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Critical tendencies of the transport infrastructure development in the Russian Arctic *

© **Natalia A. SEROVA**, Cand. Sci. (Econ.), senior researcher

E-mail: serova@iep.kolasc.net.ru

Federal Research Centre “Kola Science Centre of the Russian Academy of Sciences”, Apatity, Russia

© **Valentina A. SEROVA**, researcher

E-mail: vaserova@iep.kolasc.net.ru

Federal Research Centre “Kola Science Centre of the Russian Academy of Sciences”, Apatity, Russia

Abstract. In the article, the authors discussed the formation of a single transport system in the Arctic zone of the Russian Federation. The development of the Arctic transport system, i.e., the Northern Sea Route, adjacent airport network, seaports, water, and land communications, determined the relevance and significance of the study. It is especially important since they are the strategic priorities of Russia's Arctic policy. The study aimed to identify the trends in transport infrastructure development in the Russian Arctic. So, the authors focused on the factors determining its specifics. They conclude that the transport infrastructure of the Arctic zone of the Russian Federation is underdeveloped and needs technical improvement. According to the authors, a unified Arctic transport system is possible only after the restoration of year-round navigation through the NSR, its technological growth, and the reconstruction of the adjoining transport infrastructure.

Keywords: *the Arctic zone of the Russian Federation, the Northern Sea Route, transport system, transport infrastructure.*

Introduction

At present, the Arctic vector is one of the most important in Russia's home politics, as the Arctic rich in natural resources will be the guarantor of sustainable development and national security of our country in the 21st century. Thus, the Strategy for the Development of the Arctic Zone of the Russian Federation (AZRF) contains a priority of national interest defined: “the use of the Arctic zone as a strategic resource base that provides the solution of problems of social and economic development of the country”. The large-scale development of Arctic resources is closely linked with the need to create a unified Arctic transport system and improving its infrastructure. The development of new and modernization of existing transport communications will not only give impetus to the development of natural resources but will also contribute to improving the local population's living standard, the solution of many social problems, and it also will create preconditions for the development of transit traffic along the Northern Sea Route (NSR) and will significantly expand product distribution system in the northern areas of the country.

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The specificity of transport in the Arctic

Transportation plays a crucial role in all spheres of social and economic activities in the Arctic and is one of the most strategic sectors of the economy. The share of transport in the total volume of gross regional product in the Russian Arctic remained consistently high over the years. At the end of 2017, it was 8.2% (average for Russia — 8%). From the local perspective, the consistently high (over 10%) proportion of transport performance in GRP is typical for old industrial territories in the western sector of the Arctic — the Republic of Karelia, the Murmansk Oblast and the Arkhangelsk Oblast. The number of employed in all types of transport in the Russian Arctic is more than 40 thousand people or 9.5% of total employment in the economy (the average for Russia — 7.3%). In the entirely Arctic territories, this figure is even higher (11.8%), and in the Yamal-Nenets Autonomous Okrug, transport occupied 14.2% of total employment. Along with mining, the carrier holds a principal place in the value of fixed assets: the share of the transport sector in the total value of fixed assets in the Russian Arctic is 31.1% (average for Russia — 22.5%).

However, the transport sector of the Russian Arctic operates under the influence of a set of interrelated hard-to-regulate factors. Some of them stimulate its development (e.g., defensive purposes), while the others considerably complicate the situation and create significant risks and limitations. Natural extremeness, peripheral nature and extent of the Arctic territories, settlement features, the direction and character of historical territorial and economic ties, and so forth [1, Korchak E.A. ; 2, Zaikov K.S., Kondratov N.A., Kudryashova E.V., Lipina S.A., Chistobaev A.I., p. 10; 3, Chizhkov Yu.V., p. 27] seriously complicate and increase the cost of a single Arctic transport system, increase the transport discrimination of the population, leading to deterioration of infrastructure and technical state vehicles and impose some restrictions on the use of various means of transport. E.g., the river (an inland waterway) transport navigation is limited to a short period (2–4 months), and the construction and operation of land-based modes of transport (roads and railways) are tight in the permafrost and the harsh weather conditions in the winter. Especially relevant are these problems for sparsely populated and remote areas of the eastern Arctic. The absence of land transport links with the rest of the country causes a multi-tier and single alternative transport service schemes.

The most important factor affecting the operation of the Russian Arctic transport is also changing. Recent observations have shown that the Arctic is warming faster over the last three decades than the rest of the world. The sea ice area has reduced by 10–15% and snow on land have decreased by 10% [4, Kondratov N.A., p. 70].

The uncertainty associated with warming has different effects. On the one hand, the warming threats and leads to an increase in temperature, a change of landscapes, degradation of permafrost, a higher number of icebergs, and increase storm (wave) activity, etc. In other words, it reduces the reliability and stability of the transport system and engineering structures [5, Voronina E.P., p. 63]. On the other hand, in the long-term perspective, climate change can contribute to more effective and full use of the Arctic economic potential, increase the availability of navigation,

exploration, and mining on the Arctic shelf and new transport routes in the Arctic Ocean. Northern seas have become more available, and according to some projections, by 2050, they will be opened for year-round shipping [6, Smith L., Stephenson S.]. At the beginning of the 21st century, this new resource, transport, and logistics capabilities made the Arctic one of the most debated issues in the world. The development of its transport infrastructure got prior importance in the Russian state Arctic policy.

Current situation and development trends of the Arctic transport infrastructure

The transport infrastructure development in Arctic Russia is considered in connection to two unequal territories. The western sector formed quite an extensive system of roads and railways permanently connected to overland transport communications throughout the country and Arctic seaports. In the eastern sector, year-round surface transportation routes with access to a nationwide network are not available. Only small dead-end railway lines and roads of lower categories (winter roads) are constructed. Due to the lack of developed land communications in the eastern sector, the connection is provided through the Northern Sea Route, air and inland (river) transport.

Water transport. The largest share (50%) in the transport system of the Russian Arctic covers maritime transport. It is a critical element of the Northern Sea Route — historically rooted Russian sea transport linkages uniting the meridional water corridors of Siberian rivers and the European and Far Eastern ports of the country. Depending on climatic conditions, the NSR is divided into western Arctic — area between Murmansk¹ and Dudinka (more favorable ice conditions), and Sector East Arctic — from Dudinka to Chukotka (having mainly heavy ice conditions) [7, Zagorodnikov M. A., p. 69]. The distinctive feature of the NSR is short navigation (only 2–4 months or more with icebreakers). However, it is recognized as a profitable alternative for southern routes due to the possibility of reducing the time of delivery. The way through the Suez Canal from South Korea to Germany takes 34 days, and via the NSR — only 23.

During the Soviet period, cargo transportation along the NSR had a significant annual growth due to the exploitation of natural resources in the Russian Arctic (Fig. 1). After the transition to a market economy, navigation along the NSR stopped. Traffic volumes declined rapidly and reached only 1.25 million tons by the end of the 1990s.

¹ The NSR begins in the Kara Sea, near the Novaya Zemlya archipelago (Federal Law 30.04.1999 No. 81 “Merchant Shipping Code”, Art. 5.1), but its main cargo flows are formed in the Barents and White seas. So, the authors consider the NSR in a broader perspective, i.e. from Murmansk to Chukotka.

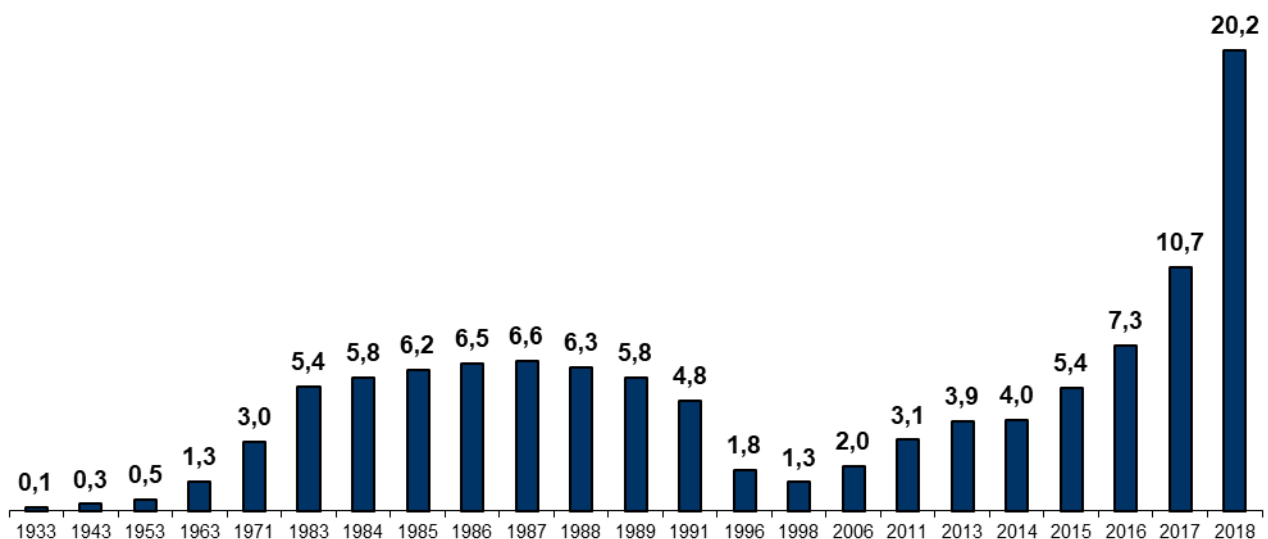


Fig. 1. Dynamics of traffic along the Northern Sea Route, thous. tons.

Only two decades after, in 2016, the volume of transported goods crossed the mark of 1980 or 7.26 million tons (energy resources: coal, oil, LNG, and metals). By 2018, the cargo delivery along the NSR increased by almost three times and was 20.2 million tons. According to forecasts, delivery along the NSR will increase, and by 2024 it will exceed 80 million tons.

The construction of the world's largest Arctic port of Sabetta on Yamal contributed significantly to the development of the delivery along the NSR. Investments in the project amounted to about 108 billion rubles, more than 70 billion rubles came from the federal budget. Construction started in 2012 was a part of the “Yamal LNG” project. It is still ongoing, but the port is now operating. It is necessary to clarify that, legally, the NSR begins in the Kara Sea and continues from the port of Dudinka to the Bering Strait, i.e., officially, it includes only 5 of the 18 ports of the Arctic basin: Dudinka, Dixon, Khatanga, Tiksi, and Pevek. But as we have seen, the NSR is much broader — from the Barents Sea to the Chukchi Sea. So, we included all the ports of the Arctic basin. The largest share in the total turnover got the port of Murmansk (60–65%) and the port Sabetta (about 25%). Remaining ports provide only 10-15%. The volume of cargo transshipment via ports of the Arctic basin is increasing every year. So, in 2016, its total size was 49.7 million tons. In 2018, it had reached 92.7 million tons, of which turnover of the port of Murmansk was 60.7 million tons, Sabetta — 17.4 million tons (by turnover growth dynamics it boosted the port transshipment by 234.7% compared with the previous year).

Integrated development of NSR is one of the priorities of Russian state policy in the Arctic [8, Serova N.A., p. 499]. Restoring the NSR functions includes the modernization of the seaports of the Arctic basin, the development of navigation and hydrographic systems, hydrometeorological and rescue support, construction of specialized vessels for fishing and research fleet, a radical renewal of the icebreaker fleet, etc. [9, Serova N.A., Serova V.A.]. Of importance is the project “Integrated Development of the Murmansk Transport Hub” (MTH) (the necessary investments amount to 139.0 billion rubles). The purpose of MTH is the creation year-round deep-sea hub based on the existing port of Murmansk, i.e., the center on the processing of oil cargo,

transshipment of coal and fertilizers, integrated into the international transport corridors “North-South” and “East-West.” In addition to the development of port facilities, the project will make the most of Russian transit opportunities and expand access to new global markets. The project started in 2014 and today they have completed the reconstruction of the federal highway P-21 “Kola”, the sea passenger station and the pier for far routes (a total station area has doubled, and the pier length has increased by 59m. So, now it is 206.6m), and energy and rail infrastructure is under construction. [10, Skufyina T.P., Serova N.A., p. 20].

Air Transport. Due to the high cost of construction and maintenance of land transport infrastructure, air transport is no alternative for passenger transport, and several state functions in the Arctic, e.g., emergency medical care and disaster management.

Targeted development of air transport took place in the Soviet period, and until the early 1990s, Arctic aviation was developed very rapidly. However, the crisis after the collapse of the Soviet Union led to the destruction of the air transport system: the intensity of flights of small aircraft decreased, its fleet reduced, the number of aviation operations in the Arctic significantly reduced, and the training of personnel almost stopped. In 1993, a single air transport system in the Arctic was represented by the former united detachments, 70% of which were closed during the 1990s. [11, Oleynikov V.A., p. 11]. Due to the lack of funds for the reconstruction and re-equipment, many airports stopped operating, and air transport services on local airlines were almost finished. Now, in the Russian Arctic, only 148 of 272 airfields and airstrips are operating. Passenger delivery is possible only at 74. The most significant number of existing airports and runways are in the Arctic areas of Yakutia (48), the Arkhangelsk Oblast (21), Chukotka (20), and the Nenets AO (19) where the air transport plays a crucial role in passenger traffic.

However, now, in the Russian Arctic airport infrastructure is slowly recovering, the new aircraft had been developed and designed for polar-based operation, and the airpark is gradually renewing. E.g., on Yamal, in 2017, an airstrip in Chokurdakh airport was opened, aircraft were updated, and their number was expanded, and some more specialized equipment for the county airport was purchased. Local budget subsidized air transport of passengers in 4 inter-regional and 30 inter-municipal areas. Twenty-one of these flights are regular. Nine are reserved and should be made in the off-season periods between localities that do not have any land connections [12, Serova V.A., p. 542].

To maintain airports with low traffic in the Far North, they are subsidized from the federal budget through seven federal state-owned enterprises (FSE). Four of them operate only in the Arctic: The Republic of Sakha (Yakutia) — FSE “Airports of the North”; (14 airfields); Chukotka — FSE “Airports of Chukotka”; (11 airfields); the Nenets AO — FSE “Amderma Airport”; (1 airfield); the Krasnoyarskiy Krai — FSE “Airports of Krasnoyarsk”; (3 airfields). In 2019, it was decided to establish a new inter-regional airline “Arctic” for the Nenets AO and the Arkhangelsk Oblast aimed at the development of interregional air transport.

A special occasion was the opening of Sabetta International Airport — a newly constructed one with the use of unique technologies to strengthen the permafrost soil watered. The airport has the status of a strategic object for the “Yamal LNG” project. In 2014, the first passenger aircraft Boeing 737 landed in Sabetta; in 2015, the airport started operating for the “Yamal LNG” seasonal workers delivery, and the first international flight was carried out in 2016. Over the three years of operation, the airport increased traffic volumes nearly three times: passenger flights — 127.7 thous. people to 369.8 thous.; cargoes delivery — 1.6 tons to 5.8 tons.

It should be noted that in 2014-2017, high rates of traffic growth occurred in some other northern airports. The leading airports are Passenger delivery: Apatity in the Murmansk Oblast (190.7%); Hatanga in the Krasnoyarskiy Krai (126.4%) and Bovanenkovo in the Yamal-Nenets AO (109.9%); Cargo delivery: Bovanenkovo (178.3%) and Labozhskoe (150.0%) in the Nenets AO; Igraka (136.9%) in the Krasnoyarskiy Krai; Seimchan (148.5%) and Omolon (120%) on Chukotka. In 2014-2017, these airports increased the volume of passenger and freight traffic in the Russian Arctic, as the most Arctic airports experienced a significant decline. The most considerable decrease in the size of passenger traffic was in Tarko-Sale in the Yamal-Nenets AO (-63.9%) and Vorkuta in the Komi Republic (-56.5%); cargo delivery: Yamburg in the Yamal-Nenets AO (-95.9%), Vorkuta (-83.9%), Belushye in the Nenets AO (75.6%) and Podkamennaya Tunguska in the Krasnoyarsk Krai (65.6%). The three airports (Dixon, Cape Schmidt, and Peschanka) had no passenger or freight transportation in 2017.

Overall, despite a lot of objective and subjective difficulties, the Arctic air transportation system continues to operate. However, the operation of the Arctic air delivery is still weak, and air transport services remain inaccessible to most of the people living in the Arctic because of high tariffs.

Land transport. As it was noted above, the land communications are the most developed in the western sector of the Arctic. In particular, the Murmansk Oblast, the Arkhangelsk Oblast, the Republic of Karelia and the Yamal-Nenets Autonomous Okrug relate to the rest of the country with the October and Northern railroads and federal highways. However, in two areas (the Komi Republic and the Nenets Autonomous Okrug), the transport network is autonomous. These territories are associated with the national transport network only by the local section of the Northern Railway (the Komi Republic) and winter road Naryan-Mar — Usinsk (the Nenets AO). In the eastern sector of the Arctic, no national railroads and highways observed.

Rail transport². The operational length of railways in the Russian Arctic is 9.6 thousand km or 11.1% of the total railway network of the country. Only 14% (1.35 thousand km.) are in the Arctic areas: the Murmansk Oblast and the Yamal-Nenets Autonomous Okrug (in the Nenets AO and Chukotka, railways are absent). The dynamics of the railway development in 2000–2018 shows a slight increase only in the partly Arctic areas of the AZRF: The Republic of Sakha (Yakutia)

² The Federal State Statistics Service does not provide open data for the Arctic territories. The further analysis was carried out separately for Arctic areas and partly Arctic territories.

(359.5 km) and Karelia (120.6 km) are the leaders. In the Murmansk Oblast, the Komi Republic and Yamal, due to the closure of some railway sections, the railway network decreased (Table. 1).

Table 1

The operational length of the railway network in the Russian Arctic, km

	2000	2005	2010	2015	2016	2018	Change 2018/2000
Arctic zone of the Russian Federation	9180	9275	9625	9625	9637	9637	+457.0
Territories entirely included in the Russian Arctic							
Nenets Autonomous Okrug	-	-	-	-	-	-	-
Murmansk Oblast	891	870	870	870	870	870	-20.7
Yamal-Nenets Autonomous Okrug	495	496	481	481	481	481	-14.1
Chukotsky Autonomous Okrug	-	-	-	-	-	-	-
Territories partially included in AZRF							
Republic of Karelia	2105	2226	2226	2226	2226	2226	+120.6
Komi Republic	1692	1671	1690	1690	1690	1690	-1.7
Arkhangelsk Oblast	1764	1781	1767	1767	1767	1767	+2.7
Krasnoyarskiy Krai	2068	2066	2067	2067	2079	2079	+10.7
Republic of Sakha (Yakutia)	165	165	525	525	525	525	+359.5

The basis of rail transport in the Russian Arctic make transportation of goods (80% of the total volume of rail transportation). The dynamics of the leading indicators characterizing the cargo delivery industry show an increase in freight transportation since 2000, with a slight fall in 2013-2014 related to the crisis and slowdown of the national economy (Fig. 2). This fall corresponded national average value (-2.8%). On the contrary, in the entirely Arctic territories, an increase (2.2%) was observed. In general, the growth of freight volumes in these territories made 53.7% in 2018 (against 24.5% — the Russian Arctic average and 32.2% — average in all Russia). It is mostly explained by the structure of cargo transportation of the Arctic territories, i.e., domination of the massive industrial cargoes. Reduced traffic volumes of such goods in the crisis years were significantly lower in comparison to consumer goods, demand for which had fallen first. The highest growth of cargo transportation for 2000–2018 was demonstrated by the Yamal-Nenets Autonomous Okrug (the volume of transported cargo increased by 5.6 times) and the Republic of Karelia (+1.8 times). A decrease in cargo transportation occurred only in the Komi Republic due to the falling of coal mining, leading in the structure of the Republic's traffic (overall decline for the entire period was — 44.9%).

Along with the increase in freight rail traffic in the Russian Arctic, the volume of passenger rail-traffic has been steadily declining. It is mainly due to the rapid rise in the number of private cars, which are the primary means of transport [13, Ksenofontov M.Y., Milyakin S.R.]. However, the national average of passenger traffic has fallen by 21.0% since 2000, and in the Russian Arctic, it fell by 60.6% (in entirely Arctic territories — 51.6%, incl. the Murmansk Oblast — more than 70%).

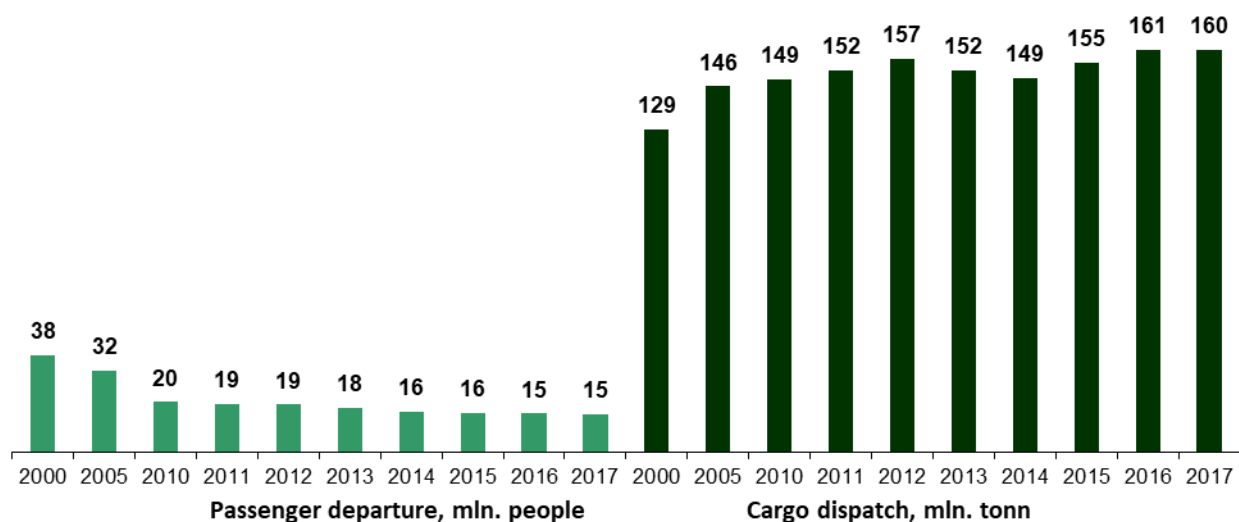


Fig. 2. The traffic dynamics within the leading railway transport network in the Russian Arctic.

Currently, in the Russian Arctic, the world's largest Arctic project "Northern latitudinal way" (NLW) is running (planned total investment is 236 billion rubles). The projects aim at linking the industrial areas of the Urals and the Arctic territories of Yamal by constructing the railway: 70 km from Novy Urengoy to Salekhard and further to Labytnangi (rail line Ob — Salekhard — Nadym — Pangody — Novy Urengoy — Korotchaevo). In 2018, Gazprom and Russian Railways signed an agreement to build a rail spur on the western section of the NLW for the new deepwater port of Sabetta in the north of the Yamal peninsula (rail line Bovanenkovo — Sabetta). It will link the entire railway Yamal infrastructure and the Northern Sea Route (the cost of the project — about 115 billion rubles). It is planned to continue the NLW to the East, to the Arctic territories of the Krasnoyarsk Krai (rail line Korotchaevo — Dudinka), which will enable the land connection to the ports of Dudinka and Igarka on the Northern Sea Route, and, in turn, will develop commodity areas of the Far North all year round [14, Gruzinov V.M. et al., p. 10]. One more project is "Belkomur" (White Sea — Komi — Ural), providing for the construction of the railway from Arkhangelsk to Perm (now this way is 800 kilometers long). Despite its strategic importance, the project is suspended for an indefinite period. Construction of this highway could contribute to the economic recovery of more than 60 settlements located along it, raising their transport accessibility, quality of life, education, health, employment growth, and the development of tourism [15, Kuratov E.S., p. 88; 16, Litovskiy V.V.].

Automobile transport. As for the road network, the length of public roads in the Russian Arctic is 108.9 thous. km 67.3% of them (or 73.3 thous. km) have a solid surface, and 38.4% (or 41.8 thous. km) are improved. The length of the Arctic roads is only 8.5 thous. km or 0.6% of the total road network in the AZRF. 79.5% (or 6.8 thous. km) have a hard coating, and 60.9 % (5.2 thous. km) are improved.

In 2000–2018, the length of roads in the Russian Arctic had increased from 49.7 thous. km in 2000 to 108.9 thous. km in 2018, i.e., more than two times (by 59.2 thous. km). It happened mainly due to road construction in the territories partially included in the Russian Arctic. The most massive increase is in Yakutia (20.8 thous. km) and the Krasnoyarsk Krai (19.4 thous. km)), and in

the most northern (arctic) areas of these territories, the construction of new roads is not carried out. Despite the increase in the total length of the AZRF roads, their share in the national road network reduced from 8.5% in 2000 to 7.2% in 2018. The same trend is observed for paved roads. Their length increased by 1.5 times (Table. 2), and their share in national road networks decreased from 8.2% in 2000 to 6.9% in 2018.

Table 2

The length of paved roads in the Russian Arctic, thous. km

	2000	2005	2010	2015	2016	2018	Change by 2000
Arctic zone of the Russian Federation	43.7	44.5	51.3	72.8	72.5	73.3	+29.6
Territories entirely included in the Russian Arctic							
Nenets Autonomous Okrug	0.2	0.2	0.2	0.2	0.2	0.2	+0.1
Murmansk Oblast	2.5	2.5	2.7	3.3	3.4	3.4	+0.9
Yamal-Nenets Autonomous Okrug	0.8	1.1	1.3	2.2	2.3	2.3	+1.5
Chukotsky Autonomous Okrug	1.3	0.6	0.6	0.7	0.7	0.9	-0.4
Territories partially included in AZRF							
Republic of Karelia	6.6	6.6	6.7	8.5	8.6	8.6	+2.1
Komi Republic	5.3	5.5	5.8	6.5	6.5	6.5	+1.2
Arkhangelsk Oblast	7.0	7.4	10.6	12.2	12.1	11.9	+5.0
Krasnoyarskiy Krai	12.8	13.0	15.1	27.5	26.9	27.5	+14.7
Republic of Sakha (Yakutia)	7.3	7.6	8.3	11.7	11.8	11.9	+4.6

In contrast to the railroad, automobile transport in the Russian Arctic is dominated by passenger traffic: its share in the total road transportation is more than 70%. The analysis of the dynamics of freight and passenger road transport shows a significant reduction in 2000-2018 in the Russian Arctic: passenger delivery fell by 2.3 times freight — 2.4 times (Fig. 3), while the national average decrease was 2.1 and 1.1 times, respectively ³.

The dynamics are positive for the investigated period in the Chukotsky Autonomous Okrug (cargoes — +83.4%; passengers — +25%), the Nenets Autonomous Okrug (cargo delivery increased by more than three times) and the Republic of Sakha (Yakutia) (passenger traffic increased by 29.7%). The Republic of Karelia demonstrated the largest decline (cargo — -90.9%; passengers — 79.5%) as well as the Murmansk Oblast (cargo — -83.7%; passengers — -79.5%). Reduced level of road transport in the Russian Arctic was due to several factors: growth of private motorization (in 2000-2018 the number of private cars in the Russian Arctic increased by 2.5 times (national average: +2.3 times) and reached 269.2 cars per 1,000 people); obsolescence of the public urban road transport (now more than 60% of buses are operating over their service life and are subject to decommissioning [17, Ushakova M.A., Sviridov D.A., p. 127]), reduction of leasing that affected the freight transport sector [18, Sevostyanova E.V., Agafonov A.A., p. 57]; rising fuel prices [19, Parshukov D.V., Kuranov E.S., p. 128; 20, Biev A.A., p. 310].

³The decrease in passenger traffic in 2005 is due to changes in registration 0in connection with the monetization of social benefits reform.

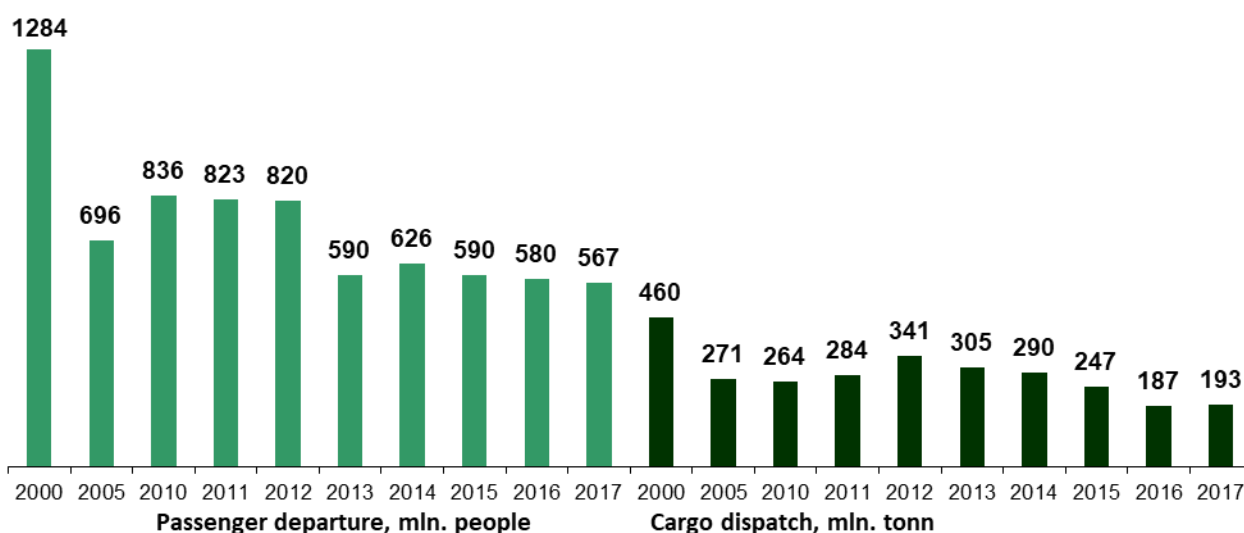


Fig. 3. Dynamics of goods and passenger transportation by cars in the Russian Arctic territories.

For generalized characteristics of the current situation and dynamics of the land transport development in the Russian Arctic, we defined security indicators of terrestrial transportation routes in 2000–2018 (Table 3).

Table 3

Dynamics of financial security in the Russian Arctic terrestrial communication routes

	2000	2005	2010	2015	2018
Railroads					
Density (per 1,000 km ²)	1.1	1.1	1.2	1.2	1.2
Engel coefficient	0.035	0.035	0.037	0.038	0.038
Public roads					
Density (per 1,000 km ²)	6.0	6.8	9.0	13.0	13.2
Engel coefficient	0.187	0.216	0.289	0.420	0.429
Paved roads					
Density (per 1,000 km ²)	5.3	5.4	6.2	8.8	8.9
Engel coefficient	0.164	0.170	0.200	0.285	0.289
Roads with an improved hard coating					
Density (per 1,000 km ²)	0.0	0.0	0.1	0.2	0.2
Engel coefficient	0.083	0.086	0.110	0.158	0.165

Source: Calculated by the authors.

The analysis showed despite the positive trends, and the Russian Arctic still has a deficient security level of land communication routes. In this case, more than 50% of the Russian Arctic terrestrial transport communications do not meet the regulatory requirements (in the Arkhangelsk Oblast and the Nenets Autonomous Okrug, these figures exceed 80% of regional roads and 90% for local).

Conclusion

Overall, the analysis of the current transport infrastructure in the Russian Arctic confirms the existence of severe imbalances in its development. Despite the favorable trends in all forms of transport, the Arctic transport system is characterized by underdevelopment and poor technical condition of the transport network, run-out equipment and a variety of other problems. In our opinion, it is possible to think about an integrated Arctic transport system only after recovery of

year-round navigation along the NSR, its technological equipment, and reconstruction of the related transport infrastructure. New forms of transport, safe and efficient use of which is possible in severe arctic conditions, should also take a special place in the Russian Arctic transport system development. Due to the scale and the high capital intensity of these problems, public-private partnership mechanisms should play a central role in the formation of a unified Arctic transport system development.

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