forms of motivation, and for this purpose, the state is creating comprehensive programs for the development of the Arctic and its individual mesoregions.

The issue of providing the Arctic population with high-quality and safe housing has always been a central one, and is currently critically acute. The depreciation of the housing stock in some Arctic settlements exceeds 70%, and this percentage is increasing, as the rate of new housing construction under resettlement programs lags behind the growth of the number of unsafe housing. Such situations are particularly common in settlements where temporary, quickly constructed residential buildings (barracks) were constructed during the economic development of the North from the 1930s to the 1950s. To address this housing issue, the state not only

promotes the development of market mechanisms, such as the "Arctic Mortgage", but also acts as a full-fledged holder and regulator. The volume of housing construction and commissioning in the Arctic zone is significantly lower than the national average. One of the government's priorities in this area is promoting the development of individual housing construction (IHC). Since 2021, the "Arctic Hectare" program has been implemented, allowing citizens to rent land in the Arctic zone free of charge for development, for example, for IHC, agriculture or entrepreneurial activities. Over the three and a half years, more than 9,700 people have participated in this program. The Ministry of Construction, Housing and Utilities of the Russian Federation is also developing standard project documentation for construction in the Arctic zone, including wooden and modular housing construction. The creation of an affordable rental housing fund in the Arctic is being considered, which would require the purchase of rental apartments and the subsidization of rent. Some Arctic regions have regional state housing programs. For example, the Murmansk Oblast has a program called "Own Home in the Arctic", under which participants can receive 1–1.5 million rubles for building a house or purchasing a prefabricated house.

The new federal Strategy for Spatial Development of the Russian Federation until 2030 [2] identifies a system of key settlements as the main spatial priority. The development of these settlements will contribute to the implementation of national development goals and the formation of a more effective system of population distribution and social infrastructure placement. A total of 2,160 key settlements have been approved by the Presidium of the Government Commission for Regional Development in the Russian Federation, which are divided into four categories: new growth points, urban agglomerations and regional administrative centers, strategic settlements, and other settlements performing functions of key settlements [3]. Currently, development programs for engineering, municipal, transport and social infrastructure are being developed for all key settlements, which will be implemented as part of the national project "Infrastructure for Life" [4] through infrastructure budget loans and treasury infrastructure loans. At the end of 2023, the Russian Government approved a list of key settlements (municipal formations) in the Arctic zone of the Russian Federation with the aim of improving the living conditions of the permanent population, increasing the quality and accessibility of essential social services, and creating conditions for people's self-fulfillment [5]. It includes 16 strategically significant key settlements (agglomerations) with a population of over 1.6 million people, or 65%

[2] The Strategy for Spatial Development of the Russian Federation for the Period up to 2030 with a Forecast up to 2036 was approved by the Order of the Government of the Russian Federation of December 28, 2024 No. 4146-r. URL: https://www.garant.ru/products/ipo/prime/doc/411143583/ (accessed 12 February 2025).

[3] As part of the implementation of the List of Instructions for the Implementation of the Address of the President of the Russian Federation to the Federal Assembly of the Russian Federation dated February 29, 2024, No. Pr-616 dated March 30, 2024. URL: https://www.garant.ru/products/ipo/prime/doc/408704827/ (accessed 10 February 2025).

[4] Developed in accordance with the Decree of the President of the Russian Federation No. 309 of May 7, 2024 "On the national development goals of the Russian Federation for the period up to 2030 and for the future up to 2036". URL: http://www.kremlin.ru/acts/bank/50542 (accessed 10 February 2025).

[5] Order of the Government of the Russian Federation of November 28, 2023 No. 3377-r (as amended on August 13, 2024) "On approval of the list of key settlements (municipalities) of the Arctic zone of the Russian Federation". URL: https://www.garant.ru/products/ipo/prime/doc/408019009/ (accessed 11 February 2025).

of the total population of the Russian Arctic. Master plans for the period up to 2035 — comprehensive plans for long-term socio-economic development — are being developed for these territorial units. For example, the key areas of development for the Arkhangelsk agglomeration (Arkhangelsk, Severodvinsk and Novodvinsk), where 20% of the population of the AZRF lives, are the development of public transport infrastructure, increasing housing availability through the construction of comfortable housing, reducing the deterioration of communal infrastructure, creating recreational spaces, constructing leisure and sports infrastructure, improving the environmental well-being of the area, and others. The mission of the Arkhangelsk agglomeration is defined as preserving the population in the Arctic and the uniqueness of northern culture and history, and a total of over 1.8 trillion rubles is planned to be allocated to achieve this.

Another important state mechanism for regulating the social attractiveness of the Arctic is the "Unified Subsidy" program [6]. It consists of inter-budgetary transfers for the implementation of social development plans for economic growth centers in the Far East and the Arctic. This mechanism allocates funds to Arctic regions for the renovation of housing and communal services, improvement and modernization of social infrastructure. In total, over 10 billion rubles were allocated from the federal budget for these purposes from 2022 to 2024. Most often, the subsidy is spent by regions on the construction and renovation of preschools, schools, cultural institutions, clinics, and sports facilities.

When analyzing the key mechanisms for regulating social attractiveness, the importance of labor market self-regulation cannot be underestimated. The mutual influence of the commodity and labor markets increases as the regulatory functions of the market mechanism develop. The main regulatory force is entrepreneurial profit, and fluctuations in the rate of profit, depending on market conditions, compress or expand the labor market, regulating its qualitative and quantitative composition. This directly affects the redistribution of income among owners of production factors; wages change proportionally to changes in the marginal product of labor. In other words, one of the basic market laws is at work: the level of wages corresponds to productivity. Government regulation instruments become additional, reinforcing the regulatory function of the market through the built-in stabilizers of legal norms.

Furthermore, the state activates the motivational functions of the market by determining specific areas of financing and setting priorities through official and unofficial "messages" to business. This is how special regimes for increasing the investment and social attractiveness of northern territories are launched — the "Arctic Concession" and the "Arctic Mortgage". In the context of the global sustainable development agenda, government authorities are setting trends for all market participants. For example, to achieve the goals of "Sustainable Cities and

[6] By Decree of the Government of the Russian Federation No. 1694 of September 27, 2022, the effect of Decree of the Government of the Russian Federation No. 254 of March 14, 2018 and the Rules for the provision and distribution of other inter-budget transfers approved by it for the implementation of activities of social development plans for economic growth centers of constituent entities of the Russian Federation that are part of the Far Eastern Federal District shall also extend to the territory of the Arctic zone.

Communities" and "Responsible Production and Consumption", a trend toward wooden housing construction is being set.

Business, as a participant in the labor market, implements corporate mechanisms to regulate the social attractiveness of the territory, covering not only its employees and their families, but also the entire population of the territory where it operates. Employers in Arctic regions are actively investing in various social benefits. It can be assumed that this process will be intensified due to the emerging shortage of skilled labor. On the one hand, corporations view personnel as an element of the company's competitiveness and are therefore forced to maintain employee loyalty through a complex benefits package. On the other hand, the excess of existing vacancies over the economically active population forces businesses to offer more attractive conditions to potential employees in the labor market.

Some of these tools have already become common practice and are widely used. This primarily involves collective agreements that include the main obligations of the parties. These obligations are in fact elements of social attractiveness, as they consist not only of mandatory conditions guaranteed by state legal and regulatory documents, but also of optional (additional) components of social and labor relations. These are issues related to pay and working conditions, professional development and career growth, working and non-working hours, health and recreation.

The key task for corporations in increasing the social attractiveness of a territory is to participate directly in the development of the region where they operate: financing projects to create and modernize social infrastructure, supporting regional education, healthcare and cultural systems. In such projects, large corporations can act not only as contractors or customers, but also as grantors, which will stimulate social activity by involving various interested groups. Good practice includes joint actions by regional authorities, businesses and local communities in the development and implementation of comprehensive programs for the socio-economic development of the territory. It is important that such initiatives not only address current issues, but also have a forward-looking vision of the external image and brand of the territory. Urban development plans, renovation programs and projects to create a comfortable urban environment should take into account the opinions of all stakeholders and be based on a well-developed scientific foundation. It is worth noting that such a practice is becoming the norm mainly for corporations in the primary sector of the economy — those whose activities are directly related to natural resources, such as the extractive industry. These companies are not geographically mobile, which creates a mutual dependence between the region and the corporations operating in it. Secondary sector enterprises are generally less restricted in their choice of location, so their social activities in relation to the territory in which they operate are often minimal. State regulation tools can serve as a motivational factor and accelerate the development of this process.

Besides, companies operating in northern territories invest in supporting indigenous peoples. This area of work needs to be coordinated not only at the national level, but also globally,

which is most effectively achieved through supranational regulatory mechanisms, for example, within the framework of the Arctic Council, whose objectives include social support for the peoples of the North. The “Children of the Arctic” and the “Youth of the Arctic” projects were on the agenda of the 2024 meetings of the working group on sustainable development.

Despite existing and emerging mechanisms, the low social attractiveness of the Arctic territories remains a serious challenge to the successful socio-economic development of their territories, leading to significant personnel shortages, labor market imbalances, and ageing of population. In these conditions, it is necessary to transform the approach to addressing social issues, focusing not so much on current problems as on the desired outcome.

Transformation of the institutional approach to the formation and development of the social attractiveness of Arctic territories

The formation of modern mechanisms for increasing the social attractiveness of territories should be carried out in the context of the ideology of a socially oriented economy, i.e., it should correspond to two target orientations simultaneously [18, Podshivalov N.S., Sivobrova I.A., p. 158]:

The first is to increase the social potential of the territory, reflected through the components of the Human Development Index (healthy life expectancy, education, and income level).

The second is to eliminate inequality in opportunities and implement the principles of social justice related to access to social benefits and services for different population groups, and thus to the provision of modern social infrastructure.

It is important to understand that, due to their specific characteristics, it is more difficult to implement this dual approach in the northern territories. Comprehensive programs and projects are required both at the macro-regional level (the Arctic zone of the Russian Federation) and at the level of individual northern territories.

Due to the complexity of the tasks, limited resources and the set time frame, serious attention should be paid to justifying the tools of social attractiveness. The classification of the mechanisms and instruments used can be based on various criteria: scale, objectives, priorities, sources, etc. [19, Musolino D., Kotosz B., p. 1164]. The analysis of social attractiveness as a phenomenon should be based on an indicative criterion (Fig. 3).

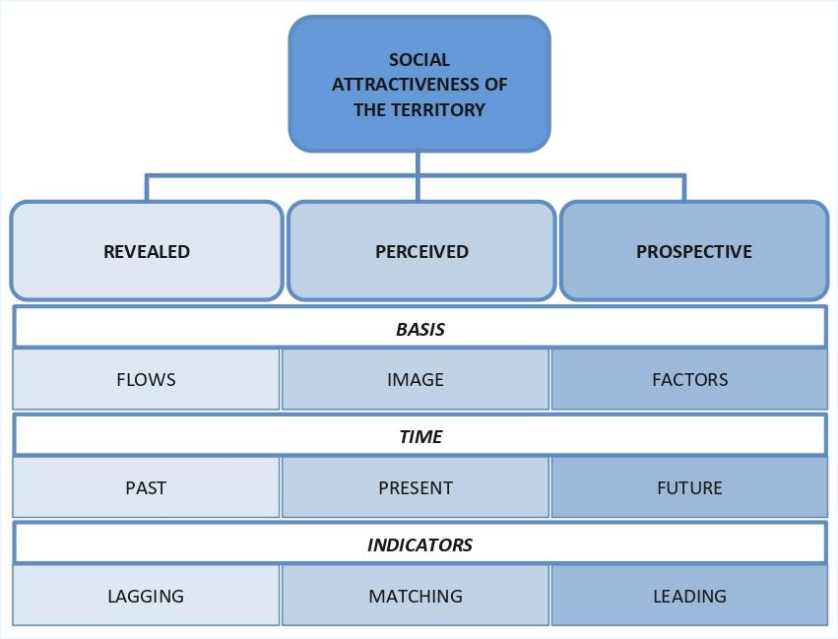

Fig. 3. The concept of social attractiveness of a territory based on an indicative criterion (compiled by the authors).

Various indicators are used to analyze the essence of the concept, which can answer questions about the level and direction of attractiveness.

Revealed social attractiveness is reflected by statistical indicators (flows), such as:

- movement of the economically active population;
- export/import of educational services and their balance;
- inbound and outbound tourist flows and their balance.

This analysis determines the social attractiveness of past periods, since most statistical indicators are lagging in nature and confirm changes that have already occurred.

Perceived social attractiveness is reflected by informal characteristics determined by:

- established image of the territory;
- associations evoked by the territory;
- positive/negative content in the media.

In this case, the assessments and the current situation coincide. Perceived attractiveness can be shaped by interested groups to address various issues.

Prospective social attractiveness reflects the social potential of the territory and is determined by factors that can enhance its attractiveness in the future:

- location;
- climatic conditions;
- proximity to the “center”;
- announced development projects;
- comfortable environment, etc.

When developing tools to increase the social attractiveness of a territory, it is necessary to analyze not so much statistical indicators as factors that can strengthen social potential in the future and become catalysts for positive changes that will correct the current situation. A

qualitative transition from a "plan and report" system to an "opportunities and their implementation" system is necessary. To achieve this, a common vision of the end result should be developed for all stakeholders (government bodies, local governments, businesses, and the public). The parameters of social attractiveness of the Arctic territories are to be significantly higher than those of the southern territories to compensate for the discomfort of living, and new high social standards should become common practice.

The subject of social development management in the Arctic should be the long-term social attractiveness of the territory. This means that the development and implementation of social policy and subsequent management decisions should be based on the principle of advanced development of the territory, built on a long-term strategic forecast. The methodological and organizational basis for the implementation of such a policy could be the harmonization of a system of mechanisms to increase the social attractiveness of Arctic territories based on the principles of social partnership among key actors.

Conclusion

The analysis of approaches to shaping and developing the social attractiveness of the Arctic, starting with the stage of national economic development of its "treasures", demonstrated that adjustments in the prioritization and directions of state influence occurred gradually. This was explained by both changes in government targets and emerging challenges of the socio-economic development of the northern territories.

The systematization of instruments for increasing the social attractiveness of the Arctic territories reinforced the hypothesis of the continuing prevalence of state mechanisms in this area of regulation. Market self-regulation works only partially and only in the short term; the market lacks strategic vision and thinking, and therefore needs to be strengthened and supported by state institutions.

The critical analysis of individual tools in their interactions revealed the ineffectiveness of the regulatory system as a whole. A number of mechanisms are ineffective, as they have completely or partially lost their functionality. This applies primarily to the motivational function of compensatory payments (northern allowances and regional coefficients). The mechanisms currently being developed, in their efforts to achieve rapid results in the development of Arctic territories, are beginning to duplicate or, even worse, contradict each other (e.g. administrative and tax incentives for residents of the Arctic zone of the Russian Federation and residents of Arctic territories of advanced development). At the same time, there is no healthy competition between individual territories for investors, labor and the attention of the federal center.

Corporate regulation is undoubtedly being developed not only with regard to its own employees and their families, but also in relation to the territories of its presence. Social responsibility is used not only to improve the quality of its labor force, but also to create a positive corporate reputation, expand its sphere of influence, and accumulate intangible assets. The

problem is that only large businesses operating in the primary sector of the economy are involved in such activities. Despite the fact that this sector is the most significant in most Arctic regions, it is not capable of eliminating all the imbalances that exist there.

There is a pressing need to transform the approach to shaping and developing the social attractiveness of Arctic territories through a prospective assessment of social potential on the basis of an analysis of all exogenous and endogenous development variables. Managing prospective social attractiveness with a set of corresponding mechanisms is becoming a field for future applied research on the formation of an appropriate arsenal.

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Demographic Challenges and Prospects of the Tyva Republic

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Abstract. The article examines contemporary demographic processes in the Tyva Republic based on an analysis of official statistics. Highly detailed demographic analysis methods are applied: migration trajectories are analyzed by individual municipalities, birth rates — by area in conditional and real generations, mortality — by leading causes of death. The purposes of the study are to assess the prospects for the demographic development of the Tyva Republic and to identify limitations and reserves for improving the situation. It is shown that due to the special position of the family institution in the hierarchy of values, ethnic identity, and state and regional family support programs, high birth rates are maintained in the republic. Signs of the second demographic transition, such as an increase in the number of delayed births and refusal to have children, as well as a decrease in the proportion of large families indicate a value gap between social groups and emerging social inequality. The implementation of agricultural economic policy in the region does not solve the problems of poverty, but contributes to the preservation of the traditional way of life of the Tyvan people and influences the migration behavior of the population. It has been revealed that external causes and infectious diseases remain among the leading causes of death: tuberculosis, homicides and suicides, poisoning, exposure to low temperatures, pneumonia and traffic accidents. Despite the fact that rural residents bear the main burden in solving demographic problems, they often die at the working age. The practical significance of the study is to identify reserves for improving the demographic situation in the republic. Since the difficulties are primarily related to economic factors, the authors propose to focus efforts on expanding social infrastructure and developing the economy through diversification of economic practices, which will also create favorable conditions for return migration of young people and a comfortable life for older age groups. Further research should be aimed at studying the effectiveness of demographic policy measures in the republic, as well as assessing the impact of compression and digitalization of social infrastructure on demographic processes.
Keywords: *demography, population structures, migration, fertility, mortality, life expectancy, territorial differences, Tyva Republic*

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Introduction

The Republic of Tyva (Tuva) is the most atypical of the regions included in the list of territories of the Far North. This is explained by its unique spatial location far from the other

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northern regions, its national composition with a predominance of the titular ethnic group, and its socio-economic situation. Tyva is a border zone between two civilizations with its own distinctive nomadic, Turkic-speaking and Buddhist culture. It is an "unknown part" of Russia in the center of Asia [1, Lamazhaa Ch., p. 296], which attracts the interest of scholars from various fields. By most socio-economic indicators, Tyva remains one of the least prosperous regions of Russia. As of 2022, the republic ranks second to last in terms of median population income (18,691 rubles) and poverty level (27.2%), ahead of Ingushetia, as well as last in terms of life expectancy (67.1 years), ahead of the Chukotka Autonomous Okrug. At the same time, the region ranks second in terms of total fertility rate (2.51), behind the Chechen Republic [1]. These extreme values make Tyva an interesting and important target for demographic research.

This article aims to study the demographic prospects of the region and to identify internal reserves for stabilizing the situation in the Republic of Tyva. It has been fully included in the list of regions of the Far North and equivalent areas since 1994 due to its natural and climatic conditions and is the southernmost region of the list. The republic does not have the large-scale extractive industry typical of most northern regions of the country, and in many respects is similar to the agrarian southern regions. Therefore, in order to assess demographic processes, a comparative analysis with both the 13 regions of the Far North and Russia as a whole will be carried out. A distinctive feature of this work is the detailed analysis of official statistics. While migration has previously been considered primarily within the context of general regional or district-specific processes, this paper examines it in terms of individual settlements and age groups. Fertility is analyzed by district in both conventional and actual generations. A detailed classifier containing 307 causes of death was used to study mortality.

The first section of the article is devoted to an overview of modern studies of the population of the Republic of Tyva. This is followed by a presentation of the research methodology and data sources used. The results are divided into four subsections: migration, birth rates, mortality and demographic prospects. The concluding section summarizes the main results of the study.

Between indigenous culture and the market: in search of demographic equilibrium

Most authors agree that the complex demographic situation in the region is primarily linked to economic factors. Poverty has a negative impact on mortality rates due to the population's lifestyle and affects the republic's attractiveness for migration. T.Yu. Gusakov notes that "the reason for economic stagnation is the "agrarian path" chosen by the regional elite of Tyva" [2, p. 76]. However, natural and climatic conditions do not allow for full-scale agricultural production throughout the republic, exacerbating the region's poverty problems. The most agrarian areas are the western and south-eastern regions (kozhuuns), as well as the Piy-Khemskiy

[1] Supplement to the collection "Regions of Russia. Socio-economic Indicators — 2023". Rosstat. URL: https://rosstat.gov.ru/folder/210/document/47652 (accessed 10 December 2024).

district, located north of the capital in the central part of the republic. The diversity of ethno-cultural landscapes testifies to the mosaic structure and natural isolation of the territories [3, Dirin D.A., Fryer P, p. 32], which complicates the region's economic development and the solution of poverty problems [4, Soyan Sh.Ch., pp. 48–50], and contributes to population outflow.

The mass outflow of the Russian population in the early 1990s had a negative impact on the economic situation in the region. The population decline accelerated sharply with the onset of capitalism in Russia, but the migration balance had already become negative in the late Soviet period, after 1970. At the same time, natural growth in Tyva was positive, with the exception of 1989–2002 [5, Abylkaliikov S.I., p. 135]. The decline in the population of various ethnic groups deprives the region of cultural diversity and skilled personnel. In the current situation, this limits the opportunities for enriching the Tyvan economy with modern skills and technologies [6, Tarbastaeva I.S.], and reduces the quality of services in the fields of education and medicine. Taking into account the level of poverty in the region, Tyva is becoming unattractive for specialists from other regions of Russia, despite the region's need for highly qualified personnel due to the contraction of social infrastructure in the periphery.

Intra-regional migration draws the most active population to the capital, leaving virtually no prospects for the development of remote areas of the republic and maintaining high levels of poverty there [7, Balakina G.F., Anayban Z.V., p. 92]. Overall, the migration mobility of the republic's residents is low. According to the 2021 census, more than half of the inhabitants of Tyva who indicated their length of residence had no experience of long-term migration [8, Abylkalikov S.I., Baimurzina G.R., Batalov R.O., p. 6], i.e., they did not leave their municipalities for more than nine months. Recent migration studies have shown that the observed movements are mainly associated with the education of young people. An analysis of digital traces from the social network VKontakte revealed that 39.5% of school graduates in Tyva continue their education in the region, in the city of Kyzyl. In addition to the regional capital, residents of the republic enter universities in Krasnoyarsk, Novosibirsk, Moscow, Tomsk, Abakan, Barnaul, Kemerovo, Blagoveshchensk, Irkutsk and Ulan-Ude [9, Chernyshev K.A., Mityagina E.V., Chernysheva N.V. et al., pp. 75, 77, 79]. In other words, there is interest among school graduates in studying outside their home region.

In Tyva, with its predominantly agrarian economy, the birth rate remains favorable. The preservation of cultural identity, ethnic self-awareness, and the integration of cultural symbols and images into the formation of the region's image [1, Lamazhaa Ch.], as well as expanded regional support for the reproduction of agricultural enterprises and the traditional rural way of life [2, Gusakov T. Yu.] contribute to the reproduction of family values. Sociological studies confirm the focus of Tyvans on their family, children, and health [10, Natsak O.D., p. 64]. Every third family in the republic has many children [11, Natsak O.D., p. 128]. Nevertheless, existing individual values of social development contradict the lifestyle of the Tyvans supported by regional authorities, which, with a lack of social support measures, increases the risk of large families falling into the

low-income category. The contradictions are most clearly evident in discursive practices about modern Tyvan women [12, Borgoyakova T.G., Lopsan A.P.]. On the one hand, these are financially successful women, running their own businesses and careers; on the other hand, there are women who are subjected to domestic violence and have low status at work [13, Anaiban Z.V., p. 37]. At the same time, the traditional image of men as breadwinners and protectors is shifting towards "parasitical" interests [12, Borgoyakova T.G., Lopsan A.P.]. In our opinion, this leads to the formation of "modern" strategies of family relations and, as a result, to an increase in the proportion of nuclear single-parent families and unregistered partnerships [14, Rostovskaya T.K., Natsak O.D., Elamanova A.S., p. 243]. In this context, not only the value gap between social groups and emerging social inequality are evident, but also the contradictions between the ongoing agricultural policy in the regional economy and social policy, which contributes not only to the breakdown of social ties, but also to the growth of social problems.

The traditional culture of peoples, including the Tyvans, is oriented toward strengthening social ties, even in communities where individualization plays a significant role in maintaining a household. The density of social networks and ethnic self-awareness allow for the effective use of social resources (networks) and positive results from cooperation between people in the realization of private and public interests [15, p. 266]. This is well understood by communities that have lost this "social strength" and are unable to participate in the formation of territorial development strategies at the regional level [16, Lytkina T.S., Yaroshenko S.S.]. At the same time, preserving and using indigenous culture solely as a means of earning a living does not contribute to the resolution of social problems. Poverty, infrastructure crisis, unemployment, and marginalization of remote rural populations lead to morbidity, alcoholism, and high mortality rates. Currently, there is an extremely high proportion of preventable causes in the mortality structure [17, Sabgaida T.P. et al., p. 62], and the highest tuberculosis mortality rate in the country [18, Revyakina O.V. et al., p. 167]. The risk group for behavioral mortality factors includes rural men over the age of 35 and rural women between the ages of 20 and 34 [17, p. 57]. From the age of 15–19, male mortality begins to exceed female mortality twofold [11, Natsak O.D.]

Thus, a number of serious socio-economic problems persist in Tyva. The traditional way of life maintained by the Tyvans, on the one hand, has a beneficial effect on the birth rate of the population; on the other hand, it does not allow solving the problems of poverty in the region, determining high mortality rates and the tendency of young people to migrate. When analyzing statistical data, we will take a closer look at the migration attitudes of residents, the future prospects for population growth in the region, and the leading causes of death.

Data and methods

The source of data for studying migration was the Rosstat Database of Municipality Indicators (DBMI). The data on the number of arrivals and departures by urban districts, settlements, and age groups were compiled from it. Migration intensity indicators were obtained

by dividing these indicator values by the population size of the corresponding groups. The sum of arrivals and departures per 1,000 inhabitants shows the migration turnover rate, and the difference — the migration gain (loss) rate. The former reflects the population's propensity for migration, while the latter records its results.

Fertility is analyzed in both hypothetical and actual generations. The main data source for analyzing fertility in actual generations, i.e., over a woman's lifetime, is the results of the 2010 and 2021 All-Russian Population Censuses. The quality of the results of the last census has been criticized due to the significant number of "non-responders", the use of administrative sources, and omissions in online questionnaires [19, Andreev E.M., Churilova E.V.; 20, Chudinovskikh O.S.], but the census remains one of the few publicly available sources for analyzing the birth rate. The census results contain information on the average number of children born per 1,000 women by urban districts, municipal areas, and age groups of women. For women aged 50 and older, this indicator reflects the total fertility rate of the generation; data on younger women allows identifying changes in the territorial and age patterns of fertility in real generations. The fertility rate in conditional generations (by calendar year of birth) at the municipal level was calculated using the method of indirect standardization by 5-year groups based on data from the DBMI. The methodology is similar to that used in the work of A.N. Petrosyan [21, Petrosyan A.N.]. The population of the republic in the corresponding years was taken as the standard.

Data on age and causes of death from the Russian Database on Fertility and Mortality [2] (RosBRiS) were used to study mortality. It was decided to use averaged data for 2015–2021, as external causes of death are not detailed since 2022. The impact of each of the 307 causes of death (including COVID-19) on life expectancy was calculated. For this purpose, standard life tables [22, Preston S., Heuveline P., Guillot M.] were constructed, as well as life tables in which individual causes of death were excluded by reducing the age-specific mortality rates by the age-specific mortality rates from the cause under study. Comparing the final values of the life tables allows answering the question: to what extent will the life expectancy of men and women change if they stop dying from a certain cause? It should be noted that, in reality, mortality from most causes cannot be completely eliminated, and reducing mortality from one cause may lead to an increase in mortality from others. Furthermore, cause-of-death coding practices may vary by region, so cross-regional comparisons of indicators are limited. Differences in mortality rates between regions were analyzed using a standardized overall mortality rate by gender and age.

The calculation algorithms were implemented in the Julia programming language, and the maps were constructed using the VegaLite.jl software.

[2] Russian Fertility and Mortality Database. *Center for Demographic Research, New Economic School, Moscow (Russia)*. URL: https://www.nes.ru/demogr-fermort-data (accessed 10 December 2024).

Research results: demographic processes in the Republic of Tyva

According to the census results, the total population of the republic in 2021 was 336,651 people, of whom 47.2% were men. The urban population accounted for slightly more than half (54.6%). In the post-Soviet period, the population of the Republic of Tyva increased by 27,500 people, or 8.9%. Currently, the republic includes two urban okrugs: the capital, Kyzyl, and Ak-Dovurak, as well as 17 municipal districts, which include 4 urban and 120 rural settlements. In total, the republic has six urban settlements (five towns and one urban-type settlement) and 144 rural settlements. It is noteworthy that the population of the capital's urban okrug, Kyzyl, grew more slowly than in the nearby urban-type settlement of Kaa-Khem [3]. While the population of the capital increased by 13.9% over the last decade, the population of the aforementioned urban-type settlement increased by 30.9%. This growth is due to its proximity to the center, the availability of developed infrastructure and the possibility of building housing on one's own. Despite the higher population growth rate in Kaa-Khem, Kyzyl's share of the region's population increased from 27.4% to 37.2% between the 1989 and 2021 censuses. The concentration of the population in two neighboring urban settlements, which practically form a single territory with developed infrastructure and opportunities for solving everyday problems, demonstrates the interest of inhabitants in this place of residence (Table 1).

Table 1

Population dynamics of the Republic of Tyva by urban okrugs and municipal districts, 1989–2021, people [4]

Area	1989	2002	2010	2021	Increase (decrease) for 2010–2021		
					total	natural	migration *
Tyva Republic	***309 129***	***305 510***	***307 930***	***336 651***	***28 721***	***45 999***	***-17 278***
urban okrugs:							
Kyzyl	84 641	104 105	109 918	125 241	15 323	15 809	-486
Ak-Dovurak	est. in 1994	12 965	13 468	12 456	-1 012	1 905	-2 917
municipal districts:							
Bay-Tayginskiy	13 401	12 321	10 803	10 807	4	1 643	-1 639
Barun-Khemchikskiy	31 421	12 683	12 847	12 178	-669	1 732	-2 401
Dzun-Khemchikskiy	22 748	21 361	19 918	19 645	-273	3 743	-4 016
Kaa-Khemskiy	14 982	13 071	12 279	12 337	58	1 386	-1 328
Kyzylskiy	22 205	22 678	27 659	35 868	8 209	4 559	3 650
Mongun-Tayginskiy	5 576	5 938	5 661	6 101	440	1 250	-810
Ovyurskiy	8 868	7 930	7 022	7 380	358	1 226	-868
Piy-Khemskiy	14 236	11 431	10 092	10 621	529	602	-73
Sut-Kholskiy	12 038	8 430	8 029	8 310	281	1 349	-1 068
Tandinskiy	23 653	13 827	12 891	15 284	2 393	1 762	631
Tere-Kholskiy	est. in 2002	1 835	1 882	1 944	62	333	-271
Tes-Khemskiy	10 413	8 908	8 174	8 966	792	1 552	-760
Todzhinskiy	6 448	5 931	6 020	6 667	647	1 073	-426

[3] Although the Kaa-Khemskiy district itself is one of the worst in the Republic in terms of migration attractiveness.

[4] Source: 1989–2021 censuses results. URL: https://24.rosstat.gov.ru/folder/66693; https://demoscope.ru/weekly/ssp/census.php?cy=6 (accessed 10 December 2024).

Ulug-Khemskiy	29 866	19 461	19 266	20 309	1 043	2 861	-1 818
Chaa-Kholskiy	est. in 1992	6 532	6 036	6 173	137	917	-780
Chedi-Kholskiy	est. in 1993	8 081	7 685	7 788	103	1 180	-1 077
Erzinskiy	8 633	8 022	8 280	8 576	296	1 117	-821

** mechanical growth — authors' calculations.*

A decline in population over the last inter-censal period has been observed in only two towns: Turan (1.0%) and Ak-Dovurak (7.5%). The former was founded by Russian settlers in the late 19th century, while the latter is known for its industrial specialization, following the establishment of a plant for the production of asbestos, slate and other products in 1964. The plant ceased operations in the 1990s, and local authorities are currently attempting to resume its work [2, Gusakov T.Yu.]. The population of 70 out of 120 rural settlements has grown, with 15 of them growing by more than a quarter. Only five of the 50 settlements with declining populations lost more than a quarter of their residents (Fig. 1).

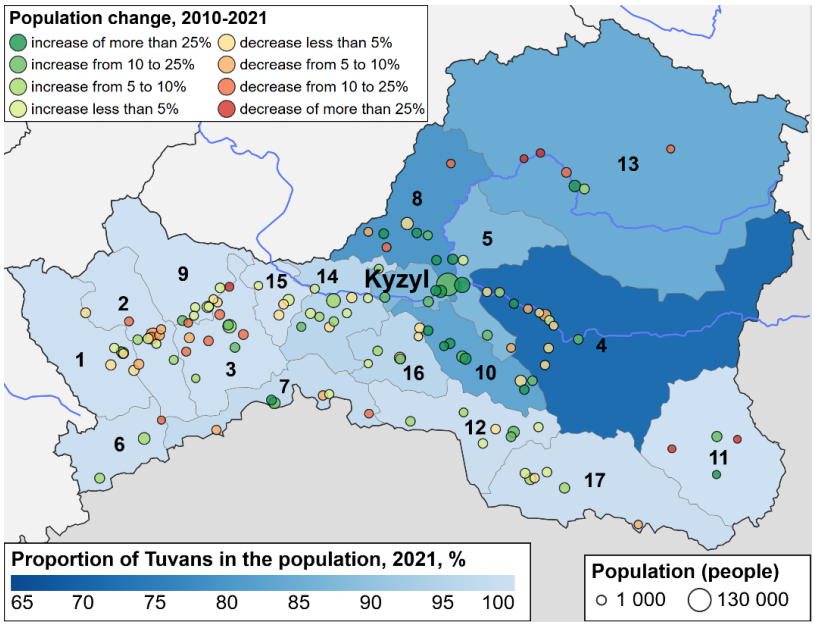

Fig. 1. Population change in settlements in the Republic of Tyva, 2010–2021 [5].

Districts (kozhuuns): 1 — Bay-Tayginskiy, 2 — Barun-Khemchikskiy, 3 — Dzun-Khemchikskiy, 4 — Kaa-Khemskiy, 5 — Kyzylskiy, 6 — Mongun-Tayginskiy, 7 — Ovyurskiy, 8 — Piy-Khemskiy, 9 — Sut-Kholskiy, 10 — Tandinskiy, 11 — Tere-Kholskiy, 12 — Tes-Khemskiy, 13 — Todzhinskiy, 14 — Ulug-Khemskiy, 15 — Chaa-Kholskiy, 16 — Chedi-Kholskiy, 17 — Erzinskiy.

The presented demographic dynamics of rural settlements in Tyva are significantly better than in most regions of Russia, especially in the Far North. In 2010–2021, as a result of migration, the Republic of Tyva lost only 5.6% of its population, which is a small outflow compared to other northern regions and is fully offset by natural growth. Furthermore, while there was a decline in the rural population in the vast majority of rural settlements across the Russian North, this trend was observed in less than half of them in Tyva due to the high birth rate. Over the past decade, the median growth rate for urban okrugs and settlements was 7.0%, for rural settlements — 1.8%. This tendency does not suggest a positive demographic outlook for rural areas. Let us take a closer

[5] Source: 2010 and 2021 census results. URL: https://24.rosstat.gov.ru/folder/66693 (accessed 10 December 2024).

look at how migration processes, birth rates and life expectancy affect the population of Tyva in different settlements.

Migration

An analysis of migration statistics at the settlement level and by directions of movement from 2014 to 2023 showed that internal migration is a characteristic feature of the republic. The vast majority of settlements (109) did not participate in international exchange, as a result of which 2,500 people left Tyva and 2,800 people arrived. Migration growth amounted to 312 people, of which 286 were in Kyzyl. The largest international migration was recorded with Kyrgyzstan, Belarus, Uzbekistan, and Mongolia. The influx of international migrants does not compensate for the outflow to other regions of Russia and has virtually no impact on the ethnic composition of the region's population. The proportion of Tyvans in 13 of the republic's 17 districts and okrugs exceeds 95%, except for the Kaa-Khemskiy district, where their share is below 80% (Fig. 1).

The migration outflow recorded by statistics is the result of interregional exchanges involving all settlements. A total of 57,400 people left Tyva for other regions over the past decade, while 42,100 people arrived. The negative balance amounted to 15,300 people [6]. The highest declines were in Kyzyl (9,174 people), Kyzylskiy (1,907 people), Kaa-Khemskiy (755), and Piy-Khemskiy (675) districts in the center of the republic, the lowest — in Mongun-Tayginskiy, Erzinskiy, and Ovyurskiy districts, located along the southern border of Russia.

At the intraregional level, all settlements participate in migration exchanges. Growth is observed in 20 of them. The largest intraregional growth was demonstrated by the capital Kyzyl (7,611 people) and the districts located nearby: Kyzylskiy (3,887 people), Tandinskiy (1,374 people), and Piy-Khemskiy (288 people). The highest migration loss was recorded in the western peripheral districts: Dzun-Khemchikskiy (2,462 people), Barun-Khemchikskiy (1,542 people), and Bay-Tayginskiy (1,249 people), as well as in Ak-Dovurak (1,261 people). In relative terms, these districts are leading in outflow. The map shows that the settlements with declining populations as a result of intraregional exchange are located in remote areas in the east (Tere-Kholskiy, Todzhinskiy) and west (Barun-Khemchikskiy, Dzun-Khemchikskiy, Sut-Kholskiy). At the same time, settlements close to the administrative center are losing population through interregional exchange (Fig. 2).

[6] A slight population increase was observed in 24 settlements, while the remaining 102 experienced a decline. The largest interregional increase, only 26 people over the decade, was in the settlement of Khayyrakan.

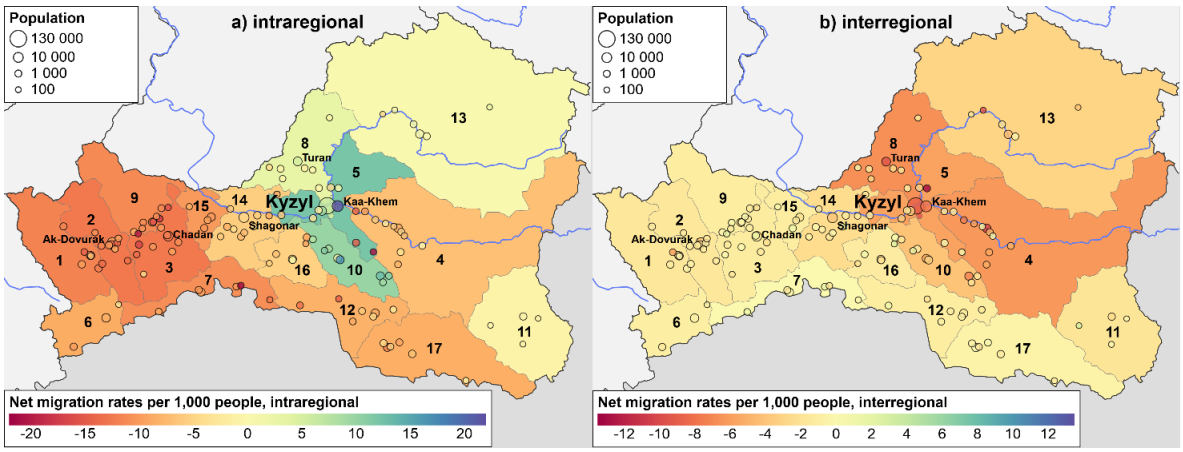

Fig. 2. Migration growth rates in the Republic of Tyva by type of movement, average annual value for 2014–2023 [7].

Low migration mobility rates are observed in Old Believer settlements in the upper reaches of the Yenisei, especially in the Sizimskiy district, despite the fact that since the early 2000s, they have been unable to support their households through crafts and other traditional types of employment and have been forced to resort to seasonal migration more often [2, Gusakov T.Yu., p. 91]. The reason for low mobility may be the chosen lifestyle or social exclusion of this group. Moreover, a secluded lifestyle often manifests itself as an optimized survival strategy. Solving poverty problems simultaneously provokes the migration of residents from remote areas with weak economies to more prosperous areas of the republic. The lack of funds for relocation and adaptation to new places of residence leads to sedentism — an extreme form of social exclusion. Neither of these contributes to the development of these territories.

Thus, in Tyva, despite a predominantly agricultural economy, the administrative center and urban settlements with developed infrastructure attract the rural population. Kyzyl is becoming a center of attraction for international migrants and residents of the republic's peripheral territories, who, lacking sufficient resources to move to other regions of Russia, choose the regional capital as their migration destination. Meanwhile, urban residents, having accumulated the necessary resources for departure, are leaving the region. In the republic's capital, Kyzyl, there is an overall decline due to interregional outflow exceeding intraregional and international growth. However, overall migration growth has been recorded in ten settlements located mainly near the capital: Kaa-Khem, Durgen, Uspenka, Aryg-Bazhy, Mezhegey, Kyzyl-Aryg, Kochetovo, Balgazyn, Sukpak, Sumon Kargy. With the exception of the last one, the listed settlements are located no more than 120 km from Kyzyl.

The age profile of migration shows differences between Kyzyl and other municipalities. Within the region, the most mobile population is aged 15 to 39. In other words, migration is widespread not only among students, but also among older cohorts, with all age groups showing a negative migration balance in relation to the regional capital. In the interregional level, the peak of outmigration is much more pronounced and occurs among those entering universities (ages 15–19). A positive balance is observed among those aged 20 to 24, but this is partly determined by the

[7] Source: Rosstat DBMI. URL: https://rosstat.gov.ru/dbscripts/munst/ (accessed 10 December 2024).

removal of students from the registration records after completing their studies — automatic returns. People of retirement age also tend to migrate, although to a lesser extent, which rather indicates the existence of a family strategy: children studying and working outside the region and their parents subsequently moving to be with them after retirement (Fig. 3).

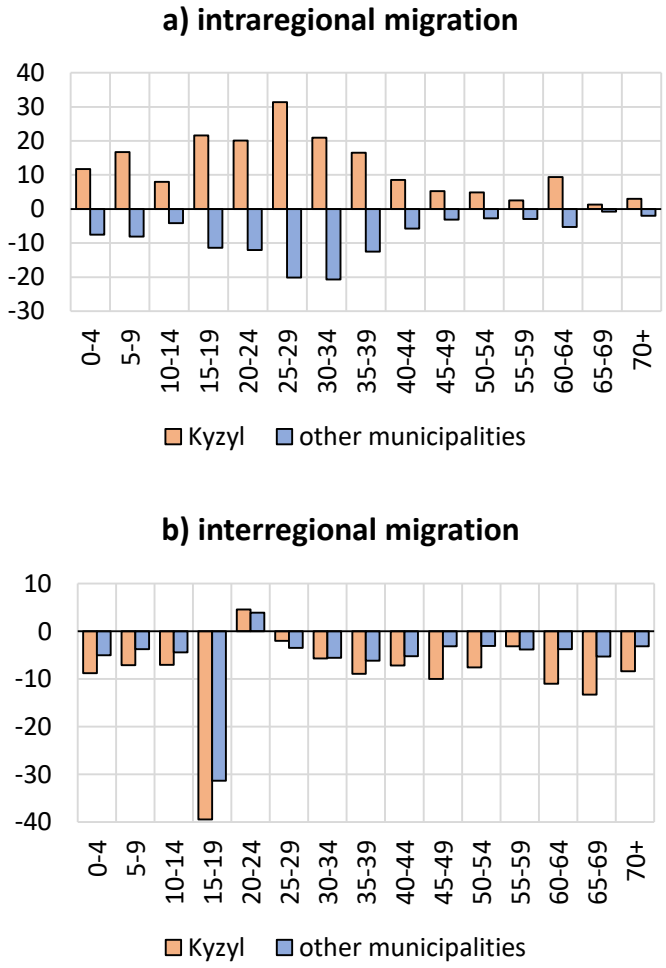

Fig. 3. Migration growth rates in the Republic of Tyva by type of migration and age group, 2023 [8].

An analysis of migration processes in the region revealed a high proportion of interregional educational migration. The results of previous studies prove that preserving and developing the educational infrastructure within the region is crucial to reducing the outflow of young people from the republic; educational centers require a rural population in the surrounding areas to compensate for the interregional outflow [23, Lytkina T.S., Smirnov A.V.]. In 2022, the Republic of Tyva had only one university (Tyva State University), with a total of 3,316 students. There are 8,667 students enrolled in 16 secondary vocational education institutions, half of which are located in Kyzyl. As demand for educational services increases, the shortage of state-funded places may lead to higher interregional migration outflows [24, Rostovskaya T.K., Vasilyeva E.N., p. 207].

Data on the digital footprints of the population from profiles on the social network VKontakte allow identifying population migration trajectories. A chord diagram constructed using G. Abel's algorithm [25] demonstrates that more than half of those leaving Tyva's districts move to

[8] Source: Rosstat DBMI. URL: https://rosstat.gov.ru/dbscripts/munst/ (accessed 10 December 2024).

Kyzyl, while residents of the capital most often move to Krasnoyarsk, Moscow, Novosibirsk, and Abakan. Reverse flows are several times smaller. Movements between rural areas are insignificant (Fig. 4).

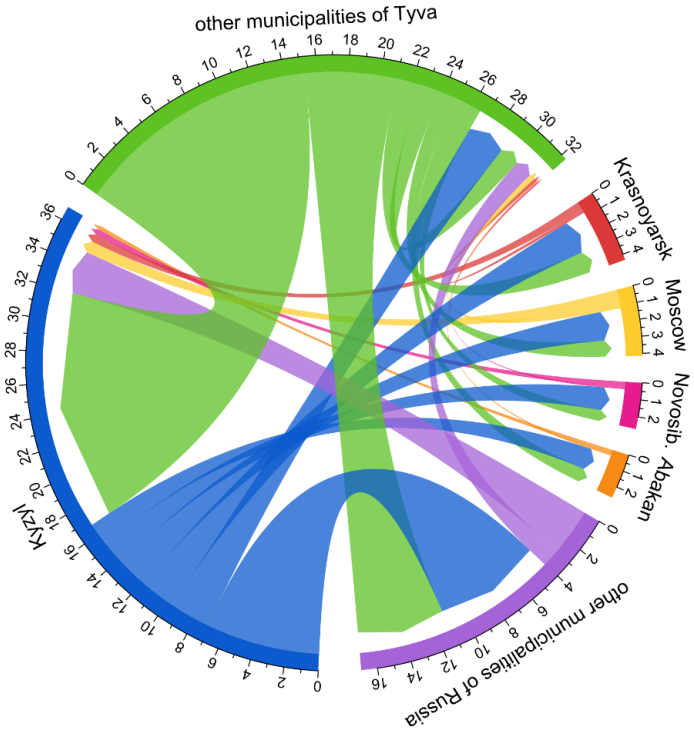

Fig. 4. Distribution of population migration in the Republic of Tyva by municipalities, % [9].

The absence of centers comparable to Kyzyl means that the migration patterns of the region's residents are rather uniform: rural areas provide an influx of population to cities. At the same time, the social potential of the most remote and isolated settlements, which are in a state of social exclusion [26, Lytkina T.S.], remains untapped. If social support measures are not implemented in a timely manner, the processes of aging and poverty reproduction will accelerate here.

Birth rate

The preservation of the traditional economy and material incentives contribute to the relatively high birth rate in the region. Comparing different historical periods, it is noteworthy that the total fertility rate began to decline during the Soviet era, and the number of children per family gradually decreased. In 1989, it was 3.31. Expanded reproduction in the region was maintained until 1996, but since 1993, this was exclusively due to rural women. The total fertility rate for urban women reached its minimum (1.52) in 2000, and for rural women — a year later (2.15). With the improvement of the economic situation in the country, by 2002 the total fertility rate for rural women had risen to 2.46, and for urban women — to 1.77. We assume that the level of ethnic self-awareness may also have influenced the growth in fertility during this period. The introduction of programs to stimulate the birth rate in the country in 2007 led to a significant

[9] Source: Virtual Population of Russia. URL: https://webcensus.ru/ (accessed 10 December 2024).

increase among both urban and rural women (2.34 and 3.11, respectively). Overall, rural women were more responsive to social support measures. The indicator reached its maximum values in 2020 in towns (2.88) and in 2014 in rural areas (6.41), after which it began to decline. Nevertheless, the region still appears to be prosperous in terms of birth rates. The share of children in the population has remained virtually unchanged since the early 2000s, remaining just above 30% (in 2021, it was 32.7%). It is worth noting that in terms of birth rates in Russia, Tyva is second only to Chechnya, where ethnic identity is also strong and the quality of life is significantly higher.

Kyzyl, a city that attracts the population of rural settlements, is less capable of reproducing its population, which indicates an accelerating demographic transition. Relatively low birth rates are also recorded in the neighboring Piy-Khemskiy, Chedi-Kholskiy, Kyzylskiy, and Tandinskiy districts. The first two districts experience a slight migration outflow, while the latter show an increase. Remote areas (Bay-Tayginskiy, Barun-Khemchikskiy, Dzun-Khemchikskiy, Sut-Kholskiy kozhuuns, etc.), on the contrary, have the highest birth rates, but also the highest migration outflow (Fig. 5).

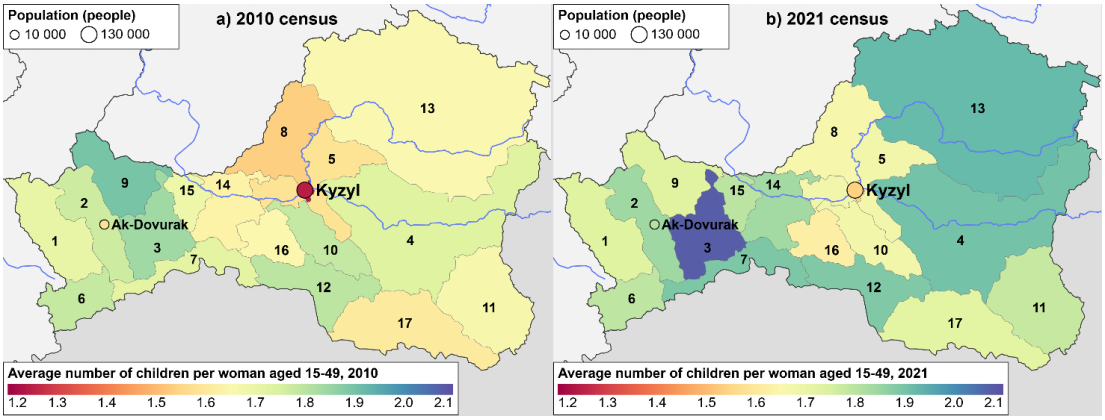

Fig. 5. Average number of children per woman of reproductive age in the Republic of Tyva by urban okrugs and municipal districts, 2010 and 2021 [10].

Conditional generation indicators better demonstrate short-term changes in fertility. In a nationwide study covering 2011–2019, all territories of Tyva, along with some republics of the North Caucasus, were among the regions with the highest birth rates [21, Petrosyan A.N.]. In 2014–2023, the total fertility rate, calculated using the indirect standardization method, decreased in all municipalities of the republic by an average of 1.65. Although the birth rate was higher than the reproduction level everywhere except the Erzinskiy and Kyzylskiy districts, measures to stimulate fertility are no longer as effective as they were previously (Fig. 6). It can be assumed that cohorts of women born in the 21st century will no longer reach the replacement level. Data from the 2021 census make it possible to track the dependence of the fertility rate on ethnicity and region of residence. Thus, the birth rate among Tyvan women living in Tyva is significantly higher than among Tyvan women in other regions of Russia (2,094 and 1,783 children per 1,000 women aged 30 to 34, respectively). The birth rate among Russian women is also higher

[10] Source: 2010 and 2021 census results. URL: https://24.rosstat.gov.ru/folder/66693 (accessed 10 December 2024).

in the republic (1,625 versus 1,296 in the rest of Russia). The Tyvan-Tojin sub-ethnic group leads the region in terms of the average number of children per woman (2,502).

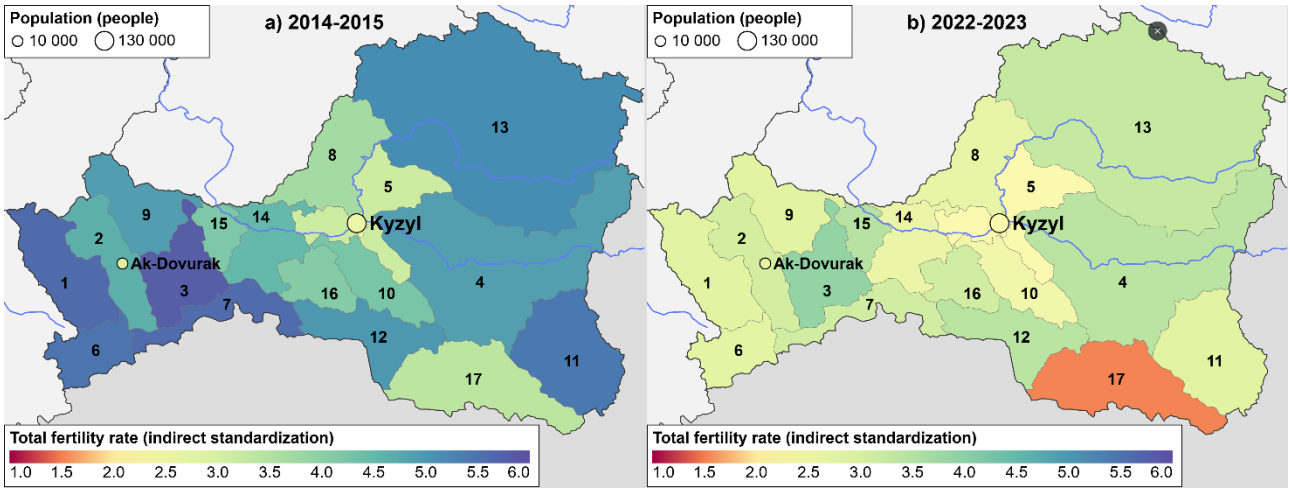

Fig. 6. Standardized total birth rate in the Republic of Tyva by urban okrugs and municipal districts, 2014–2015 and 2022–2023 [11].

Analysis by age group and settlement type showed that, despite the increase in the overall birth rate, a decline in rates is observed in both the youngest cohorts (18–24 years) and older cohorts (45 years and older). The decline in the number of births and the postponement of childbirth by young women indicates the westernization and globalization of culture and the focus of young people on their careers [1, Lamazhaa Ch., p. 305]. The increase in the number of children among older urban women is more likely to reflect the impact of financial incentives and the availability of social services during pregnancy and childbirth for urban women who have decided to have a child closer to the age of 40 or even later.

As in most regions of the world, women in Tyva are differentiated into two groups: those who consciously refuse to have children and those who are focused on family and children. The distribution of women by number of children born indicates a decline in the proportion of large families. For women aged 60 and over in 2010–2021, whose fertility period was in the 1960s–1980s, having many children was the norm. Almost one in three women gave birth to five or more children (Fig. 7).

[11] Source: Rosstat DBMI. URL: https://rosstat.gov.ru/dbscripts/munst/ (accessed 10 December 2024).

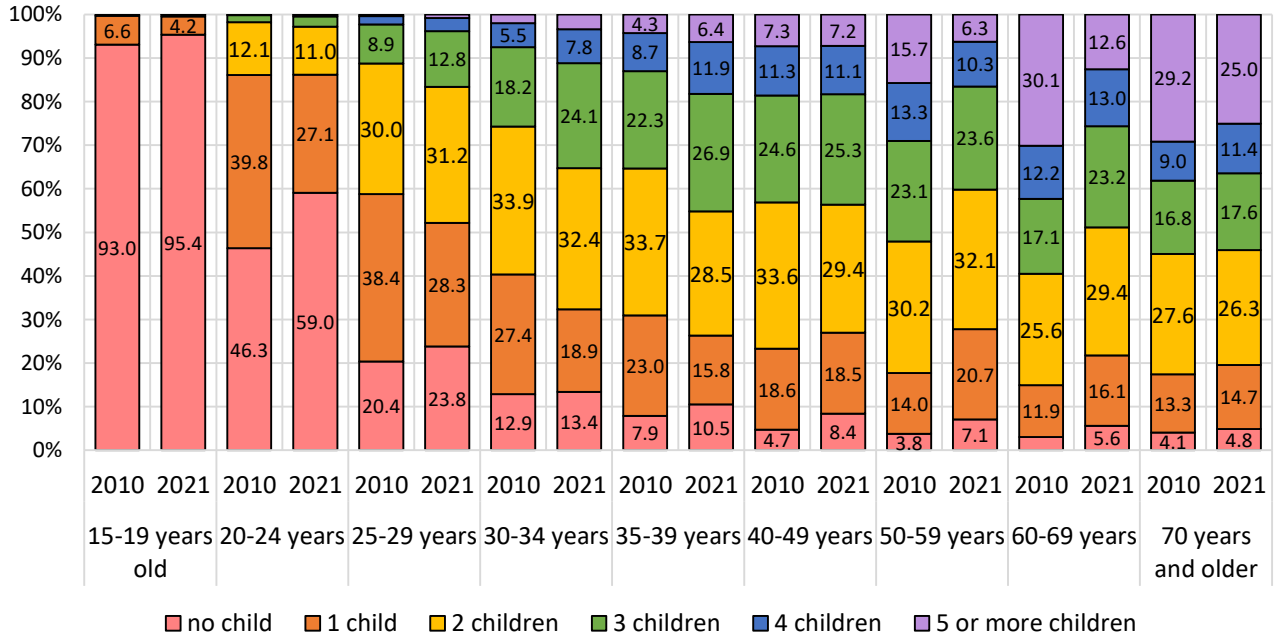

Fig. 7. Distribution of women in the Republic of Tyva by age group and number of children born, 2010 and 2021, % [12].

For the next generation of women, the desire to have a large number of children in the family is declining sharply. Among women over 50, whose active reproductive years coincided with the economic reforms of the 1990s, the proportion of those who have decided not to have children is increasing significantly. Having two or three children in the family is becoming the norm. Looking at younger cohorts (especially those aged 20 to 24), whose reproductive plans may still be realized in the future, we can observe an increase in the number of childless or delayed births, which demonstrates signs of a second demographic transition — a re-evaluation of individual views on marriage and family [27, Kalabikhina I.E., Kuznetsova P.O., p. 25]. Although the demographic transition in Tyva is usually characterized as incomplete, the combination of signs of the first and second transitions may have theoretical explanations. It is well known that the later the demographic transition begins, the faster it occurs. What took some Western countries several centuries to achieve, some developing countries can complete in just one or two generations. In Tyva, where the transition is particularly late, this may be even more pronounced — signs of both transitions are observed simultaneously in different age cohorts. It should also be noted that the westernization of traditional societies through the internet and television may lead to the spread of new family and fertility patterns even before the economic foundations for the transition are established [28, Frantsuz Yu.A.]. The increase in the proportion of women aged 25–34 with two and three children gives cause for optimism, on condition that the proportion of childless women does not grow rapidly.

The region maintains a high birth rate. During the most difficult economic times, Tyva owes its population reproduction to rural women living in remote peripheral areas. The capital city has a lesser population reproduction rate. However, it should be noted that improvements in social

[12] Source: 2010 and 2021 census results. URL: https://24.rosstat.gov.ru/folder/66693 (accessed 10 December 2024).

infrastructure and financial incentives have contributed to an increase in the number of births among urban women in older age groups, including a shift away from childlessness — a reproductive behavior more typical for this social group.

Mortality and life expectancy

In 2023, life expectancy for women in Russia was 78.7 years, compared to 73.3 years in Tyva. Life expectancy for men was 68.0 years in Russia and 59.9 years in Tyva. The difference in life expectancy between Tyvan women and men is 13.4 years, a quarter higher than the Russian average. It should be noted that in 2023, life expectancy for rural men was only 56.7 years. This is one of the lowest rates in the country. Only Chukotka Autonomous Okrug and Magadan Oblast have lower rates. Age-specific mortality rates in Tyva are significantly higher than the Russian average in all age groups over 15.

Let us consider the leading causes of death in the region; their impact on life expectancy (at birth) exceeds a quarter of a year. The data show how much the life expectancy of the population would change if mortality from a single cause was eliminated and mortality from other causes remained unchanged. Let us focus on those causes for which mortality in Tyva exceeds the average for the country and the northern regions. First, there is a group of seven external causes of death (Table 2).

Table 2

*Life expectancy losses from external causes of death in the Republic of Tyva, northern regions *, and Russia, 2015–2021* [13]

Code	Cause of death	Men			Women		
		Russia	North	Tyva	Russia	North	Tyva
285	Homicide (assault, violence) committed by another person	0.16	0.26	0.94	0.06	0.09	0.24
294	Contact with a sharp or blunt object with uncertain intentions	0.21	0.26	0.69	0.06	0.08	0.25
290	Hanging, strangulation, and suffocation with uncertain intentions	0.16	0.23	0.68	0.04	0.05	0.20
258	Injuries in traffic accidents	0.21	0.23	0.47	0.09	0.11	0.33
284	Other intentional self-harm (incl. suicide)	0.39	0.50	0.51	0.09	0.13	0.23
302	Exposure to extreme cold	0.11	0.15	0.35	0.04	0.07	0.35
279	Accidental alcohol poisoning	0.19	0.18	0.27	0.06	0.08	0.28

** North is a weighted average for 13 regions that are fully included in the List of Far North regions and equivalent areas: the Republics of Karelia, Komi, Sakha (Yakutia), and Tyva; Kamchatka Krai; Arkhangelsk, Magadan, Murmansk, and Sakhalin Oblasts; Chukotka, Nenets, Khanty-Mansi–Yugra (KhMAO), and Yamalo-Nenets (YNAO) Autonomous Okrugs.*

The impact of homicides is 5.9 times higher than the national average for men and 4.0 times higher for women. Overall, homicides reduce the life expectancy of the population by 0.6 years. The impact of a number of other external causes of death is many times higher in Tyva: contact with sharp and blunt objects (impact — 0.47 years), strangulation with uncertain intentions (0.44), and road traffic accidents (0.40). It is interesting to note that the impact of low temperatures is significantly higher than not only the national average, but also the average for regions in the Far North. Exposure to extremely low natural temperatures reduces life expectancy

[13] Source: compiled by the authors based on data from RosBRiS.

by 0.35 years. Accidental alcohol poisoning, which often leads to other external causes of death, reduces life expectancy by 0.28 years. Tyva shares a high male mortality rate from suicide with other northern regions. All of these causes of death are the result of poverty and the socio-psychological state of the population, as a reaction to difficulties in solving everyday problems, the awareness of a low quality of life and social inequality, leading to the marginalization of the individual and the manifestation of destructive forms of behavior. In addition to the seven external causes, 13 other leading causes of death in Tyva were identified (Table 3).

Table 3

Life expectancy losses due to other (excluding external) causes of death in the Republic of Tyva, northern regions, and Russia, 2015–2021 [14]

Code	Cause of death	Men			Women		
		Russia	North	Tyva	Russia	North	Tyva
129	Atherosclerotic heart disease	1.04	1.12	0.59	0.95	0.97	0.90
133	Other forms of acute ischemic heart disease	0.36	0.38	0.80	0.16	0.18	0.63
9	Respiratory tuberculosis, confirmed bacteriologically and histologically	0.10	0.10	0.90	0.03	0.04	0.42
142	Intracerebral and other non-traumatic intracranial hemorrhages	0.29	0.28	0.42	0.23	0.23	0.70
149	Consequences of cerebrovascular diseases	0.14	0.19	0.33	0.13	0.18	0.47
183	Liver fibrosis and cirrhosis (except alcoholic)	0.34	0.25	0.33	0.28	0.27	0.46
162	Pneumonia without specified pathogen	0.26	0.26	0.41	0.15	0.18	0.32
320	Coronavirus infection caused by COVID-19	0.41	0.38	0.24	0.52	0.49	0.38
244	Other types of sudden death of unknown cause, death without witnesses	0.46	0.53	0.41	0.18	0.20	0.20
143	Cerebral infarction	0.41	0.31	0.23	0.41	0.33	0.37
64	Malignant neoplasm of the trachea, bronchi, or lungs	0.50	0.51	0.37	0.13	0.15	0.16
127	Acute myocardial infarction, including complications after acute myocardial infarction	0.29	0.30	0.30	0.19	0.20	0.23
56	Malignant neoplasms of the stomach	0.20	0.20	0.30	0.14	0.16	0.21

The Republic of Tyva has the highest mortality rate from respiratory tuberculosis, confirmed bacteriologically and histologically. Although this cause of death is not considered an external one, it also reflects the region's depressed state. Tuberculosis is largely determined by social factors such as inequality, urbanization, food security and malnutrition, housing conditions, the environment, and barriers to accessing healthcare [29, Hargreaves J.R. et al.]. Life expectancy losses from this cause are 9.0 times higher than the national average for men and 14.0 times higher for women. This cause reduces the life expectancy of the entire population by 0.66 years. Tyva has a lower mortality rate from cardiovascular diseases such as atherosclerotic heart disease and cerebral infarction. This is probably due to higher mortality from external causes at an early age. In other words, the region's population does not live long enough to develop diseases of old age. At the same time, the cause "other forms of acute ischemic heart disease" accounts for several times more deaths than the Russian average. The impact of pneumonia in the republic is approximately twice as high as the average, but mortality from coronavirus infection caused by COVID-19 has taken fewer years of life than in Russia and the Far North. This is due to the smaller

[14] Source: compiled by the authors based on data from RosBRiS.

proportion of elderly people in the population. The low excess mortality in Tyva is confirmed by other studies [30, Nikitin B., Zakharova M., Pilyasov A. et al.].

Despite some increase in life expectancy in the republic since 2003, mortality from preventable causes remains extremely high. While one part of the population has begun to live significantly longer, another (primarily men in rural areas) dies from causes related to alcohol, poverty, and deprivation. Urban women have a 20-year longer life expectancy (76.0 years) compared to rural men (56.7 years). Low life expectancy rates are also observed among rural women (70.0 years) and urban men (62.3 years) [15]. The potential for increasing the life expectancy of the population is primarily linked to systematic efforts to reduce mortality from specific causes that are preventable, i.e. those that can be influenced by the healthcare system through prevention, detection and timely treatment of diseases in their early stages. It is important to note that Tyva, like many other peripheral regions, is facing a shrinking social infrastructure. For example, the number of hospital beds decreased from 5,000 to 3,700 between 2000 and 2022. The population per bed increased from 60.9 to 91.5 people. The dynamics of organizations outside the regional capital, in rural areas, is a cause for concern. Thus, the number of ambulatory and polyclinic organizations decreased from 75 in 2003 to 40 in 2022, and the number of hospitals decreased from 50 to 29 during the same period [16].

Nevertheless, the overall capacity of outpatient and polyclinic organizations, as well as the number of doctors and nursing staff, increased. We assume that this contributed to the success in reducing infant mortality (Fig. 8). While in 2000, infant mortality in the republic was twice as high as the Russian average (30.0 and 15.3‰), in 2020–2022, the figures were almost equal (5.1 and 4.5‰ on average over the three years, respectively). In terms of early neonatal mortality (within the first 7 days of life), Tyva is also close to the Russian average.

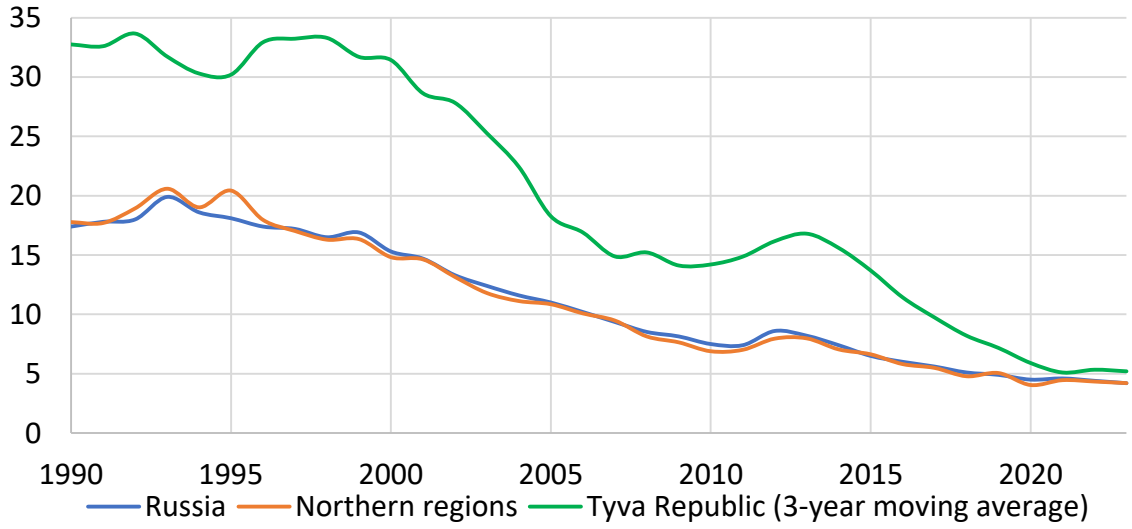

Fig. 8. Infant mortality rate per 1,000 live births in the Republic of Tyva, northern regions, and Russia, 1990–2023 [17].

[15] Life expectancy at birth. EMISS. URL: https://www.fedstat.ru/indicator/31293 (accessed 10 December 2024).
[16] Statistical Yearbook of the Republic of Tyva 2023. URL: https://24.rosstat.gov.ru/folder/45814 (accessed 10 December 2024).
[17] Source: EMISS. URL: https://fedstat.ru/indicator/31166 (accessed 10 December 2024).

A research of standardized mortality rates in all regions of Russia for 2008–2012 showed that all municipalities in the Republic of Tyva are among the most disadvantaged in terms of both male and female mortality [31, Timonin S., Jasilionis D., Shkolnikov V.M. et al.]. Data for 2014–2023 demonstrate that life expectancy indicators have improved across almost the entire republic. Kyzyl and the Kyzylskiy district are in the lead, while the worst indicators are in the peripheral territories in both the western and eastern parts of the region. On average, the standardized mortality rate across all territories decreased by 2.2‰ (Fig. 9).

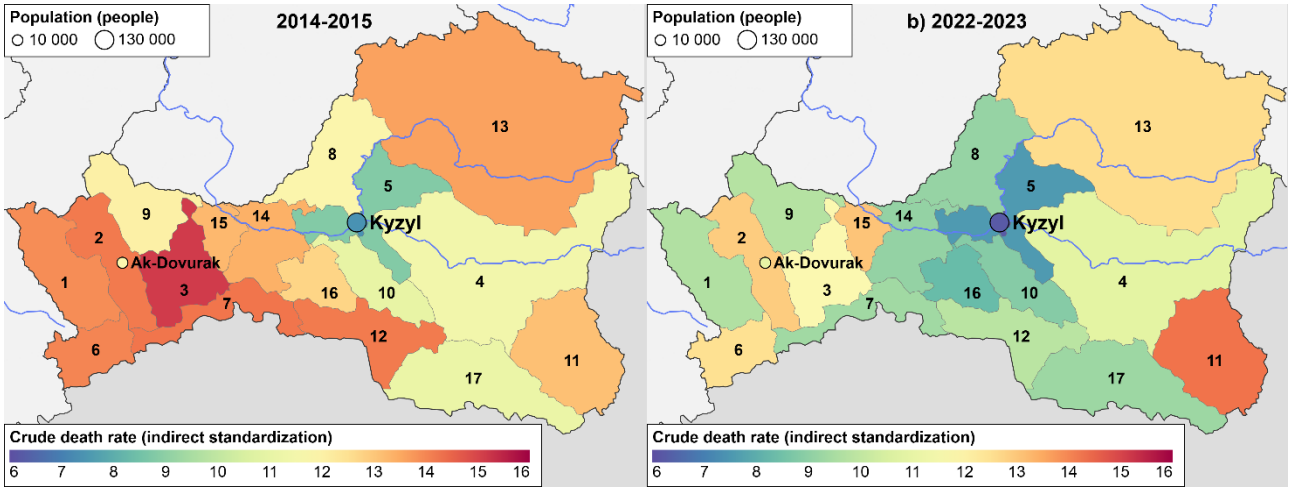

Fig. 9. Standardized mortality rate in the Republic of Tyva by urban okrugs and municipal districts, 2014–2015 and 2022–2023 [18].

As a result of high male mortality, the proportion of men has decreased by 2 percentage points since the last Soviet census and stabilized at approximately 47.2%. With a high proportion of the population under working age (over 30%), the proportion of elderly people aged 60 and over has increased more than 1.5 times, while the average and median ages of the population are steadily increasing. Losses in the working-age population due to mortality in the republic are close to those due to migration. The conducted analysis of the causes of death demonstrates the need to improve the material standard of living, the quality of life, and the level of education of the population. The Republic of Tyva has demonstrated significant success in reducing infant mortality, but there are still numerous causes of death among working-age people due to alcoholism and high levels of poverty. These include tuberculosis, homicide, suicide, poisoning, exposure to low temperatures, traffic accidents, and pneumonia.

Demographic trends and prospects for Tyva

In order to make assumptions about the demographic future of the republic, let us consider the dynamics of the main indicators of population reproduction in comparison with the northern regions and Russia as a whole. The total birth rate for the last three decades shows that, despite considerable variability, Tyva consistently exceeds the average birth rate for northern Russia. Only for a few years at the turn of the millennium the region failed to reach the replacement rate. Since 2015, this rate has been declining, but remains the highest in northern

[18] Source: Rosstat DBMI. URL: https://rosstat.gov.ru/dbscripts/munst/ (accessed 10 December 2024).

Russia. The difference between Tyva and northern regions in modern Russia has always been at least 0.5 (Fig. 10a).

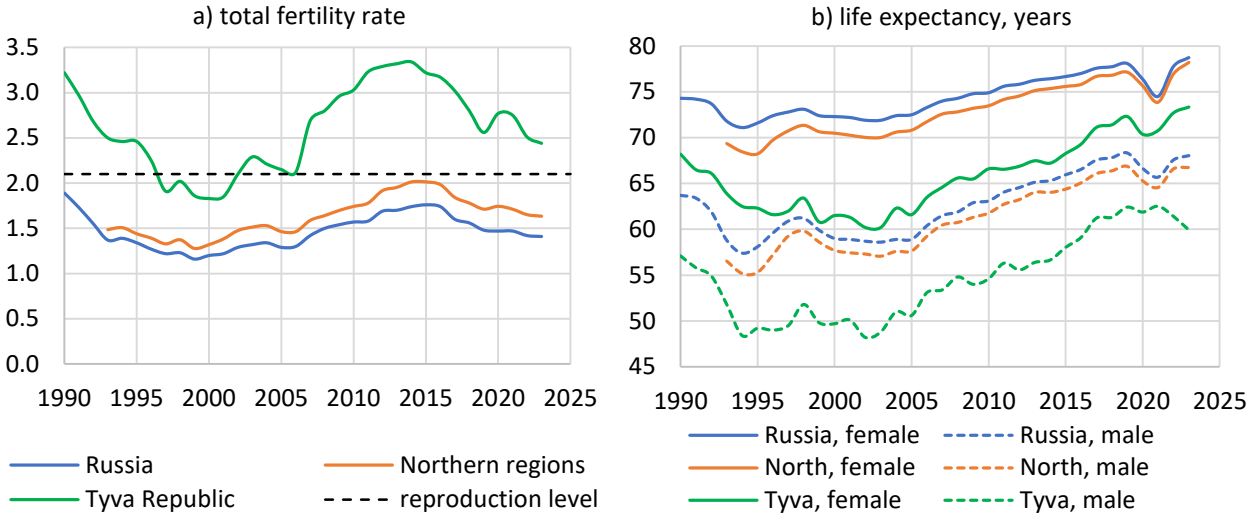

Fig. 10. Dynamics of population reproduction indicators in Russia, northern regions and Tyva, 1990–2023 [19].

Life expectancy in the republic grew from the mid-2000s until the pandemic period (Fig. 10b). The study showed that there is still significant potential for further mortality reduction. Over the past three decades, men in Tyva have lived on average 6.6 years less than in the Russian North, while women have lived 7.2 years less. This gap is gradually narrowing for women, but remains high for men.

What are the demographic prospects for Tyva? The population forecast by Rosstat shows that while the population of the North will continue to decline (by 1.6% by 2045), the number of residents in Tyva will grow (by 21.5% or 72,500 people). This is the best forecast among all northern regions. Yakutia and the Yamalo-Nenets Autonomous Okrug are in second and third place, with population growth forecast at 12.7%. By comparison, according to the same forecast, the Komi Republic will lose 26.3% of its population, the Arkhangelsk Oblast — 20.3%. While Tyva accounted for 4.5% of the population of the northern regions at the beginning of 2024, this figure is projected to increase to 5.6% by 2045 (Table 4).

Table 4

Forecast of the population of the northern regions of Russia and the Republic of Tyva [20]

Indicator	2024 (actual)	2025	2030	2035	2040	2045	Growth, 2024–2045, %
Total number, thousands of people							
Northern regions	7 441.5	7 395.4	7 298.6	7 250.7	7 265.0	7 324.7	-1.6
Republic of Tyva	337.5	341.7	353.4	369.8	389.8	410.0	21.5
Tyva's share among northern regions, %	4.5	4.6	4.8	5.1	5.4	5.6	
including those of working age							

[19] Source: EMISS. URL: https://fedstat.ru/indicator/31517; https://fedstat.ru/indicator/31293 (accessed 10 December 2024).

[20] Source: Estimated population of the Russian Federation until 2045. Rosstat. URL: https://gks.ru/compendium/document/13285 (accessed 10 December 2024).

Northern regions	4456.1	4424.3	4590.7	4628.3	4564.8	4445.9	-0.2
Republic of Tyva	192.2	196.5	218.6	232.2	241.2	246.9	28.5
Tyva's share among northern regions, %	4.3	4.4	4.8	5.0	5.3	5.6	

The working-age population in Tyva will grow even more significantly over the same period — by 28.5% (or 54,700 people), while in the north, according to the forecast, it will remain almost unchanged. This is particularly important given that, according to the Spatial Development Strategy, Russia's border regions, along with the Arctic and the Far East, are considered geostrategic territories crucial for ensuring the country's connectivity and national security.

Conclusion

Existing state and regional programs promoting the preservation of the traditional way of life of the Tyvans, aimed at stimulating the birth rate and supporting large families, do not address the problem of poverty. The prolonged financial deprivation of Tyvan families and the population's dependence on social benefits are a cause for concern, as they lead to the formation of a culture of dependency and poverty. For the region, this means dependence on the central government's loyalty and a reduction in the territory's potential for socio-economic development. Therefore, the republic's authorities should focus their efforts on stimulating the economy through the diversification of economic practices and the strengthening of horizontal ties in local communities, where various social groups participate in the formation of regional development strategies.

Currently, the population outflow is not as massive as in some other regions of the Russian North. Educational migration cannot be considered a negative factor, as it contributes to the improvement of the workforce's skills and the population's standard of living. The main way to improve the situation here is to encourage people to return after completing their education. A familiar linguistic and cultural environment may be a significant attraction for Tyvans, but without the creation of highly skilled jobs and the development of the cultural and entertainment industries, it will be impossible to significantly reduce the outflow of educated youth. In order to encourage young professionals to return, it is necessary to provide information about employment opportunities in the region at the end of their studies, so that they can realize their professional ambitions [21]. Meanwhile, for older age groups, it is necessary to improve the conditions for entrepreneurship and the accessibility and quality of social services. The tendency of the older population to leave may send a negative signal to young people, encouraging them to migrate. The difficult economic situation in the region leads to the formation of family strategies in which parents are interested in their children leaving the region. From the perspective of their life experience, the older generation determines and finances the migration needs of young people through education outside the region. The choices made by young people, in turn, are primarily determined by their environment and the people close to them.

[21] Similar practices are widely used in the European North [32, Kull M. et al., p. 142].

High birth rates are maintained in Tyva as a result of the high status of the family in the hierarchy of values, ethnic identity, and financial incentives. The main burden falls on rural women, who are "pulling" the demographic situation towards positive indicators, despite low life expectancy and migration losses. Currently, there is a view that measures to stimulate the birth rate should be targeted specifically at women who are interested in having families with many children. However, in our opinion, such measures may have a positive but limited effect, especially in families where domestic violence is common and there are signs of deviant behavior on the part of one of the spouses. It is important to maintain and develop social infrastructure (kindergartens, schools, medical facilities) in remote areas where the birth rate remains high. It is feasible to consolidate nearby settlements in order to optimize social services for the population, but this should only be done with consideration for the needs and lifestyles of residents in these remote areas. The region has undoubtedly achieved success in reducing infant and child mortality. The development of medical services and improving their quality require qualified specialists and investment in social infrastructure. Creating a comfortable environment is an important factor not only for local residents, but also for attracting tourists from other regions of Russia. The expansion of tourism, in turn, can stimulate the development of a whole range of other activities, such as the creation of souvenir products, food and light industry. Currently, employment in these sectors remains low, and poverty continues to drain the region's economic resources without solving strategic problems.

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Professional and Qualification Asymmetries in the Labor Market of the Northern Regions of Russia

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Abstract. The article examines issues related to the correspondence between the qualitative characteristics of the employed population and their jobs. The practice of hiring workers with inadequate qualifications leads to additional costs for both the enterprise and the workers themselves. When this situation becomes widespread, the resulting losses are also felt at the meso- and macrolevels. The aim of this work is to develop tools for assessing the consistency of the professional and qualification characteristics of the employed population with the requirements of jobs. The object of the study is the labor market in the northern regions of Russia. The main source of information is the results of the Labor Force Survey conducted by Rosstat in 2022. The main occupational groups are assigned a corresponding level of qualification. Based on this, qualification asymmetry coefficients are calculated for each of the regions of northern Russia. The level of useful qualification asymmetry has been identified, expressed as a stock of competencies equal to one qualification level. In this case, more highly qualified workers ensure an increase in the level of equipment and efficiency of production processes, while workers with insufficient qualifications have the opportunity to improve their qualifications directly in the workplace. In this study, professional asymmetry is determined by respondents' subjective assessment of the connection between their current job and their profession. The results presented can be used to monitor the situation in the labor market and education, which will allow for more effective use of the labor potential of the population.
Keywords: *labor potential, northern regions of Russia, labor market asymmetries, labor market structure, labor force*

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Introduction

Aligning supply and demand, as well as the qualitative characteristics of the working-age population, is a key issue in the theory of economic development based on labor productivity growth. This problem has remained the focus of attention for both theorists and practitioners throughout the history of modern Russia [1] [1, Gimpelson V.E., Kapelyushnikov R.I., Karabchuk T.S.;

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[1] Bjørnstad R. Demand and supply of labor by education towards 2030. Linking demographic and macroeconomic models for Norway / Reports 2010/39. Statistisk sentralbyrå. 44 s. URL: https://www.ssb.no/en/arbeid-og-lonn/artikler-og-publikasjoner/demand-and-supply-of-labor-by-education-towards-2030 (accessed 08 October 2024).

2, Gimpelson V.E., Sharunina A.V.; 3, Korovkin A.G., Dolgova I.N., Edinak E.A., Korolev I.B.; 4, Korovkin A.G., Korolev I.B., Edinak E.A.; 5, Brinca P., Duarte J.B., Faria-e-Castro M.].

An analysis of the structure of supply in the Russian labor market based on data from the Labor Force Survey revealed significant underutilization of the working population's potential and low efficiency of investments in human capital [1]. A high level of structural imbalance, or asymmetry, in the labor market limits economic development [6, Ivanter V.V. et al.]. Moreover, asymmetry in the labor market manifests itself with varying intensity in different regions. In addition, there are structural imbalances in qualifications across occupational groups [7, Toksanbaeva M.S., Popova R.I.]. The degree of alignment between professional and qualification characteristics in the labor market is influenced by such factors as the quality of training of personnel in the vocational education system, the relevance of the professional education received to the work performed, and the type of settlement [8, Klyucharev G.A.; 9, Lokosov V.V., Yarasheva A.V., Makar S.V.]. Professor A.G. Korovkin and his co-authors proposed a tool for analyzing the coordination of supply and demand of labor, taking into account its educational characteristics [4]. According to their estimates, structural imbalances in the labor market are unstable throughout a year and vary seasonally, but there are certain regions that stand out in terms of structural unemployment. Thus, 7 out of 20 regions with severe labor market imbalances are in the northern regions [3].

The need to ensure the country's economic and technological sovereignty in the short term is due to the aggravated foreign policy situation. The goals set can be achieved through the most effective and comprehensive use of the country's natural resources, production, innovation, and labor potential. N.M. Rimashevskaya, together with her colleagues, gave the most comprehensive definition of labor potential as "a complex socio-economic category that is a generalized (integral) assessment of the quantitative and qualitative characteristics of the economically active population's ability to perform creative work" [10, Rimashevskaya N.M., Bochkareva V.K., Volkova G.N. et al.]. Increasing labor potential makes it possible to improve the competitiveness and sustainability of the national economy [11, Kryshtaleva T.Yu.]. As a complex indicator, labor potential includes various qualitative components: intellectual, social-personal, psychophysiological [12, Migranova L.A., Toksanbaeva M.S.]. The intellectual component, determining the ability to perform work of a certain content and complexity (qualifications), is a key factor in economic development [7, Toksanbaeva M.S., Popova R.I.; 13, Heckman J.J., Kautz T.]. At the same time, the quantitative characteristic of labor potential is of significant importance, but demographic problems accumulated over previous decades are now a significant limiting factor for development. In the northern regions, the processes of depopulation and intensive migration are most acute [14, Fauser V.V., Smirnov A.V., Fauser G.N.].

The problem of an acute shortage of economically active population, especially in the northern regions of Russia, is combined with pronounced imbalances in the labor market, which makes it urgent to develop a methodology for assessing professional and qualification asymmetry

in the labor market of the northern regions of Russia and to identify reserves that increase the efficiency of using the labor potential of the population of the territory.

In recent years, the labor market has undergone significant changes related to both the structure of labor demand and the structure and quantity of labor supply. Developing a methodology for assessing qualitative characteristics, primarily educational and intellectual components, and their compliance at the local level is an integral part of the overall concept of economic development in the new economic conditions, which determines the practical importance of this study.

The aim of this work is to develop tools for assessing the compliance of the professional and qualification characteristics of the employed population with job requirements; to assess the level of professional and qualification asymmetry on the basis of the developed tools; to identify the share of useful asymmetry in the labor market of the northern regions of Russia. In this study, we define northern regions as regions that are fully or partially located in the Far North and equivalent areas [2]. The object of the study is the employed population of the northern regions of Russia.

The novelty of this study lies in the development of a methodology for assessing professional and qualification asymmetry and the level of useful asymmetry. Using northern regions of Russia as an example, an assessment of the potential for reducing existing imbalances by utilizing useful professional and qualification asymmetry in the labor market was made.

Research methods

The main source of information is data from the 2022 Labor Force Survey [3]. This survey is conducted monthly by the Federal State Statistics Service in all regions of the country. The average annual data is the most accurate and representative for the constituent entities of the Russian Federation. The survey involves individuals aged 15 years and older, and data is collected through personal interviews according to the methodology of the International Labor Organization. Researchers studying labor market issues often use data from the Russian Longitudinal Monitoring Survey (RLMS) [4] [2, Gimpelson V.E., Sharunina A.V., 15, Maltseva I.O., 16, Oshchepkov A.Yu.]. This survey differs from those conducted by Rosstat in its data collection methodology. It is conducted in a limited number of populated areas and does not cover all constituent entities of the Russian Federation, but is representative of the entire country. The unique nature of the RLMS data justifies the use of this survey data; however, its representativeness for Russia as a whole, rather than for its individual regions, imposes certain limitations. In addition to the microdata from the afore-

[2] According to the Russian Federation Government Resolution of 16.11.2021 N 1946 "On approval of the list of regions of the Far North and localities equivalent to regions of the Far North, for the purpose of providing state guarantees and compensation for persons working and living in these regions and localities, recognizing as invalid certain acts of the Government of the Russian Federation and recognizing as invalid on the territory of the Russian Federation certain acts of the Council of Ministers of the USSR".

[3] Results of the Labor Force Survey. *Federal State Statistics Service*. URL: https://rosstat.gov.ru/compendium/document/13265 (accessed 16 November 2024).

[4] Russian Longitudinal Monitoring Survey (RLMS HSE), conducted by the National Research University Higher School of Economics and the Demoscope Research Center with the participation of the Population Center of the University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Research Sociological Center of the Russian Academy of Sciences. URL: http://www.hse.ru/rlms; https://rlms-hse.cpc.unc.edu (accessed 10 October 2024).

mentioned surveys, the study utilized statistical data from Rosstat and its regional offices, regulatory acts of the Ministry of Labor and Social Protection, laws and subordinate acts.

Results

A methodological tool for assessing professional and qualification asymmetry was developed on the basis of an analysis of documents by the Ministry of Labor and Social Protection of the Russian Federation, regulating professional requirements for employee qualifications in accordance with the All-Russian Classifier of Occupations.

Table 1

Correspondence of qualification levels to the main occupational groups according to the All-Russian Classifier of Occupations [5]

Managers	Qualification Level Four
Highly skilled specialists	Qualification Level Four
Mid-skilled specialists	Qualification Level Three
Employees involved in information preparation, documentation, accounting, and maintenance	Qualification Level Three
Service and trade workers, and those involved in citizen and property security	Qualification Level Two
Skilled workers in agriculture, forestry, fish farming, and fishing	Qualification Level Two
Skilled workers in industry, construction, transportation, and related occupations	Qualification Level Two
Industrial plant and machine operators, assemblers, and drivers	Qualification Level One
Unskilled workers	Qualification Level One

The mismatch between the qualification level and the job position is expressed in two ways:

- mismatch between the level of qualifications, competencies, and skills and the requirements of the job;
- underutilization of skills, knowledge, qualifications, and competencies in the workplace.

These two aspects of professional and qualification asymmetry in the regional labor market can be measured by assessing the ratio of the number of jobs where this mismatch is identified to the number of jobs where employee qualification requirements are met.

Therefore, the coefficient of qualification asymmetry ($А_{пк}$) will be determined by the formula:

$$А_к \frac{\sum(PM_в + PM_н)}{\sum PM_N}, \text{ where}$$

$А_к$ — qualification asymmetry;

PM_N — job occupied by an employee with qualifications appropriate for that job;

$PM_в$ — job occupied by an employee with qualifications higher than those required for that job;

[5] Compiled by the author based on data from the All-Russian Classifier of Occupations: OK 010-2014 (ISCO-08). All-Russian Classifier of Occupations (adopted and put into effect by Order of the Federal Agency for Technical Regulation and Metrology dated 12.12.2014 No. 2020-st) (as amended on 18.02.2021). URL: https://www.consultant.ru/document/cons_doc_LAW_177953/ (accessed 17 November 2024).

$PM_н$ — job occupied by an employee with qualifications lower than those required for that job.

The level of labor market asymmetry that contributes to the socio-economic development of territories — the useful level of qualification asymmetry — has been determined. This level of asymmetry is expressed as a stock of competencies equal to one qualification level. In this case, more highly qualified workers ensure an increase in the level of equipment and efficiency of production processes, while workers with insufficient qualifications have the opportunity to improve their skills directly in the workplace.

The useful level of qualification asymmetry is calculated using the formula:

$$A_{к.полез.}=\frac{\sum(PM_{N+1}PM_{N-1})}{PM_N}$$, where

$A_{к.полез.}$ — useful level of qualification asymmetry in the labor market;

PM_N — job occupied by an employee with the qualifications required for that position, the standard level of qualification;

PM_{N-1} — job occupied by an employee with qualifications one level below the standard;

PM_{N+1} – job occupied by an employee with qualifications one level above the standard.

Professional asymmetry in the labor market, representing a mismatch between the profession and the requirements of the job, was identified as part of the professional qualification asymmetry.

In order to measure professional asymmetry in the labor market, the employed population with a profession was surveyed. Respondents' subjective assessment of the relevance of their current job to their profession revealed that approximately half (49.4%) of them do not consider their current job to be related to their profession.

It was found that those with an education in healthcare are more likely to associate their future career with their acquired profession, while those with an education in agriculture are less likely to associate their future career with this profession. Table 2 presents respondents' answers about the connection between their current job and their profession by occupational groupings.

Table 2

Relationship between job and acquired profession by occupational groupings [6]

	Yes	Rather yes	Rather no	No	Total
Mathematical and Natural Sciences	47%	13%	8%	32%	100%
Engineering, Technology, and Technical Sciences	45%	14%	7%	34%	100%
Healthcare and Medical Sciences	82%	9%	1%	8%	100%
Agriculture and Agricultural Sciences	31%	12%	9%	48%	100%
Social Sciences	47%	17%	8%	27%	100%
Education and Educational Sciences	68%	10%	4%	18%	100%
Humanities	45%	13%	8%	35%	100%
Arts and Culture	56%	11%	5%	28%	100%
National Defense and Security. Military Sciences	59%	14%	8%	19%	100%

[6] Compiled by the author based on data from the All-Russian Classifier of Occupations. Results of a sample survey of the labor force. *Federal State Statistics Service*. URL: https://rosstat.gov.ru/compendium/document/13265 (accessed 16 November 2024).

Based on microdata from the Labor Force Survey conducted by Rosstat in 2022, a methodology for assessing professional and qualification asymmetry in the labor market was tested using the northern regions of the Russian Federation as an example. A measurement of qualification asymmetry among the working population based on the analysis of contingency tables was proposed.

Using the developed methodology, indicators of qualification asymmetry are presented and a rating of the regions of northern Russia is compiled (Table 3).

Table 3

Qualification asymmetry coefficients in the labor market of the northern regions of Russia [7]

Region	Asymmetry coefficient, overal	Asymmetry coefficient is higher	Asymmetry coefficient is lower	Asymmetry coefficient useful	Share of useful in overall asymmetry
Chukotka Autonomous Okrug	0.36	0.11	0.25	0.29	79.4%
Khanty-Mansi Autonomous Okrug	0.54	0.31	0.23	0.44	81.1%
Murmansk Oblast	0.55	0.34	0.21	0.42	75.6%
Primorskiy Krai	0.59	0.31	0.28	0.45	77.0%
Tomsk Oblast	0.63	0.34	0.29	0.52	82.8%
Tyumen Oblast, excluding Autonomous Okrugs	0.64	0.44	0.20	0.47	74.0%
Khabarovsk Krai	0.64	0.27	0.37	0.49	75.5%
Russian Federation	***0.65***	***0.35***	***0.31***	***0.50***	***76.1%***
Kamchatka Krai	0.66	0.34	0.31	0.50	76.4%
Arkhangelsk Oblast, excluding Autonomous Okrug	0.66	0.37	0.29	0.49	73.9%
Northern regions of Russia	***0.68***	***0.34***	***0.34***	***0.50***	***74.4%***
Krasnoyarsk Krai	0.68	0.30	0.38	0.47	68.6%
Tuva Republic	0.68	0.32	0.37	0.47	69.4%
Amur Oblast	0.70	0.39	0.31	0.50	70.9%
Republic of Karelia	0.71	0.40	0.31	0.52	74.1%
Magadan Oblast	0.71	0.27	0.43	0.53	74.2%
Republic of Buryatia	0.71	0.42	0.29	0.54	76.3%
Sakhalin Oblast	0.71	0.32	0.38	0.53	74.1%
Altai Republic	0.71	0.36	0.35	0.50	70.7%
Perm Krai	0.71	0.37	0.34	0.54	76.3%
Yamalo-Nenets Autonomous Okrug	0.73	0.44	0.29	0.54	74.8%
Irkutsk Oblast	0.75	0.35	0.40	0.57	76.4%
Komi Republic	0.76	0.46	0.30	0.58	76.3%
Zabaikalskiy Krai	0.77	0.29	0.48	0.52	67.1%
Nenets Autonomous Okrug	0.79	0.40	0.39	0.57	72.6%
Yakutia Republic	0.80	0.37	0.44	0.62	76.8%

According to calculations, the average indicators for Russia and its northern regions differ insignificantly in terms of both the qualification asymmetry coefficient and the useful qualification asymmetry coefficient. In addition, across the northern regions of Russia, there is equality between the indicators of overqualification and underqualification in the structure of the qualification asymmetry coefficient in the labor market. Useful qualification asymmetry across all the regions considered has a significant share in the overall asymmetry indicator.

[7] Source: compiled by the author.

Conclusion

This study developed a methodology for assessing labor market asymmetries and calculated asymmetry by regions. Among the northern regions, the highest skill asymmetry is observed in the Republic of Sakha (Yakutia). There, the ratio of jobs occupied by professionals with lower or higher qualifications to those occupied by professionals with the required qualifications reaches 0.8. At the same time, the average for the northern regions is 0.68, which is slightly above the average for Russia. In addition to the skills asymmetry coefficient, the useful asymmetry coefficient was calculated, which shows the percentage of jobs with skills asymmetry that, due to this, allow for upgrading employee qualifications to the required level in the event of a shortage, or improving the efficiency of production processes if an employee has qualifications above the required level. In the northern regions, these ratios vary significantly: from 67% in the Zabaikalskiy Krai to 83% in the Tomsk Oblast. The phenomenon of overqualification, when a job is filled by an employee with qualifications higher than required, is widely discussed in global science. On the one hand, such an employee can become a driving force for the company's development and contribute to the introduction of new technologies [17, Nelson R., Phelps E.]; on the other hand, failure to use some of the available knowledge and skills often leads to their loss. Although this study calculates the level of useful asymmetry, it should be noted that this indicator reflects the potential for growth when certain conditions are met, namely ensuring the growth of employee qualifications in the workplace when there is a shortage of such qualifications, developing production processes, and equipping workplaces with qualifications higher than those required. Since measures to bring existing qualifications into line with workplace requirements require additional investment, the useful asymmetry indicators are in fact significantly lower, especially in the northern regions, given their educational and investment potential.

In addition to the regional aspect of qualification asymmetry, the subjective assessment of the relationship between current employment and the acquired profession is shown on average across various professional groups in the northern regions. Medical specialists are most likely to work in this profession, while agricultural specialists are less likely to occupy jobs with the required qualifications: more than half of respondents with an agricultural education have current employment unrelated to their profession. Thus, the results confirm the conclusions of E.Y. Varshavskaya about the correspondence between the structure of demand in the Russian labor market and the structure of labor supply [8].

The presented methodology for determining labor market asymmetry by profession and qualification has several limitations: in particular, it only takes into account formal education, but does not consider its recentness or advanced training. Knowledge and skills acquired through educational process may become outdated, while a motivated employee can actively improve their competencies within their profession.

[8] Varshavskaya E.Ya. Where and as whom do highly educated Russians work? *Demoscope Weekly*, 2017, no. 713–714, pp. 1–20. URL: https://publications.hse.ru/articles/201325681 (accessed 11 December 2024).

The developed methodology adequately reflects the existing problems of effective use of labor potential. Using data from regular statistical surveys for a large-scale assessment of asymmetries at the macro- and meso-levels, the methodology provides an overview of the demand for professions and the skills of employees for expanding production. At the same time, monitoring the situation on the labor market allows authorities, employment centers and businesses to respond quickly to changing conditions.

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Contribution of V.A. Rusanov to the Study of Geology and Geography of the Novaya Zemlya Archipelago (On the 150th Anniversary of His Birth)

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Abstract. This paper describes V.A. Rusanov's expeditions to Novaya Zemlya in 1907–1912. The objectives of the expeditions included studying the coastline, the Northern Sea Route, searching for minerals, and exploring the possibility of organizing fishing. V.A. Rusanov travelled on foot along the shores of Matochkin Shar, Mashigin Bay, and Southern and Northern Sulmenovaya Bay. For the first time, a walking route was completed along Krestovaya Bay in the northern part of Novaya Zemlya. The scientist described the rocks of the Silurian, Devonian, Permian, Carboniferous, and Jurassic periods with paleontological justification. As a result of his research, V.A. Rusanov suggested that in the Silurian period, there was a deep-water sea in the place of Novaya Zemlya. The similarity between the Devonian fauna of Novaya Zemlya and the fauna of Timan allowed him to establish a close connection between the North and European seas. According to V.A. Rusanov, mountain formation occurred at the end of the Palaeozoic era. While studying cephalopods, V.A. Rusanov discovered a new species, *Karoceras*. He discovered fossil ice in Krestovaya Bay, in the Eastern Valley at Cape Krestovoy. This led to the conclusion that there had been several stages of glaciation. As a result of the expeditions, the main minerals (peat, coal, pyrite, copper ore, galena, ochre) were discovered. The geographical outcome of V.A. Rusanov's expeditions was the naming of 32 objects.
Keywords: *history, expeditions, Novaya Zemlya, Rusanov, paleontology, minerals*

Introduction

The lack of knowledge about the Arctic territories has been a constant subject of interest for travelers, scientists, entrepreneurs and government agencies. Research on the northern islands, particularly Novaya Zemlya, in the late 19th and early 20th centuries was focused on finding the Northern Sea Route, attempts to reach the North Pole, and strengthening the political significance of the North as an important strategic and economic region. However, the harsh northern conditions, inaccessibility, and lack of reliable cartographic materials complicated and increased the cost of organizing systematic research for a long time [1, Filippova T.P.].

The state began actively colonizing Novaya Zemlya in 1881, when a special decree was issued on the settlement of the island in order to prevent the loss of control over the archipelago. Regular shipping was organized and settlements were built. These measures led to the profitability of Novaya Zemlya's industries [2, Belyaev D.P.].

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Extensive scientific research work on describing and mapping the coastline of Novaya Zemlya, searching for minerals, and studying the flora and fauna was carried out by the expeditions of F. Rozmyslov (1768–1769), V. Ludlov (1807), A.P. Lazarev (1819), F.P. Litke (1821–1824), P.K. Pakhtusov (1832–1835), and F.N. Chernyshev (1895). V.A. Rusanov can be considered one of those people who actively promoted the development of the Northern Sea Route and conducted detailed research on Novaya Zemlya.

Brief biography and first acquaintance with the Pechora region

Vladimir Alexandrovich Rusanov was born on November 3, 1875, in the city of Orel into a merchant family. In 1897–1898, he was an extra-curricular student at the Faculty of Natural Sciences of Kiev University. For participating in open student “riots”, he was deprived of the right to attend lectures and sent back to his homeland.

In September 1898, Rusanov’s home was searched, he was arrested, and escorted to Moscow, but in November of that year, due to lack of evidence, he was sent back to Orel. In 1899, Rusanov attempted to continue his education and applied to go abroad to study natural sciences at the Collège de France in Paris. His application was denied. In 1900, he was arrested again on charges of revolutionary propaganda, but was released due to lack of evidence.

In May 1901, V.A. Rusanov was exiled to the Vologda province under police supervision for two years. In Ust-Sysolsk, he managed to find a job as a statistician in the district zemstvo administration. Interestingly, statisticians, as hired specialists, had the following characteristic features: a revolutionary past, which made them “politically unreliable” for the government and the provincial administration; a high level of education; a relatively young age; a diverse social composition [3, Levin S.V.]. V.A. Rusanov met all these requirements. In the summer, he had to go on statistical surveys that covered the vast territory of the Ust-Sysolsk district. In July 1902, V.A. Rusanov and A.A. Bogdanov (a doctor by education, exiled to the Vologda province and working as a topographer) set off on their first expedition. From the village of Pomozdino in the Vychegda region, the expedition first traveled north by boat along the Vychegda River, then continued along the Izhma River to the border with Arkhangelsk province and further along the Sedyu River to its upper reaches. From the upper reaches of the Sedyu River, the explorers had to make their way through swampy and wooded areas. The final destination of the expedition remains unclear, but the return route followed the Vol River [4, Rusanov V.A., p. 360]. In the river outcrops, Rusanov discovered *Spirifer* mollusks of the genus *Stola Rhynchonella*, belonging to the Middle Devonian period.

In the spring of 1903, Rusanov conducted research from the village of Troitsko-Pechorskoe along the Pechora River to its mouth. A detailed report on this journey, presented to the Vologda Zemstvo Assembly, was published as a separate brochure in Vologda in 1904. It examined the problem of connecting the Pechora and Kama rivers. The scientist proposed a waterway along the Berezovka and Bezvolosnaya rivers [4].

The results of each expedition to the Pechora region were recorded in a small number of works by V.A. Rusanov, which provide information about the life, economy, customs and folklore of the Zyryans. Rusanov himself considered his first expedition to be successful and described the results as follows: “In 1902, a partial statistical and economic survey of the Ust-Sysolskiy district was conducted for the first time; the statistical material collected concerned the upper reaches of the Vychegda (a tributary of the Northern Dvina) and Izhma (a tributary of the Pechora) rivers. The statistical survey forms did not include questions about artels... I was able to confirm the existence of artels in the main industries; later, I discovered the structure of artels and their great diversity” [4, p. 329]. Already in Paris in 1907, he published this material in his monograph “Zyryans”, where he noted the widespread development of artels, collective forms of labor among the population. In the preface to the publication “Non-Agricultural Industries of the Vologda Province”, published in 1903 by the Industrial Bureau of the Vologda Provincial Zemstvo under the editorship of A.I. Maslennikov, it is stated that the “Essay on the Industries of the Ust-Sysolskiy District” was compiled primarily from the notes of V.A. Rusanov, who collected a large amount of material during his numerous trips to the Pechora region [5]. Based on the results of his expeditions, the scientist describes iron pyrites in the upper reaches of the Izhma River, bizarre cliffs with fibrous white asbestos, used for the manufacture of fireproof items, and points to rocks with a pungent petroleum odor on the Ukhta River. He noted only two locations where mineral resources were being exploited: one of these mining sites is located in the south of the Ust-Sysolskiy district, where the Kazhimskiy iron foundries and ironworks are located, and the second one is associated with the extraction of grinding stone on the Voya and Soplyas mountains. As V.A. Rusanov pointed out, “the exploration and development of the undoubtedly diverse and large resources scattered along the Northern Urals is a rewarding task for the near future” [4, p. 350].

After two years in the Pechora region, V.A. Rusanov applied to go abroad and in the autumn of 1903, together with his wife, he left for Paris, where he enrolled at the Sorbonne’s Faculty of Natural Sciences. During his first year, Rusanov studied only botany and mineralogy, which he successfully passed by the end of 1905. After passing his exams, V.A. Rusanov went to central France to do practical work under the guidance of the famous mineralogist Professor A.F. Lacroix to study the extinct volcanoes located there. In the summer of 1907, V.A. Rusanov successfully passed the exam in his main subject, geology, and received a diploma for completing the full course of study in the Faculty of Natural Sciences. As V.A. Rusanov wrote in a letter to his stepfather in 1907: “...for the vast majority of French students, this is the only goal they pursue, but for me, it will be, at best, only half of the preparatory scientific path that I have decided to take” [4, p. 382].

Expeditions to the Novaya Zemlya archipelago

After receiving his degree in natural sciences in 1907, V.A. Rusanov went on a short geological expedition to Novaya Zemlya. His main goal was not only to collect geological material for his

doctoral dissertation, but also to study the conditions for navigation. The most suitable area was the coast of Matochkin Shar, a strait that allowed access to the Kara Sea. In early July, he arrived in Arkhangelsk. On the steamship “Queen Olga”, V.A. Rusanov, together with L.A. Molchanov, a zoology student from Kharkov University, reached the coast of Matochkin Shar. Yefim Khatanzey, a Nenets, served as the expedition’s guide. They reached the Gusinaya River by boat. Rusanov examined outcrops and collected rock samples that formed the shores of Matochkin Shar (Fig. 1).

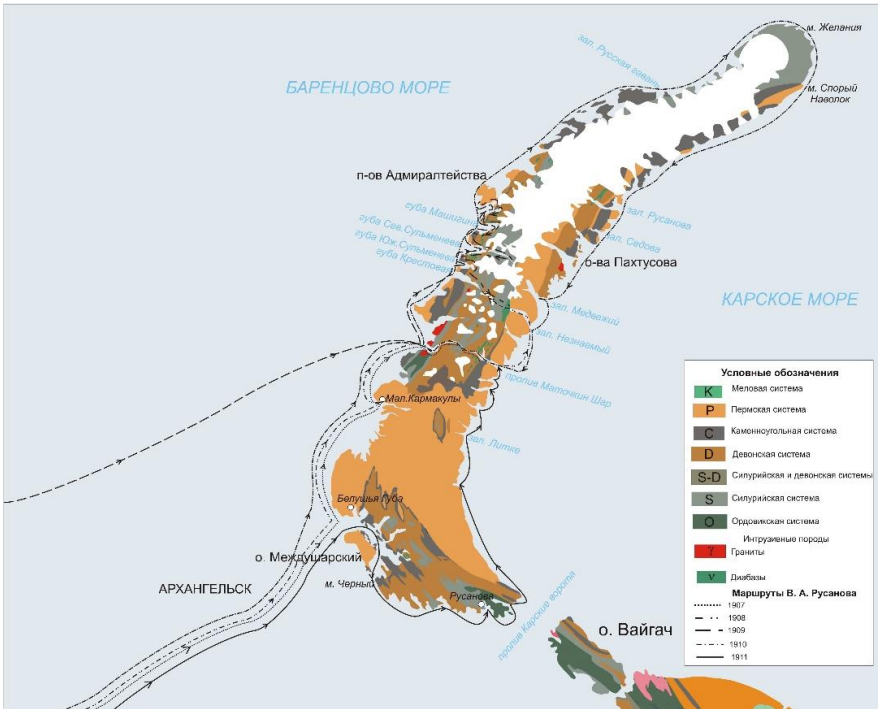

Fig. 1. Map of V.A. Rusanov’s routes to Novaya Zemlya.

He studied the glaciers with particular attention. Difficult weather conditions hampered the expedition’s progress, but the researchers travelled by karbas along the Matochkin Shar Strait to its easternmost point, Cape Vykhodnoy. During the expedition, Rusanov discovered small crystals of copper pyrite in a quartz-feldspar vein on the shore of the narrowest part of the strait and red ochre deposits at Cape Vykhodnoy. On 26 August, the expedition returned to camp, where they had to stay until the arrival of the steamship “Queen Olga”.

This expedition was of great importance for further research into the geology of Novaya Zemlya. The detailed study and description of Matochkin Shar deposits led to Rusanov’s appointment as a geologist on a polar expedition to Novaya Zemlya organized by the French Academy of Sciences in 1908 (Fig. 2). The expedition was planned to be carried out on the vessel “Jacques Cartier”, but due to weather conditions, part of the expedition continued its route to the Nenets settlement of Matochkin Shar on the steamship “Queen Olga”. Two karbases were used to reach the Kara Sea, then, heading north, enter the nearest bay. From there, they crossed the northern island on dog sleds and reached the Barents Sea. The beginning of the expedition’s route partially retraced the route along Matochkin Shar already completed in 1907. Rusanov, along with his graduate student Neve, climbed to the top of Mount Vilcheka, where he discovered pyrite crystals in shales. By the end of August, the expedition reached the most remote point of Neznaemy Bay,

which had been inaccessible the previous year due to heavy ice. Next, they had to hike through Krestovaya Valley, during which Rusanov discovered an unknown genus of cephalopods in Silurian period sediments. For several days, the expedition struggled to reach the western coast of Novaya Zemlya, and only Rusanov reached the coast of Krestovaya Bay. This was the first trek across the northern part of Novaya Zemlya. The expedition then returned to camp on the shore of Neznaemy Bay. The expedition along Matochkin Shar continued for two weeks, until 27 September, when the steamship "Queen Olga" arrived and took the travelers to Belushya Bay. There, they boarded the ship "Jacques Cartier", which took them back to Arkhangelsk. Based on the results of the expedition, Rusanov compiled a report, and Captain Bernard included materials in a separate chapter entitled "Geology, Fauna and Flora of Novaya Zemlya" written by V.A. Rusanov in his book "Dans l'ocean glacial et en Nouvelle Zemble" [6, Barr W.].

Fig. 2. Rusanov V.A., 1908 [5].

In 1909, at the invitation of Arkhangelsk Governor I.V. Sosnovskiy, V.A. Rusanov took part as a geologist in the Novaya Zemlya expedition of the Main Directorate of Agriculture and Land Management [4]. The expedition was to survey Krestovaya Bay on the northern island of Novaya Zemlya and the coastline from this bay to the Admiralty Peninsula, to determine the possibility of organizing fishing here, and to establish how suitable Krestovaya Bay was for establishing a Russian settlement there. The expedition arrived at Krestovaya Bay on the steamship "Queen Olga", where they established their main base. During their stay in Krestovaya Bay, Rusanov studied the coastal geology. He explored the outcrops of rocks from Krestovaya Bay to the Admiralty Peninsula on foot. He surveyed the western coast of Novaya Zemlya's northern island, including Krestovaya, Sulmeneva, and Mashigina Bays, as well as Sadovskiy, Sosnovskiy, and other gulfs. He discovered Carboniferous limestones with *Prodoctides*, noted gray marbles, and on one cape, in Krestovaya Bay, numerous, fairly large pieces of coal (lignite) were found scattered across the surface in Quaternary deposits. In Sulmeneva Bay, he assembled a rich collection of Devonian fossils and traced outcrops of diabase and metamorphosed schists. Based on the results of the expedition in 1909, V. V. Rusanov gave a lecture at the Arkhangelsk Society for the Study of the Russian

North on the topic of "Fossil glaciers and coal on Novaya Zemlya in relation to the geological structure of the island". He published "Review of the activities of the Novaya Zemlya expedition of 1909" and the articles: "Novaya Zemlya Coal and Centuries of Land and Sea Movements", "Description of the Coasts and Interior of Novaya Zemlya from the Admiralty Peninsula to Krestovaya Bay and from the latter to Neznaemy Bay", "On Mineral Resources on Novaya Zemlya", and others [7; 8; 9]. For the results of his work in 1909, a year later, V.A. Rusanov was awarded the Order of St. Vladimir, 4th degree.

In previous expeditions to Novaya Zemlya, V.A. Rusanov had proven himself to be a highly qualified specialist and a good organizer. In 1910, Governor I.V. Sosnovskiy, organizing an expedition to Novaya Zemlya, appointed V.A. Rusanov as its head. The expedition included mining engineer M.M. Kruglovskiy, zoologist S.S. Ivanov, anatomist S.S. Chetyrkin, navigator V.E. Remizov, guide Ilya Vylka, and others. The plan was to sail around the entire northern island of Novaya Zemlya on the ship "Dmitriy Solunskiy", round Cape Zhelaniya from the west, and then sail along the eastern coast of Novaya Zemlya to Matochkin Shar via the Kara Sea. At the end of the expedition, I.V. Sosnovsky noted: "The most important practical results achieved by the expedition were the discovery of four more Norwegian fishing grounds in the north of Novaya Zemlya, in addition to the one discovered in 1909 in Krestovaya Bay; the observation of the distribution of ice in relation to the nature of local winds and the direction of sea currents, which was highly important for resolving the issue of the Northern Sea Route to Siberia; the survey of the northwestern coast of Novaya Zemlya in terms of colonization and commercial exploitation; the compilation of highly important scientific collections on geology, paleontology, botany, entomology, zoology, etc." [1] At a meeting of the Geographical Section of the Society of Lovers of Natural Science, Anthropology, and Ethnography at the Polytechnic Museum, Rusanov gave two reports on the expedition around the northern island of Novaya Zemlya, in which he described in detail the observations of the Novaya Zemlya expedition. At the same time, his detailed description of the 1910 expedition, "On the Dmitriy Solunskiy around Novaya Zemlya", a detailed article, "On the Topography of Novaya Zemlya", a brief summary, "On the Hydrological Work of the Novaya Zemlya Expedition of 1910", and others were published [11].

In 1911, the Main Directorate of Agriculture and Land Management organized a third expedition to Novaya Zemlya. The main objective was to survey the southern coast of Novaya Zemlya, in particular Petukhovskiy Shar and Reineke Bay. As it moved along the southern coast of Novaya Zemlya, the expedition conducted meteorological and hydrographic research. As a result of the voyages of 1910–1911, V.A. Rusanov published an article entitled "The Economic Significance of the Northern Sea Route to Siberia", in which he argued that "no other route can be more profitable than the Northern Sea Route" and that "no other route can be faster than the Northern Sea Route" [11, p. 190].

[1] The crew of the "Dmitriy Solunskiy". *Around the World*, 1980; 3: 80.

In 1912, V.A. Rusanov planned to continue his exploration of Novaya Zemlya in the Sakhanikha Bay area, but circumstances prevented this. In the spring of 1912, the Russian government offered V.A. Rusanov the opportunity to lead an expedition to Spitsbergen. According to Samoylovich, a member of the Spitsbergen expedition, Rusanov did not limit himself to exploring the island alone; he wanted to conduct hydrological and hydrographic work between Spitsbergen and Novaya Zemlya, visiting Uedineniya Island, and conducting a geological survey [12]. The further route of the "Hercules", as is commonly believed, lay to the northern tip of the island, and in early September, the "Hercules" was supposed to enter the waters of the Kara Sea, but the ship disappeared. There are many theories in the literature regarding the expedition's route and location of demise. It is believed that the easternmost point of the route was on Veizelya Island (now Hercules Island), where a pillar with the inscription "HERCULES. 1913" was discovered [13]. The Arkhangelsk Museum of Local History (Arkhangelsk) and the Russian State Arctic and Antarctic Museum (St. Petersburg) house some of the equipment found during the searches of V.A. Rusanov's 1912–1913 expedition.

The most important geological and geographical results of V.A. Rusanov's expeditions

Many researchers have studied the history of the discovery and expeditionary exploration of the shores of Novaya Zemlya. The issue of cartography and toponymy of the archipelago is particularly acute. It has been established that the first map depicting the southern tip of Novaya Zemlya was made in 1562 — "New Improved (Map) of Russia, Muscovy and Tartary" by Antonio Jenkinsono Anglo [14]. There are many inaccuracies in the cartography of Novaya Zemlya in the 17th and early 20th centuries, ranging from the geographical location of the archipelago to the identification of coastal points on the western and eastern coasts. There were many maps published in different languages, by different people and based on different primary sources. A particular difference is related to toponymy. Each expedition to Novaya Zemlya, especially foreign expeditions, sought to give their own names, disregarding existing ones. As a result, some points had a series of names. For example, the ridge located in Mashigina Bay was named "Bolshaya Chyornaya" (Big Black) by the Weber expedition in 1901; Rusanov V.A. named it "Chyornaya Mountain" (Black Mountain), and O. Goltedal, a member of the Norwegian expedition, in 1921 — "Nansen Mountain". Only after the creation of the nomenclature commission under the Polar Commission of the Academy of Sciences at the end of 1933, the names of geographical objects on Novaya Zemlya were agreed upon [15]. During his expeditions, V.A. Rusanov assigned 32 new names to geographical objects (Table 1). Some of them were renamed. Geologists working in the Novaya Zemlya region deeply honored the memory of V.A. Rusanov. Thus, one of the main tasks included in the work plan of the Novaya Zemlya expedition of the Academy of Sciences in 1925 was to compile a geological profile of the valley from Neznaemy Bay to Krestovaya Bay, which V.A. Rusanov named in honor of the physician and participant in the 1908 expedition, Candiotti. The participants of the 1925 expedition of the Academy of Sciences renamed it in honor of V.A. Rusanov [16].

Table 1

Geographical discoveries of V.A. Rusanov [2]

Object	Name	Georeferencing	Year
Goltsovaya Bay		Neznaemy Bay	1908
Makarov-Zherve Glacier	Stepan Osipovich Makarov (1848–1904), Russian naval commander, admiral	Neznaemy Bay	1908
Cape Ptichiy		Western coast of Novaya Zemlya	1908
Candiotti Valley, (since 1925, Rusanov Valley)	Candiotti, doctor of V.A. Rusanov's expedition. In 1925, the Novaya Zemlya Expedition of the Academy of Sciences renamed it in honor of V.A. Rusanov (1875–1913)	Neznaemy Bay	1908
Lacroix Glacier	Alfred François Lacroix (1863-1948), French mineralogist and petrographer, professor at the Sorbonne University	Mashigina Bay	1909
Lorentz Island	Karl Alexandrovich Lorenz (1874–1938), botanist, expedition participant	Northern Sulmeneva Bay	1909
Bulya Glacier	Pierre Marcelin Boulle (1861–1942), a renowned French paleontologist and geologist, professor at the Museum of Natural History in Paris	Mashigina Bay	1909
Island, Cape Bykov (since 1926, island, Cape Afanasyev)	Alexander Alekseevich Bykov, expedition member, photographer	Northern Sulmeneva Bay	1909
Galakhova Island	Pavel Alexandrovich Galakhov, expedition member, junior official on special assignments under the Arkhangelsk Governor I.V. Sosnovskiy	Mashigina Bay	1909
Mountains, Mendeleev Glacier	Dmitriy Ivanovich Mendeleev (1834–1907), Russian chemist, encyclopedist, teacher and public figure	Western coast of Novaya Zemlya	1909
Sadovskiy Bay	Boris Ivanovich Sadovskiy, head of the Arkhangelsk provincial chancery under Governor I.V. Sosnovskiy	Admiralty Peninsula	1909
Sosnovskiy Bay	Ivan Vasilyevich Sosnovskiy (1868 – after 1917), State Councilor, Chamberlain; Arkhangelsk Governor in 1907–1911.	Admiralty Peninsula	1909
Shumniy Glacier		South Bay	1909
Bay, glacier, Mount Krivoshein	Alexander Vasilyevich Krivoshein (1857–1921), Chief Administrator of the Ministry of Land Management and Agriculture, State Secretary	Western coast of Novaya Zemlya	1910
Bay, Vilkitskiy Glacier	Andrey Ippolitovich Vilkitskiy (1858–1913), Russian hydrographer-geodesist, lieutenant general of the naval navigators' corps	Western coast of Novaya Zemlya	1910
Vylki Glacier	Ilya (Tyko) Konstantinovich Vylka (born in 1886), Nenets, expedition participant	Western coast of Novaya Zemlya	1910
Cape, Mount Kruglovskiy	Mikhail Mikhailovich Kruglovskiy, mining engineer, expedition participant	Mashigina Bay	1910
Cape, Maslennikov Glacier	Dmitriy Nikolaevich Maslennikov, Arkhangelsk fishing industrialist	Western coast of Novaya Zemlya	1910

[2] Compiled by the author based on materials: [17; 18; 19].

Nordenskjöld Glacier	Adolf Erik Nordenskjöld (1832–1901), Swedish geologist and geographer, Arctic explorer, navigator	Western coast of Novaya Zemlya	1910
Og Bay	Gustave Emile Auge (1861–1927), French geologist, professor of geology at the Sorbonne	South of Sedov Bay, in the east of Novaya Zemlya	1910
Pakhtusov Island	Petr Kuzmich Pakhtusov (1800–1835), second lieutenant, Russian navigator, hydrographer	Tsivolki Bay	1910
Pospelov Bay	Grigory Ivanovich Pospelov (1869–1933), captain of the sail-motor cutter of the expedition “Dmitry Solunskiy”	South of Cape Zhelaniya	1910
Shurin Bay (since 1925, Rusanov Bay)	Alexander Vladimirovich Rusanov, son of V.A. Rusanov	Eastern coast of Novaya Zemlya	1910
Sedov Bay	Discovered by V.A. Rusanov. Named in 1925 by R.L. Samoylovich’s expedition in honor of the renowned Arctic explorer Georgiy Yakovlevich Sedov (1877–1914).	North of Og Bay	1910
Bay, Jean Glacier	Juliette Jean (1886–1913?), fiancée of V.A. Rusanov, geologist, participant of the expedition	Krivoshein Bay and Arkhangelsk Bay, western coast of Novaya Zemlya	1911
Cape of Solunskiy	In honor of the ship “Dmitry Solunskiy”	Krivoshein Bay	1911

Over several years of studying Novaya Zemlya, V.A. Rusanov collected extensive palaeontological and lithological material, on the basis of which the first assumptions about the history of the geological development of the territory were made.

V.A. Rusanov published several articles and lectures on various geological issues. Of particular note are his special articles on Quaternary geology. These articles examine issues of glaciation, fossil glaciers, and the sequence of glacial fluctuations. He discovered fossil ice in Krestovaya Bay, in the Eastern Valley at Cape Krestovy. He established the ancient origin of the ice in relation to the overlying layers of clay, sand and pebbles. He discovered shells of lamellibranch molluscs *Astarte borealis Chemn., Astarte sulcata da Costa, Astarteelliptica Brawn., Saxicava artica Lin., Mya trucata Lin., and Macoma calcaria Chemn.* on the surface. This fact did not allow V.A. Rusanov to definitively state that the deposits were post-Pliocene in age, but further research established the presence of boreal transgression fauna and post-glacial (more arctic) fauna, proving several periods of glaciation [20]. Even today, there are various paleogeographic concepts regarding the scale of Pleistocene glaciations. Some researchers insist on glacial environments during the late Pleistocene-Holocene period and the glacioisostatic nature of the archipelago’s terraces, while others extend the age to the Neogene, and associate their origin with complex transgressive-regressive cycles in the late Cenozoic [21].

In 1908, V.A. Rusanov discovered Upper Silurian deposits in Neznaemy Bay [22]. Research conducted in 1909 on the western shore of the Northern Sulmenevaya Bay significantly expanded the distribution area of Silurian rocks. For a number of forms from Neznaemoy Bay, a new genus, *Karoceras*, was established, to which he assigned a number of species. In this collection, V.A. Rusanov identified one species as identical to *Cyrtoceras laminare Barrande*, and in subsequent

works he refers to it as *Karoceras laminare Barrande*. In this regard, comparing his discoveries with those of Barrande, the scientist concludes that at the end of the Upper Silurian period there was a close connection between the Arctic Ocean and the sea of Western Europe, but believes that later this connection was limited, since the fauna of "karoceras" is very specific to Novaya Zemlya.

Cephalopod doublets from the collection assembled by Rusanov and housed in the National Museum in Paris were transferred for study to A.F. Foerste and served as material for his work "Cephalopoda from Nesnayemi and Sulmeneva Fjords in Novaya Zemlya", published in 1925 [23]. Based on the analysis of the cephalopod fauna, the author comes to the conclusion about its Upper Silurian or Lower Devonian age; he considers the latter more likely, citing indications of the predominance of Lower Devonian deposits in the previously explored parts of Novaya Zemlya. In this work, A.F. Foerste gives a new name to the fossil remains previously described by V.A. Rusanov — *Karoceras typicum* (Fig. 3). According to the rules of the International Code, it was clarified that the type species of the genus *Karoceras* is the Silurian species *Cyrtoceras laminare Barrande* from Bohemia, five species of A.F. Foerste, including *Karoceras typicum*, should either be included in the genus *Karoceras* or be separated into an independent genus. In this regard, F.A. Zhuravleva established the new genus *Alloceras* in her work, with the type species *Alloceras typicum Foerse*, 1925 [24].

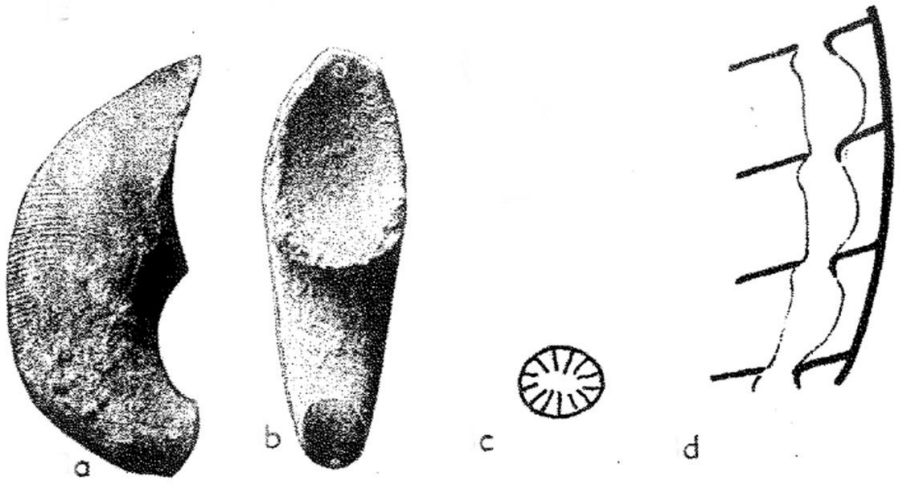

Fig. 3. Karoceras typicum Foerste. A — dorsal view, b — lateral view, c — dorsoventral section of the siphus, d — long section of the siphon [25, p. 314].

The *Karocertidae* family was identified by S. Teichert in 1939. *Karoceratidae* is a family of nautiloid mollusks from the order Oncocerida, characterized by straight or curved, laterally narrow shells and thin ventral siphuncles, which are empty, with the exception of *Karoceras* [25].

V.A. Rusanov proposed three subdivisions of the Silurian with characteristic fauna. The lowest layer is composed of dark-colored shales with shells of the new species *Karoceras*, the trilobites *Dalmania caudate Emm., Proetus waigatschensis Tschera*, and the brachiopods *Orthis bennidens Hall, Strophodonta ampla Hall, Leptoena striata Hall*, and *Whitfieldella didyma Dalm*. In the middle zone, a transition from shales to sandstone layers with a rich cephalopod fauna, 10–12 m thick, has been established. The Upper Silurian zone is represented by sandstones with an abun-

dance of brachiopods: *Whitfieldella didyma Dalm* and, less commonly, *Strophomena cuspidate Barr., S. stephani Barr., Spirifes parvulus Tschern., Rhynchonella minerva Barr.,* etc. Modern research has discovered almost all stages of the Upper Silurian [22].

The first discovery of Upper Devonian deposits also belongs to V.A. Rusanov. In 1909, he discovered Devonian mollusks of the genus *Clyphioceras* in Belushya Bay. In 1910, he discovered outcrops of Devonian rocks in Propashchaya and Arkhangelskaya Bays. He noted the Lower and Middle Devonian to the west of Neznaemy Bay, but the research of M. Lavrova in 1925 did not confirm this [26]. Later, researchers B. Chernyshev and B. Miloradovich confirmed the significant distribution of Lower Devonian deposits [27].

V.A. Rusanov discovered Lower and Middle Devonian limestones in an outcrop on the western shore of Neznaemy Bay. In these rocks, he found fossil remains of cephalopods of the genera *Orthoceras, Trochoceras, Cyrtoceras, Nautilus*, molluscs of the family *Bellerophontidae*, gastropods of the genus *Pleurotomaria*, gastropods of the genus *Euomphalus*, and corals of the genera *Cyatophyllum, Favosites, and Aulopora* [4].

In 1911, V.A. Rusanov, in his article “On the Lower Carboniferous and Upper Devonian Goniatite Fauna Found on Novaya Zemlya”, provided a detailed description of Berkh and Lichutin Island [4]. He discovered and described the remains of cephalopods of the genera *Clyphioceras* and *Orthoceras*, brachiopods *Productus, Martinia, Spiefer, Terebratula*, and *Atrypa*, and bivalves of the genera *Pecten, Enomphalus*, and *Bellorophon*. He also discovered Devonian formations on the Five Finger Peninsula containing remains of coral polyps of the genera Alveolites and Favosites, and identified new species of brachiopods; however, their descriptions were not included in the article. From the Propashaya Bay, Samoyeds, on the instructions of V.A. Rusanov, selected fossil remains of cephalopods of the genera *Trochoceras, Timanites, Orthoceras*, *Bactrites, Cyrtoceras, Platyostoma*, and *Pleurotomaria*, which characterize the Devonian fauna of the bathyal facies. This allowed concluding that there was a similarity with the Domanik facies of the Timan Ridge and suggesting that it extended from Timan to Novaya Zemlya during the Devonian period. In Krestovaya Bay and Mashigin Bay, Carboniferous rocks with a rich fauna of productus were discovered for the first time.

V.A. Rusanov found Jurassic fauna in concretions of moraine deposits on the shores of the Admiralty Peninsula, in Krestovaya Bay, near Sukhony Nos, on Mityushev Island, in the western part of Matochkin Shar, in Gribovaya Bay, and in Rogachev Bay [4].

Today, these conclusions about the geology and history of development are outdated, but at that time they were the first ideas that provided the basis and allowed Soviet geologists to determine the direction of geological research on Novaya Zemlya.

On mineral resources on Novaya Zemlya

An article with this title was first published by V.A. Rusanov in the collection “Materials on the Exploration of Novaya Zemlya” in 1910 [9].

In the southern part of Novaya Zemlya, south of Matochkin Shar, Rusanov noted the prevalence of rich, marshy, herbaceous vegetation with peat bogs typical of the tundra. Light brown peat with preserved vegetation was also widespread. Rusanov clarified that the absence of shrubs and trees would encourage Novaya Zemlya colonists to exploit peat deposits as a fuel [9, p. 56].

During his expeditionary research, Rusanov noted rounded and unrounded pieces of coal along the banks and river valleys of Novaya Zemlya. He traced coal pebbles in the area of Neznaemy Bay to Krestovaya Bay. Only near the Matochkin Shar Strait, between Cape Stolbovogo and Gribovaya Bay, 12 km from the mouth of the Matochka River, he discovered primary coal deposits. These samples of light coal are housed in the Museum of Natural History in Paris and belong to the French Oceanographic Society. Analysis of the coal, which yielded approximately 55% carbon and 5% ash with a coke yield of 45%, allowed it to be classified as lignite. The widespread distribution and approximately uniform quality of coal on Novaya Zemlya made it possible to assume that that coal formation occurred simultaneously. Rusanov suggested a Quaternary age, in contrast to the views of Academician F. N. Chernyshev, who attributed it to Mesozoic coal [28]. Rusanov based his conclusions on differences in properties and conditions of occurrence. He established a Mesozoic age for the coal in concretions with Jurassic belemnites and ammonites. Quaternary coal in Krestovaya Bay formed thin interlayers, which Rusanov associated with algae and floating wood debris. He gave the same explanation for the origin of larger pieces of lignite found in association with Quaternary glacial boulders and clay. Rusanov gave the most complete description of the discovery of coal on Novaya Zemlya in his lecture, “Fossil Glaciers and Coal on Novaya Zemlya in Connection with the Geological Structure of the Island”, delivered at the general meeting of the Arkhangelsk Society for the Study of the Russian North on September 23, 1909. The printed lecture material is stored in the archives of the Academy of Sciences [4, pp. 234–245]. Later, in the issue No. 8 of the journal “Izvestia of the Arkhangelsk Society for the Study of the Russian North”, Rusanov changed his view: he proposed a Quaternary age for the coal and a secondary nature of its occurrence as a result of the erosion and transport of older rocks containing lignite.

V.A. Rusanov noted the widespread distribution of iron ores, but pointed out their impractical significance. In particular, he pointed to the discovery of iron pyrite among Paleozoic shales. On the eastern side of Novaya Zemlya, he noted large outcrops of red ochre. They were discovered in the Matochkin Shar Strait in the summer of 1907.

Copper ores were traced in quartz-calcite veins on the northern side of Matochkin Shar, beneath Mount Sedlo. Malachite was discovered among the quartzites and sandstones of Mashigina Bay.

In 1907, cubic crystals of lead glance (galena) were discovered in the fragments of milky quartz on the northern side of Matochkin Shar. Rusanov was also searching for silver. It was already known that silver-lead ores were found at the southern tip of Novaya Zemlya. These ores were transported to Holland in the 17th century, where, on Witsen’s orders, they were studied

and found to be unsuitable for mining [29]. However, V.A. Rusanov's research did not confirm this fact. Later, silver ore deposits were discovered in the Mityushikha and Serebryanka Bays [29].

V.A. Rusanov noted the abundance of building stone: marble ranging from white and grey homogeneous to grey with white veins, and slate. He devoted special attention to diabase, considering it as a facing material. He noted the presence of asbestos and precious metals in association with diabases.

Conclusion

In recent years, the study of the history of scientific exploration of the northern and Arctic territories of Russia has become highly significant among scientists. State policy aimed at developing the Russian Arctic and North makes such research relevant. Such explorations reveal the complexity, labor-intensive nature, courage, and versatility of those who explore the North [1].

V.A. Rusanov's contributions to geological exploration are undeniable. He was the first to describe and collect rock material in various areas of Novaya Zemlya, provide mineral prospecting forecasts, and assess the profitability of mining. Factual, archival, and published materials remain as evidence of V.A. Rusanov's scientific research activities. He made both geological and geographical discoveries that filled in the blank spots on the map of Novaya Zemlya.

Many geographical objects on Novaya Zemlya are named in honor of the scientist: Rusanov Bay and Peninsula were named in 1927 by members of the expedition on the ship "Perseus"; Rusanov Bay, discovered by him in 1910, was named after him in 1925; in the same year, Mount Rusanov was named and a settlement of the same name was founded on the southern island of Novaya Zemlya. An icebreaker (1916) and a gas tanker (2018) were named after Vladimir Rusanov. Streets and lanes in Moscow, Severodvinsk, Arkhangelsk, Murmansk, and Pechora are named after the scientist. A monument to V.A. Rusanov in Pechora was erected in 1967 in memory of his work in the Pechora region.

Thus, Novaya Zemlya continues to attract the interest of many researchers and inquiring minds, drawing them in with its unexplored nature. V.A. Rusanov played a major role in the exploration of the Arctic, made a significant contribution to Arctic studies, and paved the way for subsequent geographical and geological discoveries on Novaya Zemlya.

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Language as a Tool of Social Interaction: Analysis of the Role of the Russian Language in Intercultural Communication in the Arctic

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Abstract. The article explores the role of the Russian language as a tool for social interaction in the Arctic regions of Russia, where migration and communication between different ethnic groups are taking place. In the context of the multinational society characteristic of this region, the Russian language acquires special significance, being a link between the indigenous peoples of the North (IPNS). The author’s study emphasizes that language serves not only as a means of communication, but also helps to form social identity, increasing the level of social integration. Language becomes a platform for cultural exchange, promoting mutual understanding and maintaining friendly relations between different groups of the population. For migrants, the Russian language provides opportunities for access to educational and social services, and for indigenous peoples, it “opens the door” to various resources and information necessary for their life. When writing the material, the main method chosen was content analysis of scientific literature and publicly available studies in the field of Russian language as a means of intercultural communication. Particular attention is paid to the possibilities of mutual enrichment of languages and cultures through bilingual education, translation of folklore and creation of multimedia projects, which allows not only to preserve the identity of the Arctic peoples, but also to strengthen the Russian language as the basis for interethnic communication. The authors are well aware that the study has a number of limitations based on an abstract representation of the culture and language of the northern peoples, as well as the fact that most native speakers do not actively use their native language and often hide their knowledge of it, preferring to use the official language, Russian, in everyday communication. The article analyzes the contribution of Russian and foreign scholars to research on the stated topic, as well as specific measures and strategies for improving language as a tool for interaction.
Keywords: *Russian language, intercultural communication, Arctic, bilingualism, indigenous peoples of the North, education, culture, cultural and social identity*

Introduction

In the context of globalization and migration processes, language is becoming an essential means of intercultural communication. With its long history in the Arctic, the Russian language plays a significant role in social interactions with the indigenous peoples of the North. This article provides an overview that examines how Russian is used in everyday life, education, and public life, as well as its influence on intercultural communication. The role of the Russian language in various spheres of public life, science, education, and culture in Russia and other neighboring

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countries is currently extremely significant, and the issue of its preservation is relevant. The aim of the study is to identify how the Russian language contributes to the establishment of intercultural relations, the formation of identity and the overcoming of language barriers, as well as to examine the difficulties and opportunities that arise in the process of communication with the indigenous peoples of the North. This formulation clearly defines the framework of the study and emphasizes the importance of the Russian language in the context of intercultural communication. The theoretical framework of the study forms its practical foundation, based on the promotion of knowledge of the native language and culture, which is reflected in regional projects implemented in the Arctic.

On the relevance of the Russian language, its preservation, development, and significance in the international environment and the maintenance of cultural identity

President Vladimir Putin frequently raises issues that highlight the development and study of the Russian language, which strengthens and affirms its leading role in the world as a means of adaptation, cooperation, and cultural identity. Vladimir Putin's speech at the opening ceremony of the World Russian People's Council, as well as the reading of the document "On the Approval of the Concept of the State National Policy of the Russian Federation", touched upon a number of issues related to language policy and preservation of the Russian language as an important cultural element.

Another important document is the materials of the meetings of the Council on the Russian Language (November 2024), where the current state of the Russian language was discussed and measures for its support and development were outlined. At the conference, many speakers expressed their support for the preservation and development of the languages of all peoples of Russia, provided that the state language is mandatory. "Despite the unique ethno-cultural and religious diversity of our country, it is the Russian language that largely shapes our spiritual and national identity. General education programs in subjects such as "Russian Language" and "The Language of the People, the State Language of the Republic of the Russian Federation" should be built on this foundation [1]. National languages help ethnic groups to preserve themselves, while the Russian language unites ethnic groups into a single nation, diverse in blood, but indivisible in spirit." [2]

Content analysis of research on the Russian language in Russian and foreign publications

Due to the relevance of the above-mentioned topic, contemporary scientific literature was analyzed. In addition to the main research method — content analysis — the following general scientific methods were used: *dialectical method*, which made it possible to trace the development of ideas about the role of the Russian language among the Arctic peoples in dynamic connections; *analysis*, which allows researchers to decompose the Russian language into units of

[1] Official website of the President of Russia. URL: https://kremlin.ru/events/president/news/75495 (accessed 01 December 2024).
[2] Ibid.

functioning in northern territories; and *synthesis*, which continues the analysis with further generalization of intermediate or final conclusions.

The inductive method made it possible to draw conclusions and identify key themes based on individual studies:

Language as a factor of cultural and social identity: a number of works are devoted to the correlation between language, cultural identity, and social functions in the context of migration and globalization. The authors listed below consider Russian as a means of integrating migrants and preserving the identity of indigenous peoples [1; 2; 3; 4].

Language policy and multilingualism*:* studies [5; 6; 7; 8] cover issues of language policy, preserving diversity and maintaining multilingualism, especially in Russia and the Arctic region.

Cross-cultural communication and inter-cultural interaction: there is significant interest in cross-cultural communication, where language is viewed as a tool for successful interaction between different cultures and nations [9; 10; 11; 12; 13; 14].

Linguistic diversity in the context of globalization*:* the impact of globalization on languages and cultural processes is also an important topic. Authors explore the impact of global processes on the Russian language and its future [15; 16; 17].

The following studies are based on the deductive method and allow for general conclusions based on the key idea that the Russian language contributes to the preservation of the cultural and historical heritage of the peoples of the Arctic.

For example, researcher Anna Kuznetsova (Southern Federal University, Rostov-on-Don) considers the role of the Russian language in intercultural communication as a means of overcoming social barriers in Russia and other multinational states. The author is concerned with the strategic importance of language for ensuring national security and the unity of the country [18]. To address this issue, measures are needed to support and develop the language in the international arena, as well as within Russia, in order to overcome the trend of its weakening.

The works of A.F. Kolyaseva [19, pp. 82–97] and O.E. Pekelis [20, pp. 66–101] address issues of declining speech culture and literacy. A.F. Kolyaseva places particular emphasis on the fact that language is becoming simplified and impoverished as a result of the decline in live communication and the use of various social networks and applications, where communication is often based on emoticons and images downloaded from the Internet or built into applications. O.E. Pekelis uses the concept of “linguistic economy” in his work, emphasizing the global trend of transforming meaningful phrases into their equivalents, which leads to misunderstanding of the meaning of the statement and emotional stress.

Modern people live in an era of global change and constant multitasking. However, humans have adapted to these conditions and adapted language to these goals. Whether this is good or bad is a matter of endless debate, since in an era of change there are both opponents and defenders of the use of gadgets, which cause a lot of controversy. On the one hand, we should not deny the distorting processes in communication that reduce the overall level of literacy among the

population. On the other hand, there are many opportunities for self-development and self-realization when, with the help of applications, one can learn the rules of native language, learn the basics of a foreign language and visit remote corners of the planet using websites equipped with 3D viewing capabilities or VR glasses.

The Russian language is becoming an important tool that will help to establish further international contacts and to build educational initiatives that strengthen the role of Russian as an integral instrument of unity, strength, and national security. Representatives of scientific communities are making considerable efforts to achieve the goals set by the state, developing new methods and approaches capable of popularizing the language.

The Russian language as a systematizing factor in the preservation of cultural identity

Language is not just a means of communication, but also a reflection of cultural identities. Many linguists and philosophers (Ferdinand de Saussure, Émile Durkheim, Roman Jakobson, Ludwig Wittgenstein, John Austin and John Searle, L. S. Vygotskiy, M. M. Bakhtin, T. A. Zinatullina, I. E. Bobrenev, T. N. Krylova, and others) have spoken about language as a social phenomenon. These researchers have made a significant contribution to the understanding of language as a phenomenon that exists exclusively in the context of social life and interaction. The contribution of our Russian scientist Lev Semenovich Vygotskiy (1896–1934) to the understanding of how language, thinking and the social environment influence the development of human consciousness is invaluable. In his book “Thinking and Speech”, he argues that language evolves in a social context and serves as a means of communication that promotes the development of thinking, and that the internal and external functions of language are interrelated, and language becomes an instrument of thinking through interaction with other people [21].

The Russian language occupies a central place in the formation and preservation of cultural identity for both Russian-speaking peoples and the ethnic communities under its influence. Let us consider several key aspects demonstrating the role of language as a systematizing factor in cultural identity.

1. *Language as a carrier of cultural heritage:* Language is not only a means of communication, but also an important repository of a people's historical, cultural and social artefacts. It serves as a channel for the transmission of traditions, customs and values, which in turn contributes to the formation of a unique cultural identity. The Russian language, with its rich vocabulary and diverse phraseology, contains many elements related to national culture (folklore, literature, musical works, proverbs, etc.).

2. *National cultural and emotional framework of literary and artistic works:* Significant works of Russian literature by such venerable authors as Alexander Pushkin, Leo Tolstoy, and Fyodor Dostoevsky, not only enrich the language with lexical units, but also play a significant role in shaping national identity. Literature conveys complex ideas about life, experiences, values and images that are unique to the Russian people, thereby integrating them into the general cultural

context. Through literary works, individuals have the opportunity to discover common roots and connections that effectively strengthen their sense of belonging to a particular cultural tradition.

3. *Language as a link between generations:* The connection between generations is achieved through language, where the younger generation acquires the necessary knowledge, skills and abilities that help them not only to communicate, but also to survive in times of existential uncertainty and instability in the world.

4. *Language policy and social aspects:* As the state language, Russian can play an instrumental role in shaping national identity. Social institutions and the media promote the importance of language in a multicultural space, where integration and cultural interaction are particularly important.

Constructive dialogue – a guarantee for preserving the culture of indigenous peoples: regional aspect

Constructive dialogue in sustainable regional development implies active and productive interaction between various parties, such as indigenous peoples, government agencies, businesses, and public organizations. This dialogue is necessary to take into account the interests and knowledge of the local population when making decisions regarding the use of natural resources, ecology and social issues. The main goal of this approach is to create harmony between economic growth and the preservation of the region's cultural and natural heritage. Involving all stakeholders in discussions and planning contributes to more sustainable and equitable development that takes into account the unique needs and values of local communities.

Indigenous peoples of the North (Nenets, Sami, and Inuit) have a deep connection with nature, which has a thousand-year history and is reflected in their way of life, understanding of the laws of nature and desire to live in harmony with them. In this context, the works of E.V. Kudryashova [22] and the authors' collective of M.V. Nenasheva, A.M. Maksimov, S.Yu. Kuznetsova, M.Yu. Zadorin [23] and E.F. Gladun [24] deserve special attention as they have developed platforms that ensure constructive dialogue between government structures and indigenous peoples, allowing the opinions of local residents to be taken into account on issues related to social security, environmental policy and the development of natural resources. The authors emphasize that without the active involvement of indigenous peoples in decision-making processes related to their cultural and social life, it is impossible to achieve sustainable development in the region. It is important to note that many of these communities have unique traditions, culture, and knowledge of nature that can make a significant contribution to the region's ecosystem and its preservation.

The educational system also plays a significant role in this process. It is essential to integrate the study of the culture and traditional knowledge of indigenous peoples into educational programs for both the local population and the general public. This will help to raise awareness of the realities and challenges faced by indigenous peoples.

From the perspective of international cooperation, it is necessary to intensify the activities of organizations such as the Arctic Council, which work on issues of sustainable development and the protection of the rights of indigenous peoples. Strengthening the position of indigenous peoples on the international stage will help to draw attention to their needs and rights and may also contribute to the development of a more responsible approach to natural resource management.

Consequently, we believe that effective legal regulation in the Barents Euro-Arctic region can only be achieved if indigenous peoples are included in the decision-making process. Their experience, knowledge and traditions should form an important basis for the development of sustainable policies that contribute to the preservation of the region's unique cultural and natural heritage. The creation of joint initiatives based on cooperation between different levels of government, the scientific community and local communities will be a step towards improving the quality of life of indigenous peoples and ensuring the sustainable development of the entire Arctic.

A unique project aimed at preserving the culture and language of the indigenous peoples of the North is being implemented at the Northern (Arctic) Federal University in synergy with other institutions. This is a current research trend, as the Nenets language and culture, i.e., its ethnocultural environment, are at risk of extinction, as this language belongs to languages with a low level of vitality [25, pp. 246–269].

The project was officially presented in March 2022 at an international seminar in St. Petersburg with the participation of representatives from nine constituent entities of the Russian Federation, including teachers, lecturers, and IT project developers. The project is scheduled to be implemented over a period of five years, until the end of December 2026, and consists of five consecutive stages reflecting the political and social development strategies of the country and its regions. The project is based on monitoring studies, presenting research results at scientific events, and working closely with the authorities of the Nenets and Yamalo-Nenets Autonomous Okrugs. The interdisciplinary nature of the experimental initiative should be emphasized, as in addition to monitoring the status of indigenous languages, linguistic, pedagogical and cultural studies are also being conducted.

In the autumn of 2022, under the direct supervision of researchers A.M. Polikarpov, M.V. Druzhinina, E.V. Polikarpova and O.E. Latysheva, an expedition to the Nenets Autonomous Okrug was carried out, in which representatives of the indigenous peoples of the North took part. Monitoring of the linguistic and cultural environment, studying the educational environment, and communicating with teachers and residents made it possible to make constructive proposals for improving the linguistic situation, which were clearly demonstrated in the final presentation. This made it possible to sign long-term agreements to implement the initiative between the following institutions: the Ethno-cultural Center of the Nenets Autonomous Okrug and the Northern (Arctic) Federal University (NArFU) — the Nenets Regional Center for Education Development, which approved the roadmap for the project.

The contribution of the above-mentioned researchers is invaluable, consisting of documenting Nenets folklore texts (fairy tales) and translating them into Russian in order to convey the linguistic worldview of the Nenets, reflecting their close connection with nature, and their character, rooted in kindness, mutual assistance, maternal instincts, and the rejection of negative character traits.

Thus, there is ongoing work aimed at supporting, developing and preserving the language and culture of indigenous peoples of the North, which requires multilateral cooperation and support at both the global and local levels. “In modern conditions, it is educational institutions that fulfill the function of ethno-cultural consolidation of society and ensure its sustainability [26]”. Tyumen universities have a strong teaching staff working on the design and implementation of integrated courses that fully take into account the ethno-cultural characteristics of students, since the primary tutoring is provided by representatives of the indigenous peoples of the North.

In December 2024, Bauman Moscow State Technical University traditionally held the International Scientific and Practical Conference “Current Issues in Linguistics and Professional Linguodidactics: Trends and Prospects”, which addressed topical issues such as the changing ethno-cultural and ethno-linguistic situation; the migration linguistics: cultural and linguistic adaptation of migrants; and the bilingual personality: formation and characteristics. The year 2024 was no exception, and on December 12–13, 2024, the authors of the article attended a section, where leading Russian and foreign scholars gave presentations that resonated with the audience and participants.

Historical context, territorial division, legal regulation, and socio-economic development of the Arctic

The migration of Russian-speaking people to the Arctic began in the 17th century, when Russia was actively developing its northern territories. Russian explorers and traders brought with them the language, which, according to researchers studying the North, became a source of borrowings. Thematic lexical units have been well studied by linguists and confirm the widespread use of Russian in the everyday lives of migrants and indigenous peoples. It is used for communication in families, markets, shops and other social contexts. In her linguistic research, Bagdaryyn Nyurgun Syulbe Uola finds numerous Russianisms in fishing vocabulary [27].

In 2024, T.P. Golovatskaya published a scientific article describing the most common areas of use of Russian words in the speech of indigenous northern peoples, where the gradation of vocabulary use primarily covers society and shows the assimilation of political words, names of professions, government institutions, household items, etc. This emphasizes the ability of peoples to coexist in the same spatial area and mutually enrich their existence [28].

In Russia, the indigenous peoples of the North (IPN) traditionally inhabit vast territories stretching from the Kola Peninsula in the west to the Bering Strait in the east, covering about two-thirds of Russia’s territory. Researcher E.F. Gladun sees the future of these regions in their potential to become “outposts” of the Russian Arctic and drivers of the country’s economic growth, with

significant financial support provided through state target programs. Each region has a specific economic basis and different development goals. The scholar focuses on the justification of the legal implications of sustainable development in the Russian Arctic and provides examples of barriers to this path, assessing the relevant legal documents (the Fundamentals of the Policy of the Russian Federation in the Arctic until 2020 and the Arctic Strategy) [29]. The results of her study include the identification of achievements and shortcomings in the rule of law related to the sustainable development of the Russian Arctic, as well as policy recommendations for government agencies in the form of a roadmap. A very important step is to supplement national laws with effective legal instruments establishing a sustainable approach to the Russian Arctic. One of the important points of the roadmap recommendations is the involvement of indigenous peoples of the North in the process of policymaking and decision-making concerning their territories and resources. To ensure their participation in the development of the Arctic in accordance with their traditional values and knowledge in the future, Russia needs to implement the regulatory mechanisms that existed prior to 2004. In particular, the representation of indigenous peoples in political, legislative and executive systems; the right to express their opinions and give their free and informed consent to approve projects affecting their territories should be guaranteed by federal laws and implemented through effective action programs in the Arctic regions [30; 31].

Other Russian scientists, K.S. Zaikov, A.M. Tamitskiy, and M.Yu. Zadorin, also propose a number of measures for implementing the new strategy in the Arctic zone of the Russian Federation, including:

- the need to create a conceptual framework that would be understandable to all users (the indigenous peoples of the Arctic, such as the Nenets, Yakuts, Chukchi and Khanty, speak different languages, so Russian is intended to be a universal means of communication between them and Russian-speaking migrants, allowing them to exchange experience and knowledge);
- the development of educational programs for indigenous peoples aimed at teaching children the vital skills necessary for survival in a challenging environment and a successful existence in modern realities;
- the provision of the necessary equipment for distance learning;
- the creation of programs focused on the rational use of natural resources.

Russia's cultural foundations serve as the official basis for the country's cultural policy and cover many aspects:

- preserving and developing Russia's "cultural identity";
- considering and supporting the role of "traditional" religions in the country;
- recognizing the phenomenon of "social atomization", that is, the destruction of social ties (friends, family, neighbors), as one of the most serious problems in Russian culture;
- restoring the importance of "family upbringing" as a key element of quality education;

- dissemination and in-depth explanation of "traditional family values through mass media aimed at the general public" [32], etc.

Research conducted by scientists in these regions shows that indigenous peoples, their communities, and associations constitute a significant part of Arctic society and the social structure of the Russian part of the BEAR. The main issues discussed at the intergovernmental, national, and regional levels include cultural and ethnic diversity, peace and security, general education and traditional education of indigenous peoples, sustainable environmental management, and the participation of indigenous peoples in decision-making. As a BEAR member state, the Russian Federation responds to all these issues by adopting relevant strategies, federal laws and regulations, and regional legislation. However, the primary focus is on cultural issues, which are a priority in regional socio-cultural policy. Overall, Russia's recognition of the importance and value of socio-cultural development within the framework of international cooperation is expressed in a number of political and strategic documents, as well as laws and regulations.

The Russian language as a means of socio-cultural communication

Professor I.S. Alexeeva and her colleagues from the Herzen State Pedagogical University of Russia (St. Petersburg) emphasized the importance of the Russian language as a cultural mediator in their research article entitled "A Multitude of Languages — and One Country: Building up Communication among the Peoples of Russia through Translation" [33]. They focused on developing practical, specific theories of translation, creating models for restoring lost textual heritage, and strategies for translating works by indigenous peoples. One of the proposed models is a system of interactive support for translation from the languages of the peoples of Russia into Russian, presented in variants A and B and called the "Roots Strengthen the Crown" model. They also proposed an "Interlinguacultural Model" that covers the foreign-language description of the cultures of the peoples of Russia, in two variants: A (internal) and B (external). During their work, the researchers identified a number of pressing future tasks, including:

- researching the collected archival texts of the peoples of Russia and translating them into Russian;
- initiating a large-scale analysis of literary derivatives, including interlinear translations with subsequent processing;
- researching literary tri-lingualism, focusing on the translation of world masterpieces into the languages of the peoples of Russia using Russian as a medium, and its influence on the development of national literatures;
- organizing the exchange of experience gained in national translation schools, such as in Yakutia;
- analyzing the specifics of translation.

Conclusion

Language as a means of cultural exchange is not just a way of conveying information; it promotes deeper mutual understanding and cultural exchange between different ethnic groups. The study found that the use of Russian in social interactions forms dynamic layers and connections that arise as a result of living together and active interaction. The Russian language is becoming an important component in the process of forming a common social identity. Indigenous small peoples who speak Russian are actively participating in the common cultural space, creating new forms of identity and interacting more and more with the outside world. The Russian language allows the indigenous small peoples of the North to adapt to transformational processes, to take part in state governance and to represent their interests at the global level, without losing the deep connections that have developed in their unique traditions. The Russian language is not a replacement for the native language, but a means of preserving and transmitting the culture and traditions of the indigenous peoples of the North living in the Arctic.

Therefore, Russian scientists are conducting serious research, proposing specific measures and strategies to improve the language as a tool for interaction. These include the introduction of Russian language programs for both migrants and indigenous peoples, as well as the development of educational initiatives aimed at increasing bilingualism and cultural literacy.

Preserving the culture, language, and traditions of indigenous peoples through symbiosis with the Russian language can be considered a special tool for strengthening the identity of these peoples and transmitting their traditions to future generations. The Russian language, as an important means of communication and a bridge between peoples, can serve as a vehicle for promoting the unique heritage of these peoples. It is important to create a two-way exchange process whereby the languages of the indigenous peoples of the North can be reflected in literature, music, art, and educational materials through Russian, making them accessible to a wider audience. At the same time, translating and studying the oral traditions, songs, legends, and tales of these peoples into Russian will preserve them for future generations. It is also important to teach Russian in combination with their native language, which promotes integration without depriving children of the indigenous peoples of their national identity. The introduction of bilingual education into school curricula will help to strengthen both languages: Russian will become a universal means of communication, and the native language will preserve the connection with the roots. Holding festivals, publishing books and creating multimedia projects in Russian with elements of Arctic peoples' cultures helps to popularize their heritage and at the same time strengthens the Russian language as a tool for interethnic dialogue.

Thus, the Russian language is capable not of displacing, but of preserving and supporting the cultural wealth of the peoples of the Arctic. It remains their ally in preserving their identity, serving as both a conductor and a tool for uniting people of different cultures and facilitating their interaction in the context of globalization and migration, as emphasized by this study, which is an important milestone not only in understanding social processes in the Arctic, but also for the fur-

ther development of theories of intercultural communication and research into language practices in multinational societies.

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