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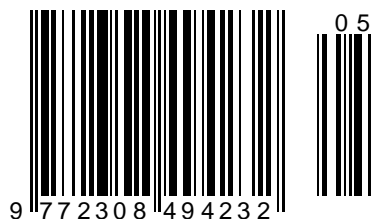
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Article



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ISSUES OF STRENGTHENING THE FODDER BASE IN THE DEVELOPMENT OF LIVESTOCK IN THE KOLKHOZ AND SOVKHOZ OF THE KASHKADARYA OASIS

Abstract: In this article, the issues of extensive livestock development in kolkhozes and sovkhozes located in the Kashkadarya Oasis, the work carried out for the development of the industry, in addition to the implementation of state plans in the field of livestock, as well as the issue of feed policy in the development of the livestock sector are covered in detail.

Key words: Leninism, VLKSM XVIII syezdi, Vulture, Bolshevik, Zarafshon, carnage, Ulus, Leninist herder.

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Introduction

In the ninth five years (1971-1975), 3,000 striking komsomol-youth foraging comrades were established in all kolkhozes and sovkhozes of the Republic. More than 150 thousand boys and girls worked in their composition. From July 15 to September 15, 1971, 683 thousand tons of feed for livestock were prepared in the Republic by the komsomolists and young people. This represented 73% of the annual plan¹. Great success has been achieved in this area by the komsomolists and youth of the kashkadarya region. In 1971, a total of 317.4 thousand tons of coarse feed were prepared in the province. In addition 172,394 tons of silos were suppressed. 150 brigades were formed in the Kashkadarya region in the preparation of feed. 45,720 boys and girls served among them. In 30 days from July 15, 1971, 3,500 tons of coarse feed were prepared by 13 komsomol-youth brigades². On July 31, 1972, at the meeting of the LKSMUZ Kashkadarya OK Bureau, the food extractor komsomol-youth team of the Sovkhoz "Oqrabot" in the peasant district was fulfilled ahead of schedule for a four-year reserve of

coarse feed for public livestock. 10,000 tons of coarse feed were prepared by them per season³.

Literature analysis and methodology

Employees of Barot Mirzayev chief 4th farm of the Sovkhoz "Leninism" in the peasant District of the kashkadarya region were given a good start to the full season for 1990. The farm raised 5,409 head of sheep during this period. Lamb was taken from 1,844 head of sheep until March 1990. 1,635 heads of lambs were left for breeding. Loqay Qoqorov, who raised 339 heads of 488 head sheep on the farm and left 302 heads to grow, Ali Soriyev, who raised 348 heads of 581 head sheep and left 294 heads to grow, Chorshanbi Normominov, who raised 200 heads of 500 heads and left 180 heads to grow 200 heads of 503 heads to grow 200 heads of sheep, and the veil that left 90 percent to grow⁴. In 1990, the cattle breeders of the Ulyanovsky District "Party XX syezdi" prematurely fulfilled the initial three-month plan of selling meat to the state. The reception points were given 29 tons more than the specified, a total of 101 tons of products. Each of the 230 head of Beaver handed over

¹ ЎзМА, 15-фонд. оп. 37, иш 57. бетлар 49.

² ЎзМА, 15-фонд. оп. 37, иш 101. бетлар 10.

³ ЎзМА, 15-фонд. оп. 38, иш 103. бет 16.

⁴ U.Kocharov. Lambing is intense. "Rural reality". March 6, 1990, No. 54 (4848).

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to meat weighed an average of 438 kilograms. The service of livestock breeders such as Tilla Narsullayev, Bakhtiyar Usmanov, Karim Polvonov, Shokir Hamroyev, Komil Tursunov was great when feeding the cattle to soybeans⁵. In the kashkadarya region, the corn planting plan was completed by 73.5 percent and the Bede planting plan by 96.6 percent in the period up to may 1988⁶. Thanks to the work of mechanics, such as Boymat Shodmonov, Eshboy Husanov, the harvest harvested in the bedazores of the Sovkhoz "VLKSM XVIII syezdi" in the Nishan district was transported to wintering places. This effectively helped develop the industry. In 1988, the Republican livestock breeders went to fulfill the instructions of the CPSU XXVII syezdi and successfully completed the second year of five years. In 1988, a feed unit of 15.2 centners was raised in the Republic at the expense of each head of cattle. According to the latest data of the agro-industrial state cometeite of the Uzbek SSR in 1988, it was found that 35 feedstocks were defective and 40 were invalid in Republican farms. This has its negative impact on the forage manufacturing industry held. At the state breeding plant "Guzor" in the kashkadarya region, the first lambs were obtained from sheep. In 1988, each head Lamb brought the farm an additional income of Rs 10-12. In 1988, 70% of the 312,000 head of sheep were lambed at the plant⁷. In 1982, the cattlemen of the "Bolshevik" karakulkhov in the Koson district began preparations for wintering in the summer. This allowed up to 220 tons of natural grass to be grazed in the Sovkhoz in 1982. In this, the Sovkhoz's X.Khojaev, R.Kochimov, N.Makhmanazarov and other workers worked effectively⁸. Participants of the plenum of the kashkadarya regional party committee contributed to the provision of as many agricultural products as possible to the country by the workers of the region, to the implementation of the Food Program of the USSR.

Discussion.

In the Kashkadarya region, the level of improvement of irrigation and melioration work, development of new and New massifs of reserve lands, increase in farm products has increased. Specialized sovkhovs were established. They ordered the state to sell cereals, meat, eggs, blackcurrant leather, flax vegetables and pulses in the province, which were completed prematurely. Until 1982, 8 specialized corn farms were established in the province, which produced effective results. Livestock wintering is considered a responsible circuit. During the last period of 1988, the milk yield of each head

cow from the Republic increased to 88 kilograms. Meat production grew by 9,000 tons or 9 percent, milk by 23,000 tons or 8 percent, and egg production by 56 million units or 14 percent during the period until February 1988. In January 1988, the meat preparation quarter plan was completed by 45 percent, the milk by 36 percent, and the egg production plan by 39 percent. Alternatively, there are serious disadvantages in the course of wintering in collective farms and sovkhovs. In the regions of Chunonchi, Andijan, Jizzakh, Syrdarya, Fergana, the level of meat production decreased. The level of egg production in Andijan, Jizzakh, Navoi, Namangan regions has decreased. In the surkhandarya region, the productivity of each head cow fell by 8 kilograms during the winter period. Meat preparation in January 1988 compared to the same period in 1987 was 2,300 the situation in the Samarkand region, reduced by tons, is in a deplorable state. It also decreased to 1,600 tons in Surkhandarya region in the first month of 1988 compared to January 1987, 1,400 tons in Sirdayo, 1,200 tons in Kashkadarya, and 800 tons in Jizzakh region. In the farms of the regions of Andijan and Fergana, the level of milk preparation in January fell behind. When the winter season of 1988 began, 14% of sheep-goats and 9% of cattle in the Republic were on average below obesity. In these areas, the livestock was isolated and further Fed. As a result, the number of lean sheep-goats was reduced by 5%, and cattle below average obesity were reduced by an equal half. But in a number of provinces, appropriate measures were not taken for additional feeding of lean cattle. Therefore, 22% of sheep and goats in Surkhandarya Region, 12% in Bukhara, 11% in Navoi region remained below average obesity or lean. In the regions of Bukhara, Surkhandarya, Navoi, 10% to 13% of the total herd consists of lean cattle. In some areas, stored feed was not used effectively. Chnonchi, in the Republic in 1988, 287 feed workshops and kitchens were left without work for various reasons. In the Navoi region, under the fault of the heads of farms, one in five workshops did not work. The situation in Karakalpakstan Assr is also in this state. In the bozatov district farms, 8 out of 20 feedstocks did not work. In the districts of velvet, lampshade, Dehkanabad, Navoi, Arnasoy, Lenin road, Moscow, Bogot, 3-4 feed shops did not work. In 1988, cattle wintering was carried out unsatisfactory in Moscow, Bogot, Koson, Shofirkon, Pop districts. In kashkadarya region, the meat preparation plan was completed in January 1988 with a cavartal plan of 42%, and the Dairy Plan of 38.4%, and the egg cultivation plan of 36.3%⁹. In the Kitab District of the

⁵ On the pages of regional newspapers. The truth of kashkadarya. "Rural reality". March 6, 1990, No. 54 (4848).

⁶ How things are going. Information on the progress of cultivation in the regions of the Republic until May 2, 1988. "Rural reality". May 7, 1988, No. 103 (4299).

⁷ By example. "Rural reality". February 10, 1988, No. 34 (4230).

⁸ Preparation for wintering. "Rural reality". 12 September 1982. № 208 (2614).

⁹ Winter is testing. "Rural reality". 14 February 1988. № 38 (4234).

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kashkadarya region, cattle breeders of the Sovkhoz "Zarafshan " received 7,450 head of sheep from the Sovkhoz in 1980. 328 heads of 450 sheep are lambed at the boymurod Farmanov horse, which works in this Sovkhoz. In kashkadarya region, the corn planting plan for the period until April 11, 1988 was completed by 48.2 percent, the one-year grass planting plan by 0.3 percent, and the beda planting plan by 88.6 percent in the province¹⁰. In 1986-1987, meat production in the Republic increased by 13% and milk and egg production by 9%. In 1987, the per capita consumption of meat in the Republic was 63 kilograms and milk consumption was 343 kilograms. In 1986-1987, 75% of the omixta feed generating capacity was launched in the Republic . Karakulism occupies a special place in the economy of the Republic. It allows you to get quality wool and other valuable products for dark skin, meat and rugs from it. Blackcurrant farms supply 20% of the meat grown in our republic and 60% of coarse wool. It also makes it possible to get 2.2 million pieces of blackcurrant skin per year in the Republic. Therefore, special attention was paid to this area by the party and the Republican government. In the Eleventh Five Years, a total of 6.2 million head of Brown sheep were grown in the Republic. In addition, a total of 92 sovkhoses specialized in Karakol sheep were established in the Republic. These sovkhoses were established on the territory of 7 large karakulik districts. In our republic, 9 Inter-farm complexes for the production of blackcurrant and mutton, 6 specialized sovkhoses for the supply of blackcurrant feed were established. However, it should be noted that the growing material and technical base of blacksmithing, the supply of energy and its production potential were not used. Until this time, the head population of black sheep was not brought to the level of regular development of this network, nor did it provide high labor productivity. The cost of production increased every year. One of the reasons for this was the fact that sheep were still bred in the old style on karakul farms. The small otars were dispersed over a very large area. In this case, the correct Organization of Labor and increasing productivity is considered a rather difficult task. An oatr of 500-600 head of sheep-lambs was served by 3-4 shepherds. The organization of Labor on this hill could not ensure the full use of the possibility of pastures. Transportation costs increase. Mobilize labor temporarily every season have to do. Further development of blacksmithing, intensification of the production of this network necessitates the introduction of new rational forms of labor based on progressive technology. Production processes should be fully mechanized, a solid feed base should be

created, and the living and cultural conditions of shepherds should be improved. The essence of this technology is that when pastures are used as plots and territories, the perfect forms of Labor Organization are applied, and the possibility of mechanizing productive work is born. Forming large mechanized sheep Brigades is a way of organizing labor in this way. The effectiveness of this method in terms of production and economy has been tested and applied in practice since 1972 at the state breeding plant of the All-Union Research Institute of karnob. A single sheep brigade, initially enlarged, was joined by 3,200 head of sheep-goats, pastures with more than 7,300 hectares of fenced surroundings, barns for sheep, drilled wells, muqim and portable artificial mating points, storage tanks for feed. The pastures attached to the enlarged sheep brigade will be divided into 26 zones. Sheep are driven twice a year, taking full advantage of the grazing opportunity depending on the season. This arrangement is changed every five years. Sheep survive 1.5-2 months on average in each Zagon. The wells are Parmesan and the cattle can drink water whenever they want. If necessary, the sheep are additionally fed with granular feed. Feed distribution in otars is mechanized. Currently, ten men are employed in the larger Shepherd brigades. 4,100 head of sheep were attached to one brigade. This is twice as much as usual. In 1981, gross output of 18,730 was raised at the expense of each member of the brigade. In the case of old-fashioned unimproved otars, this figure does not exceed 7430 soums. The revenue received by one brigade, which had grown from ten years, was 470,000. The annual salary of each Shepherd reached 3,465. This is almost twice the income received by a shepherd in a normal Otar. Costs for feeding a head of sheep at this time 34.3 percent decline. It should be noted that by introducing a cultural and surrounded grazing system, the formation of enlarged Shepherd brigades requires the expenditure of some capital. Estimates show that an average of Rs 64 is spent on each acre of pasture. But these spending will be self-righteous for four years. The state breeding plant" karnob " has employed 6 enlarged brigades over the past five years. In 17180, cultural pastures were created, which were blocked around the head of sheep. Including, 11650 heads were saved. There are workshops that produce granular feed, and points where sheep are bathed and wool is sheared. For every 100 soums spent on these complexes as early as the first year, an income of 102.4 soums was received at the end of the year. In total, the profit received in a year reached 376 thousand rubles. The enlarged sheep-farming brigades had great effect not only on the cultural pastures

¹⁰ Things are getting tinier. Information on the progress of planting cabbage in the regions of the Republic until April 11, 1988. "Rural reality". April 14, 1988. № 87 (4283).

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whose surroundings were blocked, but also when sheep were kept in a simple way. For example, in the Sovkhoz named Lenin in the Nurota district, in 1978, two large sheep brigades were formed. They were carried out by organizing the pasture exchange in a simple way. Each brigade employs 7 men. 2.2 thousand heads of sheep were attached. Labor productivity, on the other hand, increased by 30-38 percent, and the annual wage of one shepherd increased by 20-22 percent compared to ordinary otars. Such enlarged sheepdog brigades were also organized in the Sovkhoz "Ulus" and "Leninchi livestock". The experience of the enlarged sheepdog brigades necessitated the need to increase labor productivity in the blacksmithing, to increase the production of products¹¹. In the Republic, more than 10 thousand graduates graduated from higher and secondary specialized educational institutions in 1976-1978. In particular, in these years, 4,778 people were trained in the training schools and special sections of the technical schools, more than 2,450 herbalists and livestock breeders were trained¹². In the kashkadarya region, in the ninth five years (1971-1975), the training of personnel in the field of livestock was widely established. In 1972, 298 people were trained and 309 people qualified in the livestock sector in the collective farms of the Kashkadarya region¹³. N. of the Sovkhoz named "60th anniversary of the USSR" in Ulyanov district. The khudoyberdiyev chief tenants' brigade collected 40 hectares of corn attached to it and collected a total of 14,000 tons of silos. Half of it was transferred to the state order¹⁴.

Results.

Kashkadarya region, the meat production plan was implemented at 84.8 percent in 1986, with milk at 104.5 percent and eggs at 116.4 percent, while meat

production at 77.6 percent in 1987, milk at 100.4 percent, and eggs at 102.1 percent¹⁵. In 1982, 5 million tons of coarse cartilage were collected in our republic, and the task was completed in the Republic by 63 percent. Including, 1.9 million tons of senaj were suppressed. This accounts for 82% of the assignment. In kashkadarya, Surkhandarya regions, as well as in a number of districts of Andijan and Namangan regions, the dağal khashak savings plan was implemented. But at the same time, the feed savings were performed sluggishly compared to 1981. In the Jizzakh region in 1982, 215 thousand tons of coarse khashak were saved less than last year, in the Tashkent region-119 thousand tons, and in the Fergana region-43 thousand tons of low khashak. The Beda hay savings plan was set at 2.3 million tonnes, with 1.5 million tonnes being saved and 64% of the plan completed. This assignment plan lagged behind in some provinces. In particular, 29 percent was fulfilled in the Fergana region, 41 percent in the Bukhara region, 30 percent in the Navoi region, and 40 percent in the Syrdarya region. In places where the corn stem is drier, it is advisable to add to it the stems of ildizmeva, vegetable and melons crops. In 1982, little attention was paid to control over the quality of the feed being prepared. The situation in the farms of the kashkadarya region is not good. In the province, only 36 percent of 1-grade hay, 33 percent senage, 45 percent grass flour were prepared by August 1, 1982, with the remaining feed being second-grade and low-quality feed. The quality of silage and senage largely depends on the presence of concreted trenches on farms. Kolkhoz and Sovkhoz of Samarkand region are provided with 20% of concrete trenches in need, 27% in farms of Surkhandarya region, 25% in Kashkadarya kolkhoz and Sovkhoz, and 15% in Karakalpakstan ASSR farms¹⁶.

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¹² Важный этап на пути к коммунизму. Ташкент. 1981. с 92.

¹³ ЎзМА, 90 фонд. оп. 10, иш 4843. бетлар 27-29.

¹⁴ Amber grain is being handed over. "Rural reality". 14 September 1990. № 210 (5003).

¹⁵ Information on the implementation of plans for the preparation of livestock products in 1987 in the residential regions. "Rural reality". January 15, 1988. № 12 (4208).

¹⁶ Save more feed. "Rural reality". 15 August 1982. № 186 (2592).

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Article



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INTERACTION OF QUATERNARY SALTS OF 1,2-AMINO ALCOHOLS WITH ORGANOHALOGEN COMPOUNDS IN THE SYSTEM OF 50% AQUEOUS ALKALI AND BENZENE

Abstract: In the work the reactions of quaternary salts of 1,2-aminoalcohols with organohalogen compounds in a four-phase system, in the presence of a concentrated solution of aqueous alkali and benzene were studied. It was defined that in this case, bipolar 2-trialkylammonioethoxides are generated, which actively interact with organohalogen compounds and lead to the formation of the corresponding quaternary salts of 1,2-aminoethers.

Key words: quaternary salts, 1,2-amino alcohols, quaternary salts of 1,2-amino alcohols, 2-trialkylammonioethoxides, two-phase systems, four-phase systems, aqueous solutions of alkalis.

Language: English

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Introduction

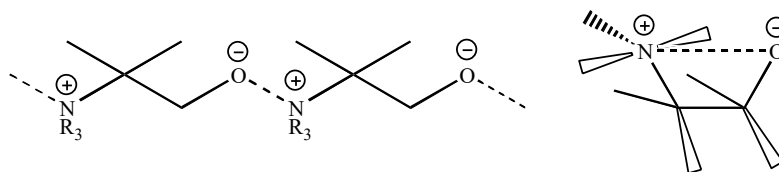
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The reaction of quaternary salts of 1,2-amino alcohols with concentrated aqueous solutions of alkalis, leading to the formation of 2-trialkylammonioethoxides [1], opens up new directions and possibilities for the synthesis of many organic compounds. 2-Trialkylammonioethoxides are essentially neutral bipolar species, they are a combination of a four-coordinated ammonium and a

negatively charged ethoxide group in one individual molecule, and the feature of one of them depends on the presence of the other, i.e. they are mutually stabilized. It is likely that in 2-trialkylammonioethoxides, the stabilization of charged centers is carried out mainly intermolecularly, since intramolecular stabilization in this case can be carried out with a very unfavorable eclipsed (clear) conformation.

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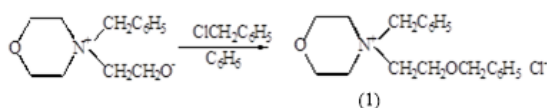
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Based on these structural and electronic features of 2-trialkylammonioethoxides, their use as good nucleophiles in nucleophilic substitution reactions becomes obvious. Therefore, in this work, we studied the processes associated with the generation of 2-trialkylammonioethoxides from the corresponding quaternary salts of 1,2-amino alcohols and their interaction with electrophiles such as benzyl, allyl, and alkyl halides. In order to reveal the nucleophilicity of 2-trialkylammonioethoxides, the subject of our research was the study of the reaction of 2-(4-benzylmorpholinio)ethoxide and 4-benzyl-4-(2-

hydroxyethyl)morpholinium chloride with benzyl chloride. We should note that the method for obtaining 2-(4-benzylmorpholinio)ethoxide from 4-benzyl-4-(2-hydroxyethyl)morpholinium chloride is described in our work [1].

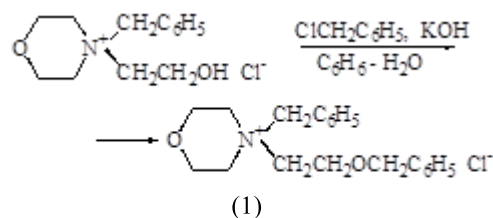
It was found that 2-(4-benzylmorpholinio)ethoxide (104) actively reacts with benzyl chloride in benzene at 10-20°C and leads to the formation of 4-benzyl-4-(2-benzylloxyethyl)morpholinium chloride with a yield of 93.7 %



The reaction proceeds in a four-phase system and is completely suppressed in the presence of protic solvents, for example, water and alcohols.

It was found out that 4-benzyl-4-(2-hydroxyethyl)morpholinium chloride, which does not interact with benzyl chloride under normal conditions

and when heated in benzene, but in the presence of a 50-55% aqueous solution of potassium hydroxide as a result of the generation of 2-(4-benzylmorpholinio)ethoxide actively reacts with it at 15-20°C, with strong stirring, and forms compound (1) with a yield of 96.2%.

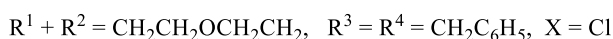
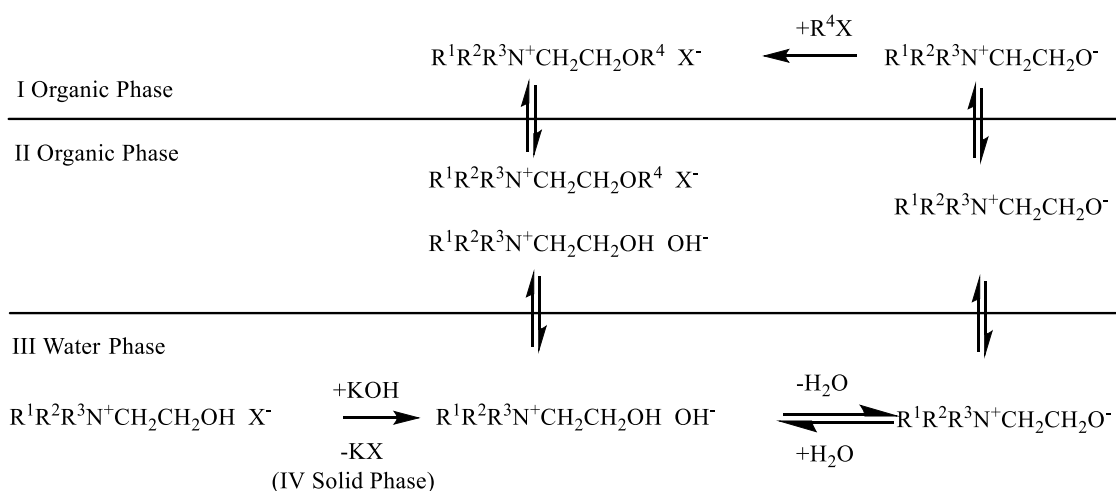


An important feature of this reaction is that it proceeds in a four-phase system immiscible with each other. In this case, the first organic phase contains benzene and benzyl chloride, and the second organic phase contains 2-(4-benzylmorpholinio)ethoxide, the product of reaction (1) and, at the initial moments of the reaction, the initial quaternary salt and its hydroxide. The third inorganic phase mainly consists of aqueous solutions of alkali metal hydroxide and its halide, and the fourth solid phase contains the alkali metal halide. With strong stirring, the initial quaternary salt of 1,2-amino alcohol from the second

organic phase, passing into an aqueous alkaline medium, turns successively into a hydroxide, then into a bipolar ion. The latter is salted out from the solution, accumulates in the second organic phase and is simultaneously generated into a highly efficient dehydrated benzene phase, where, due to the absence of the solvent solvation effect, it reacts with benzyl chloride, forming the reaction product (1), which further also accumulates in the second organic phase. The specified sequence of transformations is illustrated by the following scheme.

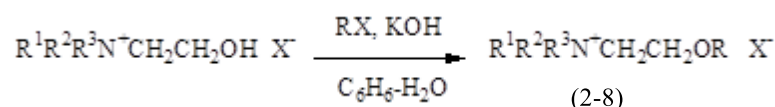
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In order to establish the generality of the nature of the above reaction, we studied the interaction of some quaternary salts of 1,2-amino alcohols of various structures with organohalogen compounds. It turned out that under the conditions described above,

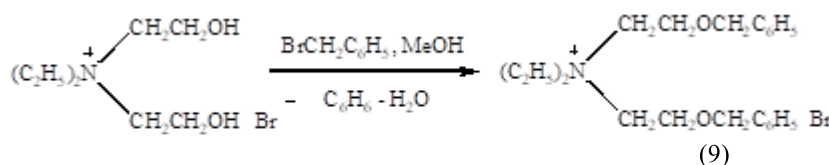
trialkyl(2-hydroxyethyl)ammonium halides actively react with benzyl-, allyl-, and alkyl bromides and form the corresponding quaternary salts of 1,2-aminoesters (2-8) in high yields.



(2) $R^1 = R^2 = R^3 = C_2H_5, R^4 = CH_2C_6H_5, X = Br$. (3) $R^1 = R^2 = C_4H_9, R^3 = R^4 = CH_2C_6H_5, X = Cl$. (4) $R^1 + R^2 = -(CH_2)_4, R^3 = CH_2CH=CH_2, R^4 = CH_2C_6H_5, X = Cl$. (5) $R^1 = R^2 = R^3 = C_2H_5, R^4 = CH_2CH=CH_2, X = Br$. (6) $R^1 = R^2 = R^3 = R^4 = C_2H_5, X = Br$. (7) $R^1 = R^2 = R^4 = C_2H_5, R^3 = CH_2C_6H_5, X = Br$. (8) $R^1 = R^2 = -(CH_2)_4, R^3 = CH_2CH=CH_2, R^4 = C_2H_5, X = Br$.

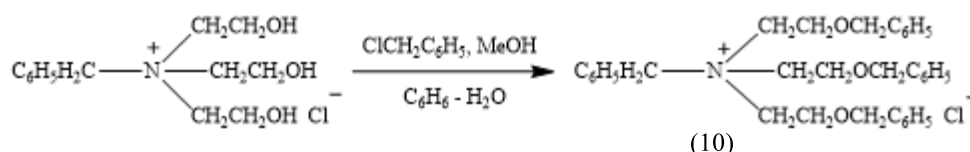
We have found out that this reaction is more general and extends to quaternary salts of bis- and tris(2-hydroxyethyl)amines. It has been established that bis-(2-hydroxyethyl)diethylammonium bromide, similarly to trialkyl(2-hydroxyethyl)ammonium halides, in the system of 50-55% aqueous alkali and

benzene at 10-20 ° C actively interacts with a twofold excess of benzyl bromide and, as a result, successive benzylation of hydroxyl groups gives bis(2-benzyloxyethyl)diethylammonium bromide (9) in quantitative yield



O-benylation of three hydroxyl groups proceeds similarly in benzyltris(2-

hydroxyethyl)ammonium chloride with a threefold excess of benzyl chloride



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The structure of the synthesized compounds (1-10) was established by physicochemical methods of analysis, including H-NMR spectroscopy.

Pic. 1. H-NMR spectrum of 4-benzyl-4-(2-benzyloxyethyl)morpholinium chloride (1). Solvent CD₃OD. In the region of weak fields, four singlets are observed, which are due to protons of benzyl radicals located at various N and O heteroatoms. In this case, the signals of the C₆H₅CH₂N⁺ fragment appear at 7.45 (C₆H₅) and 4.76 (CH₂) ppm., and the signals of the C₆H₅CH₂O fragment at 7.28 (C₆H₅) and 4.56 (CH₂) ppm respectively. The proton signals of OCH₂ and CH₂N⁺ groups located in the heterocycle are found at 3.95 (m) and 3.49 (t) ppm. Multiplet at 3.95 ppm due to the overlap of the signal of the methylene group of the OCH₂C₆H₅ radical. And the signal of the CH₂ group directly bound to the quaternary nitrogen atoms in the N⁺-CH₂CH₂O fragment appears at 3.69 ppm. in the form of a triplet.

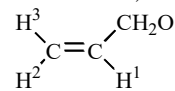
Pic. 2. H-NMR spectrum of (2-benzyloxyethyl)triethylammonium bromide (2). Solvent D₂O. Proton signals in C₆H₅, Ar-CH₂-O and OCH₂C groups are found in the characteristic low field region at 7.68, 4.8, 4.1 ppm. respectively. The difference in chemical shifts directly bonded by oxygen in the Ar-CH₂-O and O-CH₂-C groups is due to the significant influence of the unsaturated substituent in the first group. The signals of methylene protons directly bound to the quaternary nitrogen atom appear in the region of a slightly stronger field, i.e. in the region of 3.55 ppm. The multiplicity of the signal is due to the fact that one methyl group is under the influence of the -J-effect of oxygen in the N⁺-CH₂-C-O group. In the characteristic region of stronger fields at 1.48 ppm in the form of a triplet, the signals of methyl groups of ethyl radicals bound to the nitrogen atom appear. When integrated, the ratio of protons in the groups corresponded to the calculated one.

Pic. 3. H-NMR spectrum of benzyl-(2-benzyloxyethyl)dibutylammonium chloride (3). Solvent CD₃OD. As can be seen, the signals of the protons of the C₆H₅ groups in the fragments C₆H₅CH₂N⁺ and C₆H₅CH₂O are found at 7.44, 7.28 ppm. respectively. And the signals at 4.57 (s), 4.53 (s), 3.9 (t), 3.46 (t) and 3.15 (t) ppm respectively correspond to the protons of Ar-CH₂-N⁺, Ar-CH₂-O, C-CH₂-O, N⁺-CH₂-C-O and N⁺-CH₂-C groups. The proton signals of the C₃H₇-C fragment in the (C₄H₉)₂N⁺ radical appear in the corresponding regions of strong fields.

Pic. 4. H-NMR spectrum of 1-allyl-1-(2-benzyloxyethyl)piperidinium chloride (4). Solvent CD₃OD + D₂O. Singlet signals due to the protons of the C₆H₅CH₂O group are found at 7.26 (C₆H₅) and 4.51 (CH₂) ppm. respectively. A multiplet of three olefinic hydrogens of the allyl group is detected in a low field at 6.26-5.39 ppm, and the signal of its methylene group appears as a doublet at 4.06 ppm.

The proton signals of the N⁺CH₂, CCH₂C methylene groups in the heterocycle and N⁺CH₂, OCH₂ groups in the N⁺CH₂CH₂O fragment are found at 3.39, 1.74, 3.59, 3.84 ppm. respectively.

Pic. 5. H-NMR spectrum of (2-alkyloxyethyl)triethylammonium bromide (5). Solvent D₂O. As can be seen, the proton signals in the



allyl group have the following chemical shifts: 6.65-5.90 (H¹), 5.71 (H³), 5.55 (H²) and 4.36 (CH₂) ppm. respectively. Triplet at 4.20 ppm corresponds to the signal of the OCH₂ group in the N⁺CH₂CH₂O fragment. Clear triplet at 1.6 ppm corresponds to the methyl group of three ethyl groups located at the quaternary nitrogen atom, and the multiplet at 3.71 ppm due to overlapping signals of methylene protons of ethyl radicals and the N⁺CH₂ group of the N⁺CH₂CH₂O fragment.

Pic. 6. H-NMR spectrum of (2-ethoxyethyl)triethylammonium bromide (6). Solvent D₂O. As it should be expected, the multiplet at 1.59 ppm due to the position of methyl group triplets in the OCH₂CH₃ and N⁺(CH₂CH₃)₃ groups. In this case, the signals of the methylene groups directly associated with the O and N heteroatoms appear as a multiplet at 4.15 and 3.68 ppm. respectively.

Pic. 7. H-NMR spectrum of benzyl-(2-ethoxyethyl)diethylammonium bromide (7). Solvent D₂O. As can be seen from pic. 7 similar to the H-NMR spectrum of compound (6) at 1.59 ppm. a multiplet is observed, which is the result of the superimposition of the signals of CH₃ groups of ethyl radicals located at different heteroatoms. And the signals of C₆H₅, ArCH₂N⁺, CCH₂N⁺ groups appear in the corresponding regions of the spectrum, namely at 7.78 (s), 4.71 (s) and 3.56 (t) ppm. respectively. The ammonium group, which has the -J-effect, causes a shift of electrons in the chain and weakens the electron field around the H nuclei in the CH₂O group of the N⁺CH₂CH₂O fragment. For this reason, the signal of this group appears at 4.16 ppm, and the signal of the methylene group of the ethyl radical, also bound to oxygen, is found at 3.9 ppm.

Pic. 8. H-NMR spectrum of 1-allyl-1-(2-ethoxyethyl)piperidinium bromide (8), Solvent D₂O. The signals of olefinic protons of the allyl group C-CH=CH₂ appear in the low-field region at 5.95-6.69 ppm. The proton signals of N⁺-CH₂-C=C and N⁺-C-CH₂-O groups appear at 4.45 and 4.29 ppm. respectively. Multiplet at 3.86 ppm due to the superimposition of the signals of the methylene protons of the ethoxy group and the signals of the protons of the CH₂ groups located in the piperidinium ring at the nitrogen atom, as well as the signal of the protons of the N⁺-CH₂-C-O group. Multiplet at 2.2 ppm corresponds to the signals of the protons of the methylene groups located in the heterocycle in the β- and γ-positions with respect to the nitrogen atom.

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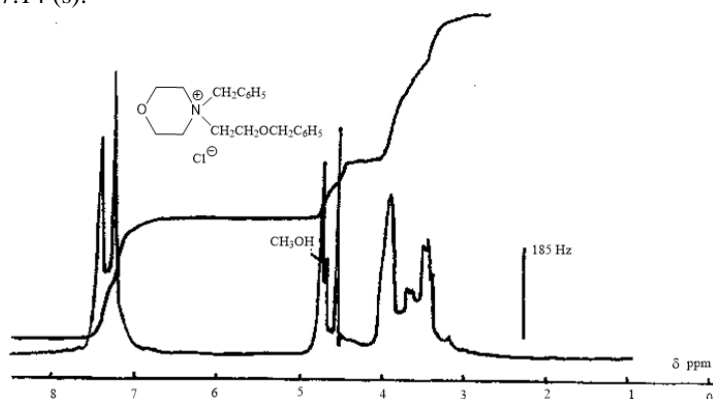
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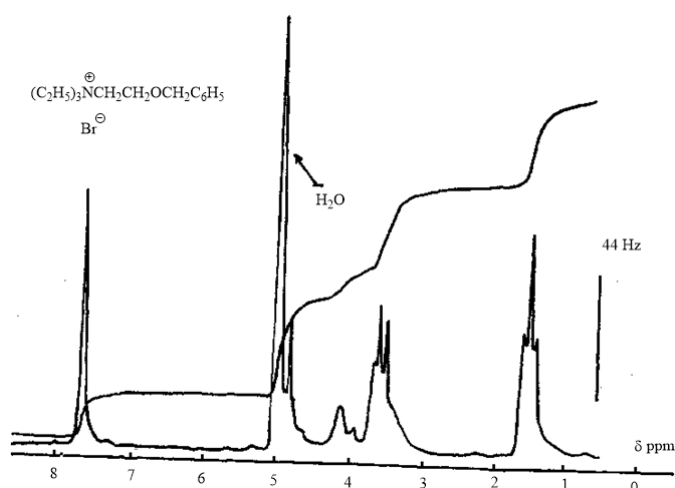
Clear triplet at 1.58 ppm due to the signal of the protons of the methyl group of the radical O-CH₂-CH₃.

Pic. 9. H-NMR spectrum of bis(2-benzyloxyethyl)diethylammonium bromide (9). Solvent CD₃OD. Compound (9) has the following signals in the H-NMR spectrum. (δ -scale, ppm), CH₃C 1.26 (t), N+CH₂ 3.38 (m), OCH₂C 3.76 (t), ArCH₂O 4.36 (s), C₆H₅ 7.14 (s).

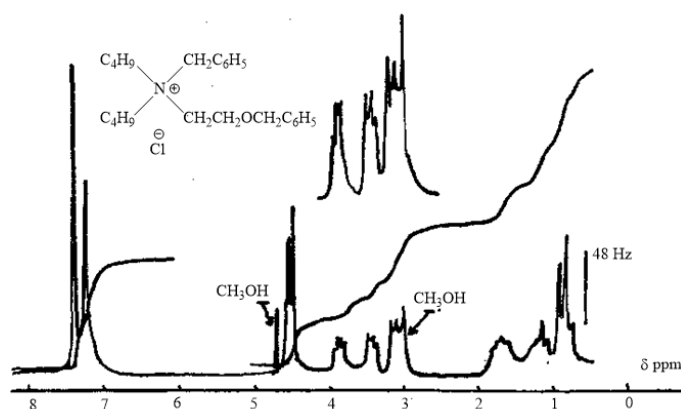
Pic. 10. H-NMR spectrum of benzyltris(2-benzyloxyethyl)ammonium chloride (10). Solvent CD₃OD. Compound (10) has the following signals in the H-NMR spectrum (δ -scale, ppm) N⁺C-C₆H₅ 7.27 (s), O-C-C₆H₅ 7.19 (s), N⁺-CH₂-Ar 4.65 (s), OCH₂Ar 4.35 (s), O-CH₂C 3.78 (t), N⁺CH₂C 3.42 (t).



Pic.1. H-NMR spectrum of 4-benzyl-4-(2-benzyloxyethyl)morpholinium chloride (1)



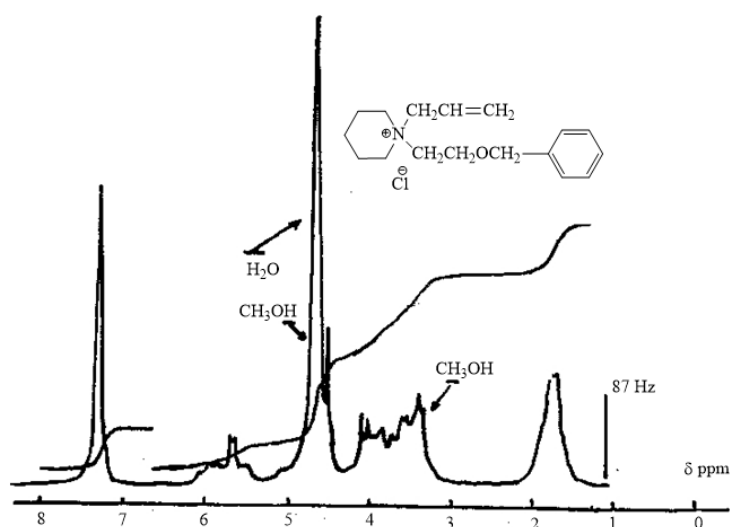
Pic.2. H-NMR spectrum of (2-benzyloxyethyl)triethylammonium bromide (2)



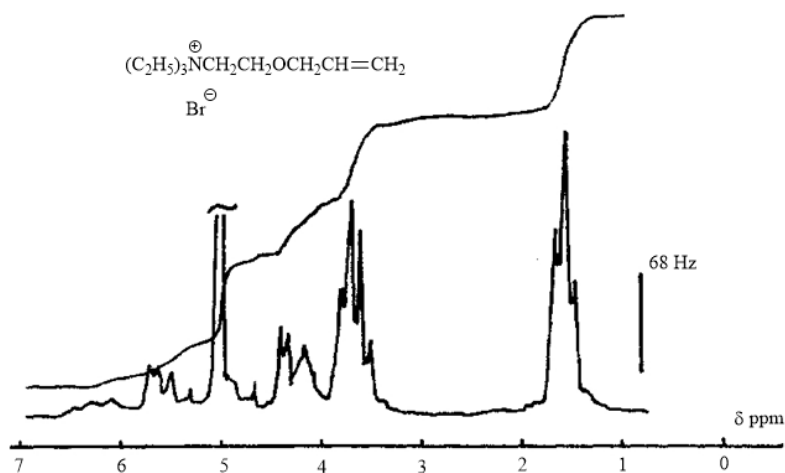
Pic.3. H-NMR spectrum of benzyl(2-benzyloxyethyl)dibutylammonium chloride (3)

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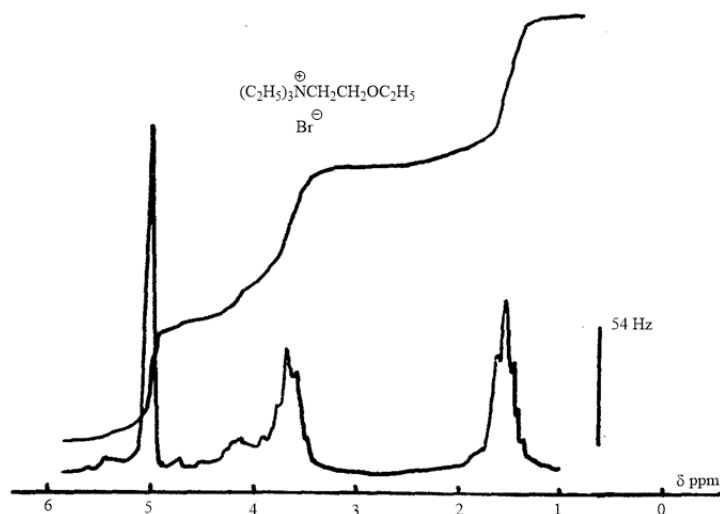
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Pic.4. H-NMR spectrum of 1-allyl-1-(2-benzyloxyethyl)piperidinium chloride (4)



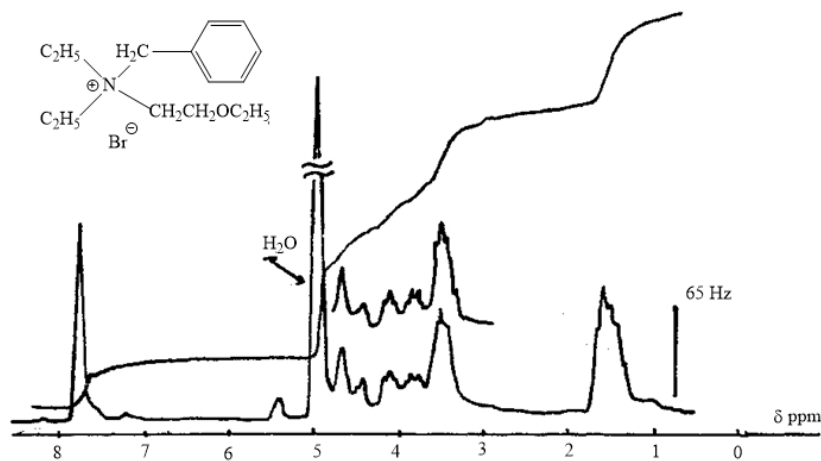
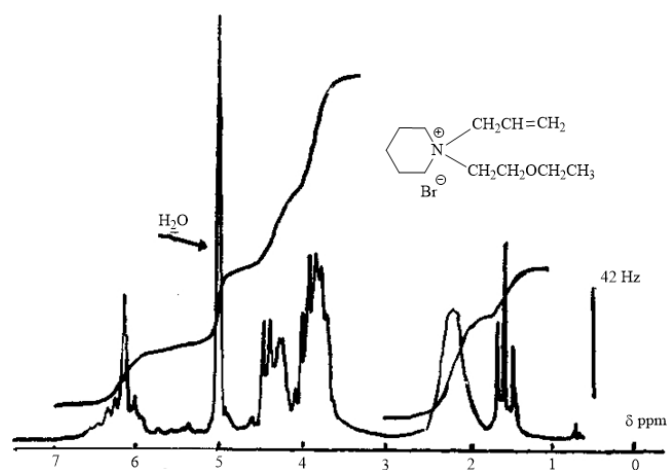
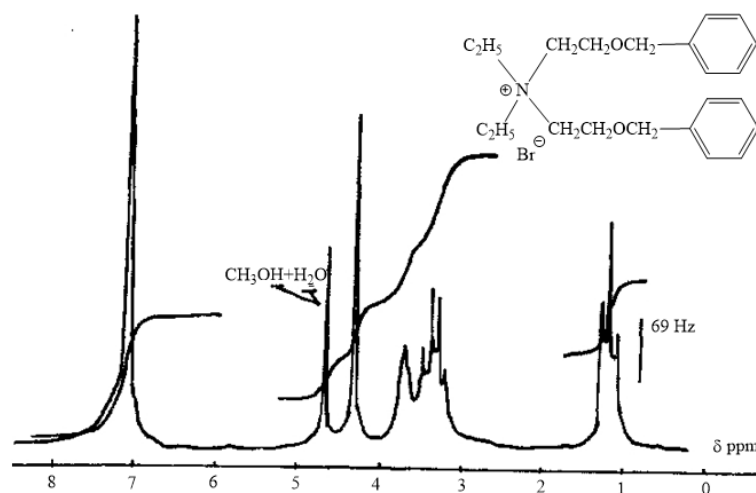
Pic.5. H-NMR spectrum of (2-allyloxyethyl)triethylammonium bromide (5)



Pic.6. H-NMR spectrum of (2-ethoxyethyl)triethylammonium bromide (6)

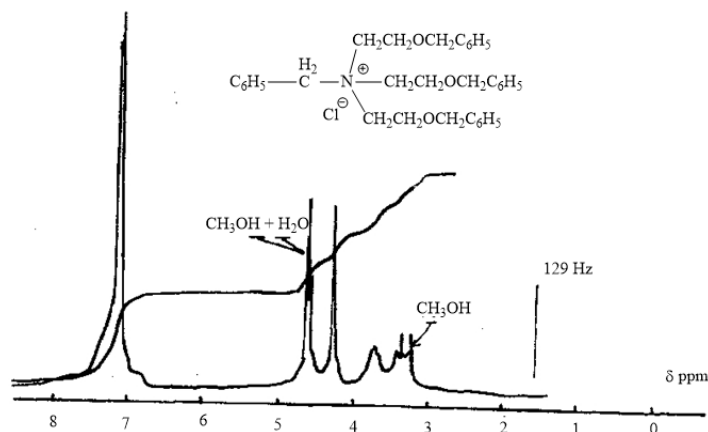
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**Pic.7. H-NMR spectrum of benzyl(2-ethoxyethyl)diethylammonium bromide (7)****Pic.8. H-NMR spectrum of 1-allyl-1-(2-ethoxyethyl)piperidinium bromide (8)****Pic.9. H-NMR spectrum of bis(2-benzyloxyethyl)diethylamine bromide (9)**

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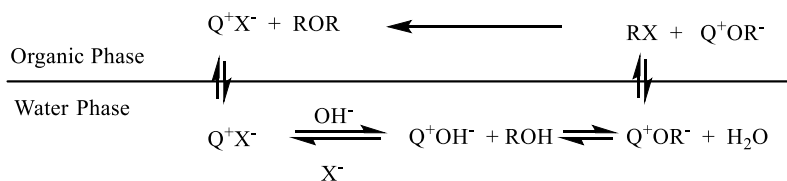


Pic.10. H-NMR spectrum of benzyltris(2-benzyloxyethyl)ammonium chloride (10)

Thus, by studying the reactions of quaternary salts of 1,2-amino alcohols with organohalides in a four-phase system, under exceptionally mild conditions, i.e. in the presence of concentrated aqueous solutions of alkalis and an aprotic solvent at 10-20°C, we have revealed their important property, leading to the formation of quaternary salts of 1,2-aminoesters. It should be noted that the above study as a method of trapping nucleophilic particles by electrophiles confirms the results of the study that were obtained in our work [1], where it was shown that quaternary salts of 1,2-amino alcohols under the action of a strong base at low water vapor pressure over the reaction mixture at 0-20°C they form 2-trialkylammonioethoxides, which are bipolar compounds.

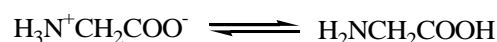
Besides it, the formation of 2-trialkylammonioethoxides from quaternary derivatives of 1,2-aminoalcohols, as well as their interaction with electrophiles, to some extent resembles the reaction of O-alkylation of the hydroxyl

group in alcohols with alkyl halides, which proceeds under conditions of interfacial catalysis [2,3,4-10]. Let us consider a typical example of such catalysis. It has been established that in a two-phase system of 50% aqueous alkali and benzene in the presence of phase transfer catalysts, the reaction of O-alkylation of alcohols is accelerated and proceeds even at 0-20°C. When used as an interfacial catalyst - tetraalkylammonium halide Q^+X^- in the aqueous phase, ions are first exchanged between Q^+X^- and alkali to form Q^+OH^- , the latter then forms Q^+OR^- with alcohol. The last reaction takes place in the aqueous phase or at the phase boundary. The substitution between Q^+OR^- and RX takes place in the organic phase. The newly formed original catalyst Q^+X^- passes into the aqueous phase and the process is repeated. Thus, the role of the onium ion Q^+ consists in the formation of an ion pair with the anion QR^- and in the transfer of the ion pair to the organic phase, followed by the transfer of the halogen anion X^- to the aqueous phase.



It shows that, despite some similarities, the interaction of quaternary derivatives of 1,2-amino alcohols with alkali and the subsequent reaction of bipolar particles with electrophiles is a special process, i.e. in contrast to the O-alkylation of alcohols under the conditions of an interfacial process, in this case, not an ion pair is generated in the medium, but a bipolar molecule in which the negative charge is fixed on the oxygen atom, and the positive one on the nitrogen atom. In this respect, such a molecule also differs from zwitter ions, for example, from betaines,

in which charge localization is impossible due to the reaction proceeding according to the scheme [11]



On the other hand, during the interaction of 2-trialkylammonioethoxide with an electrophile in the organic phase, the addition reaction of two molecules occurs, and in the reaction of the Q^+OR^- ion pair with RX under the conditions of the interfacial process, an exchange reaction occurs, and, in the first case, the obtained product does not participate in the further

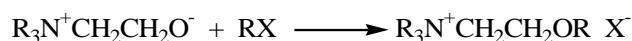
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OAJI (USA) = 0.350

process. Thus, generalizing the results of our studies and known data on bimolecular substitution reactions [12, 13], the reaction of 2-trialkylammonioethoxides



Obtaining quaternary salts of 1,2-aminoesters by the interaction of quaternary derivatives of 1,2-aminoalcohols with organohalogen compounds (Experimental part)

1. *Synthesis of 4-benzyl-4-(2-benzyloxyethyl) morpholinium chloride (1) from 2-(4-benzylmorpholinio)ethoxide.* In a three-necked cylindrical flask equipped with a stirrer, a separating funnel and a bottom tap for draining the reaction mass, to a mixture of 22.1 g (0.1 mol) of 2-(4-benzylmorpholinio)ethoxide and 25 ml of dry benzene, while stirring, 12.65 g (0.11 mol) of benzyl chloride were added dropwise. The temperature of the reaction mixture is maintained with a water bath at 10–20°C. After two hours of stirring, benzene is separated from the reaction mixture, the oily residue is dissolved in 20 ml of propyl alcohol and filtered. Then propyl alcohol is distilled off from the solution, the residue is recrystallized from acetone and compound (109) is obtained in an amount of 32.6 g (93.8%) (see table).

2. *Synthesis of 4-benzyl-4-(2-benzyloxyethyl) morpholinium chloride (1) from 4-benzyl-4-(2-hydroxyethyl) morpholinium chloride.* In the above installation, to 40–50 g of a 50–55% aqueous solution of potassium hydroxide or sodium hydroxide, 50 ml of benzene, 25.75 g (0.1 mol) of 4-benzyl-4-(2-hydroxyethyl) are sequentially added morpholinium chloride and 13.92 g (0.11 mol) of benzyl chloride. The reaction mixture was intensively stirred for 2 hours. The temperature of the reaction mixture is maintained with a water bath at 10–15°C. At the end of the reaction, the stirrer is turned off. When left to stand, the reaction mixture separates into four phases: the upper phase consists of benzene, the second phase consists of 4-benzyl-4-(2-benzyloxyethyl) morpholinium chloride. The third phase, in addition to water and alkali, also contains an alkali metal halide. In the lower fourth phase is an alkali metal halide. The lower fourth and third phases are drained. 25 ml of water is added to the mixture remaining in the flask. The aqueous solution is separated from the benzene solution, transferred to a separating funnel and extracted again with 20 ml of benzene and acidified with hydrochloric acid until neutral. The water is then distilled off under reduced pressure until a viscous mass is formed. To the residue was added 20 ml of propanol and the insoluble part was separated. Then propanol is distilled off from the solution and compound (1) is obtained in the quantity of 34.12 g (98.2%).

with electrophiles can be classified as a new type of nucleophilic substitution, proceeding between a bipolar nucleophile and a neutral substrate

Compounds (3, 4) are similarly obtained (see table).

3. *Synthesis of (2-benzyloxyethyl) triethylammonium bromide (2).* In the above setup, to a mixture of 40 ml of 50% sodium hydroxide, 50 ml of benzene, 22.6 g (0.1 mol) of (2-hydroxyethyl) triethylammonium bromide and 13.92 g (0.11 mol) of benzyl bromide are added successively. The reaction mixture is intensively stirred at 10–15°C for 2 hours. At the end of the reaction the stirrer is stopped and the reaction mixture is left for foliation. Then the lower two phases are drained. To the mixture remaining in the flask, 25 ml of water is added. Then the aqueous solution is separated from the benzene solution, transferred to a separating funnel and extracted with 20 ml of benzene. After that, the aqueous solution is acidified with hydrobromic acid until neutral, and water is distilled off from the solution under reduced pressure at 60–70 °C. Quaternary salt of 1,2-aminoester (2) is isolated from the residue by a similar method described in 2 methods in the amount of 30.6 g (96.84%).

Compounds (5–8) were obtained similarly (see table).

4. *Synthesis of bis(2-benzyloxyethyl) diethylammonium bromide (9).* In the above installation, to a mixture of 60 g of 50% sodium hydroxide, 50 ml of benzene, 24.2 g (0.1 mol) of bis(2-hydroxyethyl) diethylammonium bromide and 37.62 g (0.22 mol) of benzyl bromide are successively added. The reaction mixture is vigorously stirred at 15–20°C for 2–3 hours. At the end of the reaction, the stirrer is stopped and the reaction mixture is left for foliation. Then the lower two phases are decanted. The mixture remaining in the flask is neutralized with hydrobromic acid until neutral, transferred to a distillation flask, and benzene is distilled off. Then 40 ml of propanol is added to the residue and the insoluble part in propanol is separated. Then propanol is separated by evaporation and compound (9) is obtained in the amount of 39.3 g (93.1%) in the form of a viscous mass (see table).

5. *Synthesis of benzyltris(2-benzyloxyethyl) ammonium chloride (10).* In the described installation, to a mixture of 50 ml of benzene, 80 g of a 50% aqueous solution of potassium hydroxide, 27.55 g (0.1 mol) of benzyl tris (2-hydroxyethyl) ammonium chloride, at 15–20 ° C with vigorous stirring, (0.32 mol) benzyl chloride is added dropwise. The feed rate is adjusted so that the temperature of the reaction mixture does not exceed 30°C. After the addition of benzyl chloride, the reaction mixture was stirred for

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another 3-4 hours and processed as in method 4. Compound (10) was obtained in the quantity of 51.3 g (94%) (see table).

Table 1. Results of the interaction of quaternary salts of 1,2-amino alcohols with alkyl-, allyl- and benzyl halides in the system of 50-55% aqueous KOH (or NaOH) and benzene

№	Name of the compound. Brutto formula	Yield, in, в %	Melting temp., in °C or physical form at 20 °C	Elementary analysis, in % Found/calculated			
				C	H	N	Hal
1	2	3	4	5	6	7	8
1	4-Benzyl-4(2-benzyloxyethyl)morpholinium chloride C ₂₀ H ₂₆ O ₂ NCl	96,2	148-150	69,31 69,06	7,77 7,48	4,21 4,03	4,16 4,03
2	(2-Benzyloxyethyl)triethylammonium bromide C ₁₅ H ₂₆ ONBr	96,8	96-98	56,71 56,96	8,44 8,23	4,70 4,43	25,50 25,32
3	Benzyl-4(2-benzyloxyethyl)dibutylammonium chloride C ₂₄ H ₃₆ ONCl	94,7	110-112	73,76 73,94	9,53 9,24	3,37 3,59	9,26 9,11
4	4-Allyl-1-(2-benzyloxyethyl)piperidinium chloride C ₁₇ H ₂₆ ONCl	89,3	масла	69,31 69,04	8,97 8,80	4,56 4,74	12,28 12,01
5	2-Allyloxyethyl)triethylammonium bromide C ₁₁ H ₂₄ ONBr	95,3	66-68	49,47 49,62	9,02 9,02	5,26 5,26	30,08 30,08
6	(2-Ethoxyethyl)triethylammonium bromide C ₁₀ H ₂₄ ONBr	94,5	72-74	47,00 47,24	9,62 9,62	5,33 5,51	31,21 31,50
7	(2-Ethoxyethyl)triethylammonium bromide C ₁₀ H ₂₄ ONBr	97,3	масла	56,76 56,96	8,30 8,23	4,21 4,43	25,05 25,32
8	Benzyl(2-ethoxyethyl)diethylammonium bromide C ₁₅ H ₂₆ ONBr	97,4	масла	51,58 51,80	8,43 8,63	5,32 5,04	28,59 28,78
9	1-Allyl-1-(2-ethoxyethyl)piperidinium bromide C ₁₂ H ₂₄ ONBr	93,1	масла	62,31 62,56	7,81 7,58	3,43 3,32	18,74 18,96
10	Bis(2-benzyloxyethyl)diethylammonium bromide C ₂₂ H ₃₂ ONBr	94,0	масла	74,58 74,79	7,21 7,33	2,69 2,57	6,33 6,51
	Benzyltris(2-benzyloxyethyl)ammonium chloride C ₃₄ H ₄₀ ONCl						

Conclusions

It was found for the first time that in the four-phase system "solid phase - aqueous phase - organic phase - organic phase" in the reaction of quaternary salts of 1,2-amino alcohols with organohalogen compounds, the corresponding quaternary salts of 1,2-amino ethers are formed as a result of the generation of 2-trialkylammonioethoxides. Alkylation of the OH group in quaternary compounds of 1,2-amino alcohols

occurs at room temperature in the presence of 50% alkali and benzene, without the addition of a phase transfer catalyst.

It was defined that the regularities typical for the reaction of quaternary salts of 1,2-amino alcohols are characteristic of quaternary salts of bis-, tris(2-hydroxyethyl)amines under the same conditions.

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Article



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PROBLEMS AND ASSUMPTIONS OF TRANSPORT DEVELOPMENT IN THE REGIONS OF THE ARCTIC ZONE OF THE RUSSIAN FEDERATION. MESSAGE 1

Abstract: *in the article, the object of research is the State Program of the Russian Federation "The main trends in the spatial development of territories included in the Arctic zone of the Russian Federation" for the period up to 2035 as an expression of the policy of the Federal Center pursued in relation to the regions. The subject of the study are the elements of the above program, which, in conflict with regional specifics, hinder the achievement of the goals set in government documents. The analysis of the conducted research is the formation of an understanding of how the regions of the Arctic zone should be taken into account when formulating federal policy aimed at their socio-economic development. In order to achieve this goal, it is necessary to solve a number of tasks in the Russian Arctic.*

Key words: *spatial development, priority, technical regulation, certification, standardization, financial condition, profitability, profit, demand, preferences, demand, competitiveness, social and economic well-being of nine regions of the Arctic zone of the Russian Federation.*

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Introduction

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The natural Arctic is defined by the Arctic Circle, all territories located to the north beyond it were previously called the Arctic. Now this name is leaving the lexicon, as the name "Arctic" is fixed in accordance with international standards. In the work of the economic geographer and specialist in the northern regions and the Arctic, A.N. Pilyasov describes how the territories differed in Soviet times: the Arctic was a closed topic, all scientific work was classified as "secret", the same applied to defense issues; The High North was land-based and was an open topic, addressing the following questions:

- the main geopolitical disputes in the modern Arctic;
- the main international "bridges" in the Arctic of the past and at present, separate ways of communication, excluding classical international relations;
- districts, development which are most closely associated with strategic the interests of the countries.

When Peter I brought coffee to Russia, the North became the "entrance gate" of the drink to the country, so you can see a samovar-coffee pot in the museums of the Arkhangelsk region. Pomors actively interacted with foreign countries, primarily with the inhabitants of Scandinavia and Norwegian merchants. This feature of the Pomeranian territories contributed so much to the emergence of an international culture that a mixed Russian-Norwegian language Russenorsk arose, in which trade was conducted. This example demonstrates that the Arctic, which is more open than central Russia, has long been a zone of international cooperation. With the exception of Moscow, which, with the status of the capital of the country, is the center of contacts with foreigners.

The 30s of the twentieth century - the beginning of the active development of the Arctic by heroic Soviet polar explorers and pilots. In 1928, the airship of the explorer Umberto Nobile crashed, with the help of the Krasin icebreaker, Soviet polar explorers saved most of the expedition. From that moment on, the world realized that the young state could do a lot, and the country's leadership appreciated the possibilities of the Arctic.



Figure 1. Arctic Mediterranean

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In the museum of Dudinka there is a painting "The Battle for Dixon", reflecting the events of the Second World War. The settlement and port of Dikson is located on the shores of the Arctic Ocean on the Taimyr Peninsula, as well as on the line that divides the country in the middle. The German ship "Admiral Scheer" attacked the Arctic meteorological center and the Dixon geophysical observatory, which provided navigation along the Northern Sea Route, trying to capture headquarters maps. It should be noted that in the Arctic region, militarization and tension are higher, but the level of contacts, exchanges, etc. is also higher.

Not only the Russian Arctic, but also the international one is for many countries a "gateway" to the foreign world. The shortest distance between two points on the Earth's surface is closer to the poles, so the airport in Anchorage (Alaska, USA) is the fifth in the world in terms of cargo turnover with the countries of Central Asia. Another famous Arctic hub is the city of Reykjavik, where planes flying from Europe to North America land. The route from Japan to Europe passes over Yamal and other northern territories of Russia (Figure 1).

The modern Arctic is a zone of active cooperation between northern countries (in comparison with countries located at southern latitudes), in general, the region is a territory of closer interactions between states than inland territories, which led to the emergence of the concept of the "Arctic Mediterranean". The azimuth projection of the Arctic Mediterranean is located in the center of the emblem of the United Nations and shows well the convergence of countries through the North Pole.

Current trends:

- after a decrease in interest in the region at the end of the 90s of the last century, since the 2000s, there has been an increase in international attention to the Arctic in all countries, and the activities of international organizations are intensifying. Since 2005, the Nordic countries have been consistently adopting Arctic strategies, even Germany has created its own strategy;

- the emergence of new countries in the international Arctic: China, Southeast Asia as a whole.

In 2019, the Ministry of Natural Resources and Ecology of the Russian Federation completed the geological and geophysical studies carried out to substantiate the application for the extension of the boundaries of the Arctic continental shelf to the UN Commission on the Limits of the Continental Shelf.

➤ Initially, the Arctic was divided according to the sectoral principle: a meridian was drawn from the western point of the territory of each country to the North Pole, the sector limited by the meridians was considered to belong to the corresponding country.

➤ The UN Convention on the Law of the Sea was adopted in 1982 and ratified by Russia in 1997.

According to the Convention, the territorial jurisdiction of the state extends only to the shelf, while the off-shelf zone is declared international (International Seabed Area), coastal waters at a distance of no more than 12 miles from the baselines can be declared territorial sea, and the exclusive economic zone is a 200-mile zone from baselines. Geographically, the continental shelf is an underwater extension of the mainland that extends beyond the 200-mile zone.

➤ In 2001, Russia was the first of the countries participating in the Convention to impose restrictions by submitting an application to the UN Commission on the Limits of the Continental Shelf (at the same time, a significant part of the Arctic waters was voluntarily ceded to international use).

➤ Canada in 2013 and Denmark in 2014 submitted bids that involve significant overlap in neighboring territories. In the Danish application, Greenland has a shelf extending to the North Pole and beyond.

➤ in 2015, Russia filed a revised application to expand the Arctic shelf, which stated that the boundaries should be set taking into account the "continental nature" of the areas in the Arctic Ocean. To substantiate the application before the UN Commission, it is necessary to confirm with the help of geological and geophysical studies that the sites are the continental shelf.

The options proposed by the UN Convention on the Law of the Sea for determining the boundaries of the continental shelf are: method 1 - consideration of the thickness of sedimentary rocks to determine the place where it reaches 0.001 of the distance to the foot of the continental slope; method 2 - determining the distance of 60 nautical miles from the foot of the continental slope.

Expeditions carried out explorations and discovered a number of islands, science related to oceanology and geophysics soared after the collapse of the 1990s, but Russia had to pay more than 100 billion rubles for the mistake of the 2001 application.

➤ In 2019, the result of the meeting of the 50th session of the Commission on the Limits of the Continental Shelf was the confirmation that the Lomonosov Ridge, the Mendeleev Rise and the Podvodnikov Basin separating them are underwater heights and natural components of the Russian continental margin. Victory has been achieved, but Russia's application continues to be considered, as unconfirmed sections of the continental shelf remain.

Alternative point of view. Article 76 of the UN Convention on the Law of the Sea contains rules for determining the boundaries of the continental shelf, regardless of its location. Head of the Department of International Law of MGIMO A.N. Vylegzhanin draws attention to the fact that it was possible to apply Article 83 of the Convention, which implies the

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possibility of delimiting the continental shelf between states with opposite or adjacent coasts by agreement on the basis of international law.

The polar archipelago of Svalbard or Grumant (ancient Russian) has been settled by the Pomors since the 12th century. Traditionally, Svalbard was a territory of general use, in 1872 an international treaty between Russia and Norway-Sweden was concluded, which confirmed the special historical rights of Russia to the archipelago. However, in 1920, under an agreement between the United States, Great Britain, India, Denmark, France, Italy, Japan and Norway, Svalbard was transferred under the sovereignty of Norway, with the reservation of the equal right of other states to exploit its natural resources and territorial waters. The treaty entered into force in 1924, 39 states participate in it, including Russia since 1935.

Article 2 of the treaty reads: "Ships and citizens of all the High Contracting Parties shall be admitted, on equal grounds, to the exercise of the right to fish and hunt in the areas indicated in Article 1 and in their territorial waters." Norway mines coal on Svalbard, which is not economically justified, but the implementation of economic activities for the extraction of minerals in the archipelago in accordance with the agreement gives countries the right to be on its territory.

In 1977, Norway established a 200-mile "fish protection zone" around the archipelago, which, by its status, was an exclusive economic zone. Russia (as well as the USSR earlier) objected to such a definition and consistently recognized the water area as the open sea, drawing its western border of the continental shelf through it, connecting the extreme point of the country's land border with the north pole in a straight line, deviating slightly to the east in the Svalbard region. From the point of view of Norway, the Russian-Norwegian border should have an equal distance from Svalbard and the Russian Franz Josef Land. The discrepancy between points of view on the border line formed in the Arctic Ocean a section of the continental shelf of 175 thousand km² (12% of the Barents Sea), which remained controversial for several decades.

US President D. Trump offered to buy an administrative autonomous unit of Greenland from Denmark, which caused active discussion in Europe. The Prime Minister of Denmark M. Fredriksen answered D. Trump: "Greenland is not for sale!", and the inhabitants of Greenland said that their land would not only be American, but also Danish. The Arctic is characterized by natural and economic mobility, and the US President's proposal also demonstrated the political mobility of international Arctic cooperation. Russian experts say that the purchase of Greenland is possible, European experts, especially politicians, reject such a possibility.

In May 1905, the Tsushima naval battle took

place, which became the last decisive battle of the Russo-Japanese War. The 2nd squadron of the Pacific Fleet under the leadership of Admiral Z.P. Rozhdestvensky advanced to the eastern theater of operations to assist the troops fighting in Port Arthur, but was defeated in the Tsushima Strait before reaching their destination.

Historically, the Northern Sea Route began with the Kara expeditions (20s of the 20th century), and "got on its feet" when the export of timber through the city of Igarka was launched. It should be noted that the western radius of the Northern Sea Route was mainly working, which justified the existence of an economic base.

In the 30s of the twentieth century, a permanent connection was established along the Northern Sea Route, providing a connection between the western and eastern parts of Russia. The continuous (from west to east) Northern Sea Route, like the Baikal-Amur Mainline (BAM), was of strategic importance. Comrade I.D. Papanina at the 18th Congress of the All-Union Communist Party of Bolsheviks in 1939 said: "Dumb-headed tsarist officials did not see the vital need to master the Northern Sea Route. They caused all sorts of difficulties for single researchers who sought at their own peril and risk, in spite of ice and fog, to lay the Northern Sea Route. During the Russo-Japanese imperialist war, tsarist Russia paid dearly for its backwardness and conservatism, for the lack of well-equipped bases and military routes to the North. After the Battle of Tsushima, the famous Russian scientist Mendeleev wrote:

The sad page of the Northern Sea Route is the history of the German raider "Komet" being carried along it by Russian ships before the Second World War. During the war, "Komet" carried out combat missions in the Pacific Ocean. In the 1930s, there were many people accused of espionage in the camps in the USSR, which causes an ambiguous assessment of the collection of intelligence data by the German raider. A similar situation arose with the raid of the Graf Zeppelin airship over the Arctic waters of the USSR, in which Soviet scientists, including Arctic explorer R.L. Samoylovich (subsequently shot). The airship flew up to the middle of the Northern Sea Route, taking aerial photographs and collecting data that were mysteriously lost. "Graf Zeppelin", having not made the earlier planned landing in Leningrad, flew to Germany, where the results of observations "surfaced". The years of Soviet-German friendship cost Russia very "expensively", it is enough to recall such events of the Second World War as the raid of the cruiser "Admiral Scheer" in the Dixon area, which took place thanks to the collected navigation data, or German submarines that sank in the western sector of the Northern Sea Route convoy transports.

The considered examples show that the Arctic is an open and not fully explored region.

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The strategic importance of the Northern Sea Route for Russia remains significant and the most important for ensuring transportation (Figures 2 - 7).

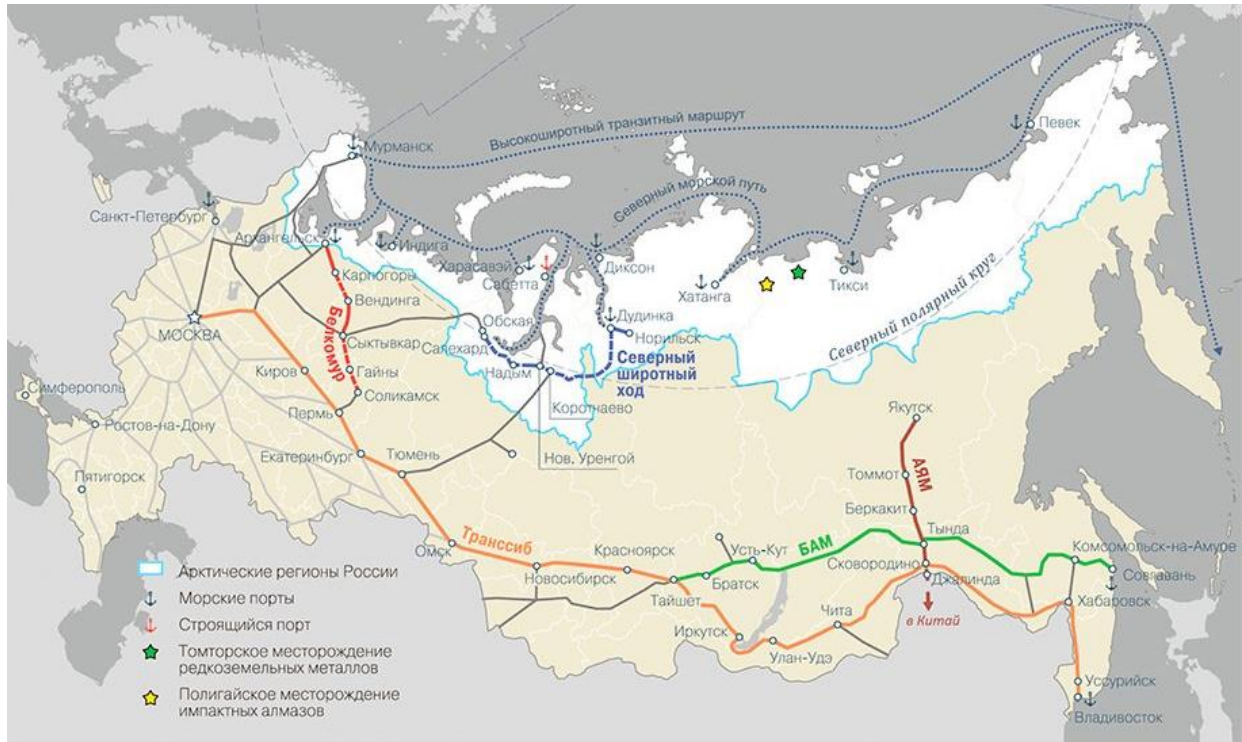


Figure 2 - Arctic Sea Routes: Northern Sea Route (blue line), Northwest Passage (red line), Central Passage Project (green line)



Figure 3 - Scheme of railway tracks in Russia

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Figure 4 - Map of the scheme of river transport in Russia

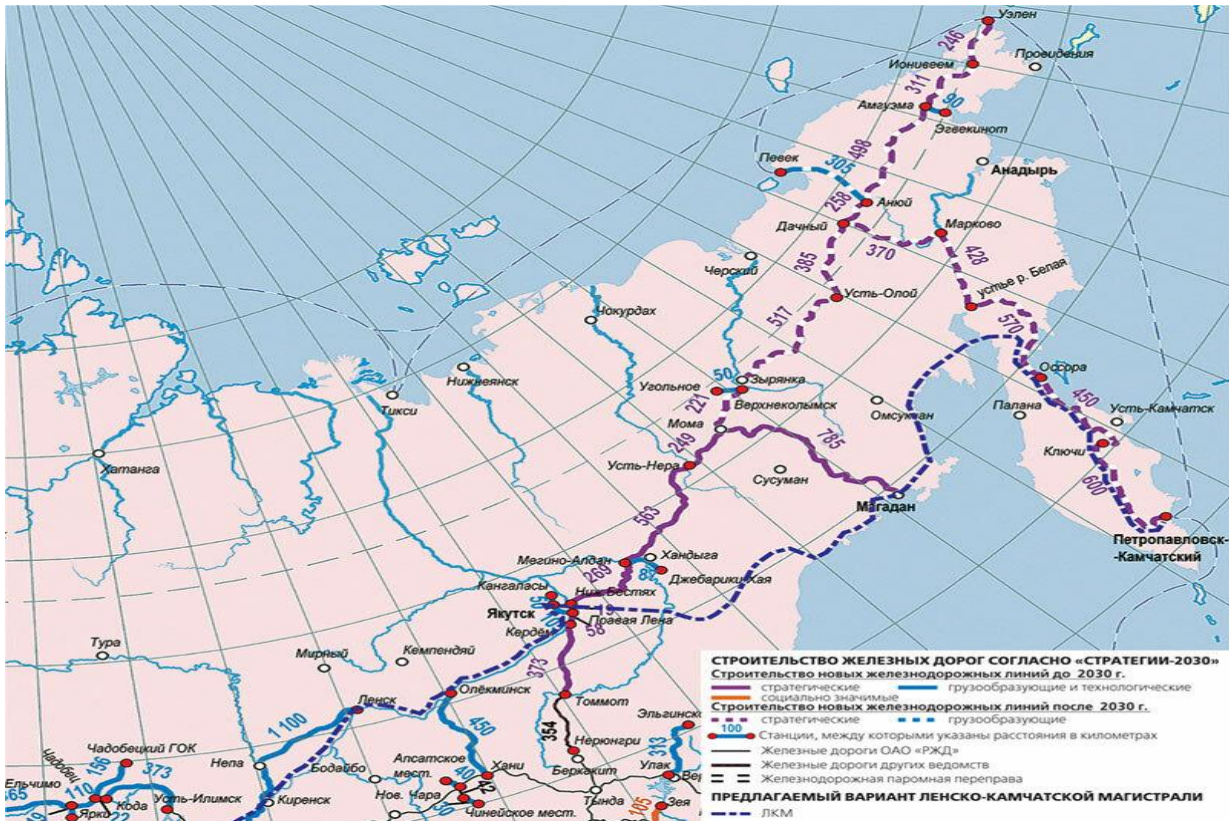


Figure 5 - Map - a scheme for the construction of new railways in the regions of the Russian Arctic

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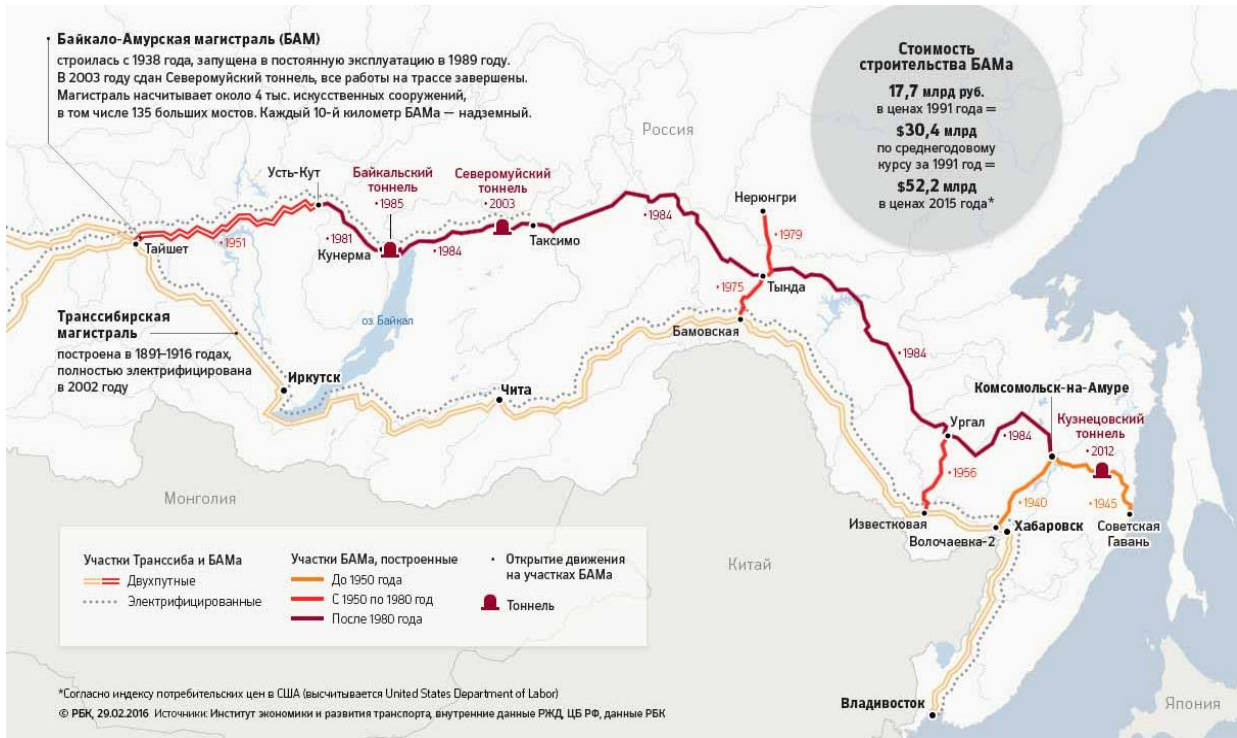


Figure 6 - Scheme of the construction of the Baikal - Amur Mainline (BAM)



Figure 7 - Adjustment in the BAM construction scheme

Currently, discussions are underway regarding the status of the Northern Sea Route - should it be international or is it an internal highway, which the Russian side insists on. A similar dispute is going on between the US and Canada over the Northwest Passage, which lies in Canadian Arctic waters. This is a less popular and more difficult sea route in terms of navigation conditions, passing near sparsely populated areas, therefore, we do not have a special need to develop it - there is such an erroneous opinion.

However, it is assumed that with climate warming in the future it will be more relevant. Canada insists that the Northwest Passage is exclusively an internal highway, the US considers it an international one. According to forecasts, by the middle of the 21st century, the ice situation will become much softer, therefore ships will be able to navigate in the area of the North Pole, moving in the middle of the Arctic Ocean. Land and air analogues of the Northern Sea Route Trans-Alaska Highway in North America

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The construction of overland routes was associated with military necessity: the main transport routes of the north of North America, connecting Alaska through Canada with the main territory of the United States, were built during World War II. As historians write, before the time when the Japanese bombed Pearl Harbor, Alaska had one highway from Valdez to Fairbanks, about 2,000 miles long. From the

point of view of the United States, Alaska was an island; if Japan cut off the shipping traffic, it would be completely cut off. This would be a disaster for her, because the region did not provide itself with food, despite the presence of the city of Palmer (northern "Kuban"), which acts as a granary.



Figure 8 - Characteristics of the transport scheme of the basic regions of the Russian Arctic

In the 40s of the twentieth century, after long negotiations with Canada, which first initiated construction, but then abandoned it, fearing an aggravation of the conflict with Japan, the construction of a vital highway for Alaska begins. A panel on the façade of the Yukon Transportation Museum in Canada demonstrates how important the construction of the Trans-Alaska Highway by the US military played in the development of transport in Alaska. Subsequently, it completely turned the life of part of the US territories, in particular, the city of Whitehorse, having found a road, became the capital of the Yukon Territory, Alaska as a whole received a stable connection with the main territory of the United States, that is, this is the Northwestern intermediate route. Canada officially positions the creation of the air Northwest route as its own invention, as does the United States. airfield system, located along the Trans-Alaska Highway, was built during World War II. Starting in 1942, it was used to transfer aircraft and cargo provided by the US to the Soviet Union under Lend-Lease. The air "bridge" extended to the Soviet Union, it was called ALSIB - the Alaska-Siberia air

road. Cargo from Great Britain during the war was delivered to Russia by sea - northern convoys to the cities of Murmansk and Arkhangelsk. In Fairbanks, a monument to Soviet and American pilots was erected, and the route of the air "bridge" is also reflected on it. Soviet pilots flew to Fairbanks to receive Douglas warplanes. The transfer point was moved inland from the coast due to possible attacks by Japanese aircraft. Soviet pilots piloted aircraft first through the United States (to the village of Nom), then through the Bering Strait to Chukotka. The Arctic is an amazing place where the close interaction of the northern countries, including the Soviet Union and America, is manifested.

The Arctic is an area of close rapprochement between the opposing sides during the Cold War - the Soviet Union and Western countries, therefore, the front lines of defense passed on its territory. In North America, the famous Dew Line (Distant Early Warning Line, DEW Line) was created - a chain of air defense radar stations that runs throughout northern Canada. An example of how militaristic themes have "sprouted" in Alaska is a farm site (claim), where the

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equipment of a radar station helps to attract tourists who are invited to pan for some gold (such economic activity is prohibited in Russia).

Another, no less militarized region of the world is Northern Norway. On the bas-relief in the building of the University of Tromsø, made in the style of Soviet newspapers, it is reflected how Uncle Sam throws cruise missiles into the territory of Norway, while pumping oil out of it. The northern part of Norway is the location of NATO military units, when there is a "thaw" in relations between Russia and the North Atlantic Treaty Organization, this adversely affects its economy. The dialectic of the Arctic also lies in the fact that the military presence contributes to the provision of jobs for the inhabitants of the region. In Russian cities specializing in military subjects, in the 90s of the last century, the problem of employment of the population, which both Alaska and northern Norway face, became acute. In the Norwegian city of Tromsø, aviation units have been preserved, but the NATO submarine base, organized in a tunnel in the rock, was closed, and subsequently sold to a private person. The Norwegian businessman, in turn, sold the base to Russia, now scientific ships are located on its territory. An example of a military facility handed over to scientists for research is the bomb shelter tunnel near Fairbanks, the largest permafrost research center in the Western Hemisphere.

In the USSR, an air defense line was also created along almost the entire coast, and several large air bases were built, including in the Murmansk region and the Yamalo-Nenets Autonomous Okrug (Amderma settlement). The village of Amderma, one of the few villages with capital houses and an airport, was completely focused on servicing long-range aviation. It is currently in a deplorable state as a result of declining population, despite the construction of several wind farms. A large contingent of Soviet troops and the airport were based on the ice field near the Pole in order to be at the closest distance to a potential enemy. Novaya Zemlya became a nuclear test site, which led to the resettlement of local residents.

The Alaska Transportation Museum has an exhibit that says, "Whoever rules Alaska in the future will rule the world." The development of transport in this region is directly related to the development of infrastructure, primarily for gold mining ("gold rushes" at the turn of the 19th and 20th centuries), and secondly, for the armed forces. The population of the city of Fairbanks is 30 thousand people, the population of the surrounding area of Borough is 100 thousand, while there are no large settlements in the area, mainly farm settlement. This feature is explained by the inclusion of the contingent of the armed forces in the population of the region.

Militarization has an impact on the life of the indigenous peoples of the North:

- During the Second World War, special units

of the Eskimos (Inuit) were created, which remained in the places of traditional residence, performing the functions of tracking a potential enemy.

➤ "Black page in the history of Canada" - the official name of the resettlement of the Inuit from the mainland of the countries to the northern islands at a distance of 2.5 thousand km, carried out solely in strategic interests (territory retention). As a result, some of the settlers died of starvation, since the representatives of this people are adapted to a certain natural environment and have developed the skills of hunting caribou, which do not live on the islands. In order to help them adapt to the high Arctic, Inuit from another village were placed with the settlers. The Canadian government recently issued an apology to the surviving Inuit people.

➤ The monument to the Deer Battalions is located in the city of Naryan-Mar. During the Second World War, residents of the Nenets District were recruited to deliver food and ammunition to the army units fighting in the Murmansk region, since reindeer are well adapted for moving along the Arctic impassability. The reindeer herders made their way to the combat area on their own. In Alaska and Chukotka, related families live on opposite sides of the Bering Strait. Skillfully managing canoes, they communicated, but in the course of the formation of new states, the peoples were divided. During the Cold War, part of the small indigenous people of the Chukchi were resettled from Novaya Zemlya and the Chukchi coast to the hinterland, because they occupied territories that were too close to a potential enemy. There has been some degradation because the coastal inhabitants are sea hunters and do not know how to herd deer. The depopulation of the coast of Chukotka is a tragic page in the history of Russia. The most non-Arctic cities in the Russian Arctic: Arkhangelsk, Severodvinsk, Novodvinsk. The cities of Arkhangelsk, Severodvinsk, Novodvinsk are located in the Arkhangelsk region, which differs from most of the Arctic in that it is covered with forests. The pulp and paper industry is located in the city of Novodvinsk, and the defense industry is located in the city of Severodvinsk. The development of the White Sea coast began in the 16th century. Enterprises specializing in the construction of ships and submarines were built on the historically earliest developed territory, where one of the first monasteries is located. Thus, one of the temples ended up on the territory of a closed enterprise. There are two companies in the city: The Zvyozdochka ship repair center, which repairs submarines, and the Northern Machine-Building Enterprise, which specializes in the production of submarines, as well as their repair by order of India. The aircraft carrier "Admiral Gorshkov" was sold to India, the Severodvinsk enterprise is also engaged in its repair. The Institute of Shipbuilding and Arctic Marine Engineering has become a branch of the Northern (Arctic) Federal

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University. M.V. Lomonosov. Currently, the city is open, new housing is being built, the flow of commuting migrants has changed. When the defense industry found itself in a very difficult situation in the 90s of the last century, the inhabitants of Severodvinsk left to work in the city of Arkhangelsk, and now the oncoming flow has intensified. We emphasize that almost all Arctic cities are dependent on any external factors, for example, oil prices or the political environment. The development of cities of defense specialization is largely associated with state policy in the field of defense support.

In terms of militarization, the Murmansk region is comparable to Alaska, on its territory there are closed administrative-territorial formations (ZATO): Vidyaevo, Zaozersk, Ostrovnoy Severomorsk, Aleksandrovsk. Initially, the historical center of the Kola Peninsula was the city of Kola, then Aleksandrovsk, then - the overgrown Murmansk - the "child" of the First World War, conceived as a transport center as part of the railway line (1915), which provided access to the sea, bypassing potentially blocked ports in the Baltic. The further fate of Murmansk is closely connected with the function of both economic and defensive "gates". The population of the city is 300 thousand people. ZATO Aleksandrovsk includes a number of administrative entities: the city of Polyarny (City of Military Glory) - the population is 42.7 thousand people, the city of Snezhnogorsk - 12.6 thousand, Gadzhiyevo - 11 thousand, Polyarny - 1.7 thousand, n.p. Deer Guba - 1.6 thousand, s. Belokamenka - 84 people, the settlements of Kuvshinskaya Salma, Retinskoye, Saida Guba (a place for storing spent parts of nuclear submarines) - there is no permanently resident population. Thus, in the area of Murmansk, including the city of Severomorsk, there are centers for basing, repair and maintenance of the Northern Sea Fleet.

The nuclear submarine "Kursk" crashed in the Barents Sea, 175 km from the city of Severomorsk. The cabin of the cruiser was installed in Murmansk on the site of a symbolic mass grave - the burial of a capsule with sea water from the crash site. The village of Korzunovo is known for the fact that Yuri Gagarin served there, who was a military pilot before flying into space. Some of the closed cities are currently open, for example, the city of Roslyakovo, since it is assumed that civil facilities related to the export of liquefied natural gas will be located on its territory. The northern part of Murmansk was famous for its large dock for repairing aircraft carriers; as a result of the crises of the 90s and subsequent years, backup power sources were disconnected at the dock, which led to its flooding during an accident in the power system. In the city.

The atmosphere of Murmansk is imbued with a naval spirit: the most famous monument in the city is the monument to "Defenders of the Soviet Arctic during the Great Patriotic War" ("Alyosha").

"Waiting" - a monument to a woman waiting for a sailor and looking at the mouth of the bay, from where the ship should return. Murmansk is the base of the icebreaker fleet, from where caravan routes along the Northern Sea Route begin. The most famous domestic icebreaker "Lenin" has become a museum. Many stories are connected with its construction in the 50s of the twentieth century, since it took place in a competitive mode with the Americans. Foreign specialists came to the construction site with an inspection, as a result of which it was concluded that the Russians would need several years to complete the work. A few months later, as a result of a heroic breakthrough, sea trials of the icebreaker were carried out. American experts announced that instead of a nuclear engine, a diesel engine was used for testing, but they were given the opportunity to verify the opposite. Despite the risks, the Soviet Union was the first in the world to build a nuclear-powered icebreaker - the pride of the country. Options for the functioning of the Northern Sea Route, namely:

1. The transition from the western regions of Russia to the east: the northern analogue of the Trans-Siberian Railway ("Anti-Tsushima").

2. "Windows" to Europe: it was for this task that the Northern Sea Route was laid in the 20s of the twentieth century, this option is the most economically profitable and actively used.

3. "Bridge" Europe - Asia-Pacific region: accompanied by difficulties during the passage along the Northern Sea Route, even with the use of modern icebreakers and ice reconnaissance methods. An obstacle is also the poor development of infrastructure in the eastern part of the route: the impossibility of repairing the vessel, the lack of the necessary support along the route.

4. Northern delivery.

It is still too early to talk about container transportation along the Northern Sea Route, because they require a strictly defined delivery time.

Lesson #2: New highways in the Arctic often open up due to extraordinary circumstances and extreme conditions.

Under normal circumstances, the heavy investment and risk that is always present in the construction of new roads is rarely undertaken by countries. The reason for the intensification of efforts may be a sharp drop / rise in oil prices or military actions. The supreme ruler of Russia, who founded his state in Siberia - Admiral A.V. Kolchak was desperately looking for a way to establish trade relations with the Entente countries for the supply of weapons and food. The Northern Sea Route would have saved the situation, so the admiral, with experience in ice navigation, showed great interest in him. The first expedition to establish regular relations of the Committee of the Northern Sea Route was organized in the same historical period. After the defeat of the army of A.V. Kolchak, the committee

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was saved and continued its activities.

The foundation of the city of Igarka was not only an economic, but also an ideological project. CM. Kirov at the XVII Congress of the All-Union Communist Party of Bolsheviks in 1934 stated: "What yesterday seemed completely unawakening, where in tsarist times people were exiled only in exile, is now there by the will of the Bolsheviks, on the basis of natural resources (apatite, iron, molybdenum, mica, thorium, titanium, etc.), in the semi-tundra, where the human foot has not yet set foot, a new, rapidly growing industrial center of the Arctic Circle has been created. Igarka was an example of a northern city flooded with lights, which was used to demonstrate the triumph of Soviet power. Note that young I.V. Stalin, under the tsarist regime, was serving a link in the Turukhansk region a little south of the city of Igarka.

- 1935 - the Territorial (Krasnoyarsk) department of the GUSMP and the Igark air base (routes to Taimyr) were formed;

- 1932 - the branch of the All-Union Institute of Plant Growing began its work;

- 1935 - in terms of the percentage of literate population, the city takes first place in the region, there are 9 schools, 3 circles of foreign languages, the arrival of O.Yu. Schmidt, tours of the Bolshoi and Maly theaters, a newspaper is published in several languages;

- 1938 - the population of the city is 18 thousand people, a bus line and a city taxi are launched.

Foreign ships call at the port of Igarka, the American journalist Ruth Gruber recalls that she saw French perfumes in the shops of the city. The book "We are from Igarka", compiled from the stories of schoolchildren, was presented at the World Exhibition in New York, but the editors excluded the information that some of the authors were from among the special settlers. At the same time, the complex development of the city took place, including scientific research on specific lens permafrost, which significantly hampered construction. Having broken through the layer of ice under which the stone is located, it is possible to rest piles on it, but the permafrost in this area is layered (the layer of ice is a layer of clay). A scientific station for its study (one of two in the world) was built in the city of Igarka in the 30s, plans were made to organize a powerful underground complex, which even included a skating rink. The second underground station is located in Fairbanks (Canada), but the Russian station is deeper, as it is located in a mine. Employees of the Igarka Permafrost Museum say that they manually cover the corridors of the station with a layer of snow and ice in order to maintain the required temperature, which makes it very beautiful in the underground tunnels.

I.I. was invited as the chief architect of the city. Leonidov is a representative of the Russian avant-

garde in architecture. Only one of his participation in the construction could make Igarka a world-class tourist attraction. The avant-garde wooden buildings, including the trading port for foreigners, unfortunately burned down.

From the point of view of food, the city was self-sustaining, in many respects this was a consequence of necessity. The first polar pilots made flights to Igarka, but under adverse weather conditions, the flight could last several weeks. Scurvy is an eternal companion of the early years of Arctic exploration, so a division of the Research Institute of Polar Agriculture is opened in the city, where experiments are carried out and new varieties of crops, such as potatoes and strawberries, are created. Initially, there was no camp in Igarka, kulaks were exiled there. R.V. Gorchakov writes that in the 30s the hands of the NKVD "did not reach" the city, so the kulaks lived relatively freely and were engaged in the cultivation of crops in the Agroarctic subdivision. To make inspections more difficult, vegetable gardens were organized on the island. In 1938, the crop was harvested: 134 tons of potatoes, 67 tons of cabbage, onions and radishes, 2 tons of tomatoes, 7.5 tons of cucumbers. A book published in 1979 says: "The population of Igarka almost completely provided itself with vegetables and potatoes throughout the Great Patriotic War! Igarka residents did not abandon this occupation even in the no less difficult post-war years. to import from the central and southern regions of the region, the sectors of the economy at the Igarsky state farm have changed. The main industries have become meat and dairy and poultry. This greatly affected the food security of the city, at present the farm exists, but is in a deplorable state. The very provision of northern territories with food is a global trend, it is more expensive, but vegetables grown in their own greenhouses are fresher than those delivered. Learn more about life in You can meet Igarka at the age of 30 by reading the books of V.P. Astafiev, who grew up in an orphanage.

Lesson #3: Remoteness isn't always bad. On the one hand, it does not allow you to quickly and cheaply deliver what you need from the mainland, on the other hand, negative trends (for example, drugs) do not reach remote areas.

The main aspects of the study of remoteness

- economic costs of remoteness, structure of the economy: limited sales market, high prices, lack of innovative developments, costs of doing business. "Remote regions suffer from a lack of both political self-government and economic self-sufficiency" (American economist L. Husky).

- migratory outflow;
- food self-sufficiency (AHDR);
- the predominance of long-distance ties over short-range ties (economic geographer A.I. Pilyasov);
- institutional costs: important decisions are made in large cities located far away, which makes it

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difficult to take into account local specifics. Alaska Governor W. Hickie, in his book *Lessons from Alaska - Opportunities for Russia*, talks about the adoption of a US federal law issued to combat carbon dioxide emissions with the help of a gasoline additive.

For part of the country's territories, this law was useful, but in a cold climate in Alaska, the atmosphere is reversely stratified, so the exhaust is pressed to the ground, which statistically significantly led to an increase in the incidence.

- increased creativity: "Remote places are full of innovators. This is due to the fact that progress is always on the way to these places and the do-it-yourself principle becomes the only opportunity to make a leap forward" (British anthropologists E. Ardener and K. Humphrey).

- increased opportunities for self-development: "Remoteness from other countries and the high cost of transportation served industry as a natural defense" (Norwegian economist E. Reinert). Paradoxically, the level of diversity of Arctic cities in Russia (Norilsk, Magadan, Vorkuta, Igarka) higher than the level of oil towns built in the "fat" 70s (Novy Urengoy, Noyabrsk).

Post-war technological breakthrough and the death of the city.

With the improvement of the transport situation in the 70s, production indicators in Igarka increased: timber export in 1943-1946 was 0 m³, in 1965 - 889 m³, in 1978 - 1.3 thousand m³. The strong growth of exports in the 1970s was associated with a change in timber loading technology: instead of self-rafting, ocean-going vessels were loaded with packages (timber stacks) that were delivered from timber processing plants located upstream of the Yenisei. Thus, the unique economic and geographical position of the city has exhausted itself to some extent. This was facilitated by the invention of river-sea vessels, on which it is more profitable to export timber. At the same time, the city is changing: the construction of multi-storey (5-9 floors) houses of standard models is being massively carried out. The peak of the commissioning of housing falls on the 70s - 80s, while the apartments in the "Khrushchev" are very cramped.

Compact cities have their advantages, but in case of population fluctuations they shrink, it is possible to make a number of generalizations that arise in the process of solving applied problems in the Arctic region:

- Is it necessary to live in the Arctic or is it just a place to extract resources?

During the implementation of specific projects, a number of questions invariably arise: should permanent settlements be created for resource projects, and if so, which ones? if a temporary stay of workers is supposed, then what will it be - on a rotational basis or for a certain period of life? Despite the fact that in Soviet times the population was declared to be fixed in the Arctic territories, a

significant part of people came to the North at a young age and lived there until the age of early retirement (due to certain benefits) or until the moment when the children finished school and it was time to enter higher education.

In the 60s of the last century, when the "road to resources" project was being developed, Canadians studied the experience of the Soviet Union in the field of creating permanent cities. In the 1990s, the Soviet Union turned to the experience of Canada, where the northern territories were not sufficiently developed, which was considered more effective. Currently, there is a decrease in the population in some northern regions of Russia: in the eastern part of the Nenets Autonomous District, the work of resource projects is carried out mainly on a rotational basis, as is the development of the Yamal Peninsula. At the same time, there are reports that the construction of new cities is planned, for example, in connection with the development of promising coal deposits near the village of Dikson.

- Ethical issues of life in the North. In the Soviet Union, northern benefits were originally created as a compensation for the difficulties associated with moving, as well as a way to secure the population, reducing the costs associated with rotational development. With the previous method, people came to the North, but after a while they left, and the new arrivals had to organize life anew. Such a change in the population was associated with both increased morbidity and loss of working time. Similar problems are typical for the regions of the foreign Arctic, for example, a similar lifestyle is led by specialists in northern Canada who come for a certain period. Gradually, the benefits began to be perceived by northerners as compensation for the fact that they sacrifice themselves for the well-being of the country.

- For whom should infrastructure be created - for the population or for the extraction of resources?

The Nenets Autonomous Okrug can be presented as a miniature model of the Arctic; its example illustrates well the contradiction of the issue of infrastructural development of the northern territories. On the one hand, most of the settlements in the district are located west of the river. Caves and the capital of the district - the city of Naryan-Mar. These are villages built in the 18th century and located along the highway that went to the city of Pustozersk and further to the east. There are practically no permanent roads in the region, winter roads cover mainly the eastern part of the district, as well as helipads. The accessibility of small settlements in the west of the region is provided either by air or by traditional sledge. Thus, the roads lead to resources, and not to the more populated areas of the Nenets Okrug, that is, the development of the territory is connected with the development of deposits.

- Center cities or base cities? Traditionally, cities are located in a close network, their existence is

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associated with an active interchange of services. Residents of small towns receive unique services in large cities, which are easy to reach in densely populated regions with a well-developed transport network. By serving small towns, large ones get an increase in the market for their goods and services, which leads to the development of a wider range of industries. The described interchange is the basis of urban life, but in the Arctic cities are largely isolated and lack the possibility of network interchange. At the same time, they perform a rather specific role of a transshipment base associated with seasonal development, with the need for additional storage of goods, which should be sent further along the Northern Sea Route to remote settlements. On the one hand, cities are excluded from the classical local network, which is the basis for development, on the other hand, they are included in powerful inter-regional flows and have additional functions associated with transshipment and storage in the off-season, with equipment settling down for the period when it cannot be operated.

- How to deal with population instability? The main problem of the North has always been considered climate, but trying to cope with the population of the Arctic regions is an almost insoluble dilemma. Architects and city planners have traditionally tried to solve the problem of climate, while the problem of frequent population change has not been clearly solved at the city level. The answer to the question "is a transforming city possible?" still no. Notorious are barrel houses, whose rounded shapes were designed to save energy. Temporary housing is associated with psychological costs - the residents of the North experienced the "delayed life" syndrome. Thus, the deliberate orientation to temporality has negative socio-cultural consequences.

- Sectoral or complex development? Development of resources or development of space?

In the 30s of the 20th century, emphasis was placed on the integrated development of territories, a new round of development in the 60s and 70s assumed an orientation towards sectoral development. Despite the fact that formally it was said about territorial production complexes, in reality the social sphere was reduced. The lack of housing and social and cultural facilities is a classic of the history of the development of the Arctic in the late Soviet era. The sparsely populated northern territories of Alaska and Canada suffer from similar problems. Question: "Is it worth creating infrastructure in the North with a full range of social categories for all ages (from children to older people)?" - has not been fully resolved. If you ask it to the residents of the Arctic themselves, then the answers will be very different, because some people of retirement age for various reasons (medical and social) do not want to leave the North, some are seeking relocation. There is currently no unambiguous solution to this issue.

- maximum adaptation of the socio-cultural and economic environment to the specific Arctic conditions: reducing the cost of their creation through the socio-psychological adaptation of people, the development of technology and technology, including nature-like ones, as well as special forms of economic activity and institutions. It is necessary to adapt the socio-economic system to the Arctic specifics (seasonality, poor transport accessibility), while ensuring autonomy, the ability to live from import to import, to form reserves, organize medical care in remote areas, and ensure the availability of universal specialists capable of providing a wide range of services. We emphasize that we are not talking about organizing a familiar environment, it is assumed that the population will live in extreme conditions.

- victory over the Arctic nature: to win, it is necessary to fulfill the dreams of people who explored the North in Soviet times, when the lines from the song "Guys of the 70th latitude" sounded: "Let blizzards rage nearby, if necessary - melt the ice!", that is, build on In the north of the city, perhaps a denser network of roads, adapt standard houses to permafrost conditions, transfer the indigenous peoples of the North to settled life and repeat the way of life that operates in the rest of the country. This path involves the destruction of the usual way of life, the mentality of people and a number of economic mechanisms.

Currently, an intermediate option is most often used, since a neutral environment has not been created in the Arctic in this way. Back in the 80s, scientific reports noted that the inhabitants of Norilsk do not feel cut off from the main territory of the country, but recent studies conducted among the population show that even now Norilsk residents do not have the opportunity to travel outside the Norilsk industrial region. On the other hand, modern residents of the Arctic have different behavioral strategies than Russians living in the main settlement zone of the country. A typical example is the existence in the North of the concept of "euro driver", which refers to a person who cannot repair a car that has stalled during a snowstorm on the highway. A large company is able to ensure the good condition of the road, which the assistance vehicle will quickly reach to assist the driver, so it can use a different strategy by hiring narrow specialists. Euro driver - a private carrier may not survive in extreme Arctic conditions in a car breakdown situation, so northern car owners have a wide range of skills not only for driving and repairing, but also for survival.

The specificity of the Arctic region, of course, is recognized, at the state level it is noted in the following documents:

- "Fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2035 and beyond".

- "Strategy for the development of the Arctic zone of the Russian Federation and ensuring national

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security for the period up to 2035".

The features of the region taken into account in the Russian legislation, namely:

- extreme natural and climatic conditions, including low air temperatures, strong winds and the presence of ice cover in the waters of the Arctic seas;
- focal nature of industrial and economic development of territories and low population density;
- remoteness from the main industrial centers, high resource intensity and dependence of economic activity and life support of the population on supplies from other regions of Russia of fuel, food and essential goods;
- low stability of ecological systems that determine the biological balance and climate of the Earth, and their dependence on even minor anthropogenic impacts.

Features of the region not taken into account in Russian legislation, namely:

- the special structure of the Arctic economy: regardless of the existing political system in all Arctic regions, the share of people employed in the public sector is higher, monopolization is higher;
- institutional remoteness: a large distance to decision-making centers is associated with the danger of using inefficient algorithms, is a generally recognized problem throughout the circumpolar Arctic;
- mobility and variability: present at all levels, seasonality, economic conditions change in connection with the cycles of development of raw deposits;
- a potentially important role in innovative development: all the challenges provided by the Arctic can potentially form the basis for the development of fundamentally new and competitive technologies, goods and products. Here one can draw a parallel between the exploration of the Arctic and the exploration of space: space projects in both the Soviet Union and America created the best technologies that fueled the economies of countries for a long time. Arctic technologies have the potential to become the basis for the country's innovative development as a whole. A significant demand for them in the Arctic region is noted both in the raw materials industries and in the sphere of life support. Economists note that the resource-extracting industry can become a "motor" for the development of innovative industries, but so far this link has not taken place.

Based on the results of considering the features of the Arctic region, we note that it needs a different economy in terms of its structure and partly in terms of management mechanisms, other institutions and other equipment.

Considering the fundamental choice: to develop the Arctic according to the canons of Central Russia, to make the Arctic "non-Arctic", to separate the Arctic region into a separate production, it is important to

take into account three aspects: cultural-ideological, organizational and economic.

Who goes to the North and stays in the North?

➤ earnings factor: research results show that people who differ in psychological qualities are sent to different regions of the North. In the works of the sociologist G.F. Kutsev from Tyumen State University, there are different degrees of orientation towards material wealth among those who come to the northern and southern regions: the higher the northern coefficient, the greater the proportion of people who came to earn money. During the construction of the Trans - Alaska oil pipeline and the development of oil and gas reserves in Western Siberia, the wages of workers could be 10 times higher than the wages of those who worked in the main settlement zone. At present, such a difference, with the exception of certain niches (extremely demanded specialists in the north of Canada, high-level managers of the primary industries in Russia), is not observed in the northern territories. People, who went to work from the 60s to the 80s of the last century, make up the main population of the modern Russian North. From this follows the discontent of the people who came to become the "material elite", since in Soviet times there were few ways for the population to improve their economic position. It is this category that is especially acutely aware of the gap in income, the deterioration of the financial situation and the loss of the opportunity to receive higher wages. Note that an important factor is the gap between reality and expectations, which were very large. People remember the situation in the Northern regions, when, during the years of shortage, the number of available goods made it possible to send parcels to the main areas of settlement. When the crisis occurred in Russia in the 1990s, the Arctic territories entered it later, than the mainland. Thus, the moral crisis observed in many northern cities is due to the fact that the general change in attitude towards the North hit the category of people who did not realize their expectations.

➤ "It's better to live in the city" - a quote from a study of students at the Taimyr School, among whom there is a large proportion of representatives of the indigenous peoples of the North. The quote refers to a broader phenomenon - urbanization, during which people move from rural areas to cities. This phenomenon is global, it reflects the general trend of the settlement network. In the territories of the foreign Arctic, there is a "female exodus", that is, women leave small settlements first of all, and then men. In Russia, these processes began in the years of the USSR and continue to go on at the present time, being one of the sources of growth of northern cities. They lead to the loss of traditional types of economy and the way of life of the indigenous population of the regions, the loss of their natural habitat. The other category is people who flee from problems at home. In the North, one can meet natives of almost all "hot

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spots", the most affected by unemployment regions of Russia and neighboring states. For this category of people, the Arctic is a territory of opportunity. If residents of certain regions of Azerbaijan and the countries of Central Asia could not open their own business in their homeland due to the deep economic crisis, then in the northern city they have the opportunity to realize themselves.

➤ professionals - a category that is becoming more and more numerous. Specialists come to the North for a short time to participate in the project. If people who came for the sake of earning money were inclined not to spend money, saving them for vacation periods or going back, then highly paid professionals create conditions for the development of the local economy.

➤ stability orientation is a recently emerged category of people. Good social living conditions have been created in large resource-rich Arctic cities, including a developed infrastructure for children. The northerners understand that it is easier for them to realize their need for housing, for example, a specialist who has studied in Moscow returns, because it is difficult to earn an apartment in the capital, in Norilsk this can be done within two years. As a rule, low real estate prices are typical for cities with a declining population.

➤ orientation to unusualness - a category of people who go to the Arctic regions for the specifics of the north. Its representatives are proud of life in the North and enjoy living conditions because it is interesting. The anthropologist and architect has long lived with the Eskimos in a remote community, and currently works in Fairbanks, Alaska, an experimental center that is developing new types of energy-efficient housing for indigenous people. The houses designed by him are designed in such a way that in off-road conditions it would be possible to deliver them to the assembly site in one flight of a small aircraft. The situation of adjustment to the specifics of the Arctic requires people who have come not to earn money, but who are eager to work creatively for the good, making people's lives comfortable, interesting and adequate to northern conditions. The founder of the reserve on Taimyr and Muscovite V.V. Larin moved to the North not only because he was the largest specialist in mountain sheep, but also a reader of the book "Territory" by O. Kuvaev. A Japanese sailor K. Yoshikawa, who is fond of sailing, once "froze" into the ice off the coast of Alaska, he owes his salvation to a group of local residents. Now a professor of cryolithology at the University of Fairbanks has created a series of educational videos about permafrost and is breeding reindeer brought from Northern Chukotka. This example is specific to Alaska because its legal system allows for more freedom. Note that in its history there were migration waves associated with the gold rush and the construction of the Alaska oil pipeline. When raising

the question of the need to consolidate the population in the Arctic, it is important to remember that that in its development the role of representatives of this category is much more significant than the role of representatives of other categories. The concept of "quality of life" includes not only good conditions, but also satisfaction from realized opportunities, including creativity.

The composition of the population is a very significant factor for the development of the territory. People's expectations and abilities are a factor that needs to be planned when predicting the development of the Arctic. Ideological framework for the development of the Arctic.

Recently, efforts have been made to create a romantic image of the Arctic and organize powerful information support. The Arctic region is positioned as a frontier - not just the development of the territory, but intensive development, causing a complete restructuring of social institutions and natural landscapes - the formation of new responses to the challenges of uncertainty. In fact, the frontier is the formation of a new development trajectory.

Frontier is a scientific term introduced by the American historian F. Turner, who designated this concept as the border between civilization and savagery in the book *Frontier of American History*, published in 1898. Often the frontier is illustrated with the picture "American progress", which is perceived ambiguously in modern ethical frameworks: under the onslaught of American progress, herds of bison, bears and Indians are being destroyed from the face of the earth. The frontier has another aspect, which reflects the slogan - "The spirit and success of America is directly related to the expansion of the country to the West." Comparison of descriptions of the development in the 19th century of new territories in the USA and Siberia shows many parallels. This process gave meaning to the American nation and began to be perceived by it as an uplifting idea that inspires modern Americans to exploits. The frontier of the 1960s is the frontier of new opportunities and risks, unsatisfied aspirations and challenges. Beyond the frontier are unexplored areas of science and space, unresolved problems of peace and war. Thus, a new American society was created in the crucible of the development of the North. in the ideology of the United States, the experience of conquering spaces in the past inspired future victories. The frontier of the 1960s is the frontier of new opportunities and risks, unsatisfied aspirations and challenges. Beyond the frontier are unexplored areas of science and space, unresolved problems of peace and war. Thus, a new American society was created in the crucible of the development of the North. in the ideology of the United States, the experience of conquering spaces in the past inspired future victories.

W. Hickel was governor of Alaska twice, in the book "Problems of Public Property. Is the Alaska

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Model an Opportunity for Russia?" he writes: "The frontier has nothing to do with the concept of "border", associated with the image of a man in a raccoon hat with a gun in his hands. We are talking about other borders - about those frontiers, about those important goals that we set for ourselves. They mobilize creative strength, imagination, and ingenuity of the human mind Few begin the life of pioneers with a decent bank account Discovery is born in the mind In order to be creative, the mind must be open and inspired The opportunity for humanity is to once again set itself such goals and overcome these limits." W. Hickie worked in the early years of the state, the idea of the frontier helped him a lot in creating a new region with an unusual social and economic system for the country. Half of the territory of Alaska was fixed as the property of the state itself, which made it possible to create a new mechanism for the reproduction of its economic base: oil companies paid not only taxes, but also paid for the lease of the territory.

The history of development in Russia certainly had the spirit of the frontier, including desperate courage and the ability to independently choose a strategy of behavior. Oil geologist F. Salmanov was the discoverer of "big oil" in the eastern part of the Khanty-Mansi Autonomous Okrug. Working in the Kemerovo region, F. Salmanov decided that there was no oil in it and arbitrarily transferred the batch, loading equipment onto a barge. This was a serious violation of labor discipline, the geologist should have been expelled from the Communist Party of the Soviet Union. When F. Salmanov discovered oil in Siberia, he sent N.S. A telegram to Khrushchev: "I found oil. That's it. Salmanov." Yu. Pimenov's painting "Wedding on Tomorrow's Street" was painted in 1962. After the Great Patriotic War, people enthusiastically perceived the situation of permanent construction. If today we start talking about the use of the ideology of the frontier, which is associated with disorder, then we can come across a significant fatigue of people. The evolution of the perception of O. Kuvaev's landmark novel "Territory", which glorifies the romance of exploration and the possibility of building the Arctic model of life, is characteristic. The text of the novel contains a dialogue between a young geologist Baklavov and an experienced geologist, reflecting the cult of a man similar to F. Salmanov, that is, capable of having his own opinion and the courage to defend it: at this age you will be guided by "accepted" and "not accepted", you are already a loser. The novel was filmed in 1978, in the film the dialogue was modified: "If you want to be a geologist, forget the words "so accepted" and "so exactly." And there is no boss in the search. "Thus, it was a geologist in Soviet times who embodied the ability to break stereotypes and discover new things.

Now the development of the North is no longer associated with the creation of new social and economic values, mechanisms and models.

Arctic governance is not a state, but a process aimed at increasing the predictability of the economic development of this territory and maintaining the sovereignty of the country:

➤ sectoral territorial development: small centers - significant subordinate territories: when they talk about the development of the Arctic, they often mention such super-organizations as the Main Directorate of the Northern Sea Route and Dal Stroy of the NKVD of the USSR - the state trust for road and industrial construction in the Upper Kolyma region, which used labor of prisoners. Nothing justifies the death of a significant number of the best people in the country in the camps, in this case, an economic and managerial model is considered that has a significant degree of autonomy and experience in creating resources for the development of large deposits. A collision occurred with Dal Stroy when geologist Yu. Bilibin, after an expedition in 1928, based on fragmentary data, made a bold prediction about the presence of an extensive gold-bearing area in Kolyma. The documents submitted to the country's leadership dealt with both placer and ore gold potential, in particular, the Srednekanskaya dike was mentioned, in respect of which the forecast turned out to be overestimated. In the hope of discovering the richest reserves of gold there, Dal Stroy was organized, as a result, the organization dispersed its forces over a large territory.

➤ institutional remoteness: it is difficult to adequately manage the development of a resource area from a remote center, especially in the absence of a clear connection and local knowledge. This factor is well illustrated by the memoirs of the pilot M.I. Shevelev about the creation of the Northern Sea Route: "Stalin asked:" Do you think all this can be done? "They answered:" If there is a decision. "Stalin:" Show me where is your Tiksi? "- Schmidt went to the map and showed. Stalin chuckled, "Yeah! Every week we scold this People's Commissariat for the fact that he cannot properly transport oil from Baku along the Volga, and you want him to build a port there? So it won't work! The Arctic is a complex thing. We need to create an organization that would be responsible for everything. And I would know - he is responsible for the Arctic and nothing more. And we will ask her - and strictly! We will write a resolution:

The model of creating a quasi-autonomous company responsible for the development of a large piece of new territory has occurred more than once in history. It was often accompanied by the formation of special organizational structures designed to consolidate efforts and sharply increase the rate of state penetration into new areas. The need for such structures increased with the exhaustion of the old schemes for the development of territories, the crisis of the old forms of development. The concept of "superorganization" was introduced by the economic geographer A.N. Pilyasov, studying the activities of

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"Dal system":

A superorganization is a monopoly structure created by the supreme executive power of the state, under its patronage and direct supervision, for the development of vast (new) spaces in order to use unique resources in the national interests and solve geopolitical problems. The integral attributes of a superorganization are goal absolutism, a rigid internal vertical hierarchy, huge powers delegated by the state, an autonomous life support system (territorial-sectoral development framework), a system for the production and accumulation of regional information and planning. An example of a superorganization is the Main Directorate of Oil and Gas Production in the Tyumen Region, which operated in the 1960s and 1970s. Such structures were created for the development of resources, therefore they are in a certain dependence on them: The peaks of gold production in the Magadan region fell on the years of the Great Patriotic War and the 1970s, when new deposits were put into operation in Chukotka. If at an early stage superorganizations (not all) were responsible for the integrated development of territories, then at the peak stages of resource extraction they became monoprofile. Economists note the perniciousness of the situation when the life of the city is connected with the city-forming enterprise: the impoverishment of the socio-cultural environment, the blocking of innovative development. The described situation predetermines a dead-end development option associated with the depletion of the deposit: diversification, controlled compression. In the case of a superorganization, by and large, a monoprofile territory arises. Thus, on the one hand, such a model solves the institutional problem of remoteness, autonomy from the central government for the sake of making adequate decisions is its powerful advantage. On the other hand, their creation is determined by the extraction of a "super resource", which lays a mine for further development - the depletion of reserves deprives the economic base and the ability to maintain the system. Territory Management Option as Collective Property: Opportunities and Traps. The way out of this situation could be the creation of a quasi-autonomous organization not of a sectoral, but of a territorial profile. Such a model of organizing the management of a remote territory is described in the book by W. Hickie "Problems of Public Property. Model of Alaska - Opportunities for Russia?". Many of the mechanisms created in Alaska were new, such as the collective ownership mechanism, as well as the fund accumulating oil revenues, the funds of which, according to the plan, were intended for the development of the state (construction of social and transport infrastructure, etc.). The pathos of collective property lies in the fact that it is an autonomous way of collective management of the territory, but modern Alaska has practically abandoned this approach. The

University of Alaska is currently in a crisis because its funding has been cut by 40% to please political groups that have reallocated the fund's funds to pay residents of the state. "Eating away" funds cannot be described as an effective way of managing collective property. It should be noted that both corporate and territorial management of the territory, after a while, comes to a crisis for political reasons or due to narrow specialization: non-sectoral management in Alaska, "Dal Stroy" and the Main Directorate of the Northern Sea Route - branch. We emphasize that for remote territories a high degree of autonomy at a certain stage is more beneficial than control from outside. Access to decision-making regarding the development of the territory attracts creative people of the frontier type, who are focused on creating something new.

In the past, Deputy Minister of Economic Development of the Russian Federation, and now the Governor of the Nenets Autonomous District A.V. Cybulsky said: "The Arctic requires large-scale projects." It is necessary to add - quickly implemented large-scale frontier projects that can break down political and infrastructural barriers that impede the development of the Arctic territories. The speed of the processes matters: detonation differs from combustion in that chemical reactions and the process of energy release proceed with the formation of a shock wave in the reacting substance, and the involvement of new portions of the explosive in the chemical reaction occurs at the front of the shock wave, and not through heat conduction and diffusion, as with slow burning. The difference in the mechanisms of energy and substance transfer affect the rate of processes and the results of their action on the environment, however, in practice, there are very different combinations of these processes and transitions from combustion to detonation and vice versa. In this regard, various fast processes are usually referred to as chemical explosions without specifying their nature. The frontier as a process of involving a large turnover of resources into the economic turnover is similar to an explosion.

The classic frontier is characterized by the following effects:

- fast, almost explosive progress;
- technological innovation;
- mandatory formation of new social and cultural institutions and organizational structures;
- powerful, but short-term economic effect (increasing return on the involvement of new resources in the economic turnover);
- concentration of people of the frontier type.

When there is a need for the speed of implementation of large-scale projects? The frontier arises when for a long time a large amount of resources could not be put into economic circulation due to certain barriers: too far, expensive transportation, no development infrastructure. The Prudhoe Bay field came into full operation when an

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oil pipeline was built in Alaska, a similar situation with the oil fields of Western Siberia and the Kolyma gold. Almost all major Arctic projects were associated with overcoming barriers, primarily infrastructure ones. Small projects do not justify the construction of infrastructure when the project is developed gradually - it has a very long payback period. The Karachayevo - Salekhard road has been under construction since 2003, during which time the Trans-Siberian Railway from Chelyabinsk to Irkutsk was built. The project is stalling because the "cream" from the development of gas fields in the Nadym region has already been removed. The road had good chances in the 60s, when a decision was made to restore the Salekhard - Igarka road, which was not implemented, which led to significant losses of funds.

Explosive involvement in economic turnover creates a rare case when the raw materials industry brings increasing returns - the more invested, the greater the return per invested unit of funds. Note that this effect is short-lived, since further resource extraction is carried out in increasingly depleted or difficult areas, so the cost of extraction increases, the return decreases. Huge investments in new resource projects (railroads, sea route development) are justified in the presence of a large infrastructure project.

The development of new resource regions goes through several phases, which include the emergence of frontier people, superorganizations and other phenomena associated with the development of the Arctic.

➤ zero phase - rumors, tests and barriers: assumptions and information about potentially rich resources that are inaccessible for one reason or another (remoteness, imperfection of technologies, etc.). M.K. Sidorov at the end of the 19th century was the first to try to deliver graphite along the Northern Sea Route, J. Lid organized the first trading operations when the transportation tariffs were still very expensive. Alaska was supposed to have gold back in the days when it was the territory of Russia, but the gold rush began only after a considerable time.

➤ the first phase is an information (demonstration) breakthrough: a pioneer is found (F. Salmanov), who proves the possibility of obtaining energy in a new space. This phenomenon is also explained from the point of view of the bifurcation theory: when the trajectory breaks down, a random factor plays a significant role, which justifies the enormous role of the individual in history. The economic effect, as a rule, is still small, the information effect is powerful, but the barrier has not yet been broken (project stage).

➤ the second phase - breaking down the barrier: a revolution in infrastructure, ideology, technology; large (venture) investments, most often state ones; institutional and organizational building; powerful ideological support (advertisement of the project - a

demonstration of Igarka to foreign journalists as a demonstration of the achievements of the Soviet government in the development of the Far North, the legitimization of large investments). The stage of sprinters, the founding of cities.

➤ the third phase - the peak of production: the ossification of institutions and organizations; the greatest economic return, while reducing enthusiasm. Stage stayers and the emergence of superorganizations.

3.1. peak production: development of a proven resource

3.2. blast wave effect

➤ fourth phase - flooding of the frontier

4.1. ghost towns or shift towns

4.2. transition from the frontier to the

"normal" economy: economist L. Husky notes that after the stage of peak production it is possible to reach such a level of the local economy, when a city appears on the site of the frontier city, which can independently maintain its existence by providing services to the surrounding territories (g . Surgut).

At the peak of production, when the infrastructure has been built and a large organization has been created, in which a rigid hierarchy has been established, there are no more pioneers, managers and specialists-engineers are working. People who are frontier in spirit manifest themselves in the zero and first phases of the cycle, where they can best realize themselves. Geologist I.L. Zhulanova described the paradox of "Dal system", noting that as a result of the work of the country's most freedom-loving people - geologists, a powerful administrative-repressive structure was created.

The objectives of the development of the transport system in Russia are as follows.

Goal 1. Formation of a single transport space in Russia based on the balanced development of an efficient transport infrastructure.

Achieving this goal will ensure the dynamic growth of the Russian economy, social development and strengthening of ties between its regions by eliminating territorial and structural imbalances in transport, involving new territories in the economic turnover by creating additional transport links, increasing the competitiveness and efficiency of other sectors of the economy by providing opportunities unhindered entry of business entities to regional and international markets, the growth of entrepreneurial and business activity, which directly affects the quality of life and the level of social activity of the population.

The single transport space of Russia should ensure the functioning of a single balanced system of transport communications, an integrated system of commodity transport technological infrastructure for all modes of transport and cargo owners, the use of uniform standards for the technological compatibility of various modes of transport that optimize their

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interaction, uniform standards for the technical compatibility of various modes of transport and vehicles, as well as create a unified information environment for the technological interaction of various modes of transport.

Thus, within the framework of this goal, the development of transport infrastructure refers not only to the development of transport communications and hubs. A qualitatively new level of system development is assumed within the framework of a single transport space in combination with a commodity transport technological infrastructure, transport infrastructure of cargo owners, technical compatibility standards, as well as an information environment for the interaction of various modes of transport.

Within the framework of this goal, at the first stage of the implementation of the Transport Strategy, the construction and reconstruction of the main directions of roads and railways, the infrastructure of sea and river ports, inland waterways and airports, the elimination of the most significant gaps and "bottlenecks" of the transport network, including in the Asian parts of Russia. The development of transport approaches to border checkpoints and large transport hubs will be ensured, their comprehensive development in the main directions of transportation will be ensured. Infrastructural conditions will be created for the development of potential points of economic growth, including the integrated development of new territories and the development of mineral deposits, primarily in Siberia and the Far East.

At the next stage of the implementation of the Transport Strategy, within the framework of this goal, a transition to the formation of a single transport space in Russia will be ensured. Based on the differentiated development of communication routes for all types of transport, the creation of a single balanced system of transport communications of the country will be ensured. The throughput and speed parameters of the transport infrastructure will be raised to the level of the best world achievements, the share of high-speed communications will be increased. In order to form a modern commodity distribution network that ensures the volume and quality of transport services, an interconnected integrated system of commodity transport technological infrastructure for all types of transport and cargo owners, an integrated system of logistics parks will be created on the territory of the country, as well as a unified information environment for the technological interaction of various modes of transport and participants in the transport process. During the development of the transport system, innovative technologies for the construction, reconstruction and maintenance of infrastructure will be mastered.

Goal 2. Ensuring the availability, volume and competitiveness of transport services according to

quality criteria for cargo owners at the level of the needs of the innovative development of the country's economy.

Achieving this goal will make it possible to fully meet the needs of the population and business entities in high-quality transport services through the introduction of advanced transport technologies and the development of passenger and freight rolling stock fleets, as well as to ensure the provision of transport services of social and economic significance of proper quality and at affordable prices.

Achieving this goal involves, first of all, the development and implementation of a model of the transport services market for the needs of all sectors of the economy. This model is innovative for the domestic transport system. It should define the parameters of the quality of transport services, the framework of quality standards for various categories of goods and sectors of the economy, the requirements for the development of the regulatory framework in the field of transport services and technological models for ensuring the quality of transport services.

In order to form a market for competitive transport services, it is necessary to create conditions for the excess of the supply of transport services over demand, as well as launch the "price - quality" mechanism, which will ensure the formation of a competitive environment and the growth of competitiveness.

Motivation mechanisms for the structural modernization of existing transport systems should be developed and put into effect in order to ensure the quality of transport services, leading, in particular, to the creation of national and international competitive transport companies.

Realization of this goal presupposes the achievement of the commercial speed of movement of goods and the rhythm of their delivery "from door to door" at the level of the best world achievements. Due to this, the economy of the country is expected to reduce the costs of circulation of goods, expressed in large volumes of working capital, as well as in significant amounts of crediting goods in transit and in stock. In seaports and checkpoints across the state border of the Russian Federation, as well as in the entire terminal network, the time for processing consignments of goods will be reduced to the level of the best world achievements.

To do this, it is necessary to introduce mechanisms to motivate the use of innovative logistics technologies, develop a system of related services and fleets of freight rolling stock that provide the specified criteria for the volume and quality of transport services at the level necessary for the implementation of the Transport Strategy. It is necessary to develop and experimentally develop highly efficient commodity transport technologies that provide quality criteria for the entire range of transport services and increase the productivity of the

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transport system. An important role will be played by the expansion of the use of container transportation technologies, including for regional and interregional transportation, small and medium-sized businesses.

Goal 3. Ensuring the availability and quality of transport services for the population in accordance with social standards.

Achieving this goal means meeting in full the growing needs of the population for transportation, as well as special requirements, in particular from citizens with disabilities, ensuring a stable connection of settlements with the main network of transport communications, as well as ensuring the affordability of transport services of social importance.

First of all, within the framework of this goal, it is planned to ensure the transportation of passengers on socially significant routes, including ensuring their affordability, including in the regions of the Far North, the Far East, Transbaikalia and the Kaliningrad region.

It is planned to develop systems of urban and suburban passenger transport, fleets of passenger rolling stock, comparable in technical and economic parameters with the world level, as well as the development of systems that provide high-speed and high-speed transportation of passengers.

At the next stage of the implementation of the Transport Strategy, the industry should take part in the development of minimum social transport standards to ensure the possibility of movement of all segments of the population throughout the country. These standards in terms of their transport component should determine the requirements for the development of the necessary communications for all types of passenger transport, the corresponding rolling stock, indicators of the affordability of transport services for the population, as well as requirements for the frequency and schedule of transport services for each settlement.

The state policy in the field of ensuring the availability and quality of transport services for the population involves the fixing of minimum social transport standards at the legislative level and the use of mechanisms to compensate for losses in the income of transport companies resulting from state regulation of tariffs for passenger transportation.

The development and implementation of a program for the implementation of minimum social transport standards throughout the country should be ensured. At the same time, these minimum standards should provide for a progressive scale, taking into account the gradual improvement in the conditions of transport services to the population.

Goal 4. Integration into the global transport space and realization of the country's transit potential.

Achieving this goal will mean laying a solid foundation for Russia's successful integration into the global transport system, expanding the access of Russian transport service providers to foreign markets, strengthening Russia's role in shaping

international transport policy, and turning the export of transport services into one of the country's largest sources of income.

The implementation of this goal involves, first of all, the development of technical and technological parameters of international transport corridors that ensure their competitiveness at the level of world analogues. This requires monitoring the market for the export of transport services, studying the advantages of competitors, developing a set of measures to improve the technical and technological parameters of international transport corridors, planning their development and harmonizing within the framework of international cooperation on transport corridors.

Integration into the international transport space, first of all, can be effectively implemented within the framework of the EurAsEC and the countries of the Shanghai Cooperation Organization. One of the promising ways to implement this initiative is the formation of container "bridges". In addition, integration into the global transport space involves the development of international cooperation with other international transport organizations and other trading partners of Russia, the expansion of participation in the system of international agreements and conventions in the field of transport, as well as in major international transport projects. It is also expected to develop and put into effect appropriate mechanisms of state regulation, motivating the creation of national and international competitive transport companies.

An increase in the share of participation of Russian transport organizations in the transportation of domestic export and import cargo, as well as cargo between third countries, requires the development and implementation of appropriate legislative and other regulatory methods that ensure the competitiveness of Russian transport.

In order to increase the receipt of foreign exchange funds from the export of transport products, taking into account international experience and economic interests in the protection of transport services in the national and international markets, it is planned to develop legislative standards that provide for:

preferential (and in some cases exclusive) admission of Russian carriers to the carriage of goods for the needs of the state, constituent entities of the Russian Federation and municipalities, as well as strategic cargo;

advantages of national carriers and forwarders over foreign ones when investing in the construction of facilities in Russia, as well as in the development of raw materials, including those developed in accordance with the Federal Law "On Production Sharing Agreements".

Goal 5. Increase the level of safety of the transport system.

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The implementation of this goal will improve the safety of traffic, flights and navigation, ensure the efficient operation of emergency rescue services, civil defense units, special services, achieve a safe level of functioning of transport infrastructure facilities, increase the level of compliance of the transport system with the tasks of ensuring the country's military security and thereby create the necessary conditions for an appropriate level of national security and reduction of terrorist risks.

Within the framework of this goal, due to a set of measures, it is supposed to achieve a level of traffic, flight and navigation safety that meets international and national requirements.

Ensuring transport security will improve the state of protection of transport infrastructure facilities and vehicles from illegal actions, including terrorist activities, that threaten the safe operation of the transport complex.

The activity of specialized emergency rescue services in cooperation with the Ministry of the Russian Federation for Civil Defense, Emergency Situations and Elimination of Consequences of Natural Disasters will be carried out at the level of international and national requirements.

The level of protection of the transport infrastructure and vehicles from acts of unlawful interference will be increased, a higher level of security for the transport of goods requiring special conditions will be ensured.

The implementation of measures to ensure the military security of the Russian Federation in order to timely meet the needs of the military organization of the state in transport services will make it possible to achieve the required level of mobilization readiness of public transport (including dual-use facilities), stocks of state and mobilization reserves, preparation of a set of measures for technical cover and restoration all types of transport communications, preparation and maintenance of all types of vehicles.

In addition to the means and measures of direct transport security, the development of means and effective systems of supervision in the field of transport is of great importance in achieving this goal. Without their improvement, management in the field of ensuring the safety of the transport system will be deprived of effective feedback.

The level of safety of the transport system within the framework of this goal will be increased through the development of systems for professional admission to transport activities through licensing or declaration (notification).

An important role in achieving a high level of safety should also be played by meeting the needs of the transport complex for specialists with a high level of professional training that meet the requirements for the safety and stability of the transport system.

Goal 6. Reducing the harmful impact of transport on the environment.

Achieving this goal will contribute to creating conditions for reducing the level of technogenic impact of transport on the environment and human health and ensuring compliance with international environmental standards for the industry.

To this end, it is planned to develop and put into effect mechanisms of state regulation that provide motivation for the transfer of vehicles to environmentally friendly fuels, as well as a decrease in the level of energy intensity of transport to the level of indicators of advanced countries.

An important reserve for reducing the volume of impacts, emissions and discharges, the amount of waste in all modes of transport is the professional training of personnel operating vehicles. Another reserve for reducing the harmful effects of transport on human health within the framework of this goal is the rationalization of traffic routes.

The implementation of these goals involves the implementation of a set of research subprograms that ensure the development of new models, methods, technologies, tools and systems. These works form the scientific support of the Transport Strategy. The introduction of developments, the implementation of projects and activities is provided for within the framework of a set of subject subprograms aimed at achieving the specified general economic, general social and general transport strategic targets, as well as within the development subprograms by modes of transport and subprograms aimed at putting into operation the main mechanisms for the implementation of the Transport strategies.

Goals for the development of the Russian transport system for the period up to 2035 and the values of the indicators for the implementation of the Transport Strategy, for which statistical information is currently available.

In addition, it is planned to carry out research work on the creation of statistical tools, monitoring and evaluation of values for such new indicators as:

reserve capacity of the transport network by type of transport in the main directions of cargo and passenger traffic;

commercial speed of movement of main commodity flows;

urgency of cargo delivery;

the level of containerization of transported goods;

development of transport and logistics technologies;

specific transportation costs in the final price of products;

ensuring the affordability of transport services for the population;

the level of security of the state of transport infrastructure facilities;

reducing the energy intensity of the transport system.

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Conclusion

There is no need to hope for a “miraculous transformation” in the understanding of transport and transport science. The current view of transport is rooted in the practice of economic policy, the architecture of economic planning has been laid out for it, in which transport is assigned a “working” place - to be in the “service” of production, that is, within the framework of a spatial development strategy, but not the locomotive of its promotion. The history of the rise of Rome, Holland, Spain, Portugal, Britain, a little later than Germany, and the historical experience of the Russian State do not teach politicians. Even the birth of space transport has changed little in the political understanding of transport, and as long as political reflection is not built on the basis of general scientific thinking, scientific and philosophical ideas will remain wishes, but not imperatives.

The integration of economic science is realized unilaterally, it loses its specific methodological base, borrowing mathematical methods of analysis. It is, of course, fruitful, and no one doubts its effectiveness, however, the movement of economic science, in addition to the “quantitative” coast, also has a political one, on which the qualitative guidelines of the movement, regulated by the world outlook, are built. Not transport should be subordinated to the development of the economy, but the economy should be developed on the basis of the modern understanding of transport as a system-forming factor in the movement of the world in general and social progress in particular. The history of man as a biological species and social form of human reality testifies that evolution was carried out thanks to the development of living space by mankind, moving first in physical space, and, as the formation of their own social space, and in it. Civilization is the product of this process.

Summing up, I would like to note that the strategic government documents on interaction with the regions of the Russian Arctic can be called insufficiently elaborated and of insufficient quality, namely:

Firstly, the degree of possible regulatory impact is reduced due to the lack of specific methods for achieving the set goals in the national program, despite the fact that the goals are very specific. Such a combination of specific goals and “blurred” methods leads to shifting the responsibility for achieving the goals exclusively to the regional authorities, who are forced to independently develop ways to achieve the targets;

secondly, a characteristic feature of government strategies is the fundamental disregard for regional specifics: despite the presence of descriptions of key regional problems in program documents, the analysis of regional specifics (institutional, cultural, social) is present only at the level of a “brief reference” about the region, which, of course, is not enough to develop

an adequate strategy for socio-economic development.

It is curious that the analyzed strategic documents ignore not only the cultural characteristics of the Russian Arctic regions, which have a very serious impact on all spheres of life of these societies through existing institutional structures, but also socio-economic characteristics, such as the causes of unemployment and the specifics of employment in the regions or demand for tourism services. All of the above factors, as well as many others, have a significant impact on the process of implementing the strategy, and on the possible results of its implementation. In other words, without a comprehensive preliminary analysis of regional specifics, the development of a national strategy for the socio-economic development of the Russian Arctic regions looks like a political adventure. Initially, we were guided by the assumption that that the state policy in relation to the regions of the Russian Arctic does not take into account some important factors that negatively affect the results of the policy. It was assumed that the Center ignores cultural specifics because of its complexity and ambiguous impact on socio-economic processes, or because culture is not the “sphere of interest” of the Ministry of Regions, which is responsible for territorial development, but it was found that the institutional features of the regions are also not taken into account in strategic documents. As a result, the results of applying the same measures in the regions of the Russian Arctic and in other parts of the Russian Federation can differ significantly, at least due to differences in the informal rules of the game, in stable working procedures. However, the socio-economic characteristics of the regions of the Russian Arctic, which are directly related to the jurisdiction of this department, are analyzed by the Ministry of the region, in strategic documents prepared by far from exhaustive. Ignoring regional features and specifics is not a distinctive feature of the Center's policy exclusively in relation to the regions of the Russian Arctic: regional cultural and institutional features are not taken into account when developing federal strategies and targeted programs, in principle, in relation to all regions of the Russian Federation. Another thing is that in the case of the regions of the Russian Arctic, the neglect of cultural and political and economic specifics is superimposed on much more difficult conditions and leads to much more serious consequences - the regional features of the Russian Arctic simply cannot be ignored. Let us recall the boundaries of the large-scale modernization of the BAM and the Trans-Siberian Railway, which were determined by V. Putin - an increase in their throughput in 2035 to over 200 million tons of cargo per year. To achieve such a result, it is necessary not only to build additional tracks, tunnels and

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interchanges, but also to increase the speed of movement.

The first stage of the project (2018-2020) worth 562.4 billion rubles. (reduced as a result of the audit to 520.5 billion rubles) provides for an increase in the carrying capacity of the BAM and the Trans-Siberian Railway in the direction of seaports and border crossings of the Far East to 124.9 million tons (+66.8 million tons compared to 2012). This year alone, Russian Railways will spend 30 billion rubles on the development of the Eastern railway range.

“In order to increase cargo traffic, it is planned to put into operation more than 45 km of new second tracks on the BAM sections. Open traffic on the stages Lena Vostochnaya - Predlensky and Delbichinda - Daban. It is also planned to reconstruct three stations: Vikhorevka, Bayronovka and Meget,” the press service of the East Siberian Railway (VSZhD) notes.

True, it will be difficult to meet the deadlines due to the accumulated backlog. “At the end of 2020, Russian Railways did not complete a number of facilities. For example, in accordance with the passport of the project “Development of the BAM and the Trans-Siberian Railway”, in 2018, 11 sidings and 78 km of additional tracks were to be built. At the end of the year, only one object was accepted (reconstruction of the subgrade at the section of the western BAM “Khani – Tynda”),” the Accounts Chamber concluded following the results of the audit. However, the head of Russian Railways, O. Belozеров, assures that the project will be completed on time.

At the second stage (2021-2025), it is necessary to build 1,310 km of additional main tracks, 32 sidings and reconstruct 29 stations, as a result of which cargo transportation along the highways will increase to 182 million tons, and by 2025, according to the new order of the President, up to 200 million tons. In total, it is planned to spend about 493.2 billion rubles for these purposes.

Russian Railways has already begun developing project documentation for the construction and modernization of a total of 84 facilities as part of the second stage of the modernization of BAM and the Trans-Siberian Railway. Particular attention is paid to the 15-kilometer Severomuysky tunnel. Today, it can only pass 16 trains per day (22 including detours). By reducing the interval and strengthening the traction power supply at the mountain pass section, it is possible to get on 27 pairs of trains weighing up to 6300 tons. This is the maximum, but it is too little. The introduction of digital technologies, for example, interval control of train traffic, which are successfully used on the Moscow Central Circle, can expand the “bottleneck” of BAM by 15-20%.

One way or another, without a modern infrastructure, neither “sew” the country, nor unleash the economic potential of Siberia and the Far East, nor diversify foreign economic relations for sure. In

addition, by increasing the capacity of the railways, “we will build the largest transport corridor from the Asia-Pacific countries to the EU states. Russia will take a key place in the global traffic flows,” Viktor Zubarev, State Duma deputy from the Krasnoyarsk Territory, justifiably emphasizes.

Let us consider the materials that determine the approach to planning socio-economic development and to solving a number of problems in the Arctic zone, mainly in the Russian Federation, but based on foreign experience. The Arctic is a special territory in which many patterns of socio-economic development that are applicable to densely populated areas, the main zone of settlement, do not work. The Arctic must be approached with a special measure. This is noted by many experts who develop strategies for the development of Russian regions, faced with the Arctic region and coming to the understanding that the usual mechanisms do not work here.

Sectors of the economy of the Arctic region:

➤ modern “office” sector - social sphere, finance, insurance, administration, scientific and technical activity and art;

➤ service industries - trade, transport, communications, hotel and restaurant business - play a significant role in a number of regions of the foreign Arctic;

➤ industry - occupies relatively small shares in foreign Arctic countries, in Russia - plays a significant role, ranging from 50% to 75%;

➤ agriculture, forestry and fisheries.

The structure of the Arctic economy includes three sectors:

* public services;

* large resource corporations;

* traditional farming.

• a network of small and medium-sized enterprises, as a rule, is absent, a large company or a consortium is often a monopolist, forming a single-industry region;

• local small business is reduced to two segments, formed on the basis of the advantage, which is determined by the need for specific knowledge and the presence of specific needs. These are areas associated with a special climate, permafrost, mining equipment and specific conditions for the occurrence of rocks (oil service), and tourism. If a small business overcomes existing restrictions, then it implements projects related to new technologies and specific niches. Purchases from regional entrepreneurs require special government support measures.

• The main competitive advantage of companies operating in the main settlement area is the advantage in price. It does not work in the Arctic, because the rise in the cost of goods occurs due to a number of factors: remoteness from production sites, high cost of construction work (permafrost conditions require special technologies), the inability to obtain economies of scale - a small market does not allow the

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development of large local enterprises working for regional demand;

- the problems of domestic business are associated with the northern benefits that lie on the

shoulders of the employer. It is difficult for small companies to fulfill these obligations; at present, this problem has no solution, which is a pity.

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Article



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PROBLEMS AND ASSUMPTIONS OF TRANSPORT DEVELOPMENT IN THE REGIONS OF THE ARCTIC ZONE OF THE RUSSIAN FEDERATION. MESSAGE 2

Abstract: in the article, the object of research is the State Program of the Russian Federation "The main trends in the spatial development of territories included in the Arctic zone of the Russian Federation" for the period up to 2035 as an expression of the policy of the Federal Center pursued in relation to the regions. The subject of the study are the elements of the above program, which, in conflict with regional specifics, hinder the achievement of the goals set in government documents. The analysis of the conducted research is the formation of an understanding of how the regions of the Arctic zone should be taken into account when formulating federal policy aimed at their socio-economic development. In order to achieve this goal, it is necessary to solve a number of tasks, namely: it is planned to implement problems in the regions of the Russian Arctic.

Key words: spatial development, priority, technical regulation, certification, standardization, financial condition, profitability, profit, demand, preferences, relevance, competitiveness, social and economic well-being of nine regions of the Arctic zone of the Russian Federation.

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Introduction

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The purpose of the spatial development of the Russian Federation is to ensure sustainable and balanced spatial development of the Russian

Federation, aimed at reducing interregional differences in the level and quality of life of the population, accelerating economic growth and technological development, as well as ensuring the national security of the country.

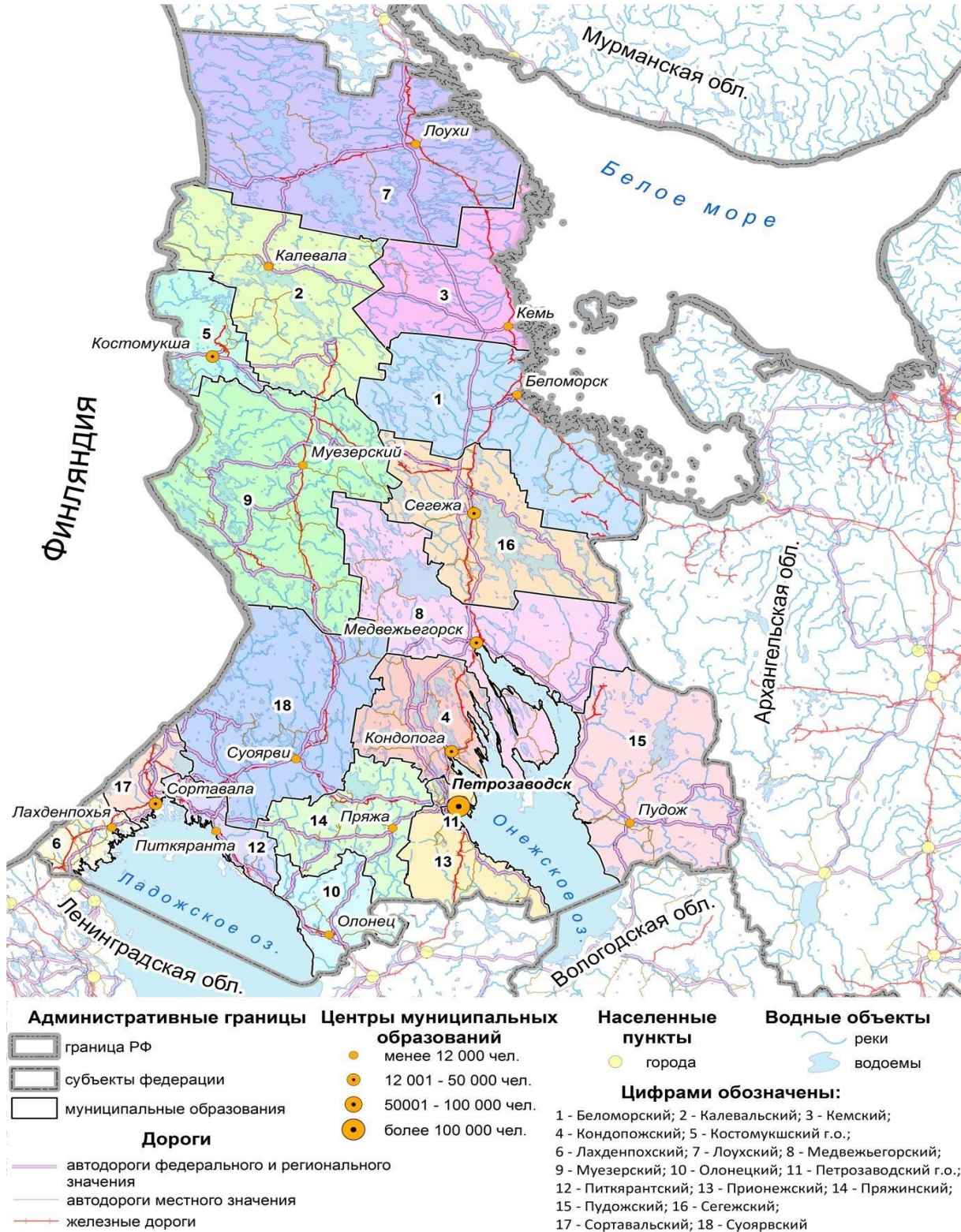


Figure 1 - Scheme of the railway networks of the Republic of Karelia.

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The specific composition and scope of work of scientific support for the implementation of the Transport Strategy is envisaged to be determined in detail when developing federal targeted programs that ensure the implementation of the Transport Strategy for the relevant periods (Figures 1 - 12).

The Republic of Karelia is characterized by a full network of railways, roads and air traffic, which provides the population with comfortable conditions when using vehicles.

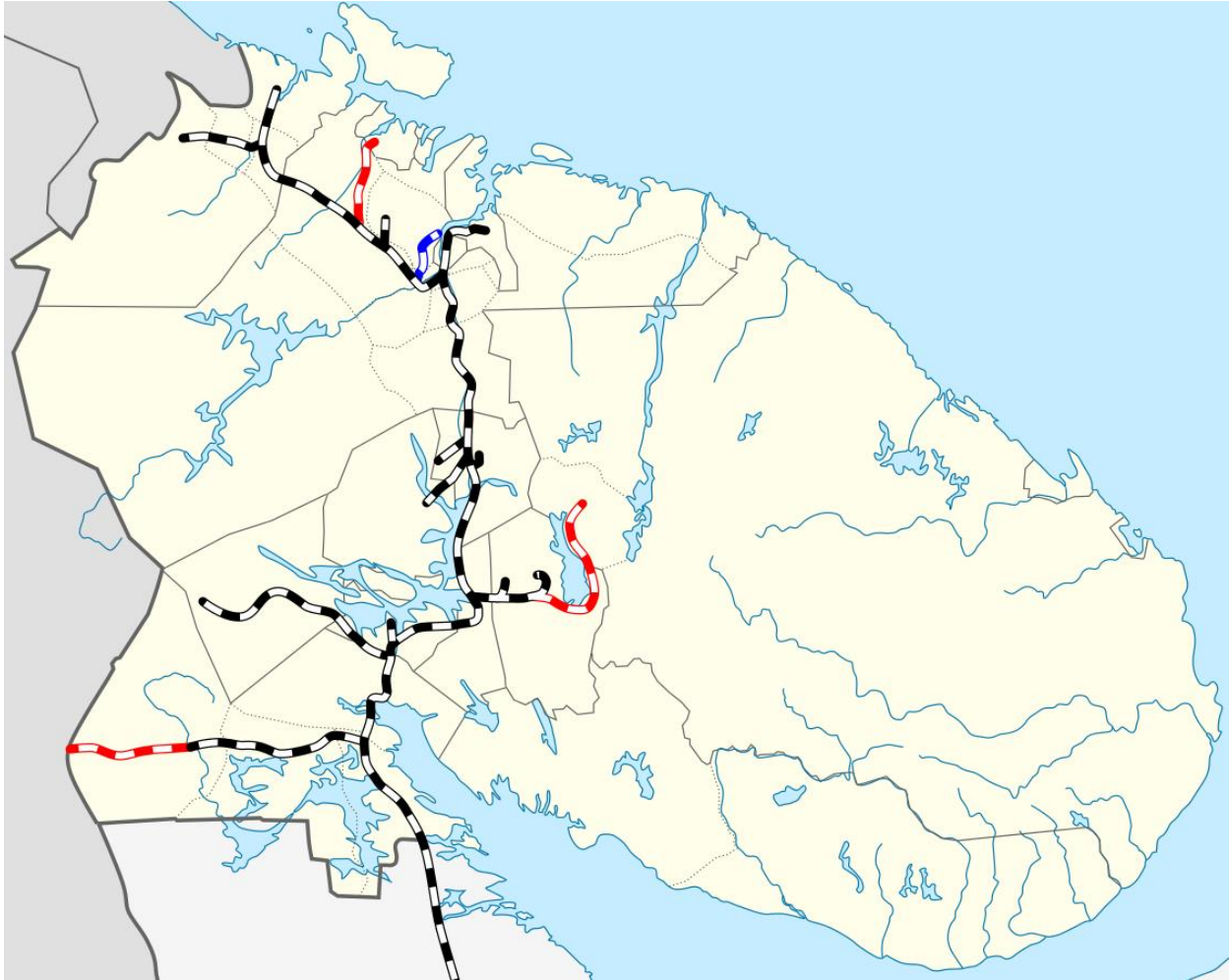


Figure 2 - Scheme - map of railways in the Murmansk region.

Unfortunately, the Murmansk region does not have enough roads for such an industrialized region. It is necessary to provide for a significant expansion

of the network of road and rail networks with a simultaneous increase in air traffic, saturated with modern vehicles.

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Figure 3 - Map - scheme of public roads of the Arkhangelsk region.

For the Arkhangelsk region, the lack of a railway network is especially acute, which will significantly reduce the cost of an increasing flow of freight traffic.

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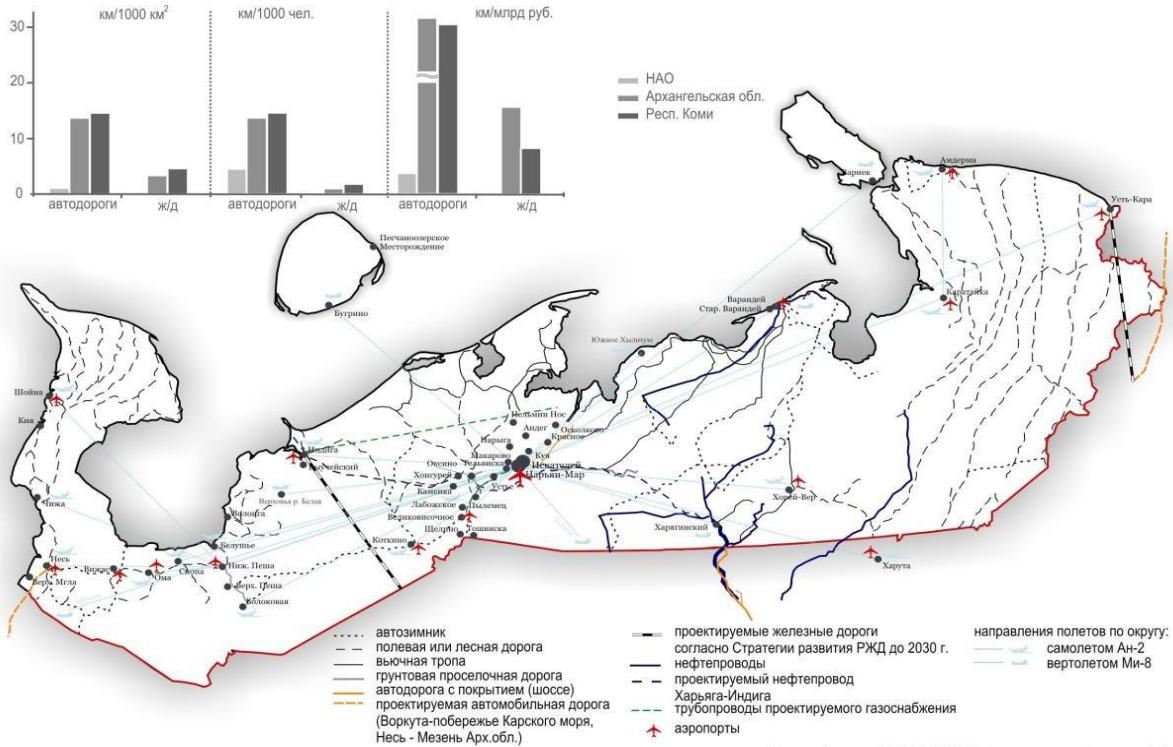


Figure 4 - Transport infrastructure of the Nenets Autonomous Okrug.

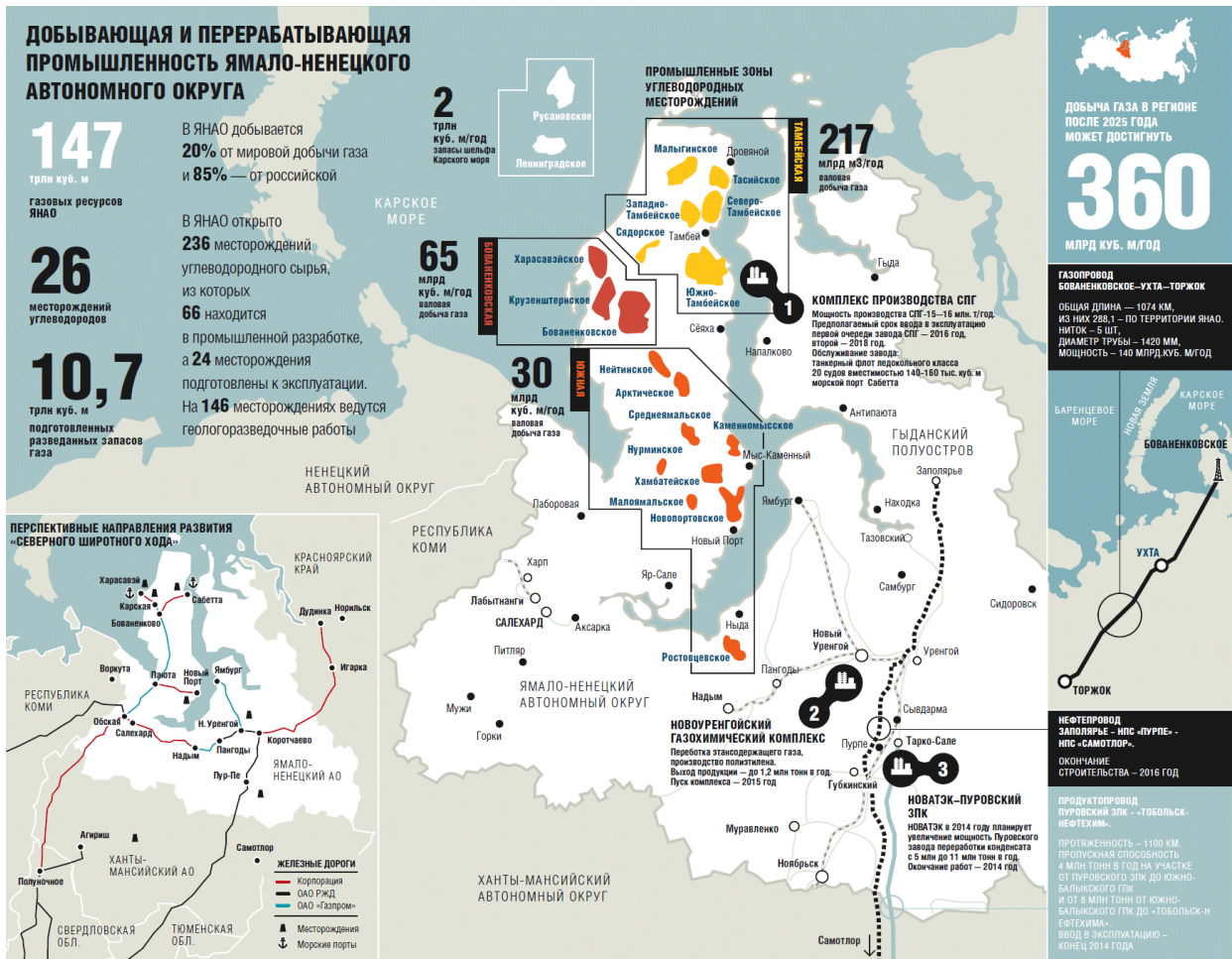


Figure 5 - Economic development of the Yamalo-Nenets Autonomous Okrug until 2035.

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Figure 6. Prospective construction of railways in the Yamal-Nenets Autonomous district until 2035.

For the Yamalo-Nenets Autonomous Okrug, the most important task is to significantly improve its filling with vehicles, namely: the arrangement of

existing sea ports and the construction of new ones with the obligatory presence of their connection to railway and road networks.

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Figure 7. Map - scheme of designed new vehicles in the Yamalo-Nenets Autonomous Okrug until 2035.

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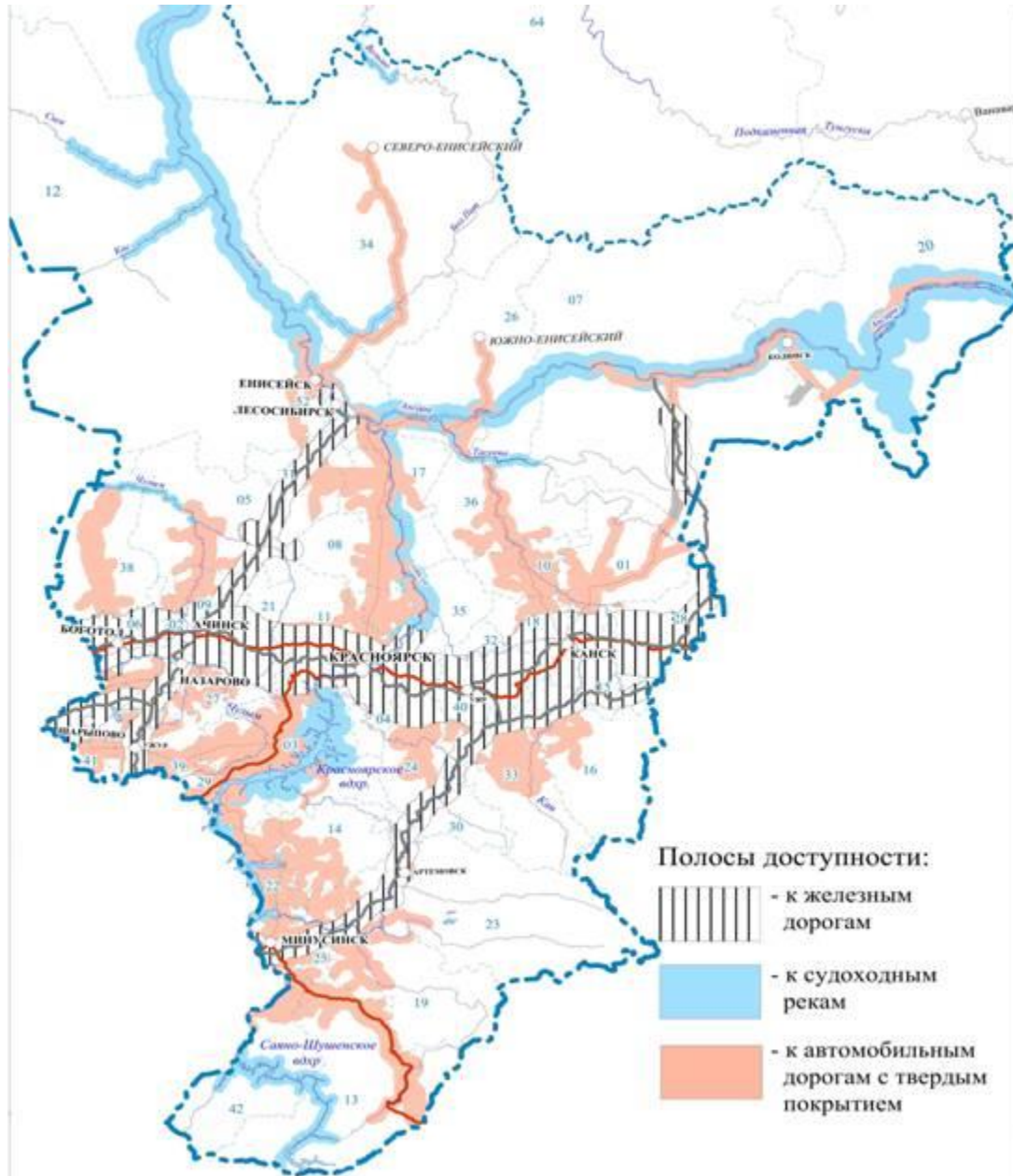


Figure 8. Features of transport logistics in the Krasnoyarsk Territory.

It should be noted that in the Krasnoyarsk Territory, the linking of navigation along the rivers to the largest seaports, which the region has, and the revival of the construction of new road and rail networks to the places of loading of goods with the provision of their transportation to the ports formed

along the Northern Sea Route, the logistics of which forms their interconnection and effective use. This experience can be used in the Arkhangelsk, Murmansk regions and in the Republic of Komi and the Republic of SAHA

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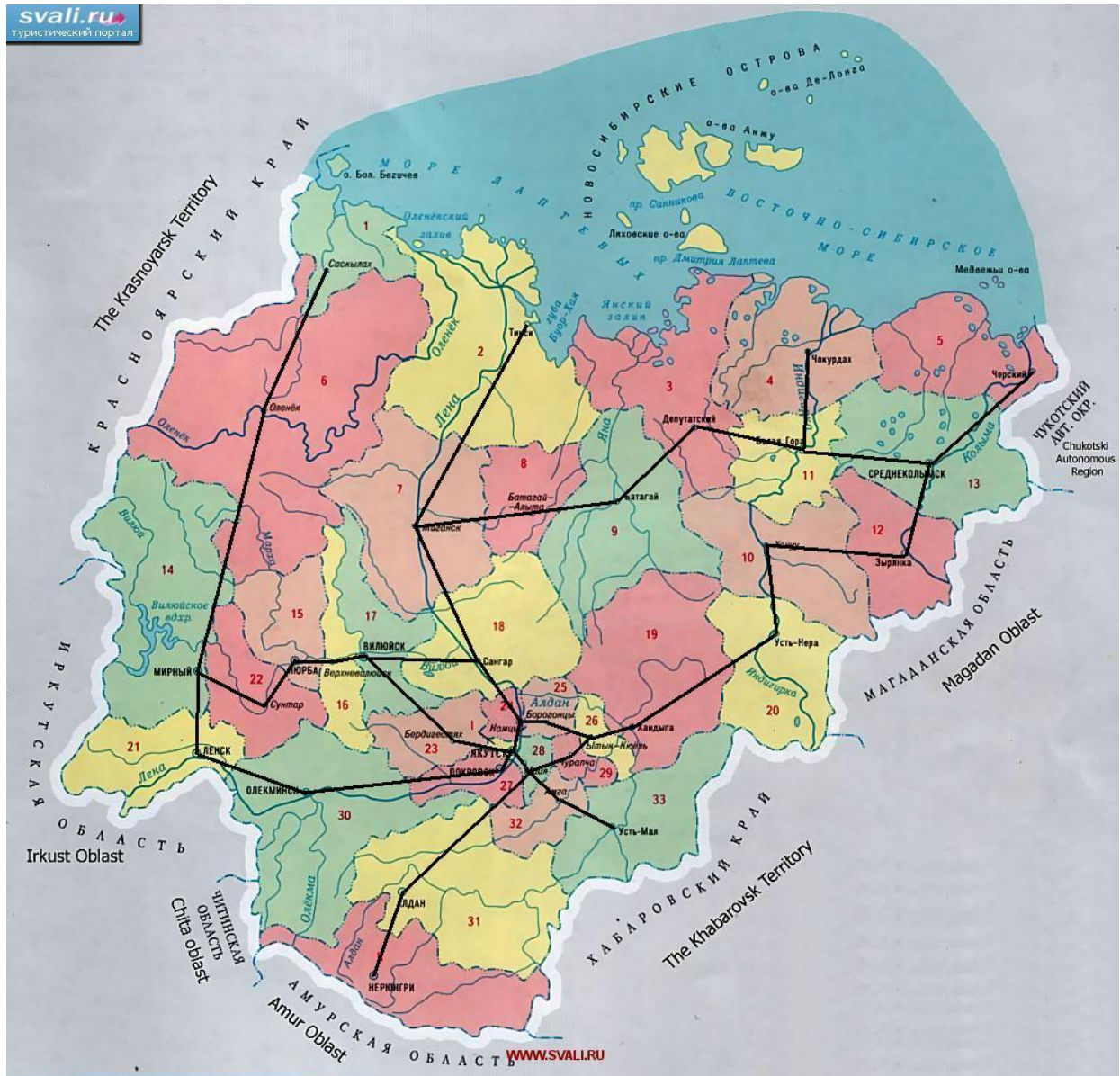


Figure 9. Road map in the Republic of Sakha (Yakutia).

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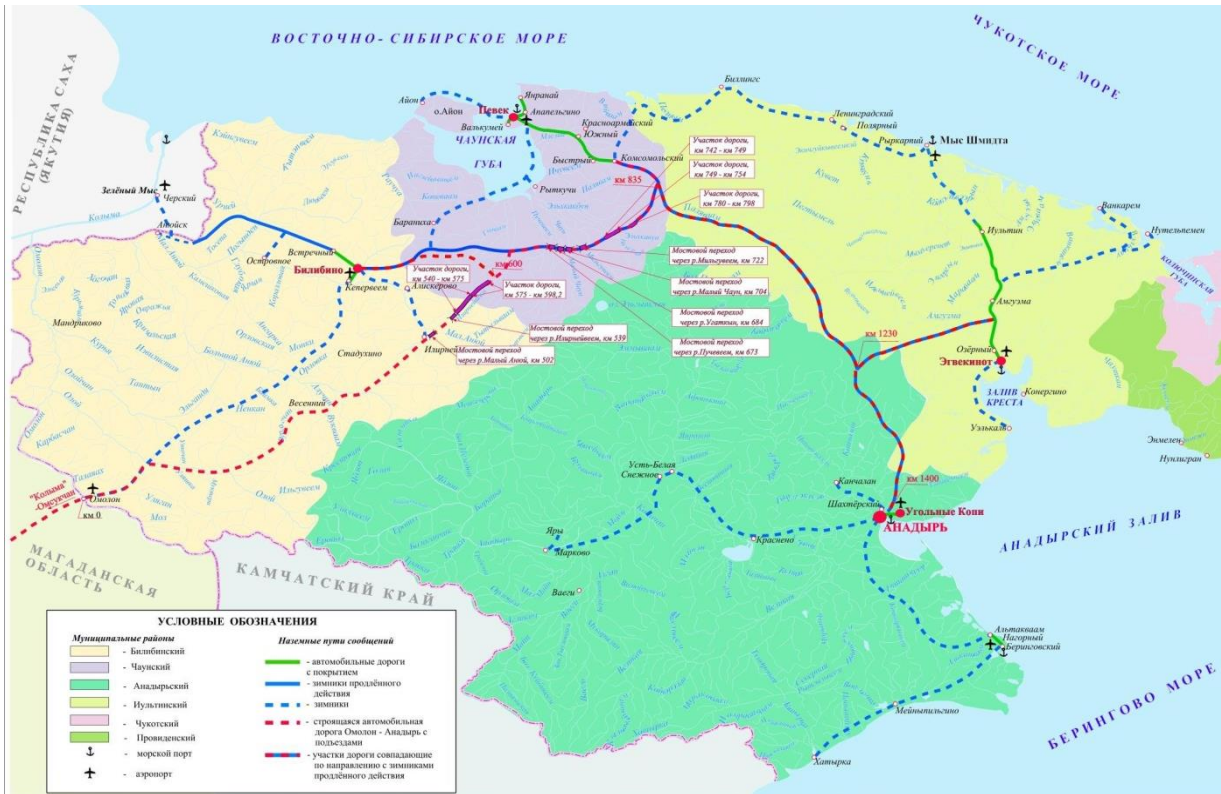


Figure 10. Road map in the Chukotka Autonomous Okrug.

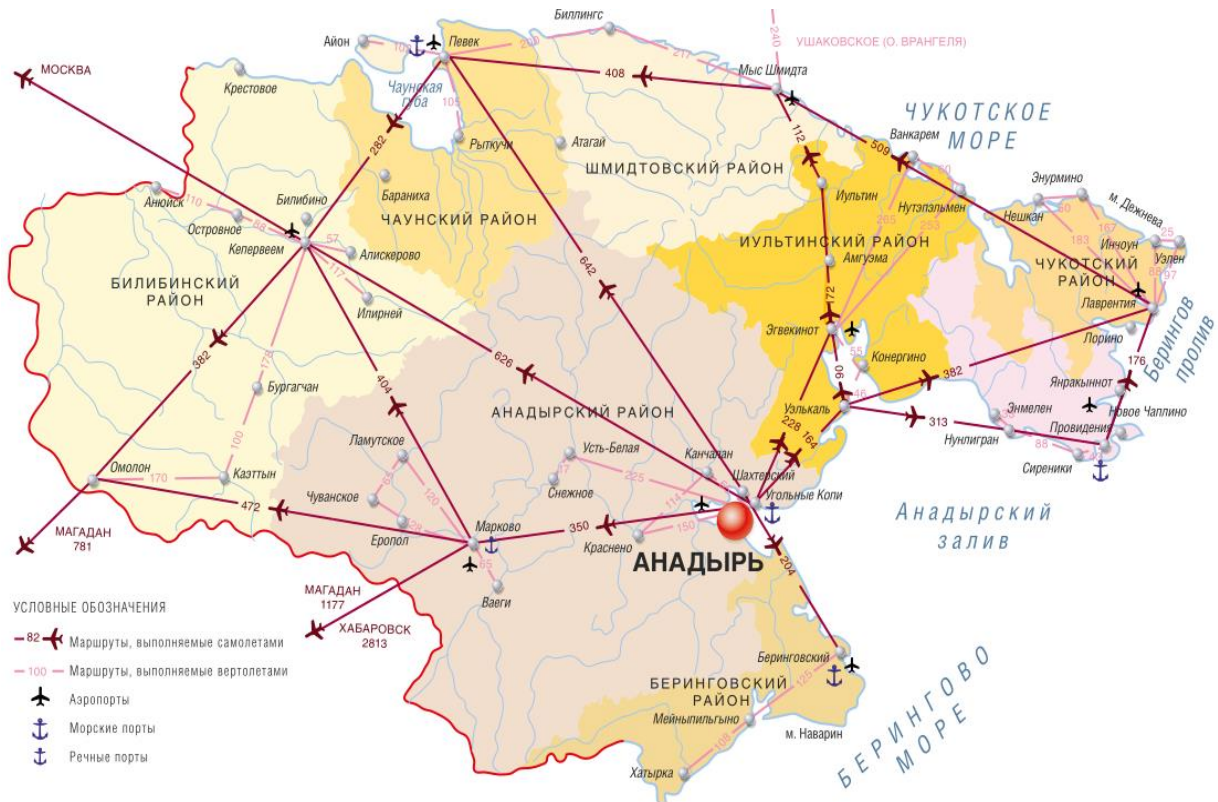


Figure 11. Air traffic in the Chukotka Autonomous Okrug.

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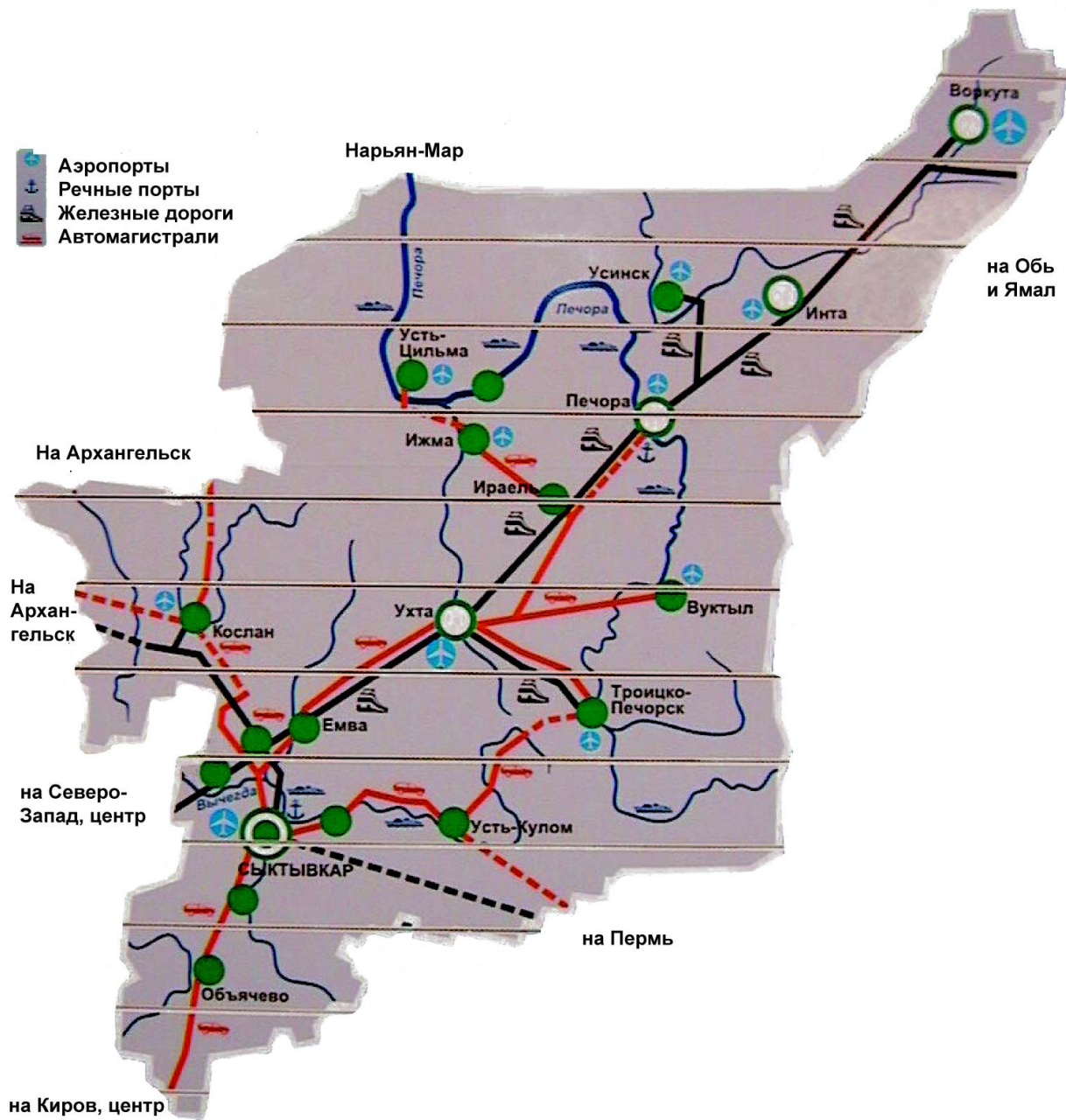


Figure 12. Map - scheme of transport routes and communications in the Komi Republic.

A decision was made to restore the Salekhard - Igarka road, which was not implemented, which led to significant losses of funds.

Explosive involvement in economic turnover creates a rare case when the raw materials industry brings increasing returns - the more invested, the greater the return per invested unit of funds. Note that this effect is short-lived, since further resource extraction is carried out in increasingly depleted or difficult areas, therefore, extraction costs increase, returns decrease. The investment of colossal funds in new resource projects (railroads, sea route development) is justified in the presence of a large infrastructure project, which must be implemented

and effectively financed from the Russian budget.

The development of new resource regions goes through several phases, which fit the emergence of frontier people, superorganizations and other phenomena associated with the development of the Arctic, namely:

- **zero phase**- rumors, tests and barriers: assumptions and information about potentially rich resources that are inaccessible for one reason or another (remoteness, imperfection of technologies, etc.). M.K. Sidorov at the end of the 19th century was the first to try to deliver graphite along the Northern Sea Route, J. Lid organized the first trading operations when the transportation tariffs were still very

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expensive. Alaska was supposed to have gold back in the days when it was the territory of Russia, but the gold rush began only after a considerable time;

➤ **first phase**- information (demonstration) breakthrough: there is a pioneer (F. Salmanov), who proves the possibility of obtaining energy in a new space. This phenomenon is also explained from the point of view of the bifurcation theory: when the trajectory breaks down, a random factor plays a significant role, which justifies the enormous role of the individual in history. The economic effect, as a rule, is still small, the information effect is powerful, but the barrier has not yet been broken (project stage);

➤ **second phase**- demolition of the barrier: a revolution in infrastructure, ideology, technology; large (venture) investments, most often state ones; institutional and organizational building; powerful ideological support (advertising of the project - a demonstration of the city of Igarka to foreign journalists as a demonstration of the achievements of the Soviet government in the development of the Far North, the legitimation of large investments). Sprinters stage, city foundations;

➤ **third phase**- peak production: ossification of institutions and organizations; the greatest economic return, while reducing enthusiasm. The stage of stayers and the emergence of superorganizations;

3.1. peak production: development of a proven resource;

3.2. blast effect.

➤ **fourth phase**- flooding of the frontier:

4.1. ghost towns or shift towns;

4.2. transition from the frontier to the "normal" economy: economist L. Husky notes that after the stage of peak production it is possible to reach such a level of the local economy, when a city appears on the site of the frontier city, which can independently maintain its existence by providing services to the surrounding territories, (such as the city of Surgut).

At the peak of production, when the infrastructure has been built and a large organization has been created in which a rigid hierarchy has been established, there are no more pioneers, managers and specialists - engineers - work. People who are frontier in spirit manifest themselves in the zero and first phases of the cycle, where they can fulfill themselves in the best possible way. Geologist I.L. Zhulanova described the Dalstroj paradox, noting that as a result of the work of the country's most freedom-loving people - geologists - a powerful administrative structure was created.

Conclusion

Financing of the Transport Strategy is envisaged to be carried out at the expense of the federal budget, the budgets of the constituent entities of the Russian Federation and extrabudgetary sources.

Funds from the federal budget are directed to the following purposes:

maintaining in working condition and reproduction of transport infrastructure facilities that are state-owned;

reconstruction and construction of transport infrastructure facilities of great socio-economic importance, as well as ensuring the safe functioning of the transport system;

transport security;

the implementation and stimulation of measures to maintain the mobilization readiness of means, transport facilities and means of communication, as well as measures carried out in the interests of national security;

ensuring the functions of state regulation and management in the transport industry;

conducting fundamental scientific research and implementing innovative scientific and technical projects of national and industry-wide importance.

Along with direct budget financing, state support can be provided in the following forms:

co-financing on contractual terms of investment projects with the registration of property rights of the Russian Federation, including financing the costs of managing investment projects and developing project documentation;

granting subsidies to the budgets of the constituent entities of the Russian Federation for the development of transport infrastructure;

providing subsidies to transport organizations engaged in socially significant transportation;

subsidizing interest rates on attracted loans to transport organizations to finance the costs associated with the purchase of vehicles;

providing, in accordance with the program of state external borrowings of the Russian Federation and the program of state internal borrowings of the Russian Federation and constituent entities of the Russian Federation, state guarantees for loans attracted by domestic organizations in order to implement the most significant investment projects in the field of transport;

allocation of funds to the authorized capital of legal entities;

development and implementation of economic mechanisms that stimulate the accelerated renewal of the fleet of vehicles, including assistance in the development of leasing modern vehicles, insurance and lending to carriers;

provision of benefits when establishing the conditions for the lease of state property, land allocation and land use.

The total volume of capital investments in the Transport Strategy is calculated in the prices of the corresponding years, taking into account the value added tax, and is estimated at 170.6 trillion. rubles.

The share of total capital investments for the implementation of the Transport Strategy in relation

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to the total gross domestic product of Russia will average 3.97 percent.

The share of total investments in fixed capital in Russia's total investments for 2020-2025 will be 12.7

percent, and for the period 2025-2035 - 10 percent, but only with strict execution and quality control of the work of all administrative structures.

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Article



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PROBLEMS AND ASSUMPTIONS OF TRANSPORT DEVELOPMENT IN THE REGIONS OF THE ARCTIC ZONE OF THE RUSSIAN FEDERATION. MESSAGE 3

Abstract: in the article, the object of research is the State Program of the Russian Federation "The main trends in the spatial development of territories included in the Arctic zone of the Russian Federation" for the period up to 2035 as an expression of the policy of the Federal Center pursued in relation to the regions. The subject of the study are the elements of the above program, which, in conflict with regional specifics, hinder the achievement of the goals set in government documents. The analysis of the conducted research is the formation of an understanding of how the regions of the Arctic zone should be taken into account when formulating federal policy aimed at their socio-economic development. In order to achieve this goal, it is necessary to solve a number of tasks, namely: it is planned to implement problems in the regions of the Russian Arctic.

Key words: spatial development, priority, technical regulation, certification, standardization, financial condition, profitability, profit, demand, preferences, relevance, competitiveness, social and economic well-being of nine regions of the Arctic zone of the Russian Federation.

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Introduction

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Designations of the Arctic regions of the country largely have an economic basis - the following norms are enshrined in the Labor Code of the Russian Federation:

➤ regional coefficients and percentage bonuses to wages (the amount is set by the Government of the Russian Federation) - bonuses are paid for work experience in the North; tables of regional coefficients were developed in the 60s of the twentieth century, the size of the coefficient depends on the place of residence: the further north, the more, reaching a value of 2 in regions with the most severe climate (north of Yakutia, Chukotka). There is a legend about the history of the construction of the city of Noyabrsk, which had to be built within the oil fields located on the border of the Khanty-Mansiysk and Yamalo-Nenets Autonomous Okrugs. The city was built to the north, because in this case the district coefficient became higher. At present, the significance of these measures has been somewhat leveled, for example, in private companies, any base wage level above the minimum level can be set. Thus, the "long northern ruble" is a thing of the past.

➤ 36-hour work week for women - at the same time, wages are paid to women in the same amount as for a full-time work week. The benefit also has an institutional meaning - the upbringing of the younger generation, since the older generation, traditionally actively participating in this process, "remained on the mainland."

➤ additional paid holidays: granted to persons working in the regions of the Far North - duration 24 calendar days), persons working in areas equivalent to regions of the Far North - 16 calendar days.

➤ persons working in organizations located in the regions of the Far North and areas equivalent to them are entitled to pay once every two years the cost of travel and baggage transportation to the place of vacation and back within the territory of Russia at the expense of the employer. This is the most relevant advantage of the current northern benefits, which has a psychological significance and increases the mobility of the inhabitants of the North, who actively travel long distances in Russia, broaden their horizons and are receptive to the new.

➤ Legislative acts of the Russian Federation define additional benefits, including earlier retirement, increased pensions, etc.

These benefits are partly borne by private employers. For large companies (Norilsk Nickel, Gazprom) this problem can be solved, but for small businesses, leaving most of the employees on vacation for two months in the summer at the expense of the employer becomes a significant burden. This problem is a brake on the development of the economy of the North, there is no solution to it so far, since the

abolition of benefits is an extremely unpopular and harsh measure. History of benefits, namely:

➤ the first compensations were established before the revolution of 1917 during the construction of the city of Murmansk: land plots were provided to the first settlers;

➤ in the USSR, benefits were originally a compensation for the difficulties associated with moving. They were intended only for those moving to the North (Decree of the Central Executive Committee and Council of People's Commissars of the USSR of November 9, 1927 "On compensation for transfers and employment in other areas"). Large companies, currently inviting a highly qualified specialist to remote areas, provide him with an apartment or a significant salary, municipalities provide doctors and teachers with special conditions;

➤ in 1930 - the establishment of benefits for areas with a low level of economic development (Decree of the Central Executive Committee and the Council of People's Commissars of the USSR of August 12, 1930 "On benefits for persons working in remote areas of the USSR and outside large urban settlements");

➤ in 1932 - the establishment of separate benefits for the Far North (by the Decree of the All-Russian Central Executive Committee and the Council of People's Commissars of the RSFSR of May 10, 1932 "Regulations on Benefits for Persons Working in the Far North of the RSFSR"). The benefits provided during this historical period were differentiated by industry and had different sizes of allowances: three categories of workers were distinguished, the greatest benefits were for "higher and middle administrative personnel, specialists of the highest and medium qualifications in industry, transport, communications, agriculture and water management, as well as medical and veterinary personnel working to combat epidemics and epizootics";

➤ Until the 60s of the last century, benefits were allocated only for resettlement to the North; they were not provided for local residents. This is stated in the instructions of the Narkomfin: "Privileges are provided to employees on the condition that the place of their former permanent residence (before starting work) is at least 1000 kilometers away from the place of work by rail or 500 kilometers by other means of communication." This was negatively perceived by the local population, as well as another example of social injustice: representatives of the indigenous small people (Nenets) lead a different way of life - some of them live in the village, some wander in the tundra, formally being homeless, because the chum cannot be registered as permanent housing. The provision of houses in the village to the "homeless" Nenets caused discontent among the people,

➤ In the 1960s, the Russian economy changed dramatically due to the start of the development of the

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rich oil and gas reserves of Northern Siberia. There is a transition from small aircraft to more expensive helicopters, the country begins to live in grand style in many ways, including the expansion of benefits that are beginning to extend to all northerners. They are beginning to be perceived by the population not as lifting, but as compensation for living in the North. A typical example is the poem by E. Yevtushenko "Northern allowance" (1976 - 1977): "For what is this northern allowance! For - eyes pressed in by a blizzard, for frost such that the skin on the faces, as if tarpaulin ...". Benefits - Canadian experience.

In Russia, S.V. Slavin, in Canada - economist and geographer L.-E. Hamelin, who founded the Center for Northern Studies at Laval University. L.-E. Amlen developed a method for determining "northernness", which the scientist defined as a combination of 10 parameters:

1. latitude: 45° N (0 points) - 90° N (North Pole) - 100 points;
2. summer temperatures: more than 150 days per year with temperatures above 5.6°C (0 points) - 0 days (100 points);
3. winter temperatures: less than 1 thousand degree days with temperatures below 0°C (the sum of negative temperatures over the number of days) - 0 points / 12 thousand degree days or more (100 points);
4. soil freezing: less than 1 month (0 points) - continuous permafrost to a depth of 450 m (100 points);
5. annual precipitation: more than 500 mm (0 points) - 100 mm or less (100 points);
6. vegetation: taiga (0 points) - tundra (80 points) - rocky desert (100 points);
7. the number of inhabitants in the settlement: more than 5 thousand people. (0 points) - 0 people (100 points) or: the number of inhabitants in the surrounding area of 250 thousand square meters. km.: more than 1 million people (0 points) - 0 people (100 points);
8. *level of development of economic activity*: no production (100 points) - multifunctional center of interdistrict significance (0 points);
9. air communication: regular flights daily (0 points) - irregular flights for a distance of 1600 km or more (100 points);
10. land transport accessibility: year-round, more than one mode of transport (0 points) - no accessibility (100 points). Off-road in the Arctic creates special conditions for farming, so accessibility is a key socio-economic parameter for the northern region. Accessibility has an important psychological effect - the feeling of being on an island described by the inhabitants of the Arctic is more depressing than the polar night.

Summation criteria L.-E. Amlena determines that north in Canada begins almost from the border with the United States. At the moment, in Canada, as in Russia, there is a division into two zones: the North

zone (Prescribed Northern Zones - A) and the transition zone (Prescribed Intermediate Zones - B). The tax system of the country, using the modern criteria of "northernness", introduces a number of benefits:

➤ tax deductions for living in the North for a certain number of days: zone A - tax-free amount - \$ 11 per day, zone B - \$ 5.5. In Russia, tax deductions are made, for example, when receiving paid medical care or when buying real estate.

➤ payment of transportation costs to the place of vacation - a number of Canadian cities.

A significant advantage of the Canadian system is that the benefits are related to the costs of the country's federal budget. There are no similar measures in other countries, it can be noted that the European Union has benefits for companies operating in depressed areas anywhere in the world.

The key border of the Arctic (Arctic AHDR Boundary) is defined by a number of socio-economic studies (Fig. 1.1. blue color), during this course of lectures, this border, passing through the administrative-territorial division (district, region, territory), will be used most often. Two international Human Development Reports in the Arctic provide a comprehensive analysis of demographics, urban development and culture (anthropologists even consider the hip-hop culture of the Arctic peoples). The socio-economic border of the Arctic is based on the border of the Arctic region as determined by the working group for the implementation of the Arctic Monitoring and Assessment Program of the Arctic Council (Arctic AMAP Boundary). A slight difference in the boundaries is noted in the north-east of Canada and in Yakutia. Dixon - ordinary Arctic

The urban-type settlement of Dikson is located on the shores of the Arctic Ocean - on the coast of the Yenisei Bay, the Taimyr Peninsula and Dikson Island. According to the stories of B. Gorbatov, in 1976 a feature film "The Ordinary Arctic" was shot, telling about the wintering of the correspondent of "Komsomolskaya Pravda" in the Arctic village in 1935. When the last plane left before wintering, the correspondent gave up his seat to a sick person, stayed for the winter and wrote a collection of stories. Dikson was founded in 1915, the first house was built as a temporary radio communication point needed to rescue an expedition drifting in the ice. Thanks to the book by B. Gorbatov and the famous song by M. Plyatskovsky "Morzyanka", Dixon became the most celebrated Arctic village of the Soviet era, where journalists and writers came. The village is a "hymn" to combat the information inaccessibility of the Arctic region, since the first thing that was built on it was a radio station that provides communications to the surrounding territories. The port carried out hydrography and loading coal for ships passing through the Northern Sea Route. Ensuring communication, navigation and logistics is an

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extremely important factor for the Arctic, and the main one for its economy.

The 70s of the twentieth century were the heyday of Dixon: a port, a large research organization that collected and analyzed climate data, including an analysis of the ice situation for a vast territory, and was also a base for the passage of icebreakers, a military unit, a coal base, a hydrographic base, sled dog farm. The number of inhabitants of the village reached 5 thousand people, now their number has decreased to 300. Dixon Island is completely settled and cut off from communications, including the airport and meteorological center (water is delivered to the airport in barrels, ice is melted at weather stations). The village has preserved: the administration, the school, the marine rescue coordination center, the base of the reserve and the shop. To ensure navigation along the Northern Sea Route, civil ships use satellite systems, military - ground. It was for the military that the Dixon hydrographic station was preserved.

In the course of considering the socio-economic characteristics of the Arctic territories, a number of questions arise: how many people are needed in the Arctic and who needs them (the state, companies, the people themselves), is the consolidation of the population in the Arctic region justified by the solution of strategic or economic problems? There is an opinion that the population in the Soviet Arctic was excessive. The Russian Arctic continues to be the most densely populated. Large cities in Alaska are located to the south (comparable to the city of Surgut). Changes in the Arctic region as a whole and in the northern regions of Russia are related to:

- with the development of technology: modern methods make it possible to carry out weather forecasts over long distances (the centralized meteorological system was moved from Dikson to Arkhangelsk);
- with economic reasons: the abolition of benefits, the unprofitability of cabotage transportation along the Northern Sea Route.

Paradoxically, in the 30s of the 20th century, due to the presence of serious difficulties with delivery in the Arctic, complex centers were built with educational institutions, research organizations and even vegetable gardens, theaters were operating in large cities (Vorkuta, Norilsk, Magadan). In the 1970s, the cities of the oil and gas North became single-industry, supporting the trend of extraction and development of resources. It should be noted that the Arctic region is so specific that the implementation of a number of Russian and international standards has to be recognized as inappropriate, for example, the norms for planting greenery on the territory of a school.

Small aircraft provide access to remote and sparsely populated territories, while aircraft are cheaper to operate than helicopters for various

purposes, including military ones. The famous polar aviation has practically disappeared: there is no pilot training system, the production of aircraft engines has been curtailed. It should be noted that work on the modernization of the AN-2 aircraft continues. At present, the Russian Arctic has become less accessible than at the end of the Soviet period. It should be noted that the President of the Russian Federation instructed the development of small aircraft in the Far East, where a similar situation has developed. An example of a small aviation zone is Alaska - almost every small town in the country has a runway for private aircraft. Helicopters are used in Greenland.

In the 1990s, the port of Dixon was transferred to the management of the Norilsk Nickel company, which was charged with the obligation to save it. Vostok Coal is planning to mine coal in a vast area of the Taimyr coal basin. Within the framework of the project, it is planned not to use the rotational method, for which it will be necessary to build a city with all the infrastructure. It is easier to deliver coal to China from the territory of Dixon, a new port is being built, but the extraction of raw materials was stopped in 2018 due to problems with the legislation. It is important to note that the territory of the coal basin is not delimited from the territory of the reserve.

The Arctic is a naturally and economically mobile region, for example, it is difficult to predict a fall in prices for extracted raw materials, which in turn can lead to a reduction in population (Igarka from 18 thousand people to less than 5 thousand). In arctic conditions, houses are built on piles to keep the permafrost from thawing, otherwise the house may collapse. The compactness of settlement in the Arctic and the provision of heat (central and individual heat supply) are an important topic that is as relevant as benefits. Building five-story houses with district heating is effective for quickly building cities during a boom, but with a declining population, maintaining stretched communications becomes uneconomical. Private heating involves the cost of clearing roads, gasoline, etc.

The concept of "pulsating cities", able to adapt to the waves of influx and decline of the population, has not yet been implemented in the Arctic. The idea of "temporary cities" is not supported by the population of the Arctic region, and the practice of temporary earnings in the North does not contribute to the development of the region, because people accumulate funds, depriving local entrepreneurs of a sales market. An example of "temporality" is barrel-shaped houses specially designed to keep warm, minimizing contact with cold air. Currently, they are used as museums of the romantic era of the development of the North, where many graduates of higher educational institutions strove to get by distribution after training.

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Main part

In the field of transport in Russia, in recent years, the necessary modernization of the infrastructure has been carried out, which made it possible to satisfy the growing demand for passenger and freight transportation and create a certain reserve for further development.

Russia has all modern modes of transport, the location and structure of its transport communications generally meet the internal and external transport and economic relations of the country, but need significant improvement.

As of the beginning of 2007, the length of communication routes of the Russian transport system was 85 thousand km of public railways, 42 thousand km of industrial railway transport, 755 thousand km of paved roads (including 597 thousand km of public roads), 102 thousand km of inland waterways, 2.8 thousand km of tram lines, 439 km of metro lines, 4.9 thousand km of trolleybus lines, 532 thousand km of air routes, of which more than 150 thousand km are international.

Every day, 69.1 million passengers and 33.1 million tons of cargo were transported through these transport communications by all modes of transport.

The growth in the volume of cargo and passenger traffic was reflected in positive changes in the socio-economic situation of the country in recent years. The volumes of transportation of goods and passengers in 2000 - 2007 are given in Appendix No. 1.

The volume of cargo transportation in 2000-2007 by all types of transport (excluding pipelines) increased by 18.1 percent (by public transport - by 23.9 percent). Freight transportation by rail increased most rapidly (by 28.4 percent).

The growth in the volume of cargo transportation was influenced by the revival of the real sector of the economy, the increase in production in the main cargo-forming industries, the development of markets for goods and services, and the favorable external economic situation in the main commodity items of domestic exports.

Railways play an important role in the transport system. Railway transport performs 62 percent of the total volume of freight traffic carried out by public transport, or 84.3 percent of the total freight turnover carried out by all modes of transport (excluding pipelines). Road transport accounts for 47.4 percent of the volume of commercial transportation of goods, and the share of rail transport has been declining in recent years, while road transport has been growing, which indicates an increase in the competitiveness of road transport in certain segments of the transport services market.

Positive changes are observed in the creation of parity between Russian and foreign carriers in the performance of international transportation. The volume of international transportation of goods by road in 2007 reached 40.2 million tons.

The share of automobile (bus) transport in the total volume of passenger transportation by public transport is 57.8 percent. In the structure of passenger traffic, 35.4 percent is occupied by rail transport, 29.4 percent - by road transport and 22.6 percent - by air transport. (Figure 1).

The decrease in 2000 - 2007 by 42.5 percent in the volume of passenger transportation carried out by rail transport in suburban traffic, automobile and urban ground electric transport is associated with a decrease in the number of trips of privileged categories of passengers, a change in the system of their accounting as a result of the introduction of unified social travel tickets, as well as with the transition to personalized accounting.

The constant growth in the number of cars in the personal use of citizens also has an impact on the decrease in the volume of work performed by urban passenger transport. In 2007, the fleet of passenger cars amounted to 29.4 million units.

Since the start of the economic reform program, the non-state sector has dominated the transport sector. Enterprises of non-state forms of ownership currently carry out: in road transport - 94.9 percent of cargo transportation and 18.5 percent of passenger transportation, in sea transport - 88.4 percent and 97.3 percent, respectively, 90.4 percent, by air - 87.1 percent and 77.8 percent, by industrial railway - 85.6 percent of cargo transportation.

Since 2002, the development of the country's transport system has been carried out in accordance with the federal target program "Modernization of the transport system of Russia (2002-2010)".

During this period, the construction of the 1st launch complex Tommot - Kerdem of the railway line Berkakit - Tommot - Yakutsk, the border railway station Chernyshevskoye of the Kaliningrad railway, a combined bridge over the river. Lena near the city of Yakutsk. The Lagar-Aul Tunnel on the Far Eastern Railway, the Bolshoy Loop Tunnel at the 1855th kilometer of the Belorechenskaya-Tuapse section, a number of checkpoints across the state border of the Russian Federation on the main directions of transportation were put into operation. Measures were taken to modernize the railway infrastructure of Sakhalin Island.

More than 15,000 km of federal and regional roads have been built and reconstructed. More than 100,000 km of federal and regional roads have been repaired. 5,000 km of federal roads were overhauled.

The length of federal highways corresponding to the normative transport and operational indicators is 17.7 thousand km.

Construction and reconstruction of federal highways, including Chita - Khabarovsk, M-4 "Don", M-5 "Ural", M-10 "Russia", transport bypass of St. highway), as well as 4 unique out-of-class bridge crossings. Four-lane traffic was introduced along the

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entire length of the road from Moscow to Nizhny Novgorod.

The growth of passenger turnover in air transport amounted to 70.2 percent, cargo turnover - 14.5 percent. The share of aircraft that meet the requirements of the International Civil Aviation Organization regarding noise in the structure of the realized carrying capacity of the fleet increased from 44 percent to 59.1 percent, the share of modern aircraft in the structure of the fleet increased from 24 to 35 percent.

Reconstruction of runways at Pulkovo, Krasnoyarsk, Khabarovsk, Blagoveshchensk, Kurgan, Cheboksary airports and replacement of lighting equipment at Pulkovo, Khabarovsk, Barnaul, Kurgan, Ulan-Ude airports was completed. Aviation security equipment was purchased for 53 Russian airports.

The volume of cargo transshipment through Russian commercial sea ports increased 2.6 times and amounted to 451 million tons, which exceeded the maximum volume of cargo transshipment by the ports of the Soviet Union in 1989 by 12 percent.

With the participation of seaports, about 60 percent of Russia's foreign trade cargo turnover is carried out.

Restoration and repair work was carried out at 723 hydraulic structures. The conditions for navigation on waterways for the delivery of goods to the regions of the Far North with a total length of 68,160 km have been provided. In 2006, the complex of works of the first stage for the construction of the second line of the sluice of the Kochetovsky hydroelectric complex was completed.

On the inland waterways of the Unified Deep Water System of the European Part of the Russian Federation, 42 percent of communication systems have been updated.

Actual expenditures on the implementation of the federal target program "Modernization of the transport system of Russia (2002 - 2010)" in 2002 - 2007 amounted to 1.93 trillion. rubles, including at the expense of the federal budget 0.54 trillion. rubles, or 27.7 percent.

Out of the total volume of financing, expenditures on railway transport amounted to 27.1 percent, on roads - 57.4 percent.

In the volume of financing from the federal budget, the share of roads is 89.9 percent, the share of railway transport is 0.4 percent.

Since 2008, the implementation of 13 major infrastructure projects has begun on the principles of public-private partnership, including at the expense of the Investment Fund of the Russian Federation.

Transport enterprises are gradually adapting to the new business conditions. However, many issues of the work and development of transport in the conditions of the formation of market relations have not yet received a satisfactory solution.

Among the main shortcomings of Russian transport, the low technical level and the unsatisfactory state of its production base stand out.

The reduction in the volume of reconstruction and construction of infrastructure facilities, as well as the rate of replenishment and renewal of fleets of vehicles and other transport equipment has led in recent years to a significant deterioration in their technical condition (age structure, increased wear, etc.) and efficiency.

At present, the length of problem areas in terms of throughput capacity is 8.3 thousand km, or about 30 percent of the length of railways, which provide about 80 percent of all freight work of railway transport.

To date, the formation of a backbone network of federal highways connecting all regions of Russia has not been completed. Only about 38 percent of federal highways meet the regulatory requirements.

The low level of development of the road network in agricultural areas, as well as in the regions of the Far North, the Republic of Sakha (Yakutia), the Magadan Region, the Chukotka Autonomous Okrug, etc., remains low.

Due to the lack of paved roads, more than 10 percent of the population (15 million people) remain cut off from transport communications in the spring and autumn.

Until now, 39 thousand settlements with a total population of up to 2 million inhabitants (including 7.5 percent of the total number of regional centers and 6.7 percent of the central farmsteads of agricultural organizations) have no connection with the country's transport network through highways with hard coated. The formation of a backbone road network in the regions of the North, Siberia and the Far East has not been completed.

Federal highways have exhausted their capacity. 13,000 km of roads are operated in excess of the standard load, especially on the approaches to the largest cities, which is almost 29 percent of the network length. The local road network is underdeveloped, so a significant part of local traffic is carried out on federal roads. The acceleration of motorization of the country has not yet led to a corresponding increase in the volume of construction and reconstruction of the road network, and the repair of roads has even somewhat decreased in recent years. With an increase in the length of public roads by 15 percent over the past 10 years, the car park has grown by almost 75 percent.

Solving the problem of bringing the length and condition of the road network in line with the needs of the economy and the population is significantly complicated by the influence of the outstripping growth of market prices for road construction materials. The rise in prices for these resources over the past 5 years was 1.5 times higher than the rise in price indices in construction over the same period. Up

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to 60 percent of the funds allocated for road works are spent on the purchase of materials.

The pace of development of civil aviation in Russia is currently 2-3 times higher than international indicators. Not only the international transportation market is developing dynamically, but also the domestic transportation market (growth - 17 percent). This is due to an increase in real incomes of the population, an increase in the competitiveness of air transport compared to rail transport in the long-distance passenger transportation market, as well as the development of consolidation and integration processes for air carriers.

At the same time, over the years of economic reforms, the number of operating Russian airports and civil aviation airfields has decreased by 2.5 times (mainly due to regional facilities). To a large extent, as a result of this, the configuration of the passenger airline network has developed, within which the largest volume of passenger traffic (up to 80 percent) is accounted for by air communications in Moscow.

Many constituent entities of the Russian Federation have almost completely lost both the network of local airlines and the airfields of local airlines. The reduction of local traffic, the closure of airlines, the collapse of the air transport infrastructure and other negative trends can become irreversible, which will lead to the complete collapse of the system of local airports operating regional aviation aircraft, and the creation of a crisis situation in many regions that are not provided with alternative modes of transport.

There is a sharp backlog of airport infrastructure and equipment from the level of development of international civil aviation, a backlog in the implementation of modern means and technologies recommended by the International Civil Aviation Organization in the field of air traffic management, automatic landing systems and other radio systems.

The systems interacting in air navigation services are not interconnected by a single organizational and technical structure, the transition from the Unified Air Traffic Management System of the Russian Federation to the Air Navigation System of Russia has not been completed, which hinders the improvement of the quality of air traffic services, the dynamic implementation and development of advanced air navigation facilities and systems recommended International Civil Aviation Organization.

The development of Russian ports and related transport infrastructure is uneven. Significant differences have accumulated in terms of the levels of manufacturability and capitalization of port hubs. This is a consequence of the uneven and unstable cargo base, the insufficient development of the adjacent railway, road and pipeline infrastructure, as well as the rear terminal and warehouse infrastructure.

There is a shortage of port capacities focused on transshipment of imported cargo (containers and ro-ro cargo), which is caused by the rapid development in recent years of port capacities aimed at transshipment of export cargo.

The share of inland waterways that limit the capacity of the Unified Deep Water System of the European part of the Russian Federation is currently 4.9 thousand km (75 percent).

The most important problem is the technical and technological lag of the Russian transport system in comparison with developed countries. It is not ready for the widespread use of modern technologies, primarily container technologies. The growing demand for freight transportation is constrained by the underdevelopment of the country's transport and logistics system. Forwarding services for the population and the economy remain at a low level. There is no high-speed rail service in the country.

The innovative component in the development of rolling stock fleets and technical means of transport remains at a low level, especially in domestic transportation. There is a significant lag in the environmental parameters of transport operation.

Urban public transport does not receive proper development, including its modern high-speed types, which could significantly reduce the severity of the problem of transport development of megacities.

Almost in all sectors of the transport complex, the tendencies of aging of fixed assets and their inefficient use persist. Depreciation of fixed production assets for certain groups of fixed assets has reached 55 - 70 percent and continues to grow.

At the beginning of 2007, the depreciation of fixed production assets of large and medium-sized commercial organizations amounted to: in railway transport - 58.6 percent, in maritime transport - 51.2 percent, in inland water transport - 69.7 percent, in automobile transport (without road facilities) - 49 .6 percent, air - 50.3 percent.

The state of many technical means of transport has reached a critical level. A significant part of them is operated beyond the normative service life, the other is approaching this period. As a result, the safety and economic efficiency indicators of transport operation are significantly deteriorating.

One of the most significant is the problem of imbalance in the development of a unified transport system in Russia. It includes 3 most important components.

The first is disproportions in the pace and scale of development of different modes of transport. The most striking example is the significant lag in the development of inland water transport and the high growth rates of motorization.

The second is the underdevelopment of the existing transport infrastructure, which is most acutely manifested in the discrepancy between the level of development of roads and the level of motorization

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and demand for road transport, in a sharp reduction in the number of regional and local airports, as well as in the presence of numerous "bottlenecks" at the junctions of individual modes of transport.

The third is the territorial uneven development of transport infrastructure.

The most significant differences are between the European part of Russia, on the one hand, and the regions of Siberia and the Far East, on the other. Differences between regions in terms of transport provision are becoming unacceptable. For example, 6 constituent entities of the Russian Federation do not have rail links with other regions of the country.

Due to the insufficient development of transport, the integrated development of new territories and the development of mineral deposits, primarily in Siberia and the Far East, are held back.

The solvent demand of the population for transportation is not fully satisfied. Passenger transportation is not provided on socially significant routes, including due to unaffordability of prices (primarily in the regions of the Far North and the Far East).

In connection with the growth of transport tariffs in recent years, there have been certain restrictions on transport and economic relations. Due to the high transport component, the competitiveness of domestic products is reduced not only in the external, but also in the domestic markets. The weakening of ties between the regions of the Russian Federation undermines its unity and reduces the economic security of the country.

The mobility of the population in non-urban traffic in 1995-2007 decreased by 60 percent, mainly due to a reduction in trips related to recreation and tourism. For a significant part of the population, travel over long distances has become practically inaccessible, which causes additional social tension in society.

The level of safety of transport activities remains low, primarily in road and air transport. In road traffic accidents, 23.5 people per 100,000 people die every year, in the countries of the European Union this figure is 9-10 people.

The insufficient level of safety of transportation of goods and passengers by domestic transport companies negatively affects their competitiveness in the international market of transport services.

Road transport is the main air pollutant in large cities (up to 80 percent of total emissions), its share in the total emissions in the country is 40 percent.

The current state and capabilities of the transport system in the field of ensuring the military security of Russia indicate that the most difficult period in its development is over. However, a number of significant problems remain. The needs of the country's defense in the development of modern types of vehicles, the construction of new and the reconstruction of existing transport communications

related to dual-use infrastructure facilities are not sufficiently taken into account. A negative impact is exerted by the insufficient throughput and carrying capacity of transport infrastructure facilities and vehicles, the underdevelopment of the railway and road networks in the north and east of the country, as well as in a number of border regions, the passage of the main transport communications in the east of the country near the state border of the Russian Federation.

The resource intensity of transportation and the transport costs of the economy are growing. The increase in the cost of transportation, in turn, causes an increase in transport tariffs.

Due to the shortage and unsatisfactory condition of the rolling stock, many city and intercity bus routes have been closed, and the frequency of bus traffic has decreased. Due to unprofitability and the lack of state support measures, many air lines and part of river passenger routes are closed, which leads to the satisfaction of the population's demand for transportation not in full.

The complexity of the financial condition of transport is exacerbated by the outpacing growth in prices for the resources it consumes. The level of the revenue rate for transportation especially began to lag behind the growth in prices for resources after the Government of the Russian Federation made decisions to curb the indexation of railway tariffs without extending a similar procedure to industries supplying transport with material and technical resources.

Despite the multiple increase in tariffs for the transportation of passengers and goods, the financial situation of transport enterprises could not be normalized. Passenger transportation in domestic traffic on all modes of transport (with the exception of intercity bus transportation and regular air lines) is unprofitable, and the profitability of modes of transport for the carriage of goods is minimal. The share of unprofitable large and medium-sized enterprises in 2007 was 32 percent. On the part of the clientele, receivables to transport organizations also increase.

The main reasons for the low profitability and unprofitability of transportation are a decrease in the volume of transportation work while maintaining the entire infrastructure of modes of transport and a slight decrease in the number of production personnel, as well as a lag in the growth of revenue rates from the growth in prices for fuel, electricity, materials and technical equipment consumed by transport. The allocated budget subsidies do not yet fully cover the losses in the income of transport companies resulting from the state regulation of tariffs for passenger transportation.

The influence of these causes affects regardless of the form of ownership of transport organizations. The main railway transport, classified as a natural

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monopoly industry and owned by the state, also operates with low profitability. There is an acute problem of attracting investments in the development of the transport industry, which is due to the low investment opportunities of transport enterprises, difficulties in attracting long-term borrowed funds, and the underdevelopment of public-private partnership mechanisms. Currently, in most cases, a non-capital-intensive development model is being implemented, in which the volume of services grows due to an increase in the use of existing fixed assets.

The priority problem remains the improvement of the legal framework for the development of the transport system and the transport services market, including the creation of a regulatory framework that regulates the quality of transport services, ensuring the mobilization training of transport organizations and the fulfillment of their military transport duties, the development of public-private partnership mechanisms that ensure a clear legislative distribution of rights, responsibilities and risks between the state and the investor, as well as the definition of priority areas for the application of these mechanisms in transport.

The shortage of qualified professional personnel is increasing in the transport industry.

Another important problem is the insufficient level of competitiveness of domestic companies and the entire transport system of Russia as a whole in the global market of transport services. This is due to both the listed problems and insufficient opportunities for domestic transport organizations to compete in the world market, including the effective use of Russia's geopolitical advantages in international transit traffic.

The technical and technological parameters of international transport corridors do not ensure their competitiveness in the international market.

Integration into the global and regional markets for transport services will mean increased competition, increased access to the Russian market for foreign carriers, removal of administrative and tariff barriers, and will lead to a more difficult situation for domestic transport companies.

An analysis of global trends in the development of transport shows that no country is able to control the risks of its own economy without having strong transport positions.

World trends in the development of transport show that:

the period of patronage in relation to modes of transport and carriers has ended. The efforts of most countries are aimed at increasing the competitiveness of national transport and abandoning the quota system, as well as tariff and other restrictions. They are replaced by the harmonization of transport legislation;

The market of transport services has become more complex, all segments of the transport process and logistics have begun to be integrated. This led to

the development of a new type of transport infrastructure - transport, storage and commodity transport complexes, which formed an integrated system of interaction;

transport centers became the control elements of the system, which made it possible to optimize "through" tariffs. This has led to the transition of the point of profitability from the processes of physical transportation to the field of transport and logistics services. The concept of transport corridors has been transformed. From a set of routes, they turned into a system of transportation control centers and transport hubs, which gradually acquired the functions of managing the tariff policy;

the quality of transport services and competitiveness have reached a high level of development. In segments of the transport market, the services of which are in demand, competition has stepped over the stage of competition for the quality of transport services. It's guaranteed. The struggle is price-based. Against this background, the requirements for the environmental friendliness of transport are increasing. Hence the desire to maintain an acceptable share of the transport component in the price of the final product, while observing strict environmental and safety standards.

For the Russian transport system, these levels of development are not yet achievable. It is necessary to stimulate a gradual improvement in the quality of transport services, the integration of transport service technologies, and an increase in the competitiveness of carriers and operators of transport hubs. Following this, one can expect an optimization of the affordability of transport services. As restrictions, the given levels of safety and environmental friendliness of transport should act.

The main system-wide problems in the development of the transport industry of the Russian Federation are as follows:

Availability territorial and structural disproportions in the development of transport infrastructure;

insufficient level of accessibility of transport services for the population, mobility of labor resources;

insufficient quality of transport services;

low level of export of transport services, including the use of transit potential;

insufficient level of transport security;

strengthening the negative impact of transport on the environment.

Thus, significant restrictions on economic growth have appeared in Russia, due to the insufficient development of the transport system. A new long-term transport strategy is needed, which defines the main strategic directions and targets for the development of the transport system for the period up to 2035. Predictive qualitative and quantitative parameters for the development of the transport

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system of the Russian Federation for the period up to 2035. Scenario options for the development of the Russian transport system for the period up to 2035 have been developed in three versions - inertial, energy and innovative. Inertial version of the development of the transport system.

The inertial option for the development of the transport system involves:

- implementation of large-scale transport projects that ensure the extraction and development of mineral deposits in new production areas (oil in Eastern Siberia, gas on the Arctic shelf, etc.) and the construction of relevant pipelines;

- development of transport infrastructure that ensures the realization of the transit potential of the economy;

- reconstruction and construction of especially important objects of transport infrastructure, primarily objects that ensure the safety of the functioning of transport systems, as well as the modernization and renewal of the fleet of vehicles;

- advance development of transport infrastructure in the areas of export deliveries of goods, primarily the development of seaports and approaches to them;

- growth in the volume of domestic transportation of raw materials in connection with the increase in coal mining, the development of energy, metallurgy and oil refining;

- low dynamics of export traffic and outstripping growth of import traffic,

- continued dominance in imports of food and consumer goods;

- insufficiently high rates of construction and reconstruction of the road network, the persistence of sharp disproportions in its development in the European and Asian parts of Russia;

- maintaining low mobility of the population, primarily in air transport, which is due to insufficient growth in incomes of the population and the continuing aging of the aircraft fleet;

- lack of transportation and infrastructure reserves in the modes of transport necessary to improve the quality of transport services for the population and production, the introduction of transport and logistics technologies.

The energy and raw material option involves the accelerated development of transport infrastructure, mainly for transport support for the development of new mineral deposits and the increase in fuel and raw materials exports, the realization of Russia's competitive potential in the field of transport and the growth of exports of transport services. At the same time, the following features can be distinguished:

- implementation of large-scale transport projects (including within the framework of public-private partnerships) that ensure the development of mineral deposits in new mining areas, mainly in Siberia, the Far East and the continental shelf;

- diversification of directions for export deliveries of Russian hydrocarbons, including to China, and the creation of an appropriate infrastructure;

- development of transport infrastructure that ensures the implementation of the country's transit potential, including joint projects for the production and export of hydrocarbons within the framework of the EurAsEC, as well as with other states;

- increase in domestic transportation of coal in connection with the development of power generating capacities and metallurgical production;

- increase in transportation volumes and assortment of products of fuel processing and raw materials (petroleum products, concentrates, chemical cargoes, metals, etc.), as well as engineering products;

- low growth rates of export shipments and a significant increase in the volume of import shipments of highly processed goods, primarily products of high-tech sectors of the economy;

- continued increase in the number of private passenger cars, with a decrease in the volume of passenger transportation by public transport (mainly by road) in the period up to 2025 and some growth in 2025-2035;

- an increase in the need for the construction and reconstruction of the road network connecting new residential areas in megacities and suburban areas of large cities with places of application of the labor force.

When implementing this option, measures to develop the country's transport system will be carried out primarily in metropolitan agglomerations, as well as in regions with high growth rates - in the South of Russia, Siberia and the Far East.

Rail transport will have to ensure unhindered growth in the transport of raw materials to the main centers of consumption, including transport for export.

Of decisive importance will be the specialization of seaports through the creation of so-called "layered ports" following the Rotterdam model, when the port system will include remote railway junctions and transport and logistics complexes. This will require the development of access roads to ports and port production and storage areas focused on the processing of cargo, the formation of port zones that ensure the processing of incoming cargo.

An additional impetus will be given to the development of transport in the Arctic zone (territories located mainly to the north of the 60th parallel).

The development of the country's transport system will become one of the main sources of economic growth. The impetus for technological development will be received by a part of the manufacturing industries associated with ensuring the development of transport. At the same time, the implementation of the energy and raw material option will have a number of negative consequences for the

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prospective socio-economic development of the country and ensuring national security, in particular:

it will be necessary to create significant reserves of the capacity of the transport network in the main directions due to possible sharp fluctuations in demand for the transportation of export bulk cargoes in terms of volumes, nomenclature and directions due to changes in the situation in the world markets for fuel and raw materials;

a decrease in the economic efficiency of transportation is possible due to an increase in the imbalance in export-import cargo flows. The imbalance will be associated with an increase in exports of bulk and liquid cargoes and imports of finished products. Specialized and universal types of rolling stock will have low performance in terms of the coefficient of mileage with a load, that is, significant flows of empty stock are possible;

population mobility will grow at a slow pace, which will be one of the reasons for the insufficient dynamics of improving the quality of human capital in the country. The level of passenger traffic will be lower than the level with the innovative option by 14.3 percent, and passenger turnover - by 11.5 percent. This is due to lower rates of growth in real incomes of the population, a decrease in the population and a smaller scale of development of infrastructure and rolling stock of passenger transport. Lower growth in the welfare of the population will cause a slower growth in the number of personal cars;

there will be significant differentiation in ensuring the availability of transport services for different regions and social groups of society;

low investment activity will cause a significant burden on the budgetary system associated with financing the construction, repair and maintenance of roads.

The innovative option involves the accelerated and balanced development of the country's transport system, which, along with the achievement of the goals envisaged in the implementation of the energy and raw material option, will provide transport conditions for the development of the innovative component of the economy, improving the quality of life of the population, and the transition to a polycentric model of Russia's spatial development. For the innovative option, a number of features characteristic of the energy and raw material option are retained, in particular:

implementation of large-scale transport projects that ensure the development of mineral deposits in new mining areas;

diversification of directions for export deliveries of Russian hydrocarbons;

development of transport infrastructure that ensures the implementation of the country's transit potential, including joint projects within the framework of the EurAsEC, as well as with other states;

increase in domestic transportation of coal in connection with the development of power generating capacities and metallurgical production;

an increase in the volume of transportation and the range of products of fuel processing and raw materials, as well as engineering products due to the increase in innovative activity in the energy, fuel and raw materials industries, and related machine-building industries.

At the same time, the distinctive features of the development of the transport system according to the innovative option will be:

a significant increase in export transportation of highly processed goods, primarily products of high-tech sectors of the economy, the growth rate of which will be 2.5 times higher than the growth rate of transportation of similar imported goods;

increasing the role of transport and logistics infrastructure in organizing the movement of goods;

growth in the volume of passenger transportation by public transport. The highest growth rates are expected in air transport, and the main absolute increase will be provided by road transport;

the emergence of the need to build and reconstruct a road network connecting new residential areas in megacities and suburban areas of large cities with places of application of labor in a significant number of large and medium-sized cities due to an increase in the level of income and quality of life of the population;

increasing the demand of the economy and the population for high-speed transportation services (with a predetermined delivery time) and passengers (with maximum freedom of movement and the possibility of planning personal time).

When implementing this option, measures to develop the country's transport system will be concentrated, along with metropolitan agglomerations, also in cities where significant innovation and human capital is concentrated. In the east of the country, such a scenario will give a selective impetus to the development of cities with a significant amount of accumulated innovation potential - Tomsk, Novosibirsk, Krasnoyarsk, Irkutsk.

At the same time, the "infrastructural effect" of the formation of urban agglomerations associated with the implementation of projects for the construction of large transport complexes, multimodal logistics centers and information hubs will be of paramount importance.

Along with the South of Russia, Siberia, the Far East and the Arctic zone, the Volga and Ural macroregions will become zones of priority transport development. Spatial development will become multipolar, not rigidly tied to the established energy and raw materials and financial centers.

Regional aspects of the development of the country's transport system will be related to:

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creation of a network of territorial production clusters focused on high-tech industries (in the aviation industry, shipbuilding, nuclear industry, in the production of new materials, in computer science and telecommunications), with the concentration of such clusters in urbanized regions;

the creation of territorial production clusters focused on deep processing of raw materials and energy production, ensuring the development of new territories; formation and development of tourist and recreational zones on the Black Sea coast, in Altai, Baikal, Kamchatka, regions of the North;

the development of large transport, logistics and production hubs in the North-West, the South of Russia and the Far East.

The development of railway and maritime transport, along with the tasks of ensuring the transportation of bulk cargo, including export ones, will increasingly focus on improving the quality of transport services for cargo owners and strengthening interaction in the framework of ensuring efficient logistics chains of goods movement.

An important role will be played by the development of the Northern Sea Route, primarily for commercial transportation, with the creation of an appropriate infrastructure on the northern coast of Russia.

Measures to increase the competitiveness of maritime transport will significantly increase the share of the fleet flying the State Flag of the Russian Federation in the world's maritime fleet and significantly increase the export of transport services.

Transportation by road will grow at a high rate, which provides the most flexible response to the demands of the economy, especially the sectors of high- and medium-tech industries.

Measures aimed at the development of air transport and the use of significant advantages (primarily environmental) of inland water transport will significantly increase their share in the country's transport balance.

Of decisive importance for the formation of a modern commodity distribution network in Russia will be the creation of an integrated network of transport and logistics complexes that provide a wide range of competitive services, the accelerated development of intermodal transportation and the formation of territorial production clusters.

The development of public passenger transport will receive a significant impetus. First of all, this applies to the development of high-speed and high-speed rail transportation, all types of air transportation, urban and suburban transport.

When implementing this option, the country's transport system should develop at a faster pace than the sectors of the economy and the social sphere in order to remove the infrastructural restrictions on the country's future socio-economic development, which depend on transport.

The implementation of an innovative option for the development of the transport system will solve the main tasks facing the country, namely:

indicators of population mobility will approach the level of developed countries, which will be one of the most important factors in improving the quality of human capital in the country;

differentiation in ensuring the availability of transport services for different regions and social groups of society will decrease;

the competitiveness of domestic goods and services in world markets will increase due to the balanced development of the country's transport system;

the growth of the economic efficiency of passenger and freight traffic will optimize the transport costs of the economy and increase the availability of transport services for the population.

Comparison of scenario options leads to the conclusion that the innovative option acts as a target for the long-term state transport policy, since it fully allows to realize the strategic interests of Russia.

When moving to an innovative option, the requirements for the nature and directions of development of the transport system are most determined by the following fundamental factors:

strengthening of global competition covering the markets for goods, services, capital, and other factors of economic growth. Structural restructuring of the world economy, associated with a change in the balance between economic centers, an increase in the role of regional economic unions, the expected spread of new information, nano- and biotechnologies. This will entail a change in national and world cargo and passenger flows, an increase in the requirements for the quality of transport services;

exhaustion of sources of export-raw material type of development, based on increasing fuel and raw material exports, the need for a transition to intensive innovative development.

On the agenda is the need to diversify the Russian economy, increase the share of products with high added value in the structure of the gross domestic product, and the share of the processing industry.

As a result, the question arises of the transition from a predominantly extensive to an intensive model of development of the transport system based on innovative breakthrough technologies that improve the quality of transport services.

The second important trend is the globalization of the economy and Russia's entry into the World Trade Organization. This factor causes an increase in international and intra-industry competition, which requires an increase in the competitiveness of the transport industry.

Considering these factors and the current state of the Russian transport system, we can conclude that transport is a priority point for the growth of the national economy.

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When switching to an innovative option for the development of the transport system, it is necessary to ensure:

development of a competitive market for transport services;

availability of transport services for the population;

an increase in the share of domestic transportation and transportation of finished products in the overall transport balance of the country;

expanding the range and improving the quality of transport services based on the use of modern transport, logistics and infocommunication technologies, the development of new forms of organizing the transport process and interaction between modes of transport;

multiple increase in labor productivity and energy efficiency in transport;

revitalization of the activities of domestic transport organizations in the world market of transport services, transnationalization of their activities, the transformation of Russia into the largest exporter of transport services;

integration of the transport system of Russia into the Eurasian transport space, development of multi-vector transport links with world economic centers;

transport support for new centers of socio-economic development of the country;

high territorial mobility of the population;

increasing the innovative activity of transport companies, a radical renewal of transport and technical means, taking into account the development of domestic transport engineering, strengthening the role of scientific and technical support in the development of the transport industry;

increase in the level of professional training and qualifications of transport workers, improvement of their material and social security, creation of safe working conditions;

ensuring the reliability and safety of the functioning of the transport system, including in the field of ecology, reducing the number of accidents and disasters, injuries and deaths in transport accidents;

development and application of effective mechanisms for state regulation of the functioning and development of transport;

improvement of the investment climate in the transport industry.

At a new stage, the transport strategy should determine the active position of the state in improving the transport system of Russia as a key factor in the socio-economic development of the country. This primarily concerns improving the quality of transport services, reducing the total costs of society dependent on transport, increasing the competitiveness of the domestic transport system, and strengthening the innovative, social and environmental orientation of the development of the transport industry. Based on this, the goals, priorities and objectives of the strategic

development of transport for the long term are formulated.

The main task of the state in the field of functioning and development of transport is defined as creating conditions for economic growth, increasing the competitiveness of the national economy and the quality of life of the population through providing access to safe and high-quality transport services, turning the geographical features of Russia into its competitive advantage.

The strategic goal of the development of the transport system is to meet the needs of innovative socially oriented development of the economy and society in competitive high-quality transport services.

The achievement of this strategic goal will be ensured through the effective development of a competitive environment in the transport industry, the creation of optimal reserves in the development of infrastructure, the achievement of an advanced level of development of engineering and technology, increased attention to social and environmental factors, and an increase in the national, economic and other types of security of the country, depending on transport. To create an efficient competitive transport system, 3 main components are necessary, namely:

competitive high quality transport services;

high-performance, safe transport infrastructure and vehicles, which are needed to the extent that they will provide competitive high-quality transport services;

creation of conditions for exceeding the level of supply of transport services over demand (otherwise there will be no competitive environment).

In order to form high-quality transport services, it is necessary, first of all, to determine the parameters and quality standards, to provide incentives for their implementation and the creation of highly efficient technologies that meet quality standards, to work out the elements of technologies, the regulatory framework and methods of state regulation, and to introduce a number of pilot highly efficient technologies in the regions.

It is necessary to create conditions for the development of both internal competition (between carriers, modes of transport) and external competition (with international transit systems). Internal competition will increase the rhythm and speed up the movement of goods, reduce transport costs, increase the availability of transport services, improve the investment climate and develop market relations. This will have a positive impact on the external competitiveness and realization of the country's transit potential. Creating a market for competitive transport services involves:

development of the regulatory framework in the field of transport services (safety, environmental friendliness, quality of transport services, development of methods of state regulation of the market). At the same time, the creation of effective

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feedback in the form of a system of control and supervision is of paramount importance for regulation;

development of a high-performance transport and logistics infrastructure that ensures a competitive level of transport services (primarily commercial speed and reliability);

achievement of the advanced level of engineering and technology that provides standards of safety, environmental friendliness, efficiency and quality of transport services.

The most important strategic direction in the development of the transport system is the balanced development of the transport infrastructure. The implementation of this direction means the coordinated integrated development of all elements of the transport infrastructure based on a comprehensive analysis of statistics and the use of mathematical methods for predicting the needs of sectors of the economy and the population in transport services, developing a statistical accounting system, building a transport and economic balance, predicting the dynamics of the cargo base, analyzing models of transport development. systems in order to select optimally balanced options.

The development of the regulatory framework should provide for the harmonization of transport legislation, integration into the global system of standards and communications, the definition of standards for the quality of transport services, responsibility for their observance, as well as consumer rights. Improving the quality of transport services will require the creation of reasonable reserves in the transport system, and this, in turn, will allow developing competition in the main directions of freight and passenger traffic.

Of particular importance for the transport strategy is the improvement of the system for providing the transport industry with labor resources, which should ensure the design and implementation of projects for the development of transport systems, the operation of transport infrastructure and vehicles, the provision of transport and logistics services, etc.

An important role in the implementation of the transport strategy is played by increasing the manageability and controllability of transport development by increasing the efficiency of state regulation and management methods, and developing project management mechanisms.

In accordance with these main strategic directions of development, the structure of the main targets of the Transport Strategy of the Russian Federation for the period up to 2035 (hereinafter referred to as the Transport Strategy), its goals, priorities, tasks and implementation mechanisms is being formed. The main targets of the Transport Strategy, namely:

- general social;
- general economic;

general transport;

types of transport activities.

General social guidelines are:

the mobility of the population and the availability of transport services;

reduction of accident rate, risks and security threats by means of transport;

reducing the share of transport in environmental pollution.

General economic guidelines are:

provision by the transport industry in full of high-quality transport services that ensure the planned growth rates of the gross domestic product;

competitive level of specific transport costs in the price of final products;

increasing the commercial speed and rhythm of the promotion of consignments of goods;

use of innovative technologies for the construction and maintenance of transport infrastructure;

implementation of an effective state tariff policy;

use of modern mechanisms for the development of an economic competitive environment, including public-private partnerships;

coordination with strategies and programs for the development of related industries.

General transport landmarks are:

development of the transport network in accordance with the needs of the economy and society;

increasing the productivity and profitability of transport systems;

increasing the return on assets of the transport infrastructure;

reduction of energy intensity;

creating priority competitive conditions for national carriers and increasing their competitiveness;

innovative commodity transport technologies corresponding to the best world achievements;

preparation for transportation of high-tech products;

formation of the necessary conditions for investing in the transport industry, ensuring its development at a faster pace;

development of transport engineering and allied industries - suppliers of resources to the level necessary for the implementation of the Transport Strategy.

By type of transport activity, the guidelines are:

until 2035 - addressing issues related to the elimination of "bottlenecks", the development of throughput and transportation capabilities in accordance with federal targeted programs, as well as strategies and concepts for the development of various types of transport;

from 2035 - adjustment of these strategies and concepts, development of federal targeted programs in accordance with the results achieved, new conditions and the Transport Strategy in order to develop a single

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integrated integrated balanced transport system that meets the needs for high-quality competitive transport services. The main targets by types of transport activities for the period 2021-2035 are determined by the federal target program "Development of the transport system of Russia (2021-2035)" and its subprograms by types of transport. It is envisaged that the main targets for the types of transport activities should be updated in accordance with the goals and objectives of the Transport Strategy. It is advisable to carry out these adjustments in 2024, taking into account the results achieved and new features of transport development. Anthropologist from the European University at St. Petersburg E.V. Lyarskaya offers an original definition of the boundaries of the Arctic: "The Arctic is where the timetable ceases to make sense." Despite the availability of modern technology and the possibility of navigation, this phenomenon is typical for the North. Anthropologist and expert on nomadic peoples A.V. Golovnev in his book "Ethnoexpertise on Yamal: Nenets nomad camps and gas fields" develops the concept of the specificity of the constantly moving Arctic world. For a person living in middle latitudes, movement is an unusual state, which confirms the existence of goods "on the road" or a special regime for believers that

allows travelers not to fast. For people living in the North, being on the road is the norm, only those who cannot move (the sick) stay in one place. which confirms the existence of goods "on the road" or a special regime for believers, allowing travelers not to fast. For people living in the North, being on the road is the norm, only those who cannot move (the sick) stay in one place. which confirms the existence of goods "on the road" or a special regime for believers, allowing travelers not to fast. For people living in the North, being on the road is the norm, only those who cannot move (the sick) stay in one place.

The cult of movement that exists in the Arctic is justified from the point of view of common sense: if you don't move, then midges and mosquitoes will "eat" in the summer, except for rare periods with a very high density, in winter you can freeze. In order to stop and stay in one place, in the North, a person needs to take special actions: build a shelter, invest resources, make efforts for heating. As illustrations for the book by A.V. Golovnev used symmetrical photographs of reindeer argish and a train moving along the Yamal Peninsula. Moving around the North requires taking into account certain subtleties, even with modern technology, so the parallel with deer is not accidental (Figure 1).

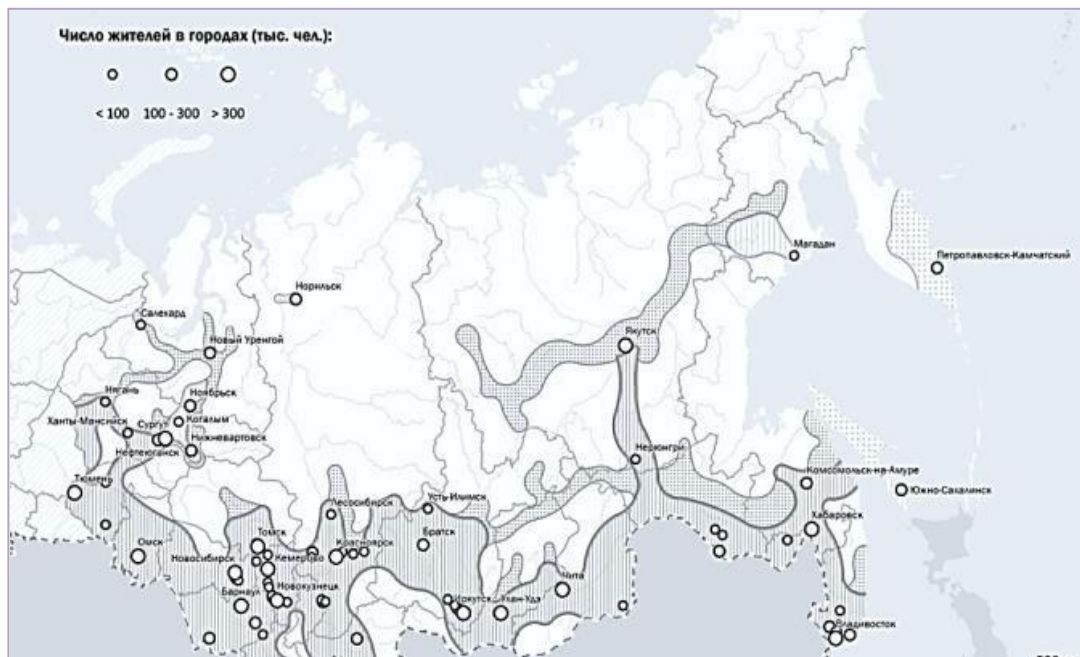


Figure 1 - Off-road and areas of non-alternative transport.

The motto is "The Arctic is movement", but it is followed by a paradoxical conclusion: the Arctic is off-road. Traffic in the Arctic region has a specific character, the traditional transport network practically does not reach the Arctic territories. Off-road is a feature that leaves its mark on all aspects of life in the Arctic, both in Russia and abroad. In Figure 1, off-

road areas are the lightest, gray areas in the north are areas with no alternative transport. If something happens to the key road of the area, then this event is equated to a natural disaster, for example, the blurring of the only road leading to the city of Churchill (Canada) led to a tenfold increase in food prices. Food had to be delivered by helicopter, an expensive

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vehicle. Without alternative northern transport is reflected in the definition of sustainability and reliability of life in the North. The local road to the airport "Alykel" in Norilsk is regularly swept during snowstorms. In the song "Morzyanka" by V. Troshin there are the words: "There is snow all around, at least hundreds of miles to travel."

The north of Russia is the territory of river and air transport. A map showing the density of roads of various types reflects the degree of increasing inaccessibility of the northern territories: roads of various quality reach the regions of Kolyma and Chukotka, and there are almost no railways in the entire northeast of the country. At the same time, the Arctic and the north-east of Russia are a zone of landing sites for air transport. It should be noted that small aviation is currently almost lost, so the issue of its development is at the state level. To do this, it is necessary to develop new types of aircraft, because the AN-2 aircraft is finalizing its age (it is no longer produced), and the transition to helicopters is not economically viable. On the map - Figure 1 of the accessibility of the regions of the world, the brightest are the zones with cities (population of at least 50 thousand people), the travel time to which is several hours, the darkest - several days (d - days). Regions are available, as well as to other desert areas of the world. Recently, experts from Australia and Arizona (USA) have begun to study the Arctic, since the problems of the regions turned out to be close. It should be noted that a separate scientific direction is being formed that studies the features of remote regions of the world.

If we define the boundaries of the Arctic in an economic way, then, first of all, we will have to talk about its remoteness from the main transport routes and economic centers. This is reflected in the daily life of people in the form of a rise in the price of products, the delivery of which takes a long time and with a large number of transfers, which requires additional costs. The cost of food products in the Yamalo-Nenets Autonomous Okrug for 2022 shows that the price of individual items (beef, butter, milk) may differ by two or more times from the industry average. A winter road leads to the largest Krasnoselkupsky district of the district - a motor road, the operation of which is possible only at sub-zero temperatures. This means additional transshipment, for transportation on a winter road, special vehicles are required that consume a lot of fuel: off-road Ural trucks or all-terrain vehicles on ultra-low pressure TREKOL ("Ecological Transport") tires that do not damage the thin tundra cover. The Yamal district of the district is the third zone of inaccessibility, to which there are two ways: by rail from Surgut to Novy Urengoy and from Labytnanga to Salekhard (in summer - by ferry, in winter - by ice crossing, until the ice has become - under certain conditions, ships move on air cushions, which is dangerous and reduces the carrying

capacity).

From the point of view of the economy as a whole and the efficiency of the industry, the absence of transport means the absence of development. The Tomtor deposit of rare earth metals is located in the north-west of Yakutia, rare earth minerals occurring there ("new oil") are necessary for the modern technological order, they are used in the production of communications equipment and electric vehicles. The project for the development of the deposit is included in the state program "Industrial Development and Increasing its Competitiveness". Many oil fields discovered during the Soviet era have not yet been developed due to lack of communication. If the field is located on the coast, oil can be exported using tankers, but in the Arctic Ocean they can not always go directly to the coast, which can be shallow. Therefore, economic activity in the Arctic is always a balance of transport accessibility and the efficiency of raw material extraction. In this aspect, the region is in the past, economic geographers are well aware of the idea that the Earth has become flat.

Off-road is strongly reflected in the psychology of the northerners, who are very keenly aware of their isolation. In the 30s of the 20th century, the only connection with a number of territories was a caravan of waterways (a line from a song about the regions of Kolyma: "Do not swear from evil longing, the last caravan is going to the mainland"). The instability of air travel imposes certain requirements on the reliability of systems and means of life support for cities in the Arctic region. 30 years ago in Norilsk there was an accident on the gas pipeline, which could leave the city in winter (at a temperature of -40°C) without heating. When considering the evacuation of people, calculations were made that determined that if the planes took off one after another, then it would take more than two months. In order to launch the gas pipeline, the whole city worked, up to that in kindergartens dumplings were made for the liquidators of the accident. Transport isolation is the need for mutual assistance, the ability to mobilize and do more than just one's job. When considering the prospects for the development of the Arctic and life in a northern city, it is necessary to take into account an additional miscalculation of risks and reliability, and the courage of people is also necessary. Despite the fact that since the 1930s a lot of efforts have been made to make the Arctic look like the European part of Russia, it does not give in.

Potential transport routes

➤ **Northern latitudinal course**- a railway line under construction in the Yamalo-Nenets Autonomous Okrug with a length of 707 kilometers. Route: Salekhard - Nadym - Novy Urengoy - Igarka - Dudinka - Norilsk. Less likely is the launch of a segment of the route Korotchaevo - Norilsk, more likely that the capital of the region, Salekhard, will connect with the main economic centers, primarily

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Novy Urengoy, almost along the route of the "dead Stalinist road", which was dismantled after the death of I.V. Stalin.

➤ **Railway "Obskaya - Bovanenkovo - Karskaya"**- the northernmost of the operating railways, built by JSC "Gazprom". It is expected that it will have a number of branches to other fields.

➤ **Project "Ural Industrial - Ural Polar"** assumed the laying of the railway to the south through potential areas for the development of minerals (mainly ore). The project is currently on hold.

➤ **"Belkomur"**(White Sea - Komi - Ural) - involves the connection of the White Sea through the Perm Territory with the Ural railway networks in different versions: connection of a new branch with Arkhangelsk; a branch line to the projected port of Indiga, located on the coast of the Barents Sea. The port is convenient, but minerals have been found at a great distance from it.

You can get acquainted with many problems of the region's development prospects on the example of the city of Igarka, located on the banks of the Igarskaya channel of the Yenisei in the Krasnoyarsk Territory. The first Soviet city built in the Arctic was founded in 1929, the population in its entire history has never exceeded 25 thousand people, at present it is about 4.5 thousand. With the colorful and characteristic history of Igarka, it is worth starting to study the Arctic, because that it is a warning of a multitude of scenarios.

The scheme of organization of traffic flows in the North zone shows that a significant part of the territory is occupied by the off-road zone. If air transport and winter roads are not taken into account, then water transport remains - rivers (in the diagram from left to right: the Ob, Yenisei, Lena), the railway (black dotted line) and the Northern Sea Route (blue line). The red circles indicate the southern entrance bases off-road - the ports where shipment from rail transport to river transport is carried out. In the case of r. Yenisei is Lesosibirsk, Yeniseysk and Krasnoyarsk, on the river. Ob - Surgut, on the river. Lena - Osetrovo. The northern entry bases off-road are ports (blue circles), where shipments from the Northern Sea Route to river transport (Dudinka, Igarka, Pevek, Tiksi, etc.) take place. One of the key transport routes in the Arctic - the city of Igarka is located at the exit of the Yenisei to the Northern Sea Route (marked with a red star). From the Angara region and the upper reaches of the Yenisei, the timber was transported in rafts to Igarka, where it was reloaded onto sea vessels. The uniqueness of the location of the city was that the width and depth of the Yenisei River allowed ships with a wide draft to enter several hundred kilometers to Igarka. With the beginning of the shipment of timber in the 30s of the twentieth century, the systematic use of the western wing of the Northern Sea Route began through Igarka, which was originally

called "Komseverput" and was controlled by the Committee of the Northern Sea Route. The long Northern Sea Route made it possible to establish a military threat; earlier attempts to provide trade communications failed. Kupets M.K. Sidorov, author of the book "North of Russia" failed to establish trade links with the European part of Russia and Western countries from Krasnoyarsk along the Yenisei and further through the future fragment of the Northern Sea Route. Mentor of the future Emperor, General N.V. Zinoviev in response to the project of M.K. Sidorov in 1867 "On the settlement of the north of the Empire, on the improvement of the situation of its inhabitants and on the development of foreign trade" wrote the following: "Since there is permanent ice in the North, and arable farming is impossible, and no other industries are unthinkable, then, in my opinion, it is necessary to remove the people from the North in internal countries of the state, and you are busy on the contrary and explaining about some kind of Gulf storm, which cannot be in the North. Such ideas can only be promoted by lunatics." The unwillingness of the tsarist government to deal with the North before the Russo-Japanese War is characteristic. Comrade I.D. Papanin at the 18th Congress of the CPSU (b) in 1939, beginning with the words "Dumb-headed tsarist officials did not see the vital need to master the Northern Sea Route," was a direct response to this position.

Having been refused, M.K. Sidorov published an announcement in the foreign press, which attracted the attention of the English captain Joseph Wiggins. From 1874 to 1894, D. Wiggins conducted eleven trading voyages to the mouths of the Siberian rivers and back, and proved the possibility of using the Northern Sea Route. In 1877, on the initiative and at the expense of M.K. Sidorov, the first voyage of the schooner "Morning Dawn" from the Yenisei to St. Petersburg was made. The expedition was carried out by Captain D.I. Schwanenberg, who had to change the ship and spend the winter on the Yenisei, while part of the crew died. The new composition included a sailor exiled to Siberia, who was met in St. Petersburg with shackles, but was subsequently released. Sweden met the hero Niels Nordenskiöld in a different way, who committed on the schooner "Vega".

Regular export of Siberian timber through Igarka was established due to its unique economic and geographical position:

- **geographic microlocation:** on the Yenisei, which is several hundred meters wide, there can be serious storms, but the Igarskaya channel allowed ships to settle and winter safely. Port facilities located in the channel are less prone to destruction during the ice drift, which demolishes port cranes in Dudinka, located downstream (they still have to be lifted annually to a hill).

- **transportation methods:** in the days of the USSR, according to the bold decision of Volzhanin

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B.V. Lavrov, who manages export operations, self-raffing of timber in rafts was established.

Lesson #1: the importance of finding a good junction between highways and off-road, but for specific technological capabilities. The geographical position of Igarka can be considered as a field that was discovered, gave a powerful positive effect, but eventually exhausted itself.

The Norwegian Jonas Lied was an entrepreneur, diplomat, writer, citizen of the Russian Empire, citizen of the USSR and supporter of trade in the Yenisei region. For its organization, J. Lid met Nicholas II, A.V. Kolchak, V.I. Lenin, F.E. Dzerzhinsky, G.V. Chicherin. Even before the Revolution of 1917, J. Lid made a lot of efforts to create the Ust-Yeniseisk transit point and was understandably jealous of the construction of Igarka. He founded an enterprise that assumed a two-way flow of goods: in order to produce export products (fabrics, oil), machine tools were imported to the Krasnoyarsk Territory. The second powerful interchange station was planned to be organized in the area of Belushya Guba, in the book "Siberia - a strange nostalgia" Jonas Lid recalls: " The plan called for the transportation of various types of goods across the Kara Sea using a flotilla of specially built and cheap to operate icebreaking tugs and barges. For this, it was mainly necessary to build a deep and ice-free harbor in Belushya Guba, which on the western coast of Novaya Zemlya is located about 160 kilometers north of the Kara Strait and not much less south of Matochkin Shar. To use one or another channel from the Kara to the Barents Sea, a tug with a caravan of barges from Ust-Yeniseisk and Nakhodka could make five round trips in one season. Large cargo ships from the west would unload and load in Belushya Bay and could make as many voyages as in any European harbor. At present, the center for the development of Novaya Zemlya and the military command of the units stationed there are located in Belushya Guba. Transshipment of goods from one mode of transport to another for the regions of the North remains relevant. Gazprom Neft uses ice-class tankers to deliver raw materials from the production area (Cape Kamenny) to the city of Murmansk, where it is reloaded to the floating oil storage facility UMBA, which delivers oil of class and relatively small displacement (compared to tankers that can be used in the Atlantic), which is economically disadvantageous.

This scheme has been used since the mid-90s of the twentieth century, when tankers were used to export oil, following the route along the Ob River to the Khanty-Mansiysk Autonomous Okrug. In 1999, the RITEK company developed a transport scheme for the export of oil produced in the Priobye by river tankers during the ice-free period. The use of the Northern Sea Route makes it possible to avoid mixing high-grade oil produced at a number of fields with the cheaper grade Urals. If one pipe of an oil pipeline is

used for transportation, then the oil mixed in it will be sold at the lowest price, which emphasizes the problem of the lack of alternatives to transport.

The Belokamenka supertanker is one of the world's largest floating oil storage facilities with a displacement of 360 thousand tons, a length of 340 m, a width of 65 m and a side height of 35 m. in the United Arab Emirates. Over 81 million tons of crude oil were transshipped through Belokamenka during its operation. In Europe, the use of such tankers is prohibited without sufficient reinforcement of the sides and tanks, which can lead to an oil spill. In 2022, the place of Belokamenka was taken by the vessel UMBA.

Transport accessibility turns the remote outskirts into the periphery: diversity and self-sufficiency are reduced.

- the basis of diversification and sustainability is the local knowledge infrastructure (universities, research centers), but in 1977, in order to optimize, a branch of the Krasnoyarsk forestry technical school was closed in Igarka;

- in 1983 - due to the appearance of the central television, local television was closed, the production of vegetables and selection work were stopped;

- The problem of fresh food is acute not only during times of crisis, but also during the heyday of the city, when it is included in good transport networks: the prices for vegetables and fruits that are delivered in non-marketable form increase.

- Since the 1990s, there has been a gradual decrease in the population following the collapse of the city-forming enterprise.

- the project "Zapolyarnaya Igarka: the archive revives the city" involved the creation of a city-museum. Potentially, the idea could be implemented, the capital of the Soviet Arctic has something to show: the Museum of Permafrost, the House of Crafts, the "Dead Stalinist Road", the work of architects and writers, hunting, fishing, the exceptional beauty of the Yenisei. The city of Dawson (Alaska) - the "capital of the gold rush" with 2 thousand inhabitants is a popular tourist center.

- the upper timber processing plants begin to use the railroad for timber export, it ceases to flow to the city of Igarka, in the absence of raw materials, the sawmill transshipment plant is closed. Up to this point, the employees of the plant are paid wages in coupons for products that are almost impossible to buy, but on the black market they can be exchanged for money at an unfavorable rate. In a better position were people associated with the extraction of fish, who had the opportunity, for example, to send their children to study in Krasnoyarsk.

- introduction of "icebreaking collection" - thanks to the appearance in the 70s of powerful nuclear icebreakers, navigation along the Northern Sea Route began. They are expensive to operate: a

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number of large companies (Gazprom, Novatek) use their own vessels to transport oil, Yamal LNG and Norilsk Nickel try to do without icebreakers, using ice-class vessels. During the transition to self-sufficiency in the 90s, the Murmansk shipping industry, to which the nuclear fleet passed, "pushed through" the introduction of a tonnage due for passage along the Northern Sea Route for all ships, regardless of the season (even in the summer, when icebreakers are not used). Officially, this decision was justified by the need to maintain the navigation economy of the Northern Sea Route, unofficially - to save the icebreakers.

We can say that the victory over seasonality in the Arctic region is approaching, but it paradoxically "kills" the traditional sectors of the economy. Having learned that the Igarsk forest was being taken out during the escort of nuclear icebreakers, J. Lid proposed to the Soviet government a project to use cargo submarines for the Yenisei voyages. The world's first nuclear-powered LNG transport submarine is indeed being developed. There were a lot of discussions on the question of the expediency of preserving the icebreaker fleet, which exists only in Russia. Despite the fact that large companies try to avoid the use of pilotage by nuclear-powered icebreakers, in unstable ice conditions they often have to be called in for help.

The victory over the Arctic is the death of small forms. The similarity between the Arctic and African regions lies in remoteness, as well as in a low level of economic development, including low solvency. In the traditional economy, the land is cultivated with the help of hand tools, the equipment that has appeared requires fuel and lubricants, that is, it is expensive to maintain. The economic sectors that could exist in the 30s of the last century with a semi-handicraft organization do not survive in modern conditions. Officially, the Northern Sea Route starts from the Kara Gate, and everything located to the west of Novaya Zemlya is not legally it. The main transport vector of the Northern Sea Route is the vector to the west, where nickel, natural gas and oil are supplied from Yamal. The most severe conditions are noted on the eastern part of the route, therefore, in the days of the USSR, the Lena Diameter existed - part of the cargo was not circled around Taimyr, but along the river. Lena was brought in with an overload, for example, to Kolyma. The website of the Administration of the Northern Sea Route publishes information about the constantly changing navigational and hydro situation. In the course of icebreaking assistance, the icebreaker crushes ice floes 2-2.5 m thick, which remain in the formed corridor. Vessels are currently being designed to handle 4m ice and are equipped with an Azipod rig that gives greater maneuverability, including 360-degree rotation, which is especially important when working in ice. There are situations when icebreakers

get stuck, ice floes flying out from under them can hit the hull of the following ship. Depending on the ice conditions in the winter and summer periods, icebreakers are escorted by vessels of different ice classes. The dilemma of the strategy for the development of modes of transport on the Northern Sea Route: Icebreaker + caravan or smaller ice-class vessels. Leading Russian and foreign design institutes, shipyards and shipowners took part in the development of the new high ice class tanker (ARC7).

Currently, the FSUE "ATOMFLOT" fleet includes four icebreakers:

➤ type Arktika: "Yamal" and "50 Years of Victory" - work in the ocean;

➤ Taimyr type: Vaigach and Taimyr are low-draft icebreakers needed to navigate through freezing river mouths;

➤ the construction of the heavy-duty nuclear icebreakers "Leader" (length about 209 m, icebreaking capacity - 4.3 m), the universal icebreaker "Arktika", serial icebreakers "Sibir" and "Ural" in deep water).

The crisis of the 1990s in Russia and the "icebreaking collection" led to a sharp decrease in the volume of transportation along the Northern Sea Route (1.8 million tons in 1998), but thanks to the Yamal LNG project, the situation began to improve (2016 - 7, 2 million tons). Decree of the President of the Russian Federation dated May 7, 2018 No. 204 "On the national goals and strategic objectives of the development of the Russian Federation for the period up to 2024" assumes that the volume of traffic by 2024 will reach 80 million tons. An increase of almost 10 times will occur due to the launch of the Arctic LNG 2 project, the operation of the Norilsk Nickel oil production complex, the operation of Yamal LNG and coal deposits in Taimyr.

The Northern Sea Route mostly passes close to the coast, in some places (Kara Gates) the ice conditions are so heavy that it is easier to get around Novaya Zemlya from the north. The climate is changing towards warming, the ice cap around the pole is gradually decreasing, according to forecasts, by 2050 the entire Arctic Ocean will become almost free of a continuous cover of ice (with the exception of icebergs). There is a prospect of using neutral waters in the region of the Pole for international navigation and ending disputes for the right to pass through the Northwest Passage (Canada, USA) and the Northern Sea Route (the Americans are trying to prove that its territory is international).

The port of Sabetta provides work on the production and export of natural gas (17 million tons per year) of the Yamal LNG enterprise. The population of Sabetta is about 20 thousand people. This is a period of prosperity, the beginning of a new cycle of development of natural resources. Like Igarka, Sabetta is a modern "showcase" of a city built in the tundra under the most difficult conditions. In the

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news, you can see the world's first icebreaking gas carrier "Christophe de Margerie", ordered for year-round transportation of LNG within the framework of the Yamal LNG project, VIPs visiting Sabetta, including the President of the Russian Federation. At the competition for painting an LNG storage tank, the project of the artist who proposed the image of a can of condensed milk won. Remembering the history of the city of Igarka.

Conclusion

➤ Technical difficulties or disbelief are examples: building on permafrost in the Arctic or building the port of Churchill in Canada. Many of the roads that were built began to function despite the notion that this was impossible. The governor of Alaska noted that the first railroad contributed to the development of the central part of the country, but as a transport project it was on the verge of payback. Throughout the 20th century and up to the present time, discussions about the possibility of using airships in the North have not stopped. Obstacles to the implementation of this idea are: wind, the high cost of helium and the explosiveness of hydrogen.

➤ Special qualification requirements: for driving on a winter road, for passing in a caravan behind an icebreaker, for driving special vehicles. The Soviet writer V. Konetsky writes: "It is better to get hit in the stomach yourself than to feel how ice floes flying out from under the icebreaker hit the ship's hull." An icebreaker can pass through ice not exceeding 2-2.5 m in thickness, the most modern - up to 4 m, hummocky ice is impassable. Vessel navigation in ice conditions requires its reconnaissance, carried out either by remote means (satellite) or by aviation. Thus, navigation along the Northern Sea Route is a complex technical and science-intensive process.

➤ Additional maintenance costs: The winter road is expected to be built virtually anew each year.

➤ Additional transshipment / reloading, sections of the way on which different modes of transport are used.

➤ Megaprojects or off-road transport - megaprojects inevitably leave vast territories "overboard", "small forms" allow continuous development of space

A high official of one of the northern regions, in response to a proposal to support a small project to create all-terrain vehicles, for which residents have a high demand (which indicates that it will be present in other similar regions, including foreign ones), replied: "Am I invited to engage in zhivopyrkami?". It should be noted that "zhivopyrki" is an innovative future, since the largest company "Bombardier" started the release of its wide product line with snowmobiles, and Silicon Valley - with structures assembled in a garage. Now in Russia in garages they assemble equipment designed to overcome the Arctic off-road and is a

niche of competitiveness. One of the first Canadian tundra planes, the F-11 Husky ("Bush plane"), was made by an American firm in Quebec, the whole of Canadian shipbuilding grew out of this project. Bombardier produces not only airplanes and snowmobiles, but is also a major manufacturer of rolling stock and services for the operation of rail transport.

Despite the small number of people living in the Arctic region of Canada, the country is very Arctic in terms of economic specialization. When in Russia they talk about construction in the Arctic, then by inertia they are talking about the construction of large cities with a population of up to 100 thousand people. The development of the Arctic is also technical development:

- a center with a test bench for research of aviation technology and automotive technology (icing, low temperatures) was built in the city of Thomson;

- a test center for helicopters has been opened in the city of Yellowknife, Yakutia has been fighting for this for a long time;

- The history of sliding vehicles designed for off-road movement is being studied by the Ural group of northern design. Researchers, constructors and designers, from the point of view of a scientific approach, consider traditional household items of indigenous northern peoples, for example, sleds. Modernization of traditional Nordic ideas allows the design of modern transportation systems, shelters and clothing. Such areas should be given no less attention than large projects, such as the construction of a highway, because the new road will not be able to work effectively without the support of small capillary projects.

Summing up the consideration of the Arctic transport, it must be emphasized that it has two "wings": Features of the natural and socio-economic conditions of the Arctic, which reduce the effectiveness of traditional methods of management, namely:

- **seasonality**- associated with climatic features, affects the availability of food and its cost, transport accessibility (winter roads, summer navigation), features of industrial production and the work of housing and communal services;

- **social seasonality**: northerners have a long vacation, which is more important for them than for residents of central Russia. Thus, during the summer period, there is a shortage of labor in all sectors at once, including the medical and commercial sectors;

- **seasonality in the extraction of raw materials**: The American model of oil development calls for all installation work to be carried out from frozen sites to ensure environmental responsibility and not damage the thin tundra vegetation. Currently, the commissioning of the Tomtor deposit of rare earth metals in Yakutia is being considered. The need to

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transport ore with a low radiation background (less than in an airplane) caused protest movements in the region, which Khatanga joined, where it was planned to store ore for six months, since its transportation is possible only by winter roads;

- **low population-** does not make it possible to create the necessary market volume, and is also the reason for the lack of specialists, which is recognized as the main problem in almost every northern village. To eliminate it, both in Russia and abroad, a lot of special measures and benefits (payments, provision of housing) have been developed. Having provided remote settlements with modern technology, it is necessary to provide them with specialists serving it. At the same time, trained experts often leave remote areas.

In different regions of the Arctic, development is proceeding in two main directions (depending on the situation), namely:

- **scrapped:** implemented in the frontier regions - "Let snowstorms rage nearby, it will be necessary - we will melt the ice" (a line from a song of the 60s). In the process of developing new and resource-rich territories, instead of seasonal navigation, an efficiently operating highway is mastered - the Northern Sea Route, the environment is being arranged: roads are being laid, cities are being built.

- **fixture:** in the absence of a significant resource in the Arctic regions, special laws begin to work. As symbols of ongoing processes, you can use a house on stilts, built in such a way as to protect the permafrost from the thawing process, and sleds - the most efficient northern transport.

Principles of effective organization of management in the Arctic:

- **concentration-** alternation of active and passive phases, vigorous activity is concentrated in compressed time and space intervals, for example, an enterprise needs to bring in equipment, spare parts, fuel (preferably with a margin) during the season;

- **polyfunctionality** - the traditional principle of managing in the North (the deer is both transport, food, and clothing), the key to the innovative development of remote settlements through the institution of local multifunctional innovation centers;

multifunctionality of the Arctic in modern conditions, namely:

- **at the level of individual enterprises and settlements:**

- dissemination of practices of self-sufficiency with food;

- heat and power supply based on local and/or renewable resources, consistent transition to distributed energy;

- **at the level of individual specialists:** specialists traditionally take on a number of functions that, in the conditions of inhabited territories, are

delegated to individual organizations or professionals. In general, in the Arctic regions, the combination of professions is more common than in the southern regions: medical workers master broad competencies and can provide assistance in more cases; a driver in the North must have the skills to repair a vehicle;

- **mobile infrastructure-** alternate use of the resource by users located remotely from each other, for example, mobile slaughter complexes for deer;

- **zoning-** territorial differentiation of priorities, target indicators and mechanisms of socio-economic development, consistent with the main provisions of the Strategy for Spatial Development of the Russian Federation;

- **most developed areas-** are the place where it is most expedient to place the support bases for the development of the Arctic. Increasing the efficiency of the economy in the most developed areas should be ensured by measures developed for densely developed territories, including year-round and round-the-clock transport accessibility;

- **buffer zones-** transitional not only in space, but also in time. Buffer zones are areas of active economic development, for which a consistent set of measures should be planned, focused either on gradual "additional development" to the state of a developed territory, or on a long-term curtailment of activities, reclamation of the territory and its return to a "natural" state. The first case involves the development of a road network, the second - the closure of sites. Controlled compression is a difficult decision, involving understanding the dynamics of the development of the territory and considering the possibility of its "revitalization". In a 1961 paper, economist S.V. Slavin noted that stopping the work of the "dead railway" (Salekhard - Igarka) was the right decision, since it is impossible to build in such harsh conditions in the north of the Yamalo-Nenets Autonomous Okrug, the road towards the city of Norilsk is possible only along the river. Yenisei. In the same year, F. Salmanov discovered large oil reserves in Western Siberia, and a few years later new railway lines were opened. Preservation of the "dead road" would save the Soviet Union a significant amount of money. We emphasize that the development of the Arctic territories took place with great difficulty, so complete elimination is not advisable.

- **least developed lands-** the classic hard-to-reach, roadless Arctic with the most severe conditions, where the implementation of the triad of principles is especially effective: impulsiveness, mobility, multifunctionality. The fight against off-road involves investment in the development of off-road transport.

Policy implementation success criteria:

- **traditional:** large investment projects that provide jobs for thousands of jobs often involve costs that are not comparable to the benefits, the northern territories need not quantitative (many workers), but qualitative indicators (skilled specialists);

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➤ **arctic:** territorially differentiated efficiency criteria.

- **Poor cell and internet coverage** and low reliability: they hinder the socio-economic development of the regions, lead to difficulties in providing emergency assistance, hinder the development of tourism and a positive perception of the region, and lead to problems in production. Laying fiber optic cable along the Northern Sea Route faces political challenges, permafrost creates problems for laying cables over land, and it is difficult and expensive to provide Internet communications via satellites in elliptical orbit ("Yamal"). There are plans to implement the total coverage of the territory with Internet communications as a pilot region for a low-orbit satellite communications project ("Sphere" or an analogue). Several projects are working on creating a network of several dozen satellites.

- **Low density of year-round roads, lack of terrestrial communication with all settlements** as a result - high transport costs. Solution: building roads and developing new forms of off-road transport. In Yakutia, a new type of airship was tested, the idea of using them appeared long ago, but it faced a number of problems.

- **Seasonality, including the seasonal nature of the delivery of goods.** To solve this problem, it is necessary to provide for the replacement of the northern delivery with local resources. Architects in Alaska include in the design of the house the possibility of a one-time delivery of all the necessary materials to a remote village by one small-engine aircraft.

- **Periphery/remoteness - low susceptibility to innovation** in peripheral rural communities due to the lack of human capital and material resources, as a result - the high cost of life support. For example, there is a high demand among the administrative structures of a number of territories for information about new technologies and features of self-sufficiency, for example, the construction of a dam in difficult climatic conditions. The solution is to use in the Arctic the methods used in the field of social innovation, when a specific person is selected as an intermediary between the local community and the carriers of new technologies, for example, a teacher who is able to introduce and use innovations (wind power plant).

- **The high cost of life support for remote settlements.** The solution is the provision itself or the elimination of settlements. The key factor for choosing a strategy is the decision of the inhabitants. In foreign Arctic regions, there are works dedicated to helping small communities in a crisis situation, the first proposal in them is to search for a local leader (and not an investor). In some settlements, representatives of older age groups support the idea of resettlement, in others, it is advisable to use a flexible system of legislative standards. A person who wants

to live in the wild in Alaska independently builds a road to his house and installs solar panels, freeing local authorities from the need to deliver fuel and a socially significant set of products to him. Russia fulfills a wide range of social obligations, the impossibility of providing them paradoxically leads to the liquidation of remote settlements. Therefore, people should have the right to make lifestyle choices - while taking responsibility for their lives and health.

- **High construction cost**, as a result - low rates; the use of non-adapted technologies, as a result - a high level of accidents. Solution: creation of a pilot quarter to select the best design and technological innovations for the Arctic regions.

- **High transport costs for the import and export of agricultural products**, low demand in the Russian market. To solve the problem, there is a range of possibilities: promotion of products to the markets of large cities of Russia and to foreign countries, development of gastronomic tourism and infrastructure for primary processing of products, sales in corporations of subsoil users. For the Nenets Autonomous Okrug, the traditional approach is the delivery of products produced throughout the district to the regional center - the city of Naryan-Mar, while in the eastern part of the region there are winter roads that provide the opportunity to use a much shorter route to the city of Vorkuta, in the western part - faster and it is easier to export products to the city of Arkhangelsk through the city of Mezen. Note that the Arctic almost always requires non-standard solutions.

- **Threats of degradation of the traditional way of life of indigenous peoples and the ecology of the environment.** Solution: distance education for representatives of the indigenous peoples of the North, including the development of textbooks in national languages, the introduction of the practice of nomadic schools, the creation of digital archives of culture, including recordings of traditional folklore and rituals, the involvement of representatives of indigenous peoples in the creation of video products, the development of computer games. Ensuring a healthy lifestyle, including self-diagnosis based on the use of automated medical devices, educational work and a "hot line" for residents of remote settlements. In nature management: the use of digital technologies, the use of unmanned aerial vehicles to optimize the routes of movement of herds, control the quality of the state of pastures, and warn of predator attacks.

- **Low level of entrepreneurship development** driven by a number of barriers:

- **institutional-** the need to provide northern benefits provided for by the Labor Code of the Russian Federation;

- **natural-** heating and capital construction costs;

- **economic** - high transport costs.

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Solution: compensation for the costs of entrepreneurs aimed at providing northern benefits, or revision of the preferential system.

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Article



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A MODEL FOR ANALYZING THE IMPACT OF HUMAN ECONOMIC ACTIVITY ON THE ENVIRONMENT IN THE MAPLE SYSTEM

Abstract: A matrix method based on the theory of linear algebra is used to construct and study models for predicting the state of the environment. Matrix transformations are accompanied by complex calculations, routine calculations, which increase as soon as the dimension of the matrices increases. Computer mathematics systems, which are rapidly developing today, are able to reduce or completely avoid the difficulties of the computational process. The article discusses the modeling of a comparative analysis of the impact of construction projects on the environment by the example of the Petersen matrix model in the Maple system.

Key words: matrix, aggregated estimate, production factors, column vector.

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Модель анализа воздействия хозяйственной деятельности человека на окружающую среду в системе Maple

Аннотация: Для построения и исследования моделей прогнозирования состояния окружающей среды используется матричный метод, в основе которого лежит теория линейной алгебры. Матричные преобразования сопровождаются сложными вычислениями, рутинными выкладками, которые увеличиваются, как только повышается размерность матриц. Системы компьютерной математики, которые стремительно развиваются сегодня, способны уменьшить или полностью избежать трудностей вычислительного процесса. В статье рассматривается моделирование сравнительного анализа воздействия строительства проектов на окружающую среду на примере матричной модели Петерсена в системе Maple.

Ключевые слова: матрица, агрегированная оценка, производственные факторы, вектор-столбец.

Введение

Экологическая оценка состоит из нескольких стадий. Важной стадией является прогноз значимости воздействий деятельности намечаемой деятельности на окружающую среду и ее оценка. На этой стадии устанавливается факт тех изменений которые могут быть происходить в среде при применении каких-либо альтернативных действий. Также на этой стадии оценивается важность вносимых изменений [1].

Оценивая те или иные воздействия на окружающую среду, используют методы, которые

являются взаимодополняемыми. Характеризуются методы своей направленностью на выявление значимых воздействий намечаемой хозяйственной деятельности. Теоретическими основами одного из методов является линейная алгебра, сам же метод называется матричным.

При матричном методе используются различные типы матриц:

1) перечни типов воздействий, простые контрольные списки;

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2) списки объектов, которые испытывают влияние и изменяются под каким-либо воздействием, простые контрольные списки;

3) простейшие причинно-следственные матрицы с установлением взаимодействия типов воздействия и объектов для их испытания;

4) сложные матрицы экологических последствий хозяйственной деятельности и обратных реакций [2].

Основой простых и сложных контрольных листов являются перечни типов воздействий или списки компонентов природной среды, которые терпят изменения под воздействием. Перечисление компонентов природной среды осуществляется в строках матрицы. В столбцах матрицы приводятся типы воздействий. В случае изменений при реализации проекта связано с изменением компонента среды, то идет отметка той клетки в матрице, в которой зафиксировано взаимодействие. Ранжирование интенсивных воздействий осуществляется в сложных матрицах. При ранжировании придается вес или балл интенсивности. Также в сложных матрицах выполняется ранжирование по значимости изменений в экосистемах. В таких матрицах определяется значимость изменения под воздействием объекта, испытывающего воздействие [1]. При расчете агрегированных показателей перемножаются вес воздействия и значимость изменений, затем осуществляется суммирование значений по столбцам и по строкам. Так определяют интенсивность воздействий, которые направлены на выявление наиболее чувствительных или наиболее изменяющихся объектов, терпящих воздействие. К примеру, было выявлено, что наибольшее воздействие оказывается на почву и поверхностные воды; менее значительное - на грунтовые воды; и совсем не оказывается воздействие на атмосферу, фауну и флору[3]-[5].

Рассмотрим матричную модель Петерсена, которая представляет модель анализа воздействия хозяйственной деятельности человека на окружающую среду. В этой модели рассматривается две группы матриц, которые обозначим A и B ; вектор, обозначим его через V .

Для матриц группы A определяют первичное воздействие элементов конкурирующих проектов строительства или реконструкции некоторой территории на параметры окружающей среды; качество поверхностных вод, воздуха, почв, биотические

сообщества и т.д. Часто эти воздействие оценивается в баллах в интервале $[-3...+3]$.

Строки матрицы A - хозяйственные (производственные) факторы первично воздействующие на окружающую среду, столбцы - параметры окружающей среды. Таким образом, строки воздействуют на столбцы[6].

Для матриц группы B при использовании тех же величин проводится оценка вторичного воздействия, которое могут оказать измененные под влиянием проектов компоненты природной среды на социальные факторы: плотность населения, уровень здоровья, производство продуктов, услуг, занятость и т.д. В матрице B параметры окружающей среды вторично воздействующие на человека (социум) — строки; социальные факторы — столбцы. Так же, как и в матрице A осуществляется воздействие строк на столбцы.

Матрицы группы A и B называют матрицами Петерсена. Вектор V называют вектором веса значимости социальных факторов. Матрица Петерсена – это комплексное описание экологических систем, применяемых при оценке окружающей среды. Матрица имеет столько столбцов, сколько количество соответствующих вовлеченных компонентов (например, химических веществ, загрязняющих веществ, биомассы) и столько строк, сколько вовлеченных процессов(биохимические реакции, физическое разложение). Еще один столбец добавляется для размещения описания кинетики каждого преобразования ([уравнения скорости](#))[7].

Произведение матриц AB : $AB = C$ определяет непосредственное воздействие производственных факторов проекта на социальные факторы. Умножив полученную матрицу C на вектор весов значимости социальных факторов V , получают результирующий вектор-столбец CV , сумма значений которого является агрегированной оценкой воздействия проекта. Лучшим является проект с большей агрегированной оценкой.

Проведем сравнительный анализ влияний 2-х проектов строительства и выбрать проект с наименьшим антропогенным влиянием, если имеются матрицы Петерсена A_1, A_2 - влияние проектов на компоненты окружающей среды, B - влияние на социум, V - значимость социальных факторов[3]:

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$$A_1 = \begin{pmatrix} 3 & 1 & 0 \\ 2 & 2 & -2 \\ -2 & -3 & -1 \\ 2 & 3 & 3 \\ -2 & -3 & 0 \end{pmatrix}, A_2 = \begin{pmatrix} 2 & 3 & 1 \\ -2 & 2 & 2 \\ -1 & -2 & -3 \\ 3 & 2 & 3 \\ 0 & -2 & -3 \end{pmatrix}, B = \begin{pmatrix} -3 & -2 & -1 & -2 \\ 3 & -1 & 0 & 2 \\ 1 & -1 & 2 & 0 \end{pmatrix}.$$

При расчете агрегированных оценок влияния проектов 2-х проектов A_1 и A_2 на окружающую среду для первого проекта A_1 имеем:

$$A_1 \cdot B = \begin{pmatrix} 3 & 1 & 0 \\ 2 & 2 & -2 \\ -2 & -3 & -1 \\ 2 & 3 & 3 \\ -2 & -3 & 0 \end{pmatrix} \cdot \begin{pmatrix} -3 & -2 & -1 & -2 \\ 3 & -1 & 0 & 2 \\ 1 & -1 & 2 & 0 \end{pmatrix} = \begin{pmatrix} -6 & -7 & -3 & -4 \\ -2 & -4 & -6 & 0 \\ -4 & 8 & 0 & -2 \\ 6 & -10 & 4 & 2 \\ -3 & 7 & 2 & -2 \end{pmatrix} = C_1,$$

для второго проекта A_2 :

$$A_2 \cdot B = \begin{pmatrix} 2 & 3 & 1 \\ -2 & 2 & 2 \\ -1 & -2 & -3 \\ 3 & 2 & 3 \\ 0 & -2 & -3 \end{pmatrix} \cdot \begin{pmatrix} -3 & -2 & -1 & -2 \\ 3 & -1 & 0 & 2 \\ 1 & -1 & 2 & 0 \end{pmatrix} = \begin{pmatrix} 4 & -8 & 0 & 2 \\ 14 & 0 & 6 & 8 \\ -6 & 7 & -5 & -2 \\ 0 & -11 & 3 & -2 \\ -9 & 5 & -6 & -4 \end{pmatrix} = C_2.$$

Матрицы C_1 и C_2 умножим на V , соответственно:

$$C_1 \cdot V = \begin{pmatrix} -6 & -7 & -3 & -4 \\ -2 & -4 & -6 & 0 \\ -4 & 8 & 0 & -2 \\ 6 & -10 & 4 & 2 \\ -3 & 7 & 2 & -2 \end{pmatrix} \cdot \begin{pmatrix} 2 \\ 3 \\ 1 \\ 3 \end{pmatrix} = \begin{pmatrix} -48 \\ -22 \\ 10 \\ -8 \\ 11 \end{pmatrix} = S_1;$$

$$C_2 \cdot V = \begin{pmatrix} -6 & -7 & -3 & -4 \\ -2 & -4 & -6 & 0 \\ -4 & 8 & 0 & -2 \\ 6 & -10 & 4 & 2 \\ -3 & 7 & 2 & -2 \end{pmatrix} \cdot \begin{pmatrix} 2 \\ 3 \\ 1 \\ 3 \end{pmatrix} = \begin{pmatrix} -10 \\ 58 \\ -2 \\ -36 \\ -21 \end{pmatrix} = S_2.$$

Суммируем элементы матриц S_1 и S_2 :

$$AO_1 = -57; AO_2 = -11,$$

полученное значение есть агрегированная оценка воздействия проектов. Проект с наибольшей агрегированной оценкой является лучшим проектом строительства:

$$AO_1 < AO_2,$$

тем самым таким проектом является проект A_2 .

Проведем сравнительный анализ влияний 2-х проектов строительства в системе Maple. Используем специализированный пакет системы Maple – *LinearAlgebra*[8]:

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restart;
with (LinearAlgebra);

Вводим A_1 , A_2 - матрицы Петерсена, B , V :

$A1 := \text{Matrix}(5,3,[3,1,0,2,2,-2,-2,-3,-1,2,3,3,-2,-3,0]);$

$A2 := \text{Matrix}(5,3,[2,3,1,-2,2,2,-1,-2,-3,3,2,3,0,-2,-3]);$

$B := \text{Matrix}(3,4,[-3,-2,-1,-2,3,-1,0,2,1,-1,2,0]);$

$V := \text{Matrix}(4,1,[2,3,1,3]);$

$$A1 := \begin{bmatrix} 3 & 1 & 0 \\ 2 & 2 & -2 \\ -2 & -3 & -1 \\ 2 & 3 & 3 \\ -2 & -3 & 0 \end{bmatrix}$$
$$A2 := \begin{bmatrix} 2 & 3 & 1 \\ -2 & 2 & 2 \\ -1 & -2 & -3 \\ 3 & 2 & 3 \\ 0 & -2 & -3 \end{bmatrix}$$

$$B := \begin{bmatrix} -3 & -2 & -1 & -2 \\ 3 & -1 & 0 & 2 \\ 1 & -1 & 2 & 0 \end{bmatrix}$$

$$V := \begin{bmatrix} 2 \\ 3 \\ 1 \\ 3 \end{bmatrix}$$

Для каждого проекта производим расчет агрегированных оценок влияния проектов на окружающую среду. Умножим матрицу A_1 на матрицу B , а затем полученную матрицу умножим на матрицу V , при этом используем

команду *Multiply*. В результате получим матрицу $S1$. Суммируя элементы матрицы $S1$, получим значение $AO1$, которое является агрегированной оценкой влияния проекта A_1 на окружающую среду[8]-[10]:

$C1 := \text{Multiply}(A1,B);$

$S1 := \text{Multiply}(C1,V);$

$AO1 := S1[1,1]+S1[2,1]+S1[3,1]+S1[4,1]+S1[5,1];$

$$C1 := \begin{bmatrix} -6 & -7 & -3 & -4 \\ -2 & -4 & -6 & 0 \\ -4 & 8 & 0 & -2 \\ 6 & -10 & 4 & 2 \\ -3 & 7 & 2 & -2 \end{bmatrix}$$

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$$SI := \begin{bmatrix} -48 \\ -22 \\ 10 \\ -8 \\ 11 \end{bmatrix}$$

$$AOI := -57$$

Те же вычисления произведем для проекта A_2 :

```
C2:=Multiply(A2,B);
S2:=Multiply(C2,V);
AO2:=S2[1,1]+S2[2,1]+S2[3,1]+S2[4,1]+S2[5,1];
```

$$C2 := \begin{bmatrix} 4 & -8 & 0 & 2 \\ 14 & 0 & 6 & 8 \\ -6 & 7 & -5 & -2 \\ 0 & -11 & 3 & -2 \\ -9 & 5 & -6 & -4 \end{bmatrix}$$

$$S2 := \begin{bmatrix} -10 \\ 58 \\ -2 \\ -36 \\ -21 \end{bmatrix}$$

$$AO2 := -11$$

Для того, чтобы система осуществила выбор в сторону проекта с наибольшей агрегированной оценкой, используем условный оператор *if*.

Оператор *if* позволяет записать условное выражение вида[9]:

if<Условие>*then* <Элемент 1>*else* < Элемент 2> *fi*;
(если<Условие>тогда <Элемент 1>иначе < Элемент 2>) *fi*)

```
if AO1>AO2 then print('AO1_Nailychi_proekt');
else print('AO2_Nailychi_proekt_');
fi;
```

AO2_Nailychi_proekt_

Для автоматизированной программы, вводим числовые данные- элементы матриц в начале программы и через буквенные обозначения записываем исходные матрицы[10]:

```
restart;
with (LinearAlgebra);
a11:=3:a112:=1:a113:=0:a121:=2:a122:=2:a123:=-2:
a131:=-2:a132:=-3:a133:=-1:a141:=2:a142:=3:a143:=3:
a151:=-2:a152:=-3:a153:=0:
a211:=2:a212:=3:a213:=1:a221:=-2:a222:=2:a223:=2:
a231:=-1:a232:=-2:a233:=-3:a241:=3:a242:=2:a243:=3:
a251:=0:a252:=-2:a253:=-3:
b11:=-3:b12:=-2:b13:=1:b14:=-2:b21:=3:b22:=-1:b23:=0:b24:=2:
b31:=1:b32:=-1:b33:=2:b34:=0:
v11:=2:v21:=3:v31:=1:v41:=3:
```

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A1:=Matrix(5,3,[a111,a112,a113,a121,a122,a123,a131,a132,a133,a141,a142,a143,a151,a152,a153]);
A2:=Matrix(5,3,[a211,a212,a213,a221,a222,a223,a231,a232,a233,a241,a242,a243,a251,a252,a253]);
B:=Matrix(3,4,[b11,b12,b13,b14,b21,b22,b23,b24,b31,b32,b33,b34]);

Далее, программа идентична описанию выше. Как видно, программа работает без каких-либо осложнений. Действия над матрицами осуществляются согласно применения команд для матричных операций.

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Article



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EFFECTIVENESS OF USAGE OF ENTREPRENEURIAL CAPITAL IN ECONOMIC SECTORS OF SUGHD REGION

Abstract: The article dwells on transformation of property relations and the emergence of mixed ownership contributed to the competition of entrepreneurial capital and require highly qualified specialists and economic knowledge, but also a good knowledge of the basics of the economy, doing business, communication skills and the ability to find a compromise solution in negotiations. The main forms of mixed ownership in the economy of the Sughd region are of great importance, ensuring the functioning of the private and collective sectors of the economy, providing jobs for the population of the region and others, investing their entrepreneurial capital in the development and management of the region's economy.

Key words: effectiveness, economy, economic sectors, Sughd region, labor productivity.

Language: Russian

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ЭФФЕКТИВНОСТЬ ИСПОЛЬЗОВАНИЯ ПРЕДПРИНИМАТЕЛЬСКОГО КАПИТАЛА В ОТРАСЛЯХ ЭКОНОМИКИ СОГДИЙСКОЙ ОБЛАСТИ

Аннотация: Изучена трансформация отношений собственности и появление смешанной собственности способствуют действию конкуренции предпринимательского капитала и требует от специалистов высокой квалификации и экономических знаний, но и хорошее знание основ экономики, ведения бизнес деятельности, коммуникабельности и умения находить компромиссное решение в переговорах. Основные формы смешанной формы собственности в экономике Согдийской области имеют огромное значение, обеспечивая функционирование частной и коллективных секторов экономики, обеспечивая работой население области и других, вкладывая свой предпринимательский капитал в развитие и управление экономикой региона.

Ключевые слова: эффективность, экономика, отрасли экономики, Согдийская область, производительность труда.

Введение

УДК – 338 (575.3)

Основываясь на общепринятой формуле эффективности предлагаемый метод оценки производительности труда предпринимательского капитала экономики региона как набора показателей для оценки различных субъективных показателей. Субъективная оценка

эффективности предпринимательского капитала на основе сочетания ее квалификационных возможностей.

Следовательно, показатель экономической эффективности предпринимательского капитала экономики региона (Т) будет:

$$T = T_{\text{пр}} + T_{\text{ф}} \quad (1)$$

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где $T_{пр}$ - показатель эффективности экономической деятельности отдельной отрасли;

T_{ϕ} - индикатор эффективности взаимодействия субъектов производства в конкурентных рыночных условиях хозяйствования.

Эффективность предпринимательского капитала необходимо оценить в основных

отраслях: промышленности, сельском хозяйстве, смешанном, малом и среднем бизнеса экономики региона и сфере услуг (не умаляя роль и значение других отраслей экономики региона).

Промышленность является локомотивом экономики Согдийской области и трансформация отношений собственности привела к изменению предпринимательского капитала и структуры отраслей промышленности, что отражено ниже.

Таблица 1. Структура предпринимательского капитала отраслей промышленности Согдийской области(в%)

	2015	2016	2017	2018*	2019*	2020*
Вся промышленность	100	100	100	100	100	100
Минерало - добывающая промышленность	33,7	29,1	25,8	30,6	26,3	35,4
в том числе:						
Добыча энергетических материалов	1,3	1,5	2,3	3,5	3,0	2,4
Добыча неэнергетических материалов	32,4	27,6	26,2	27,1	23,3	33,0
Обрабатывающая промышленность	60,7	66,7	66,8	64,0	69,0	61,3
в том числе:						
Производство пищевых продуктов, включая напитки и табака	31,2	46,1	49,0	33,6	33,3	25,9
Текстильное и швейное производство	23,6	16,1	13,1	12,5	10,2	8,9
Производство кожи, изделий из кожи и производство обуви	0,01	0,1	0,1	0,1	0,4	0,3
Обработка древесины и производство изделий из дерева	1,3	0,5	0,4	0,5	0,7	0,7
Целлюлозно – бумажное производство, издательская и полиграфическая деятельность	0,1	0,2	0,1	0,3	0,2	0,1
Производство нефтепродуктов	0,7	0,6	0,3	0,1	0,0	-
- Химическое производство	-	-	-	-	1,4	1,1
Производство резиновых и пластмассовых изделий	1,3	1,3	1,5	1,9	1,1	0,8
Производство прочих неметаллических минеральных продуктов	1,8	1,4	1,8	2,4	4,4	6,1
Металлургическое производство и производство готовых металлических изделий	0,2	0,1	0,1	11,8	16,7	17,0
Машиностроение	0,5	0,3	0,3	0,5	0,5	0,2
Прочие отрасли промышленности	0,01	0,02	0,1	0,3	0,2	0,1
Производство и распределение электроэнергии, газа и воды	5,6	4,2	4,7	5,4	4,7	3,3

Эффективность предпринимательского капитала различных форм собственности и форм предприятий Согдийской области способствовали росту объемов промышленности.

Так, за 2020 год промышленными предприятиями произведено продукции на сумму 9883097,9 тысяч сомони, что по отношению к 2019 года с учетом индекса производства промышленной продукции составил 131,5%.

Из 593 отчитывающихся промышленных предприятий в 2020 года 379 или 64,0% предприятий превысили уровень 2019 года. В тоже время количество простаивавших предприятий в 2020 году, составило 75 (или 12,6%) или 139 (23,4%) предприятий уменьшили

уровень производства с соответствующим периодом 2019 года [1; 6; 7; 8].

Рост объема промышленной продукции в 2020 года, по сравнению с 2019 года, обусловлен, по нашему мнению 2 факторами:

1. Трансформацией собственности, появлением различных форм хозяйствования, предпринимательским капиталом и их влиянием на развитие экономики региона.

2. Приростом производства пищевых продуктов.

Основным условием притока трудоспособного предпринимательского капитала на рынок труда является наличие свободных рабочих мест. Создание новых и расширение

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действующих предприятий и организаций приводит к росту рабочих мест, что безусловно связано с обновлением основного капитала.

За последние годы в связи с ростом капитальных вложений, как в государственных, так и на кооперативных предприятиях и в организациях потребность в предпринимательском человеческом капитале имеет тенденцию к росту. Так, сумма капитальных вложений если в 2016 г. по Согдийской области составила 1925043,1 тыс. сомони, в то время как в 2015 году 1658924,8 тыс. сомони, а в 2011 году 902738,5 тыс.сомони [2; 3; 4; 5].

Этот рост в основном происходит в промышленности, транспорте и связи, жилищно-коммунальном хозяйстве, в народном образовании.

Следует отметить, что значительная часть капиталовложений была направлена на развитие отраслей промышленности и, прежде всего, в развитие гидроэнергетики.

Это в свою очередь вызвало некоторый рост притока свободного предпринимательского

капитала на рынок труда Согдийской области. По количественным темпам роста среднегодовой численности рабочих и служащих первенство удерживают предприятия и организации частного сектора (52,0%). На второй месте - предприятия и организации коллективной формы собственности (31,1%) [2].

В ходе реализации экономической реформы создается реальная база с основным предпринимательским капиталом для возникновения и развития многоукладного хозяйствования на селе.

Поэтому, по сравнению с промышленностью в сельском хозяйстве есть определенные положительные сдвиги, в деле формирования предпринимательского капитала. Так, по состоянию 2016 г. в Согдийской области зарегистрировано 1 государственное сельхозпредприятие, 58964 дехканских хозяйств и 688 прочих сельхозпредприятий, то есть 98,8% относятся к дехканским или частным хозяйствам [2, с.193]. Другими словами 98,87% сельхозпредприятий это предприятия частного сектора.

Таблица 2. Динамика дехканских хозяйств в экономике Согдийской области.

	2014	2015	2016	2017	2018	2019
Число дехканских хозяйств,ед	12772	15515	17708	34475	50472	54661
Посевные площади сельскохозяйственных культур тыс.га	167,3	166,8	167,0	166,0	183,8	190,5

Из таблицы видно, что количество дехканских хозяйств увеличилось с 12772 ед до 54661 ед или возросло на 23,3%.

Особую роль в развитии экономики Согдийской области играет предпринимательский капитал смешенного, малого и среднего бизнеса.

Развитие малое и среднего предпринимательство в сельском хозяйстве является одним из приоритетных направлений экономической политики. Это сфера деятельности обеспечивает формирование высокоэффективной предприимчивости, рациональное использование относительно не крупных, особенно вторичных ресурсов, создание механизма рыночного саморегулирования. Сырьевая база этих отраслей может быть размещена во всех регионах республики.

Кроме того, они могут успешно решать три жизненно важные задачи: производство конъектурного малообъемного количества продукции, оперативное удовлетворение потребностей населения и обеспечения привлекательными местами трудоустройства.

Оценка деятельности малых и средних

предприятий сельского хозяйства в Согдийской области свидетельствуют о том, что за период, начиная с 2010 по 2016гг. динамика роста число малых и средних фирм сферы услуг положительная. Рост в целом по РТ составил - 18,3 %, по Согдийской области - 15,9 %. При этом на долю частных фирм приходится 74,8 %.

В развитии предпринимательства в сельском хозяйстве региона достигнуты определенные результаты. В 2016 г. в Согдийской области функционировали 1189 предприятий, 39,4 тыс. физических лиц осуществляли индивидуальную предпринимательскую деятельность. В сфере малого и среднего предпринимательства было занято 30156 чел., что составило 7,5 % от общей численности населения, занятого в экономике региона [2, с.75-177].

В результате трансформации, более половины населения заняты в частном или коллективном секторах экономики, на совместных предприятиях.

Возникновение различных форм собственности и соответственно, секторов

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экономики региона увеличила капитальные вложения в них, о чем было отмечено ранее.

А) Государственно-частное партнерство как форма предпринимательского капитала со смешанной собственностью

Неразвитость государственно-частного предпринимательства и недостаток финансирования в национальной и региональной экономике не позволяет субъектам хозяйствования, со смешанной собственностью,

выйти на мировой уровень развития и эффективно развиваться в инновационных сетевых структурах.

Главным источником развития и функционирования субъектов государственно-частного предпринимательства в экономике Согдийской области, выступают заимствованные, благотворительные и собственные средства, особенно в оказании платных услуг.

Таблица 3. Эффективности предпринимательского капитала сферы услуг Согдийской области.

	ед. изм.	2014	2015	2016	2017	2018	2019
Объем платных услуг населению	млн.	8923,6	9949,8	10805,5	10913,6	10084,1	10033,7
на душу населения	сомон	879,6	1096,4	1180,0	1231,7	1131,3	1161,2
Число предприятий бытового обслуживания	единиц	650	558	548	425	436	461
Чис.работников	1000	2,4	2,1	2,1	1,7	1,9	2,1

Расчеты автора по: Статистический ежегодник Согдийской области (Статистический сборник). Агентство по статистике при Президенте Республики Таджикистан в Согдийской области, 2020. С.75 - 177.

Потребность в государственно-частного предпринимательства с предпринимательским капиталом со смешанной формой собственностью, в региональной экономике удовлетворена всего на 15-20%. [11]

В зависимости от участвующих в конкуренции предпринимательского капитала и рыночных субъектов смешанной собственности разделяют конкуренцию предложения товаров и конкуренцию спроса.

Особенно во внешней торговле, о чем свидетельствует нижеследующая таблица. [12, с.120]

Таблица 4. Динамика внешнеторговой деятельности предпринимательского капитала со смешанной собственностью.

ед. изм.		2014	2015	2016	2017	2018	2019
Внешнеторговый оборот	млн. долл.	4463,3	5138,1	4988,8	5274,7	4326,2	3929,9
страны СНГ	млн. долл.	2017,9	2311,4	2093,0	2405,7	2045,4	1968,0
страны остального мира	млн. долл.	2446,4	2826,7	2895,8	2869,0	2280,8	1961,9
Экспорт	млн. долл.	1257,3	1359,7	943,4	977,3	890,6	898,7
страны СНГ	млн. долл.	180,0	239,6	177,4	246,0	226,7	294,4
страны остального мира	млн. долл.	1077,3	1120,1	766,0	731,3	663,9	604,3

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Импорт	млн. долл.	3206,0	3778,4	4045,4	4297,4	3435,6	3031,2
страны СНГ	млн. долл.	1836,9	2071,8	1915,6	2159,7	1818,7	1673,6
страны остального мира	млн. долл.	1369,1	1706,6	2129,8	2137,7	1616,9	1357,6
Сальдо	млн. долл.	-1948,7	-2418,8	-2988,8	-3320,1	-2545	-2132,5
страны СНГ	млн. долл.	-1656,9	-1832,2	-1754,2	-1913,6	-1592,0	-1379,2
страны остального мира	млн. долл.	-291,8	-586,6	-1234,6	-1406,4	-953,0	-753,3

Характерно, что предпринимательский капитал государственно-частного партнерства со смешанной собственностью, также развиты и во внешней торговле, в взаимодействии РТ с другими странами.

Таким образом, трансформация отношений собственности и появление смешанной собственности способствуют действию конкуренции предпринимательского капитала и требует от специалистов высокой квалификации и экономических знаний, но и хорошее знание основ экономики, ведения бизнес деятельности,

коммуникабельности и умения находить компромиссное решение в переговорах.

Б) Предпринимательский капитал совместных предприятий как форма смешанной формы собственности в экономике региона

Эффективной формой смешанной собственности является создание и функционирование совместных предприятий в экономике Согдийской области.

Характеристика основных показатели их деятельности показаны ниже.

Таблица 9. Динамика основных показателей предпринимательского капитала совместных предприятий

	2014	2015	2016	2017	2018	2019
Затраты на производство и реализацию продукции (работ,услуг), тыс сомони						
Всего:	661701,8	687346,9	725986,2	890893,5	1145609,5	1643174,5
в том числе: города и районы						
Айнийский р-н	45554,7	54725,4	57625,0	71746,2	81913,9	97307,7
Аштский р-н	-	-	-	-	-	-
Б. Гафуровский р-н	14973,4	21034,6	17611,3	25293,5	30015,9	38712,7
г.Бустон	1075,4	1141,0	733,7	607,9	942,9	793,1
г.Гулистон	100576,3	107809,7	113809,2	129043,6	144177,4	193730,0
Зафарабадский р-н	-	-	-	-	-	-
г.Истаравшан	80615,0	101311,0	113465,0	140146,0	150019,0	143673,0
г.Исфара	14233,6	19223,8	17664,0	16008,1	9075,1	14844,2
Канибадамский р-н	-	-	31,9	-	-	-
Матчинский р-н	5,0	3,3	-	-	-	-
г. Пенджикент	192824,6	310461,6	327313,8	429909,0	651992,0	1047016,0
ш. Хучанд г. Худжанд	211843,8	71636,5	77732,3	78139,2	77473,3	107097,8

Анализ таблицы показывает, что предпринимательский капитал совместных предприятий как форма смешанной собственности функционируют по всей территории области. Но, основное их количество сосредоточено в центре области. Причина этого:

- более благоприятная привлекательная бизнес среда т.е. инвестиционный климат более привлекателен;

- инфраструктура более развита;
- близость и финансовых и управленческих структур.

Эти факторы способствуют более эффективному развитию совместных предприятий в областном центре и области, сокращая издержки как производственные так и не производственные.

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В) Предпринимательский капитал свободных экономических зоны в экономике региона

В республике Таджикистан действуют 4 свободные экономические зоны со смешанной и частной собственностью: Дангара, Сугд, Ишкашим и Пяндж.

В Согдийской области функционирует как отмечено выше СЭЗ СУГД.

Свободная экономическая зона «Сугд» расположенная в г.Худжанде имеет площадь 320 га. В СЭЗ «Сугд» зарегистрировано 23 субъекта, 3 из которых являются совместными.

Субъекты СЭЗ «Сугд» реализуют проекты с финансированием Польши, Турции и Китая. В январе-декабре 2017 г. в СЭЗ «Сугд» из 23 зарегистрированных субъектов, зарегистрировано 3 совместных предприятия: ООО СП ТТ

«Таджпроф», ООО СП «СтарПласт», ООО СП «Силкоат Бойя». Из числа зарегистрированных объектов осуществляют деятельность 11 и 1 субъект произвел инвестиции в основной капитал для проведения строительных работ и покупредпринимательский капитали оборудования.

Вывод

Таким образом, можно отметить, что 4 основные формы смешанной формы собственности в экономике Согдийской области имеют огромное значение, обеспечивая функционирование частной и коллективных секторов экономики, обеспечивая работой население области и других, вкладывая свой предпринимательский капитал в развитие и управление экономикой региона.

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Article



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COMPARISON OF FIXED-LENGTH PARSING TOOLS

Abstract: This article provides an overview of the Astera Centerprise, Pandas, fixed-width-parser, SQL*Loader, JRecordBind, and JSaPar tools used to parse fixed length files. These tools are compared in terms of the ability to process fixed-length records of different types, as well as in terms of the ability to process files with a hierarchical structure. As a result of the comparison, the tools that are most suitable for processing fixed-length files with a hierarchical structure are selected.

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Introduction

This article touches upon the problem of processing fixed-length files with a hierarchical structure.

Fixed length files are increasingly becoming an integral part of everyday life. They are used in systems that regularly receive data that is easier, faster and cheaper to process and transmit using a text format in which each position is reserved for a specific value. An example of such systems are automated booking systems.

To ensure the booking of air tickets and optimize the work of the airline industry, complex work with passenger data and their flights is necessary, which leads to the creation and analysis of fixed-length files. These files contain information about passengers, their flights and other data necessary for booking. Thus, automated booking systems are inextricably linked to fixed-length files.

Part of the fixed length files presented in automated booking systems has a hierarchical structure, that is, records of a certain type cannot

appear in a file without a previous record of another known type.

In this article, we will review and compare popular tools for parsing fixed-length files and identify among them those that are most convenient for working with hierarchies within files.

Astera Centerprise

One of the popular tools for handling fixed length files is the data management platform Astera Centerprise. The platform is an efficient data integration solution that enhances the convenience of working with ETL projects.

Astera Centerprise offers a rich library of built-in data transformations that allows you to validate, clean, and transform data without writing any code.

The built-in parser processes the incoming stream of data from fixed-length files into ready-made outputs [1].

The parser is very easy to prepare for work, as it has a small list of functions for processing files: The parser allows you to:

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- enable or disable the processing of the first line of the file as a file header;
- set a custom record separator;
- enable or disable the removal of leading and trailing spaces in a string;
- enable or disable the processing of multiple entries.

To set rules for parsing files, you need to create a parsing schema. The parsing scheme is a description of the file record structure. For one field, the name, title, data type, format, starting position, length, description, and nullability are specified.

The parsed data is exported to a text file, an Excel file, or a database table [3].

Because the platform does not offer the ability to organize dependencies between two records when parsing a file, it is not suitable for parsing fixed-length hierarchical files.

Pandas Library

The Python core library – Pandas – has a `read_fwf()` function for parsing fixed-length files.

In addition to the input file, the function takes a list of tuples as parameters. In each of the tuples, the interval of the corresponding field is indicated. For the fields that will be obtained during the parsing, it is possible to specify a name.

The function can skip some lines, process the file header separately, and also allows you to set a custom field separator [8].

One of the advantages of the function over analogues is the ability to automatically select the parsing scheme (that is, the intervals of each field) according to the parametrically specified number of the first records of the file.

However, since the function can only process records of one type at a time, it is not suitable for processing files of a fixed length with a hierarchical structure.

Package fixed-width-parser

fixed-width-parser package is provided as a JavaScript language module focused on parsing and assembling fixed-length files.

The `FixedWidthParser` class is responsible for working with the file. When a new class instance is initialized, the file parsing scheme is set. The parsing schema in this case is an array of configurations that define the relationship between lines of text and final JSON objects. The result of parsing the file is a JSON structure.

In addition to the standard functions for setting the location and length of a field within a single record, as well as assigning a string or number data type to each field, it is possible to set the alignment value within the field and specify the field fill character [6].

Like the considered Pandas library, the package processes only one type of record at a time, which, with a wide variety of records and their hierarchical structure, greatly complicates the processing of the corresponding files.

SQL*Loader

By virtue of its purpose (loading data into a database), the `SQL*Loader` utility very often has to deal with positional data, that is, fixed-length files.

The file format is specified in the control file. By file format is meant a description of the specific locations of the start and end bytes of each field [10].

In total, `SQL*Loader` provides 3 approaches for setting the field format:

- through the initial and final position of the field;
- through the initial position and length of the field;
- through the length of the field.

In the latter case, the relative positioning of the fields is used - that is, the next field begins exactly where the previous one ended.

To process one record, it is better to use one approach for all fields.

`POSITION` keyword is used to specify the start and end positions of a field when describing a schema.

Figure 1 shows an example of a control file using this approach. So, for example, the column `COLUMN_INT_VALUE_4` starts at position 6 and ends at position 9. The total length of the field is 4 characters.

```
1 LOAD DATA
2 INFILE 'fileFixedLength.dat'
3 INTO TABLE EXAMPLE_TABLE
4 (
5     → COLUMN_INT_VALUE_4 POSITION(1:4) INTEGER,
6     → COLUMN_INT_VALUE_4 POSITION(6:9) INTEGER,
7     → COLUMN_CHAR_VALUE_5 POSITION(11:15) CHAR,
8     → COLUMN_DATE_VALUE POSITION(16:21) DATE "YMMDD"
9 )
```

Figure 1 – `SQL*Loader` control file with fixed-length file parsing scheme

To specify the initial position and length, the `POSITION(S) DATATYPE(L)` binding is used, where S is the initial position, DATATYPE is the field data type, and L is the field length.

To specify only the length of the field, the `DATATYPE` keyword is used, where the length of the field is indicated in brackets [7].

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SQL*Loader offers more fine-grained customization of each field. For example, it allows you to turn on and off the trimming of leading or trailing (can be removed both from both sides and from one specific) spaces. The utility also allows you to replace a user-defined set of values with NULL or a default value [9]. These are just a few of the field customization options.

SQL*Loader allows you to process several different record types in a single load. To do this, use the WHEN clause, which specifies a condition that refers to the field being processed.

Therefore, SQL*Loader is suitable for processing hierarchical data if the records in a particular field will refer to the parent.

JRecordBind

JRecordBind library is written in Java and is used to parse fixed length text files [5].

To set the parsing format for positional files, the library uses a custom XSD parsing schema. The XSD schema enumerates and separately configures all

record types in a file. When creating a schema, the root record main is specified, with which the library will work when parsing. By specifying the length of the root entry, we are talking about dealing with a fixed length file. In the future, all records will be checked for compliance with this length. The root entry is given the type of entry that is the root of the entry hierarchy. When describing a root record type, the records nested within it are listed as separate elements. Thus, JRecordBind allows you to process files of a fixed length with a hierarchical structure in one pass through the file.

In addition, the XSD schema offers many attributes to customize the processing of any field. It is possible to set the field length, element separator and filler, line separator, converter (conversion from a string to the desired data type), the number of lines that make up one record, specify the element subclass (in case a record of the same type consists of several different types) [5].

On figure 2 is an example of an XSD schema for parsing a file.

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <xs:schema targetNamespace="http://url.example/"
3           xmlns:xs="http://www.w3.org/2001/XMLSchema"
4           xmlns="http://url.example/xmlns"
5           xmlns:jrb="http://jrecordbind.org/3/xsd"
6           elementFormDefault="qualified">
7   <xs:complexType name="rootRecord">
8     <xs:sequence>
9       <xs:element name="field1" type="xs:string" length="4" fixed="ROOT"/>
10      <xs:element name="field2" type="xs:int" length="6" jrb:converter="converters$SimpleIntConverter"/>
11      <xs:element name="field3" type="xs:string" length="5"/>
12      <!--subrecord-->
13      <xs:element name="subrecord" type="subrecordType" minOccurs="1"/>
14    </xs:sequence>
15  </xs:complexType>
16
17  <xs:complexType name="rootRecord">
18    <xs:sequence>
19      <xs:element name="field1" type="xs:string" length="9" fixed="SUBRECORD"/>
20      <xs:element name="field2" type="xs:string" length="6"/>
21      <!--subrecord-->
22      <xs:element name="subrecord" type="subrecordType" minOccurs="1"/>
23    </xs:sequence>
24  </xs:complexType>
25
26  <xs:element name="main" type="rootRecord" jrb:length="15" jrb:lineSeparator="#10"/>
27 </xs:schema>
```

Figure 2 – XSD schema for parsing a fixed-length file with a hierarchical structure for the JRecordBind library

JSaPar

JSaPar (Java Schema based Parser) is a Java library that provides a schema-based fixed-length file parser and linker. The description of the data format of a fixed length file is done in an XML schema [4].

In the parsing scheme for records (strings), you can specify the minimum length of the string, a fill character (in case the string does not reach the minimum in length), the string condition (the condition under which the string in question is determined to this type), the number of expected strings, the name record type, field separator, line separator (at the schema level).

For fields, in addition to the name, length and data types, you can set the alignment of the value within the string (center, left, right), filler characters (for alignments), the mode of deleting filler characters during parsing, the mode of deleting leading characters during parsing [2].

Despite the rich functionality of the library, it does not support the parsing of hierarchical files since records do not have the ability to refer to each other.

Tool Comparison

Each of the tools discussed has its own unique capabilities for processing fixed-length files, and each tool was created to solve its problems when working with such files. Because of this, not all of them can handle hierarchical file structures.

Among the tools reviewed, three options are of most interest – SQL*Loader, JRecordBind and JSaPar.

Although JSaPar does not directly handle hierarchical structures, it is able to handle several different types of records and has the ability to fine-tune the parsing of records. Since JSaPar is implemented in Java, where ready-made records are uploaded, matching records into a hierarchy after parsing does not cause much difficulty.

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SQL*Loader will be convenient to use if the data needs to be uploaded to the database without serious pre-processing.

JRecordBind allows you to process hierarchies during file parsing and provides a ready-made class with structure preservation. JRecordBind is a great option, especially if the parsed data needs some serious processing, which can be done using the Java language.

Conclusion

Thus, we have considered 6 tools for parsing fixed length files: Astera Centerprise, Pandas, fixed-width-parser, SQL*Loader, JRecordBind, JSaPar.

Among the considered tools, the most suitable for working with files with a hierarchical structure were selected: SQL*Loader, JRecordBind and JSaPar. For each of the selected tools, strengths were emphasized, and situations were identified in which their use would be the best solution for the developer.

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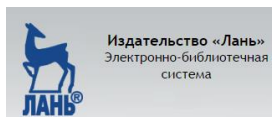
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