



Available Online at EScience Press Journals

# International Journal of Agricultural Extension

ISSN: 2311-6110 (Online), 2311-8547 (Print)

<http://www.esciencepress.net/IJAE>

## SPATIAL DEVELOPMENT FOR SOCIO-ECONOMIC DEVELOPMENT OF ARCTIC TERRITORIES

**Anatoly N. Silin, Marina L. Belonozhko***Industrial University of Tyumen, Tyumen, Russian Federation.*

### ARTICLE INFO

#### Article History

Received: July 12, 2021

Revised: November 23, 2021

Accepted: December 01, 2021

#### Keywords

Economic problems

Social sector

Human capital

Innovative technologies

Natural resources

### ABSTRACT

Studying development of the Arctic territories, despite the unfavourable climate, terrain, lack of transport connections, low population density is an urgent problem that politicians and researchers are acutely facing. The purpose of this study was to investigate the level of spatial development of the Arctic territories belonging to states located in Eurasia and North America and adhering to different strategies for the development of these regions. The paper presents the population dynamics of the Arctic territories. It is revealed that it is not related to the general dynamics' characteristic in general for the countries to which the Arctic territories under study belong. In addition, each region, for example, the Arctic Zone of the Russian Federation, has different population dynamics from other regions. It is also established that the Arctic territories, although they are economically connected with the countries, they are part of, but in contrast to them, have a positive dynamic of gross domestic product in the Eurasian part of the Arctic territories, and a negative one in Alaska. This indicates that, regardless of the riches of the Arctic territories, different strategies are used by states for their development. The materials of the study may be of practical value for politicians and researchers engaged in the problems of the spatial development of the Arctic territories and are looking for innovative approaches to solving emerging problems.

*Corresponding Author: Marina L. Belonozhko**Email: mbelonozhko7430@nanyang-uni.com**© The Author(s) 2021.*

### INTRODUCTION

Scientific research of the Arctic territories has recently acquired a special relevance. This is conditioned by the richness of this part of the planet for minerals, the reserves of which in other territories are almost exhausted (Olesen, 2020). For example, a quarter of the hydrocarbon reserves in the world are located in the Arctic territories (Serova et al., 2020), and many more minerals are useful for modern industry (Semberg, 2020). And also, due to global warming and the associated reduction of the ice cover, the possibility of creating new sea routes that are economically profitable for many countries opens up (Semberg, 2020). For

example, the sea route from East Asia to Western Europe in the Arctic is 40% more economical than the currently used routes (Semberg, 2020). Many research papers have been devoted to the study of the peculiarities of the Arctic territories. In particular, the analysis of the natural and geographical features of the Arctic territories that belong to such countries as Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States is carried out (Krasulina et al., 2020). In addition, their social and economic spheres have been studied. All these countries have a high economic potential, due to natural resources. Thus, Norway has many oil and gas facilities, a developed fishing industry

(Krasulina *et al.*, 2020). Finland uses an innovative approach to the extraction and processing of natural resources in a harsh climate. Ore mining and the woodworking industry have a positive impact on the Swedish economy (Krasulina *et al.*, 2020).

Russian researchers study the Global Policy of development of the Arctic territories (Martynova, 2019), as well as the positive experience of other Arctic states, and analyse the state of the socio-economic sphere of the regions included in the Arctic Zone of the Russian Federation. In particular, the social and economic problems of the Republic of Karelia are analysed and directions for their solution are developed (Volkov, 2020). The classification of problems that do not contribute to the innovative development of the Arctic territories is also carried out (Volkov, 2020). These include the following problems: economic, social, in particular, demographic, infrastructural, technological, legal, personnel, information, integration, and transport sectors (Bondar *et al.*, 2021; Dziuba, 2021). The obstacles to the development of the Arctic territories include (Korchak *et al.*, 2019): low population density, climate features, remoteness of settlements from administrative centres, orientation to the extraction of raw materials, and not to its processing. Based on these problems, states set goals and tasks that are aimed at solving them. For example, economic development, improving the quality of life and safety of the population (Jungsberg *et al.*, 2020), creating conditions for the development of Arctic territories (Fondahl *et al.*, 2021), and the necessary infrastructures for this, in particular, the Arctic Zone of the Russian Federation (Volkov, 2020; Zaikov *et al.*, 2019). Researchers and politicians are making efforts to develop and apply an innovative policy for the development of Arctic territories (Zaikov *et al.*, 2019), both within Russia and in other countries.

With the help of an integrated approach that takes into account the economic, political, and geographical situation, different directions of development of the Arctic territories are analysed (Zaikov *et al.*, 2019). A two-level model was created to analyse the socio-economic development of the Arctic territories, using the example of Canada (Kobylko *et al.*, 2019). Researchers (Krasulina *et al.*, 2020) suggest solving social, economic and scientific problems that arise in the Arctic territories of different countries and are common to each of them together by developing a unified Concept of the North through international cooperation. Scientists have

analysed the reasons why the global interest in the Arctic territories has recently increased (Serova *et al.*, 2020). And also analysed the models of their development. It was found out that the Russian model is aimed at the development of natural resources, in contrast to the models of other Arctic countries, in which the priority is the sustainable development of territories (Serova *et al.*, 2020; Tsukerman and Kozlov, 2021). The latter, in turn, requires a careful attitude to the environment, to preserve it for future generations (Heino *et al.*, 2020). The purpose of this study is to investigate the level of the spatial development of the Arctic territories of states that adhere to different strategies for the development of northern regions. For the furtherance of this goal, it was necessary to solve the following tasks:

1. To investigate the level of social development of the Arctic territories belonging to different states.
2. To investigate the level of economic development of the Arctic territories, using the example of three states.

#### **METHODOLOGY**

The following methods were used: theoretical methods of analysing statistical data characterising the level of social and economic development of states, in general, and individual territories, in particular. Among such parameters, the population of the studied countries and the population of individual territorial units were selected. In addition, among the parameters characterising the socio-economic development of the territories, the following were chosen: the unemployment rate, the level of monetary expenditures and disposable resources of households, the monetary income of households.

The indicators characterising the housing conditions of the population of the territory, the educational sphere, research, transport, etc., were considered. The study used the World Bank database, statistical data from Rosstat, data from the Federal State Statistics Service of the Russian Federation, in particular statistical information on the socio-economic development of the Arctic Zone of the Russian Federation. The dynamics of these parameters were investigated. The methods of comparison and graphical representation of the results were also used in the work. The data for the construction of the diagrams included the population of certain territorial units. This choice was made to study the natural dynamics of the population, which was not

caused by the expansion of the Arctic Zone according to the Decree of the President of the Russian Federation No. 287 of June 27, 2017 "On Amendments to the Decree of the President of the Russian Federation No. 296 of May 2, 2014 "On the land territories of the Arctic Zone of the Russian Federation" (2017).

The experimental basis of the study was the states that include the Arctic territories. In particular, the United States, of which Alaska is a part, located in the Arctic zone. Denmark, which includes Greenland, is located in the Arctic zone. And also, the Russian Federation, a third of the area of which is the Arctic Zone of the Russian Federation. The choice of countries is determined by their geographical location: Eurasia, North America, and different landscapes, natural resources, living conditions, population density, level of economic and social development. The study was conducted in five stages.

1. At the first stage, the distribution of Arctic territories between the countries of the world was studied. In particular, between the Russian Federation, Canada, the USA, Norway, Denmark, Sweden, Finland, Iceland.

2. At the second stage, the dynamics of the population of the Arctic territories considered in this paper and the countries they are part of were studied to find out whether the change in the population of the Arctic zones is a general trend in the population of the country, or a phenomenon characteristic only of a specific region, provoked by the peculiarities of living in these territories.

3. At the third stage, the dynamics of the population of the Arctic Zone of the Russian Federation (AZRF) was

considered in detail, taking into account the rural and urban population separately. The population changes in certain regions of the Russian Arctic were also studied: The Republic of Karelia, the Republic of Komi, the Republic of Sakha (Yakutia), the Arkhangelsk Oblast without the Nenets Autonomous Okrug, the Krasnoyarsk Krai, the Nenets Autonomous Okrug, the Murmansk Oblast, the Yamalo-Nenets Autonomous Okrug, the Chukotka Autonomous Okrug. The aim was to find out whether the trend of population decline in the Arctic Zone of the Russian Federation is common for all regions, or whether there is a difference in dynamics for different regions of the Arctic Zone of the Russian Federation.

4. At the fourth stage, the dynamics of changes in the parameters characterising the social development of the regions included in the Arctic Zone of the Russian Federation was studied.

5. At the fifth stage, the dynamics of the gross domestic product (GDP) of the Arctic territories and the countries they are part of in general were considered to identify patterns of economic development of the Arctic territories.

## RESULTS

The distribution of the Arctic territories between the countries of the world is not unambiguous. The reason for this is the disputed territories, the claimants for which are several states at once, or the inclusion in the Arctic new territories. This paper presents the distribution of Arctic territories between the countries of the world (Fauser and Smirnov, 2018) (Figure 1).

Distribution of Arctic territories among the countries of the world, sq. km

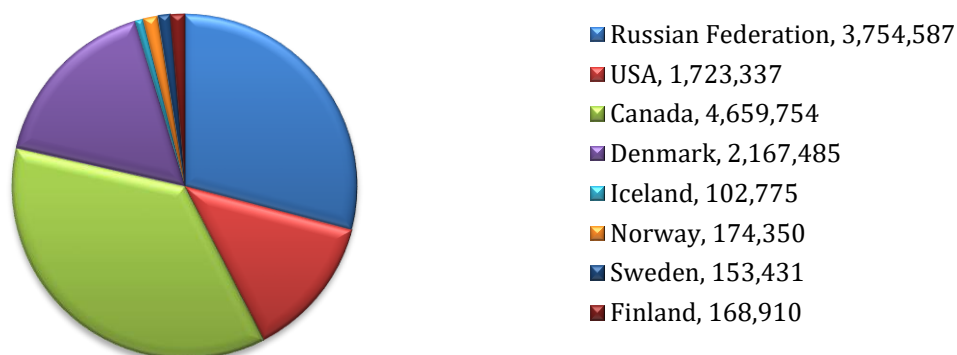


Figure 1. Distribution of Arctic territories.

Basically, the Arctic territories do not have a high population density. Moreover, the number of people living on them is constantly changing. Table 1 shows the data that can be used to study the dynamics of the population of the Arctic territories and compare it with similar parameters of the countries to which these territories belong. Table 1 further shows that the changes in the population of the Arctic zones do not

repeat the general trend characteristic of the state to which they belong. For example, in Alaska, the population has decreased, while in the United States it has increased. The same is true for Greenland with Denmark, and the Russian Arctic with the Russian Federation. Next, the study considers the dynamics of the population of the Arctic Zone of the Russian Federation (AZRF) (Figures 2-4 and Table 2).

Table 1. Dynamics of the population of the Arctic territories and the countries to which they belong.

	2014	2015	2016	2017	2018	2019	Changes, %
Alaska	736.283	737.498	741.456	739.700	735.139	731.545	-0.6%
USA, million	318.4	320.7	323.1	325.1	327.2	328.2	3%
Greenland	56.295	56.114	56.186	56.172	56.023	56.225	-0.12%
Denmark, million	5.627	5.66	5.707	5.749	5.781	5.806	3%
AZRF	2.396.106	2.384.933	2.374.945	2.411.003	2.363.621	2.349.850	-1.9%
Russian Federation, million	143.8	144.1	144.3	144.5	144.5	144.4	0.4%

Source: Federal State Statistics Service of the Russian Federation, 2021; World bank, 2020.

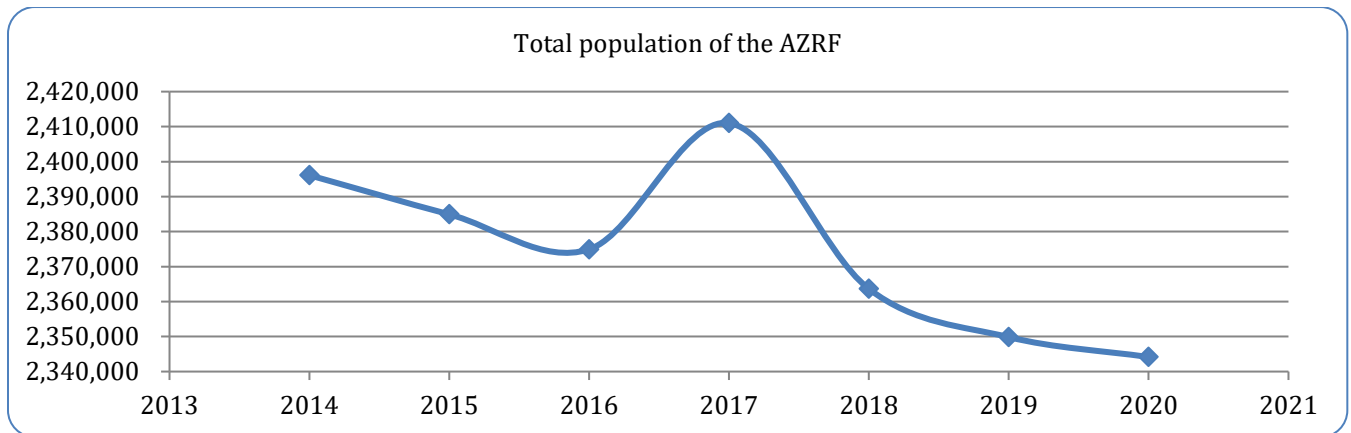


Figure 2. Dynamics of the population of the Arctic Zone of the Russian Federation.

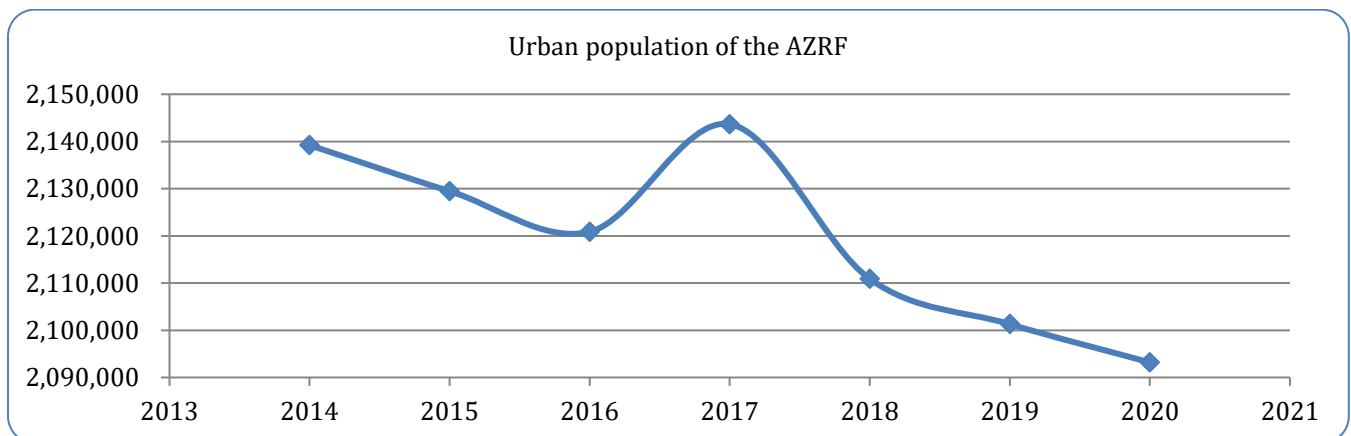


Figure 3. Dynamics of the urban population of the Arctic Zone of the Russian Federation.

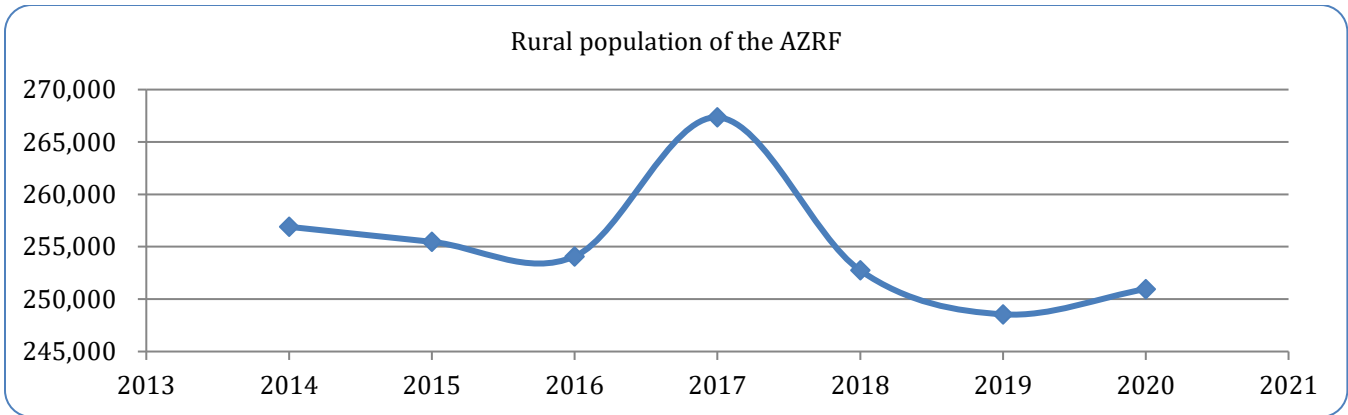


Figure 4. Dynamics of the rural population of the Arctic Zone of the Russian Federation.

The data for the construction of diagrams in Figures 2-4 included the population of the following territorial units: the Komi Republic (Vorkuta urban district), the Sakha Republic (Yakutia) (Allaikhovsky municipal district, Anabar National (Dolgano-Evenki) municipal district, Bulunsky municipal district, Nizhnekolymsky municipal district, Ust-Yansky municipal district), the Krasnoyarsk Krai (Norilsk urban district, Taimyr Dolgano-Nenets

municipal district, Turukhansky municipal district), the Arkhangelsk Oblast without Nenets Autonomous Okrug (Arkhangelsk urban district, Novaya Zemlya urban district, Novodvinsk urban district, Severodvinsk urban district, Mezen municipal district, Onega municipal district, Primorsky municipal district), Nenets Autonomous Okrug, Murmansk Oblast, Chukotka Autonomous Okrug, Yamalo-Nenets Autonomous Okrug.

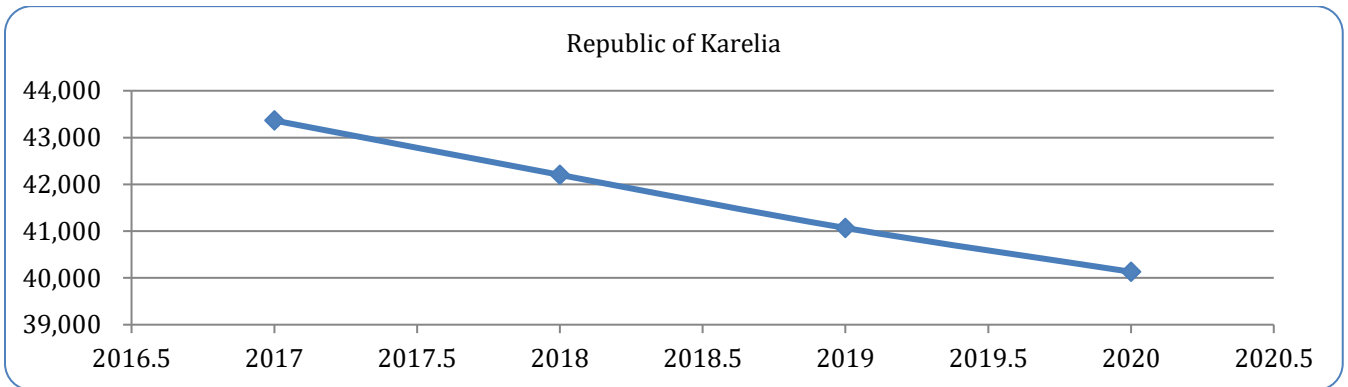


Figure 5. Dynamics of the population of the Republic of Karelia.

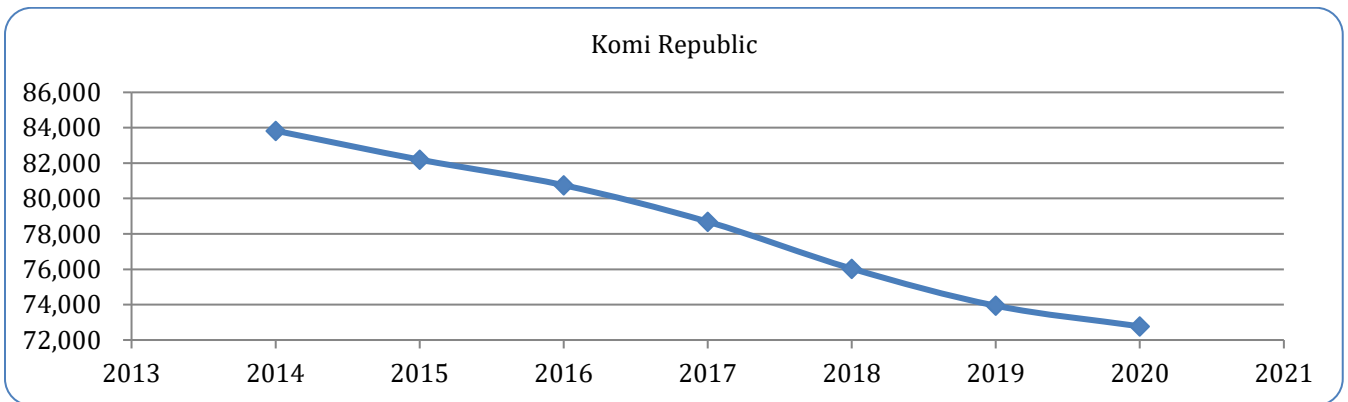


Figure 6. Dynamics of the population of the Komi Republic.

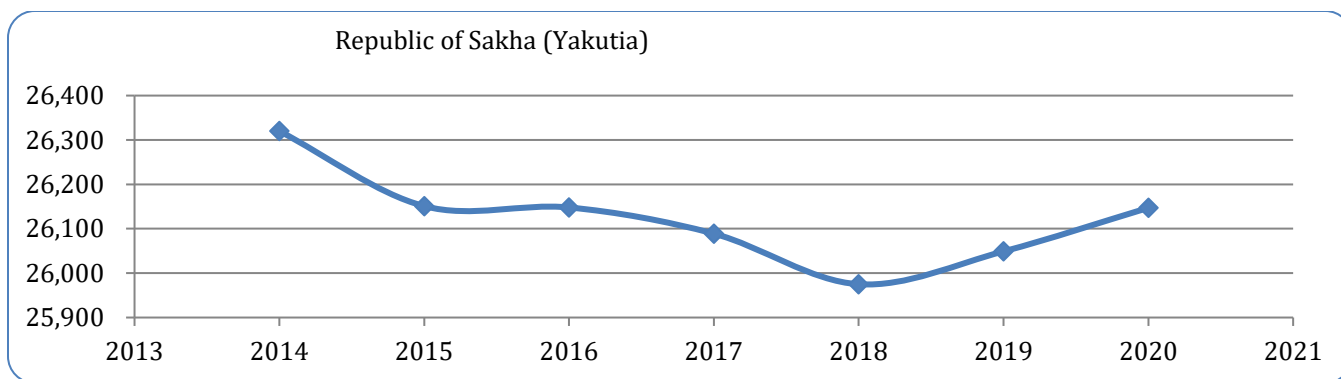


Figure 7. Dynamics of the population of the Republic of Sakha (Yakutia).

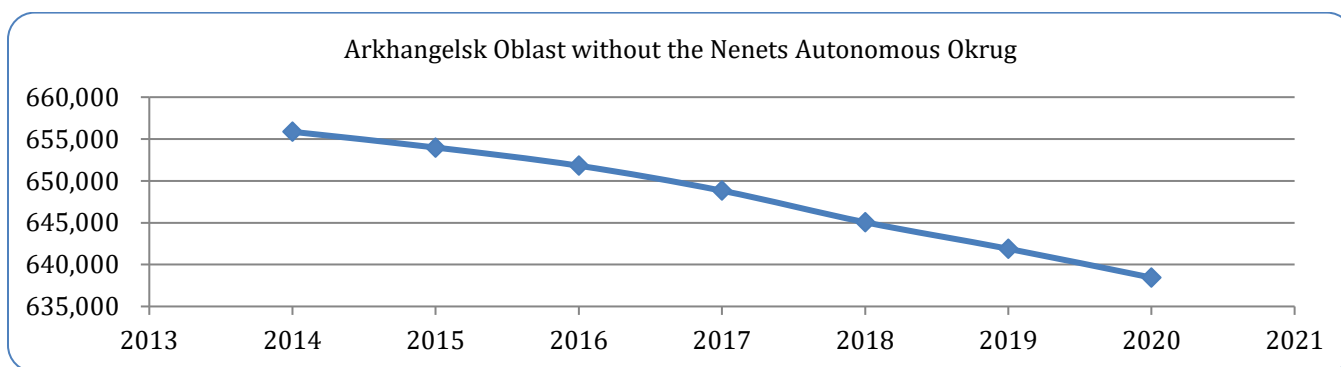


Figure 8. Dynamics of the population of the Arkhangelsk Oblast without the Nenets Autonomous Okrug.

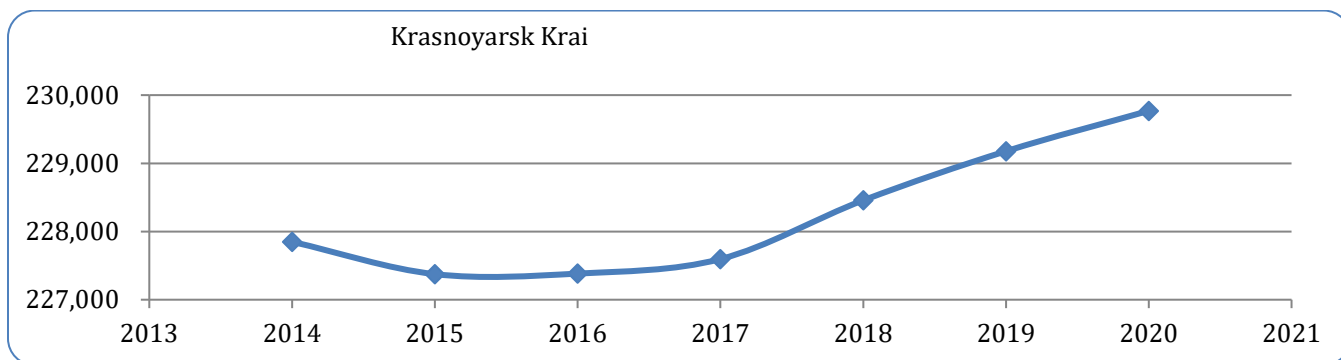


Figure 9. Dynamics of the population of the Krasnoyarsk Krai.

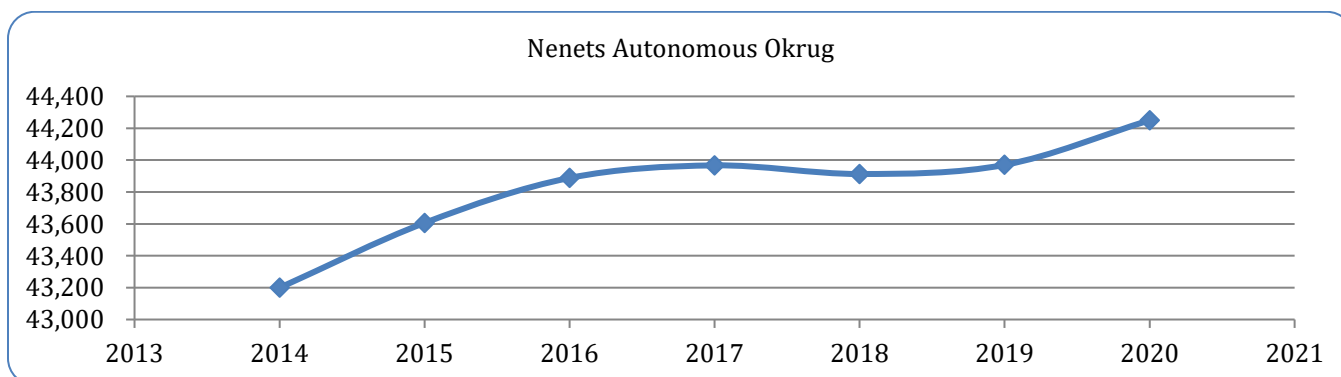


Figure 10. Population dynamics of the Nenets Autonomous Okrug.

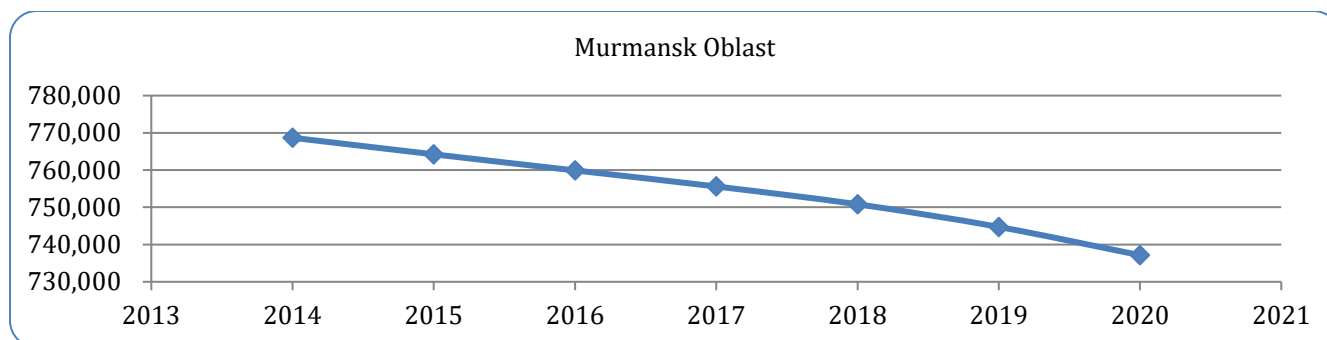


Figure 11. Dynamics of the population of the Murmansk Oblast.

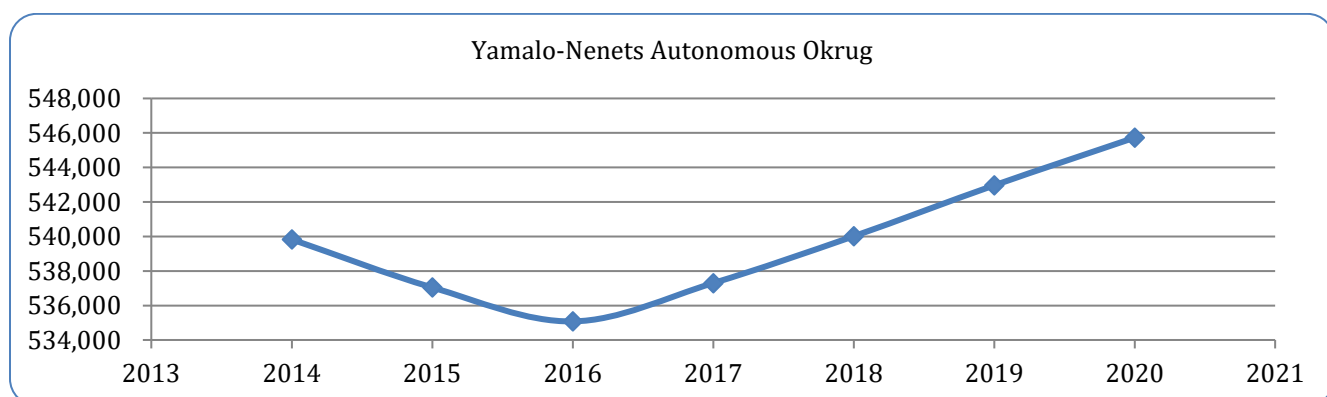


Figure 12. Population dynamics of the Yamalo-Nenets Autonomous Okrug.

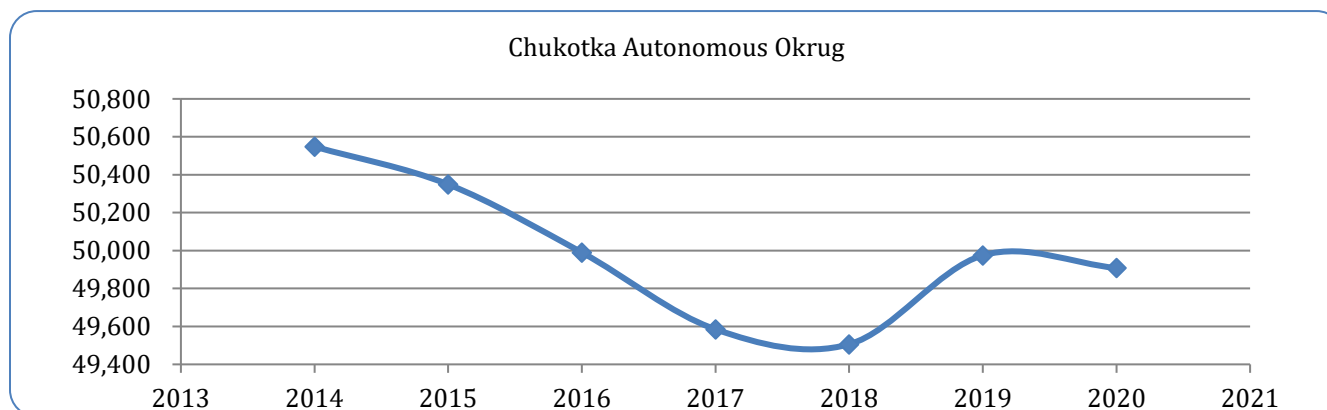


Figure 13. Dynamics of the population of the Chukotka Autonomous Okrug.

As can be seen from Figures 5-13, the trend of population decline in the Russian Arctic is not typical for all regions. For example, in the Krasnoyarsk Krai (Figure 9), the Nenets Autonomous Okrug (Figure 10), the Yamalo-Nenets Autonomous Okrug (Figure 12), stable growth is observed. In the Russian Federation, measures are being taken at the state level to develop the Arctic territories. In particular, the following steps were taken in the social sphere in 2020: 100 hotel beds were commissioned after renovation, and 41 beds after

refurbishment. Hospital organisations with an area of 358 sq. m, with 7 beds, were also built. Outpatient clinics and medical centres with an area of 249 and 1.499 sq. m., respectively, were built. Attention is also paid to the physical development of the population of the Arctic territories. In particular, 1 swimming pool, 1 sports facility with artificial ice with an area of 1.800 sq. m, gyms with an area of 6.901 sq. m, 3 sports and recreation complexes were put into operation. Attention is paid to the education of citizens living in these

territories. In 2020, 8,388 sq. m were commissioned to professional and educational organisations. Secondary schools received a total of 1,000 new and reconstructed places for 540 students and 300 new places in rural areas. Preschool educational organisations received 4,920 new places.

The number of students of preschool educational organisations in the Arctic zone in 2020 amounted to 166,295 people or 2.23% of the number of students in the entire Russian Federation. Attention is also paid to the cultural development of residents of the Arctic

territories of the Russian Federation. For example, in 2020, club-type cultural institutions and concert halls were replenished with 350 and 400 seats, respectively. 509.9 thousand sq. m. of the total area of residential premises were put into operation in the Arctic Zone of the Russian Federation in 2020, which is 18% more than in 2019. 8,256 apartments were built. The dynamics of these and other parameters is presented in Table 2. Next, the study considers the GDP dynamics as one of the characteristics of the economic development of a territorial unit (Table 3).

Table 2. Indicators of the development of the socio-economic sphere in the land territories of the Arctic Zone of the Russian Federation.

Indicator	Year				
	2016	2017	2018	2019	2020
Major repairs of apartment buildings, sq. m	714,776.5	1,250,160.6	1,685,028.4	-	-
The unemployment rate (according to the methodology of the International Labour Organisation), %	-	5.6	5.3	4.6	6.0
Commissioned, thousand sq. m. of the total area of residential premises	427.1	561.5	419.8	408.4	509.9
Hotels, beds	25	73	410	105	141
Swimming pools (with a track length of 25 and 50 m), units.	3	-	1	3	1/492
Sports facilities with artificial ice, units/ sq. m	1/1800.0	1/2827.0	-	2/3473	1/1800
Gyms, sq. m	580	1,111.0	1,300	8,988.0	6,901.1
Sports and recreation facilities, units.	3	6	1	7	3
Tourist bases, beds	12	87	30	32	12
Sanatoriums, beds		111			
General education organisations, student seats	1,003	510	720	865	1,540
Preschool educational organisations, seats	1,200	1,828	1,200	1,330	4,920
Number of preschool education organisations, units	831	843	822	889	-
Number of children enrolled in pre-school educational institutions, persons	154,415	158,399	159,295	161,376	166,295
Percentage of households with a computer, %	84.8	74.8	83.8	80.3	80.1
Percentage of households with Internet access, %	84.0	76.6	86.4	84.0	86.6
Degree-credit enrollment, persons	172	157	178	162	183
Graduation from postgraduate school, persons	174	202	111	81	79
Graduation from postgraduate school with the thesis defence in the reporting year, persons	8	4	4	0	0
Number of organisations with postgraduate studies	18	16	10	10	-
Admission to doctoral studies, persons	0	2	3	1	0
Graduation from doctoral studies, persons	8	0	3	2	3
Graduation from doctoral studies with the thesis defence in the reporting year, persons	0	0	0	2	1
Number of organisations with doctoral degrees	3	2	2	1	-
Length of public roads of local significance, km	5,642.9	5,970.1	6,230.8	7,309.3	9,079.9



Total area of residential premises, thousand sq. m	56,966.0	58,225.9	58,389.7	58,090.6	65,100.4
The total area of the housing stock, on average per inhabitant, sq. m	19	24.9	24.4	24.3	25.0
Migration growth of the population	-14.021	-14.447	-12.335	-9.271	-9.490
Transportation of passengers by buses on regular transportation routes, thousand people.	170,141.5	169,978.1	169,818.1	161,942.9	-
Passenger turnover of buses on regular transportation routes, thousand passenger-km	1,516,502.3	1,515,871.9	1,517,317.7	1,515,026.6	-
Number of children's health camps, units	466	437	489	79	-
Level of monetary expenditures of households, on average per household member per month, RUB	27,558.5	27,924.1	30,259.9	33,973.2	38,874.7
Level of available household resources, on average per household member per month, RUB	32,581.5	33,725.5	35,621.0	40,803.3	47,309.9
Level of expenditure on final consumption of households, on average per household member per month, RUB	21,357.4	22,283.2	23,375.2	26,339.7	27,551.4
Monetary income on average per household, per month, RUB	93,143.2	99,139.4	102,377.3	111,212.0	-

Source: Federal State Statistics Service of the Russian Federation, 2021.

Table 3. GDP dynamics of the Arctic territories

	2014	2015	2016	2017	2018	2019	2020	Changes %
Alaska, billion USD	53.48	-	53.29	-	52.93	-	-	-1
USA, trillion USD	17.53	187.22	18.71	19.52	20.58	21.43	20.937	19%
Greenland, billion USD	2.842	2.499	2.707	2.827	3.052	-	-	7%
Denmark, billion USD	353	302.7	313.1	332.1	356.9	350.1	355.184	0.61
AZRF, trillion USD	0.10295	0.070876	0.065127	0.08657	0.09853	0.102	-	-0.9
RF, trillion USD	2.059	1.363	1.277	1.574	1.67	1.7	1.483	28

Source: Federal State Statistics Service of the Russian Federation, 2021; World bank, 2020.

The level of economic development of the Arctic territories is different for all countries (Table 3). For example, the United States has had an increase in GDP over the past 7 years, while this economic indicator has decreased in Alaska. The opposite situation is in Greenland, where GDP has grown compared to Denmark. In the Russian Arctic, the decline in GDP is lower than in the whole state.

## DISCUSSION

The borders of the Arctic territories are not clearly defined until today (Federov *et al.*, 2019). There are still differences in determining the ownership of some parts of the Arctic territories to certain countries. Therefore, there is no unambiguous distribution of the Arctic territories between the northern countries in the scientific literature. For example, researchers (Serova *et al.*, 2020) give the following figures: the area of the Arctic lands of Russia is 5.8 million sq. km; Canada – 1.43

million sq. km; Norway – 0.75 million sq. km; Denmark – 0.372 million sq. km; USA – 0.126 million sq. km. In addition, the borders of the Russian Arctic were expanded in 2014 with the Decree of the President of the Russian Federation No. 296 of May 2, 2014 “On the land territories of the Arctic Zone of the Russian Federation”. According to (Galimullin and Matveenکو, 2019), since 2014, the area of the Russian Arctic has become almost a third of the total area of the territory of the Russian Federation, namely 4,969,391 million square kilometers. Researchers (Krasulina *et al.*, 2020) studied the social and economic features of the Arctic zones of eight countries according to the following parameters: gross regional product, wage level, population, unemployment rate. Their dynamics for the period from 2007 to 2019 is estimated. It was revealed that the GDP for the studied period changed in the United States by 3.232%, while in Alaska by 0.918%. In this study, the US GDP for the period from 2014 to 2019 increased by 22%, and in

Alaska it decreased by 1%. At the same time, the population in the United States increased by 0.758%, and in Alaska by 0.557% (Krasulina *et al.*, 2020). According to the calculations, the US population grew by 3%, and in Alaska it decreased by 0.6%. The following changes were recorded for Denmark and Greenland: GDP was 0.155% and 4.87%, respectively (Krasulina *et al.*, 2020). In this study, GDP decreased by 0.8% in Denmark and increased by 7% in Greenland. The changes in the population are as follows: 0.533% and -0.041% (Krasulina *et al.*, 2020), according to the calculations, 3% and -0.12% in Denmark and Greenland, respectively. For Russia, the GDP is 3.782%, and the population is 0.188% according to (Krasulina *et al.*, 2020), according to calculations, the GDP is 28%, the population is 0.4%. One of the characteristics of the problem of all countries with territories in the Arctic zone is the low population density. This leads to some inconveniences and high costs in the organisation of large-scale industrial production (Grydehoj, 2018). In Greenland, there are attempts to solve this problem at the state level with the help of a policy of population concentration in large settlements, the construction of which is financed by the state, as well as social security of citizens is carried out (Grydehoj, 2018). As a result of this policy, there was rapid urbanisation of the recently nomadic people. And thus, almost 60% of the island's population was concentrated in five cities with a population of 3 to 17.5 thousand people. And 40% of the population lives in cities with no more than 3 thousand people. At the same time, cities do not have a road-transport connection (Grydehoj, 2018). Communication is carried out by sea vessels, or by planes and helicopters when the sea is covered with ice. In addition, there is a shortage of human capital on the island, which they are trying to compensate by attracting specialists from Denmark, as well as sending students from Greenland to study in Denmark (Grydehoj, 2018).

In Norway, the strategy for the development of Arctic territories includes the large-scale construction of roads in the north of the country (Tsukerman and Kozlov, 2021). And the connection of the Arctic Zone of the Russian Federation is provided by road transport on roads (mostly paved) of federal, regional, inter-municipal and local significance. For example, the length of public roads of local significance in 2020 was 9,079.9 km. Railway and sea transport also operates in the Russian Arctic (Volkov, 2020). All this plays an

important role in the territorial development of the region, where the population is dispersed in small groups located at large distances from each other (Volkov, 2020). In addition, this contributes to solving the existing problems of transporting mineral raw materials extracted in the Arctic zone to its processing points and consumers. But there is still a problem of connecting remote small settlements from administrative centres. For example, in the Priuralsky municipal district, about 70% of the population live in settlements that do not have transport links with the administrative centre (Korchak *et al.*, 2019).

In Sweden, Finland, and Norway, considerable attention is paid to the development of universities and research institutes that study the problems of the Arctic territories and search for innovative methods to solve them (Volkov, 2020). In Norway, for example, universities train highly professional personnel, as well as scientific research, the development of innovative technologies necessary for the development of the Arctic territories (Tsukerman and Kozlov, 2021). According to this study, in the territory of the Arctic Zone of the Russian Federation, the number of organizations with postgraduate studies in 2016 was 18 units, and by 2018 it had decreased to 10. In turn, the number of organizations with doctoral degrees has changed from 3 to 1 over the same period. Perhaps, in this regard, the number of postgraduate students (from 174 to 79 people) and doctoral students (from 8 to 3 people) has decreased. In addition, conditions for attracting tourists are being created abroad in the Arctic territories for their economic development (Volkov, 2020). In Finland, Greenland, Canada, Norway, and the Russian Federation, "winter cities", "snow villages", and ski resorts are being created (Korchak *et al.*, 2019; Eritja, 2017; Miroshnychenko, 2021). As the study has shown, in the Arctic Zone of the Russian Federation, there is also an emphasis on attracting tourists. Thus, over the past five years, the AZRF hotels have increased the number of beds by 754 units, and tourist bases by 173 units. In turn, the sanatoriums increased by 111 beds. All the production facilities available in the Arctic territory are undergoing the problem of a shortage of labour resources and human capital (Volkov, 2020; Polukarov *et al.*, 2021). According to our study, the reason for this may be a natural decrease in the population, which has recently been observed not only in the Arctic territories but also around the world. For example, in the Arctic

Zone of the Russian Federation, the population has decreased by 2.2% over the past seven years. In addition, the migration outflow of the population from the harsh climate zone can also affect the reduction of labour resources and human capital (Yaroshenko and Tomashevski, 2021; Kachynska *et al.*, 2021). In 2020, it amounted to 9.490 persons or 0.36% of the population of the Arctic Zone of the Russian Federation. Mostly young people aged 15-34 years migrate (Korchak *et al.*, 2019).

The reproduction of human capital, according to researchers (Volkov, 2020), can be influenced by migration, the availability of education at the place of residence, and the availability of appropriate medical care, the availability of employment opportunities in the specialty. In addition, researchers (Korchak *et al.*, 2019) emphasize the impact of migration on human capital, which is directly related to territorial development. Some states, in particular the Russian Federation and Canada, solve these problems with the help of subsidies. Furthermore, the state policy is aimed at maintaining and developing the social sphere of the local population with the help of industrial enterprises that are located in the Arctic territories. The outflow of human capital from the Arctic territories is associated with climatic conditions. They, in turn, lead to an increase in the costs of living, food, necessities, utility bills, the blockade of supplies of everything necessary for living and fuel in winter due to the climatic blockade of transport links (Korchak *et al.*, 2019).

In the Arctic Zone of the Russian Federation, over the past five years, household spending on average per family member has increased by 41%. At the same time, the resources available to households have increased by 45% on average per family member.

Despite the state financial support for the Arctic territories, the labour markets are still experiencing a shortage of qualified specialists in the fields of production, tourism, construction, healthcare, and social services (Dumchikov and Pakhomov, 2021). For example, in Norway, the labour market is not filled by 15% with qualified workers. Other Arctic states are experiencing the same problems. At the same time, the unemployment rate in them remains high. For example, in Finland it is about 6%, in Sweden – 7.5% (Korchak *et al.*, 2019), in the Russian Arctic – 6%, in Alaska – 7%. The human resource in the Alaska labour market mainly consists of migrants from other regions of the country

who work in shifts (Korchak *et al.*, 2019). Moreover, in this region, the demand for labour depends on the season. In summer, it increases by 15% for workers in the construction professions, the fishing industry. In Sweden, Denmark, and Norway, there are not enough representatives of such professions: mining metallurgy technicians, programmers, engineers, chemists, mechanics, biotechnologists, IT engineers. There is a shortage of healthcare workers in Finland. At the same time, there is a great demand in the labour market of the Arctic territories of Denmark and Sweden for specialists with higher education. And in Finland and Norway, there are also specialists with secondary vocational education (Pitukhina *et al.*, 2020).

In the Arctic Zone of the Russian Federation, there are also problems in the labour market, related to the discrepancy in the qualifications of the local population, who are accustomed to performing duties related to reindeer husbandry and fishing, and the need for qualified workers who can use innovative technologies in modern production. To optimise the labour market of the Arctic territories, some countries practice training qualified personnel starting from school age, conducting consultations and training by specialists of the production of schoolchildren and students. In Canada and Norway, young professionals are encouraged through scholarships, grants, internships, opportunities to get higher education for free not only by residents of these countries but also abroad (Korchak *et al.*, 2019). In Canada, rotational shiftwork is practised at enterprises located in the Arctic territories. At the state level, there is support for scientific research and the development of innovative technologies that can work in mountainous areas at low temperatures and snow. The mining industry of Alaska, although it uses an innovative approach, is developing slowly. The reason for this is the geographically remote location from other industrial zones of the country, transportation to which is expensive and economically unprofitable (Tsukerman and Kozlov, 2021). Problems with transport links to remote settlements are also observed in Greenland, where the main modes of transport are sea and air (Government of Iceland. Ministry for Foreign Affairs, 2020).

Sweden is also characterised by a decrease in the population in the Arctic zone, which leads to a shortage of human capital, despite the financial state support for the economy of the Arctic region. An innovative

approach to the development of the Arctic territories in Sweden is being developed by technological universities and is being implemented by highly educated engineers at mining mines. In Greenland, an innovative approach to the mining industry is at the stage of conducting exploration work and training personnel with the necessary qualifications (Tsukerman and Kozlov, 2021). Scientists (Korchak *et al.*, 2019) emphasise the importance of the territorial development of the availability of not only transport communications but also information and communication. It is also claimed that there is no permanent radio and television broadcasting, as well as information and communication technologies in the Arctic Zone of the Russian Federation. According to the study, in 2020, 80.1% of households had a computer, and 86.6% of households had Internet access (Federal State Statistics Service, 2021).

### CONCLUSIONS

This study showed that different countries apply different policies aimed at the development of the Arctic territories that belong to them. For example, as the analysis of the dynamics of socio-economic parameters shows, the population and GDP have decreased in Alaska, although in general, both these parameters have increased in the United States. The opposite situation is observed in the other two Arctic zones studied in this work: Greenland and the Arctic Zone of the Russian Federation. The population in them has decreased, which has the opposite trend compared to Denmark and the Russian Federation as a whole, respectively. And at the same time, the GDP of the regions has more positive dynamics compared to the country as a whole, which they are part of. This indicates the economic development of Greenland and the Arctic Zone of the Russian Federation. But at the same time, the social sphere still has many unresolved problems: a large migration outflow of human capital, a shortage of specialists in such professions as engineers, programmers, healthcare workers, mining metallurgy technicians, chemists, mechanics, biotechnologies, etc. The analysis of socio-economic statistical data of the Arctic Zone of the Russian Federation has shown that the following steps are being taken for the development of these territories: research centres are being created to search for innovative approaches to the development of these regions and the reproduction of human capital.

Housing and communal conditions are being improved, sports and cultural centres, educational organisations, hospitals and other social institutions are being built. Road transport links with administrative and industrial centres of the regions, information and communication services are being established. All this soon can give positive results in the reproduction of human capital in remote Arctic territories.

The materials of this work can be useful to scientists and politicians engaged in monitoring the level of development of the Arctic territories belonging to both the Russian Federation and foreign countries. And also, for those who are looking for innovative methods of the spatial development of the Arctic territories. In the course of the study, new questions have arisen that need to be solved. For example, to find out the reasons for the outflow of population from the Arctic territories, the knowledge of which would help to create appropriate living conditions in these territories, and thereby reduce the migration of human capital from them. In addition, there is a need to study and borrow from other countries the experience of the spatial development of the Arctic territories.

### ACKNOWLEDGEMENTS

RFBR grant "19-29-07355" Human capital of the Arctic region in the concept of the spatial development of Russia".

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