# Problems and prospects of economic growth in the context of the environmental component of sustainable development in the Arctic zone of the Russian Federation

*Artur* Kuchumov[1,*], *Elena* Pecheritsa[2,*], *Natalia* Blazhenkova[3,*] and *Alexandra* Chaikovskaya[4,*]

[1]Candidate of Sciences in Economics, Associate Professor, Department of Economics and Management in the Service Sector, St. Petersburg State University of Economics, 191023, St. Petersburg, Russian Federation
[2]Candidate of Sciences in Sociology, Associate Professor, Department of Economic Security, St. Petersburg State University of Economics, 191023, St. Petersburg, Russian Federation
[3]Doctor of Economics, Professor, Department of Finances and Credit, Ufa State Petroleum Technical University, 450000, Ufa, Russian Federation
[4]Candidate of Sciences in Economics, Associate Professor, Department of Regional Cooperation, St. Petersburg State University of Industrial Technologies and Design, 191186, St. Petersburg, Russian Federation

**Abstract.** The article examines the perceived drivers of economic growth and the corresponding implications for proactive, evidence-based policies, discusses national issues and shapes a shared vision for the future among key interested parties. The authors highlight the main drivers of change and economic growth in the Arctic, including energy security, climate change, and transportation development, which have a huge direct impact on the Arctic region across all three dimensions of sustainable development: economic, social, and environmental. The authors consider the following as the problems facing the creation of conditions for economic growth in the Arctic region of the Russian Federation, in terms of sustainable development: environment, problems of the Arctic population, management problems in the changing Arctic, and the adaptation of technologies and production processes to the Arctic climate. In conclusion, the authors deduce that the creation of a joint group consisting of relevant private, public, governmental and non-governmental organizations would be the best strategy for considering effective mechanisms for multinational and multilateral governance of sustainable development in the Russian Arctic zone. The authors also believe that in order to create conditions for economic growth in the Arctic zone of the Russian Federation and to facilitate further transition to sustainable development, the authorities at the first stage should provide economic support measures for doing business, especially in two key areas for the Arctic: the development of animal husbandry and the development of various types of tourism.

## 1 Introduction

Over the past 2 decades, Russia has identified two key national interests in the Arctic: development of hydrocarbons and control over sea routes, and consistently works on their promotion [1]. In 2021, with the beginning of the UN decade of activities on achieving Sustainable Development Goals by 2030, the problems of sustainable development of the Arctic territories of the Russian Federation become particularly relevant. Although some progress in achieving the indicators contained in the previous Arctic Development Strategy for the period up to 2020, Russia is still facing global challenges to develop the already achieved goals, namely, the formation of energy and transport and information and telecommunication infrastructure, addressing the issues of environmental security and social development, advancing sciences and technologies for the development of the Arctic, and improving the investment climate [2, 3].

We support the opinion of the authors of [4,5] that the natural ecosystems characteristic of the Arctic, the presence of indigenous communities, and commercial interest in the region require an innovative model of development based on a high level of responsible exploitation, diplomacy, regulation, and the development of scientific methods, based on the general principles of the economy-nature-society system, linking environmental, social, and economic processes.

According to the authors of [6], the Arctic currently has great potential for economic growth, despite the fact that at present it is a region with high levels of poverty, social instability, untrained workforce, and environmental vulnerability.

It is known that 20 percent of the world's energy resources in the form of fossil fuels, such as oil, gas, and coal, are located in the Arctic. In addition to the

* Corresponding author: arturspb1@yandex.ru, helene8@yandex.ru, bnm61129@yandrx.ru, sasha_chaikovska@list.ru

traditional range of hydrocarbon resources, the Arctic region has enormous potential and wealth for alternative and renewable energy projects, including wind, hydropower, tidal, and geothermal. Due to the current high demand for energy around the world, several countries are turning their attention to circumpolar international relations and resource exploration, but no discussion of Arctic development would be complete without a thorough understanding of the concept, features and application of the principles of sustainable development.

The authors of [7] and [8] believe that creation of conditions for economic growth of the Arctic zone of the Russian Federation is the basis for its transition to sustainable development.

According to A.I. Bedritsky [9], the existing management system certainly needs to be updated and adjusted in accordance with binding rules for all participants in order to counter a number of threats to the integrity of the Arctic ecosystems and the serious consequences of climate change. The author of [10] agrees with this statement and adds that production of hydrocarbons in the Arctic region is a challenge for the implementation of the concept and features of sustainable development.

The Arctic region contains huge amounts of extractable energy resources, most of which are offshore, in areas that have long been inaccessible but are now becoming open due to climate change. Some of the most important regions for energy production include the Northern Slope in Alaska (USA), Eastern and Western Siberia, the Timan-Pechora District, South/ North Barents (Russia), the territory east of Norway, and East Greenland. Relevant regions in the energy sector also include Russian territories: The Vilkitsky Islands, the Laptev Sea, the Vilyui sector, the Khatanga district and the North Kara Sea; the western part of the Barents Sea north of Russia, belonging to Denmark and Norway; West Greenland region; the Sverdrup Islands north of Canada; and the Beaufort-Mackenzie Basin in the Canadian Arctic.

Some authors single out energy security, climate change, and transport development as the main drivers of change and economic growth in the Arctic; they have a huge direct impact on the region from all three components of sustainable development: social, economic, and environmental [11], while T.O. Ediseeva [12] highlights three main factors affecting the current and future economic growth of the Arctic region: the availability of important Arctic sea routes, the growing importance of hydrocarbons and mineral resources in the Arctic, and, as a result, the management of the Arctic. Another controversial aspect is the legal framework that must be developed for the implementation of local and international environmental governance, understood as the means by which society will define and act in accordance with the objectives and priorities related to the management of natural resources and economic growth in the Arctic. This statement includes rules, both formal and informal, that regulate the people's behavior in decision-making, as well as their implementation. An appropriate political and legal framework at the global, national, regional, and local levels is a prerequisite for an adequate level of governance.

The purpose of this study is to examine the opportunities for economic growth in the context of the environmental component of sustainable development of Russia's Arctic regions. The objectives of the study are to study and analyze the problems that hinder the creation of conditions for economic growth of the Russian Arctic regions in terms of environmental goals of sustainable development.

## 2 Results

The regions of the Arctic zone of the Russian Federation (AZ RF) have an invaluable opportunity to introduce genuine and effective changes in the perception of the Arctic and to create new models of economic growth for the future of the Arctic region. We will consider the challenges to the creating conditions for economic growth in the Arctic zone of the Russian Federation from a sustainable development perspective.

1. Environment.

The Arctic region is prone to persistent organic pollution. Mostly, mid-latitude pollutants migrate to the Arctic by wind and ocean currents. This is a local problem of transboundary pollution that requires urgent regional regulation and attention from global governance.

solution of the problem of the USSR environmental legacy. During the annual environmental rehabilitation of the Arctic (suffering from domestic and military landfills of 70 years ago), through the efforts of the environmental platoon of the Northern Fleet, hundreds of tons of technogenic waste, including on island territories, are collected and sent for processing [13].

Energy production is both a risk and an opportunity. Models for the development of oil and gas and other fossil energy resources in the Arctic will be determined by the industry's ability to develop technological strategies to minimize damage, pollution, and natural disasters, acting mainly preventively and actively responding to pollution phenomena. To restore contaminated areas, it is necessary to develop innovative methods of environmental restoration, as well as corporate social responsibility (CSR) schemes that take into account the needs of the local population.

Since 2019, RAEX-Europe ranking agency has started to compile ESG ratings of Russian regions. This ranking evaluates not only the managerial and social components, but also changes in environmental risks and measures taken to eliminate them. When calculating the rankings, risks are assessed using per capita pollution indicators of each region, while effectiveness in eliminating environmental risks is assessed according to environmental protection indicators. The higher the environmental risks, the higher the environmental protection indicators should be. In this case, the system achieves a balance. In the case of imbalance, we can conclude that due attention to risks is not paid [14]. The ESG ranking of the AZ RF regions is presented in Table 1.

**Table 1.** ESG ranking of the Arctic zone regions. Source: compiled according to [15]

| Region / Position | E | S | G | ESG |
|---|---|---|---|---|
| Yamalo-Nenets Autonomous District | 76 | 2 | 12 | 19 |
| Nenets Autonomous District | 81 | 1 | 13 | 21 |
| Krasnoyarsk Territory | 17 | 43 | 34 | 28 |
| Republic of Sakha (Yakutia) | 10 | 15 | 74 | 35 |
| Chukotka Autonomous District | 58 | 4 | 65 | 41 |
| Murmansk Region | 78 | 14 | 20 | 50 |
| Arkhangelsk Region | 73 | 41 | 66 | 71 |
| Komi Republic | 82 | 42 | 48 | 78 |

The maximum volumes of gross pollutant emissions from stationary sources are metallurgical (Krasnoyarsk Territory) and oil and gas (Yamalo-Nenets Autonomous District, Komi Republic) regions. The "antileader" in terms of indicators is the Krasnoyarsk Territory, in which more than 13% of all emissions of enterprises into the atmosphere of the Russian Federation occur [15].

2. Indigenous peoples, environmental pollution and climate change consequences. In addition to the economic consequences, which are generally positive for the region and depend on equitable governance through the return of income from exploitation to local communities, we can mention the enormous social and environmental consequences, which seem more difficult to manage. Indigenous communities in resource-rich arctic areas are increasingly exposed to the serious impacts of climate change, as well as to external development pressures advocated by the government and its industrial partners. With the discovery of vast energy resources in previously inaccessible areas of the Arctic, new measures are being taken at the federal level to develop these regions, including bringing modern infrastructure to remote settlements. Thus, climate change and modernization have become two inextricably linked forces that are greatly altering the context in which the indigenous populations of the region exist. Recent ice modelling results from polar-orbiting satellites have revealed actual evidence of a significant decrease in the arctic sea ice since 2010. The loss of sea ice opens new prospects for offshore oil production and new sea routes. Modernization is perhaps the main driver of all changes that synthesizes the causes and consequences of physical and social transformations. Increased industrial activity in the Arctic, aimed at facilitating access to oil and gas reserves, is further aggravating already severe climate impacts, which include changes in weather patterns, wildlife and vegetation, as well as in the availability and quality of food and water. As a result, the changes affect not only the physical space, but also the sociocultural landscape of the Arctic. Over the past 60 years, Arctic indigenous peoples have undergone tremendous changes that have affected their culture and social organization. As terrestrial and marine habitats are disturbed and fragmented by climate change and industrial development, the traditional livelihoods of indigenous communities have become increasingly limited [16].

3. the impact of the coronavirus pandemic, which that has spread over the past two years, also cannot be overlooked. Due to their isolation and low population density, the Arctic regions of the Russian Federation should be in a much safer position compared to the more densely populated territories. However, this pattern has not worked for the AZ RFThe Arctic is home to some of Russia's hardest-hit regions. For example, the highest per capita incidence of coronavirus among all 85 subjects of the Russian Federation was registered in the Yamalo-Nenets Autonomous District, and four of the ten federal subjects with the highest number of deaths per capita are also in the AZ RF. Another seemingly illogical fact is that the incidence of coronavirus in the Murmansk region at times was greater than in neighboring Finland or Norway, which have 7 times the population of Murmansk [17]. This fact can be explained by the fact that COVID-19 propagated to remote Arctic regions of the Russian Federation as a result of the migration of workers coming from all regions of Russia and the neighboring countries to work at industrial mining enterprises in the Arctic. An example is the second largest outbreak of COVID-19 in Russia, in Belokamenka, Murmansk Oblast, registered in mid-April 2020, at Russia’s second-largest liquefied natural gas plant, owned by Novatek, where 20% of 1,100 employees were infected.

Furthermore, the pandemic undoubtedly has a strong impact on small and medium businesses in the AZ RF. The introduction of lockdowns and QR codes, the shift of some workers to a remote format, all these reasons certainly do not have the best affect entrepreneurship in the best way: people use catering services to a much lesser extent, buy fewer clothes, cosmetics, etc., the tourism sector has also suffered seriously, even though domestic tourism in Russia began to develop rapidly due to the closure of a number of borders, nevertheless the income from inbound tourism has dropped significantly.

As for the energy and oil and gas sectors, which are the most relevant in the AZ RF, the pandemic makes its adjustments there as well, as given the decline in production, the sector's demand for services is seriously decreasing. To solve this problem, the government of the Russian Federation decided to support the energy sector by creating a fund of unfinished wells. This is a separate mechanism with state support measures to ensure the operation of the sector when production is restored in full. It is about additional possibilities of crediting oil companies, which allocated these resources under an additional drilling order. The total volume of crediting of this sector for two years may amount to about 400 billion rubles [18]. In the context of the environmental component of sustainable development, the restrictions on business activity associated with the pandemic, in our opinion, rather have a beneficial effect on the environment. And here we can talk about the imbalance

of interests between the environmental and economic components of the goals of sustainable development.

4. Management aspects. Governance challenges in the changing Arctic are specific, characterized by a constant search for efficiency in a completely fragmented, multidimensional and changeable reality. Russia, despite having the largest geographical share of the Arctic territory, has the least clear-cut type of regulation, which exposes the environment and local communities at a considerable level of vulnerability, and the existing legal framework represents regional and local legal mechanisms that need to be harmonized.

4.1. Management of human potential and the labor market. The number of unemployed in the territories of the AZ RF on average is at the level of all-Russian indicators, however, this applies, firstly, not to all regions, and, secondly, the average Russian indicator of 7–9% is almost 2 times higher than the threshold value of 4%. For example, in the Nenets Autonomous District the unemployment rate is 9.2%, in the Murmansk region and the Republic of Sakha (Yakutia) it is 8.8% [19,20]. The peculiarity of this region is its fairly high level of wages, which is sometimes 2 times higher than, for example, wages in the central part of Russia, while the number of jobs, concentrated mainly in the industrial sector, is much lower, and working conditions are not the easiest, with the prevalence of shift work and physical labor in factories, enterprises for the extraction of gas, oil, and other minerals. Not to mention the climate of the regions of AZ RF, which is not suitable for everyone. On the plus side, we can note the regional social support for young specialists in the regions of the AZ RF, such as payments to young specialists and young families.

4.2. Interrelations and interactions between both the economic entities of the regions of the AZ RF and regions as a whole. The creation of a single effective system of links for the interaction of the Arctic regions requires new methods of management based on "netization" and digitalization using information technology, which will ultimately lead to the maintenance of a balance between all three components of sustainable development: environmental, economic, and social.

5. Adaptation of technologies and production processes to the Arctic climate. Arctic cities and towns, usually located in rural areas with harsh climates, sparsely populated, over long distances and with scarce infrastructure, struggle to find innovative solutions to attract existing and potential residents, tourists, entrepreneurs, and investors. Their industrial base is constantly changing, with the traditional industries such as mining, forestry, and hydropower becoming more technologically advanced, while service industries such as tourism and culture are expanding rapidly [21, 27-29].

## 3 Discussion

According to various estimates, about five hundred million people live in the Arctic, including 2.5 in the AZ RF. In some Arctic regions, the majority of the population is indigenous in origin and has lived there for several thousand years [22]. Approximately 7 percent of the world's population lives in the Arctic, an area that makes up 10 percent of the earth's surface, and is believed to contain more than 20 percent of undiscovered oil resources. This region is also rich in fish resources, minerals, and freshwater. The Arctic is also home to vast areas untouched by modern human activities and unique terrestrial and marine ecosystems of global importance that are attractive to tourists. The Arctic plays an important role in the global climate system, so aligning hydrocarbon development, climate change policy, and the specifics of the region is challenging, as the resources of the Arctic ecosystem can only support the region's population with moderate resource consumption in a sustainable development process. The challenge is to try to simultaneously protect the natural and social values of the Arctic by developing opportunities for local populations, using the available surpluses wisely, while ensuring economic growth. The economic development of arctic resources can serve growing global needs, but it can also serve the global process of exploring a real model for sustainable development.

Respect, shared values, traditional knowledge and competency development programmes can ensure that northerners have a strong capacity to implement policies and at the same time benefit from development outcomes. Partnership in energy education and research will strengthen knowledge and capacity to meet the needs of the Arctic. A sustainable future of the AZ RF and its residents depends on competent local people and partnerships with the non-Arctic world. In terms of education in the oil and gas sector, the biggest challenge in training personnel in the Arctic is to develop a world-class training and development system that meets the needs of business and industry, but provides the most prepared workforce that meets local environmental and social needs. Leading educational institutions in the Russian Federation have a crucial role to play in building the capacity in Arctic communities by sharing knowledge and experience and ensuring broad access to relevant oil and gas education for indigenous peoples at all levels. In fact, such training should be based on the study of business strategies, exploring policies between partners, and managing with sustainable business models. a sustainable future for the Arctic in terms of training also depends on an educational plan focused on environmental management and a better understanding of sustainable development models. Models for the development of oil, gas, and other fossil energy resources in the Arctic must be driven by the industry's ability to develop technology strategies to minimize damage, pollution, and disasters, as well as to respond to events and restore contaminated areas [23-26].

## 4 Conclusions

Achieving a balance between preservation and development is a major theme of the current Arctic debate. In this balance, the ongoing oil and gas

exploitation seems to be the most contentious interest, as environmental considerations collide with economic interests. Thus, the decision of whether to develop new offshore areas for exploitation includes not only energy issues, but also how the development of economic interests will affect indigenous populations, the marine environment, regional development, climate change and energy security. The most common explanations for the increased interest in energy development in the Arctic in recent years are rising commodity prices, new technologies to reduce the cost of Arctic operations, and increased availability due to the melting Arctic sea ice. Additional impetus for oil and gas development in the Arctic has come from the depletion of more southern oil and gas fields in Alaska, Norway and Russia, as well as a reference to promising Arctic resource potential in a 2008 report by the U.S. Geological Survey. While these factors create a backdrop for growing commercial interest in the region, they do not provide a full picture. The decision on how and when to open new Arctic sea areas for prospecting and exploratory drilling is perhaps as much a result of the relationship between the local and federal governments as it is result of commercial interests. Since the final decision to authorize exploratory drilling is made by the respective federal and state governments, understanding the inner workings of new site discoveries is critical to understanding arctic oil and gas development.

In formulating the general problems of sustainable development in the AZ RF, they are as follows:

- environmental, associated with both transboundary pollution and permanent emissions from industrial (mainly energy) enterprises
- social, primarily associated with the problems of the indigenous population, which is increasingly exposed to the serious impacts of climate change, as well as to external pressure from the development of the territories of the AZ RF, and, secondly, the high level of unemployment in a number of Arctic regions
- economic, currently associated with the impact of the Covid-19 pandemic.

In addition, it can be noted that there is an imbalance between development and conservation. For example, economic development seriously impedes the development of the environmental factor (the impact of the oil and gas industry on the environment), and the social factor may hinder economic growth (it is quite difficult to simultaneously take into account the interests of both indigenous peoples living in the RF AZ and mining companies in the exploration and damage to the vulnerable nature of the region).

Current trends suggest that a joint group consisting of relevant private, public, governmental and non-governmental organizations, rather than one single entity, would be the best strategy for considering effective mechanisms for multinational and multilateral management of economic growth and sustainable development of the Arctic zone of the Russian Federation. This strategic form of governance could be a good way to protect the common interests, priorities and programmes of stakeholders. to create conditions for economic growth in the Arctic region of the Russian Federation and further the transition to sustainable development, the authorities at the first stage need to ensure measures of economic support for business, especially in the two main areas for the Arctic: the development of animal husbandry (for example, reindeer herding) and the development of various types of tourism (especially environmental tourism), which have become especially relevant after the closure of borders due to the spread of coronavirus infection, while respecting the principles of minimizing anthropogenic impact on the surrounding environment

## References

1. Oxford Analytica 2019 Sea route and energy are key to Russia's Arctic vision, Expert Briefings. Available online: https://doi-org.ezproxy.unecon.ru/10.1108/OXAN-DB246950 (2019)
2. Sustainable Development Goals. Available from: Available online: https://www.un.org/sustainabledevelopment/ru/sustainable-development-goals/ (2021)
3. National set of SDG indicators. Available online: https://rosstat.gov.ru/sdg/national (2021)
4. S.S. Gutman and A.A. Basova, Indicators of sustainable development of the Arctic zone of the Russian Federation: problems of choice and measurements, Arctic: Ecology and Economy, **4(28)**, pp 32-48 (2017)
5. S.M. Nikonorov, On conceptual approaches to the development: Polar Index, Barents Index and Index of Sustainable Development of the Arctic Council countries. Available online: https://www.econ.msu.ru/sys/raw.php?o=73806&p=attachment (2021)
6. M. Koman, et al., *How Far is the European Union from Sustainable Development Goals? Challenges on the Path Toward Sustainability in Europe* (Emerald Publishing Limited, Bingley, 2020) pp. 31-53
7. R.S. Czarny, et al., *The North American Arctic Games: Between Cooperation and Rivalry, Politics and Development in the North American Arctic* (Emerald Publishing Limited: Bingley, 2021) pp. 73-107
8. R. V. Knaub, Development of the Arctic territories of the Russian Federation in the 21st century in the context of security from emergency situations of various genesis, *Geopolitics and Ecogeodynamics of Regions*, **7(2)**, pp. 58-72 (2021)
9. A.I. Bedritsky, Sustainable development of the Arctic zone of the Russian Federation and climatic aspects of environmental and hydrometeorological safety, *Energy Policy*, **4**, pp. 3-10 (2018)
10. J.S. Higginbotham, The North American Arctic. Energizing Regional Collaboration and Governance. Special Report. Available online:

https://www.cigionline.org/sites/default/files/documents/NAA%20Special%20ReportWEB.pdf (2018)

11. S.A. Karaganov, et al. Arctic Policy of Russia: International Aspects, *Documents of XXII April International Scientific Conference on the Problems of Economic and Social Development, Moscow, 2021 National Research University "Higher School of Economics* (Publishing House of the Higher School of Economics, Moscow, 2021) p. 56
12. T.O. Ediseeva, Features of sustainable development of the Arctic regions, *Economics and Business: Theory and Practice*, **5-1(63)**, pp. 173-176 (2020)
13. Development of the Arctic. Available online: https://fussing-Arctic.rf/razvitie-arktiki/ (2021)
14. RBC Available online: https://trends.rbc.ru/trends/green/5f172e609a79476e61071503 (2021)
15. ESG ranking of Russian regions 2020. Available online: https://raex-a.ru/rankings/regions/ESG_raiting (2020)
16. G.M. Arruda and S. Krutkowski, Social impacts of climate change and resource development in the Arctic: Implications for Arctic governance, *Journal of Enterprising Communities: People and Places in the Global Economy*, **11(2)**, pp. 277-288 (2017)
17. P. Devyatkin, The impact of the coronavirus pandemic on the life in the Arctic region. Indigenous Peoples. Available online: https://russian-arctic.info/info/articles/redaktsionnye-stati/vliyanie-pandemii-koronavirusa-na-zhizn-v-arkticheskom-regione-korennye-narody/ (2021)
18. How Russian oil industry survived the pandemic. Available online: https://www.eprussia.ru/epr/393-394/4021861.htm (2021)
19. Calendar. Publication of official statistical information on the socioeconomic development of the Arctic zone of the Russian Federation in 2020. Available online:https://gks.ru/free_doc/new_site/region_stat/calendar1-2020.htm (2020)
20. Rosstat: The report "Socioeconomic situation of Russia" for January-July 2021, the final version (online, pdf). Available online: https://nangs.org/analytics/rosstat-doklad-sotsialno-ekonomicheskoe-polozhenie-rossii-itogovyj-pdf (2021)
21. M. Lindberg, et al., Co-creative place innovation in an arctic town, *Journal of Place Management and Development*, 13(4), pp .447-463 (2020)
22. S.F. Lukin, Arctic Encyclopedia: The Population of the Arctic. Available from: https://docplayer.com/428382-Arkticheskaya-enciklopediya-naselenie-arktiki-arctic-encyclopedia-arctic-population.html (2014)
23. G.M. Arruda, Arctic governance regime: the last frontier for hydrocarbons exploitation, *International Journal of Law and Management,* 57(5), pp. 498-521 (2015)
24. B.S. Sergi and A. Berezin, Oil and Gas Industry's Technological and Sustainable Development: Where Does Russia Stand?, Sergi, B.S. (Ed.) *Exploring the Future of Russia's Economy and Markets* (Emerald Publishing Limited, Bingley, 2018) pp 161-182
25. A. Østhagen, Developing North American Arctic Offshore Oil and Gas: A Comparative Study – Part 1 By Article, Canada, Denmark and Greenland, Natural Resources and Energy, United States. Available online: https://www. thearcticinstitute. org/developing-north-american-arctic_part1/ (2012)
26. A. Kuchumov, et al., Essential, legal and environmental aspects of sustainable development of arctic tourism, *IOP Conf. Ser.: Earth Environ. Sci.,* **678**, 012042 (2021)
27. K.V. Matrokhina., V.Y. Trofimets, E.B. Mazakov , A.B. Makhovikov and M.M. Khaykin, Development of methodology for scenario analysis of investment projects of enterprises of the mineral resource complex, Journal of Mining Institute, 259, pp. 112-124, doi: 10.31897/PMI.2023.3 (2023)
28. I.G. Gerasimova, I.S. Oblova, E.I. Golovina, The Demographic Factor Impact on the Economics of the Arctic Region, Resources, 10, 117, doi: 10.3390/ resources10110117 (2021)
29. V.V. Sharok, E.G. Vakhnina, Yu.A. Yakovleva, Health Resource of National Physical Education and Sport System: Northern Dimension, *Teoriya i praktika fizicheskoy kultury=Theory and Practice of Physical Culture*, **3**, pp. 45-46 (2019)