

КЛЮЧЕВЫЕ АСПЕКТЫ РАЗВИТИЯ ВНУТРИРЕГИОНАЛЬНОГО ПАССАЖИРСКОГО СООБЩЕНИЯ В ЕНИСЕЙСКОЙ СИБИРИ В УСЛОВИЯХ ЭПИДЕМИОЛОГИЧЕСКИХ ОГРАНИЧЕНИЙ

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Аннотация. В условиях неблагоприятной эпидемиологической обстановки, региональная транспортная система относится к числу наиболее пострадавших. Ограничения, накладываемые на работу общественного транспорта, снижают совокупный пассажиропоток, тем самым уменьшая объем выручки транспортных предприятий. Следовательно, актуальной задачей становится нахождение путей увеличения совокупного пассажиропотока. В статье предлагаются ключевые направления развития регионального железнодорожного транспорта, как наиболее безопасного в условиях эпидемии COVID-19.

Ключевые слова: транспорт, региональная инфраструктура, логистическая инфраструктура общественный транспорт, Красноярский край, Хакассия, Енисейская Сибирь.

KEY ASPECTS OF REGIONAL COMMUTER SERVICE DEVELOPMENT IN YENISEI SIBERIA DURING THE PANDEMIC RESTRICTIONS

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Abstract. During the unfavorable epidemiological situation, the regional transport system is among the most negatively affected. The restrictions imposed on the operation of public transport reduce the total passenger traffic, thereby reducing the volume of revenue of transport companies. Therefore, finding ways to increase the total passenger traffic becomes an urgent task. The article proposes key directions for the development of regional railway transport, as the safest in the context of the COVID-19 epidemic.

Key words: transport, regional infrastructure, logistics infrastructure, public transport, Krasnoyarsk Territory, Khakassia, Yenisei Siberia.

The development of a sustainable public transport system is one of the important factors in the regional development of the Russian Federation. The current conditions of an unfavorable epidemiological situation are characterized by the need to combine two opposed factors of its development: the need to increase the economic efficiency of transportation on the one hand, and also to increase the social distance between passengers on the other hand. Consequently, there is a need to replace road transport by rail when organizing passenger transportation. In particular, this becomes justified when organizing intraregional traffic, in which the availability of air transport for consumers is impossible without direct subsidies. This is also typical for the most populated districts of the Krasnoyarsk Territory (western, eastern and southern groups of districts), located at a distance of less than 700 km. from the edge center.

In our opinion, special attention should be paid to the development of daily railway passenger traffic for the implementation of transportation in intraregional traffic. This type of passenger transportation is characterized by a more stable, sustainable passenger traffic than interregional transportation, which is of particular importance in the context of the current decrease in traffic due to the COVID19 epidemic. As of 2021, the route network of intraregional trains in the Krasnoyarsk Territory does not cover a significant proportion of large settlements, covering only the eastern group of districts. This forces the residents of the western and southern group of districts to use road transport in an uncontested form, thereby creating an excessive load on the road transport network of the region, as well as increasing the risks arising from transportation. Thus, the organization of daily intraregional passenger transportation by rail within the existing infrastructure becomes justified. At the same time, one should also take into account the factor of the

Republic of Khakassia, which until 1991 was part of the Krasnoyarsk Territory. As a result, it has stable transport links with the city of Krasnoyarsk within the macro-region "Yenisei Siberia".

In addition to traditional suburban transportation, a new group of trains - "Day trains" with a route duration of more than 200 km, has been developed in the Russian Federation, used for interregional passenger transportation during daylight hours. Currently, most of these trains serve large settlements in the Central Federal District. On the scale of the Siberian Federal District, as of 2021, this category includes only one route 147/148 Kemerovo - Novosibirsk - Kemerovo [4].

Consider the current situation in the field of intraregional rail passenger transportation in settlements in the southern group of regions of the Krasnoyarsk Territory and the Republic of Khakassia. These territories can be described as the most populated and developed districts of Yenisei Siberia, concentrating the largest part of regions' population outside Krasnoyarsk. Thus, the current and potential passenger flows between them and Krasnoyarsk are the most sustainable and intense.

The provision of urban-type settlements and the largest rural settlements of the Krasnoyarsk Territory with railway transport in the southern group of districts and the Republic of Khakassia is offered in Table 1 [1,4,5,8,10]. According to statistics, in 26 out of 50 municipalities of the Krasnoyarsk Territory, passenger traffic is carried out, covering 48.90% of the urban population. However, only 7 of them have year-round daily connections with the regional center by day trains. As practice shows, rail transport can successfully compete with road transport only if there is a daily year-round service. For example, out of 31 urban settlements of the Novosibirsk region [10], passenger traffic is carried out in 22 of them (75.65% of the urban population outside Novosibirsk), including 16 settlements (59.73% of the urban population) provided with daily suburban communication with the regional center. [2, 10]. Since 2010, there has been no daily passenger traffic with settlements in the southern group of the Krasnoyarsk Territory and the city of Abakan. Other settlements of the Republic of Khakassia have been deprived of any passenger traffic with the city of Krasnoyarsk since 2013, which resulted in an outflow of passengers from rail to road / bus transport. As of 2021, long-distance and intra-regional railway passenger traffic in the southern group of regions of the Krasnoyarsk Territory and the Republic of Khakassia is represented by long-distance trains: Krasnoyarsk - Sayanskaya - Abakan (in operation daily), Abakan - Barnaul - Moscow and Abakan - Novosibirsk - Moscow "(every other day). Commuter passenger service exists only at the branches "Mezhdurechensk - Biskamzha - Abakan - Koshurnikovo" and "Askiz - Abaza" [1,9].

Let us assess the development prospects in these areas of daytime passenger traffic. Table 1 shows settlements with a population of more than 1000 people with a railway transport infrastructure:

Table 1 - Settlements of the southern group of districts of the Krasnoyarsk Territory and the Republic of Khakassia [1,4,5,8,10]

№	Settlements with a population of more than 1000 inhabitants (2021)	Station / stopping point	Distance from Krasnoyarsk (railroad), km	Population (2021)
Eastern part of southern group of districts of the Krasnoyarsk Territory and the Republic of Khakassia				
1	Sayanskaya	Sayanskaya	187	3 997
2	Koshurnikovo (including the urban-type settlements (cities) of Krasnokamensk and Artemovsk)	Koshurnikovo	385	8 654
3	Kordovo	Kizir	436	1 042
4	Irba (including urban-type settlements Bolshaya Irba, the rural settlement Kurskoe)	Irba	466	4 285
5	Kuragino	Kuragino	458	13 095
6	Minusinsk (including eponymous urban-type district)	Minusinsk	543	70 821
7	Abakan	Abakan	561	187 239
Western part of southern group of districts of the Krasnoyarsk Territory and the Republic of Khakassia				

8	Kopievo	Kopievo	379	4 036
9	Iyus	Iyus	416	1 201
10	Tselinnoe	250 km stopping point*	434	1 432
11	Shira	Shira	445	9 448
12	Tuim	Tuim	460	4 211
13	Sorsk	Yerbinskaya	529	11 215
14	Ust'-Bur	Ust'-Bir'	547	1 939
15	Charkov (including rural settlement Uibat)	Uibat	563	1 198
16	Abakan	Abakan	644	187 239
17	Tchernogorsk	Tchernogorskiye Kopy*	649	75 419
18	Domozhakov	Kirba	600	1 089
19	Askiz (rural settlement)	Razdolnaya stopping point	654	7 267
20	Askiz (urban-type settlement)	Askiz	659	4 355
21	Beltirskoye	Beltyry	673	4 695
22	Abaza	Abaza	729	14 990
23	Birikchul'	Birkchul	705	2 519
24	Biskamzha	Biskamzha	742	1 000
25	Vershina Tyoyi	Tyoya*	766	3 184
26	Kirba	Sorokaozerki*	667	1 343
27	Sayanogorsk	Oznachennoye*	695	45 951

* non-passenger stations/stopping points

To assess the potential passenger traffic, we will take into account the additional passenger traffic arising from the creation of day trains. As an object for comparison, we use the route of the day train "Moscow - Voronezh", where in 2019, the annual passenger traffic of this route was approximately 1.33 million people (0.76 trips per year per capita) [4,6], despite for the presence in this direction of both traditional PDS and suburban transportation. In addition, it is necessary to take into account the average annual specific passenger traffic of traditional long-distance trains in the direction where it is currently absent (0.69 trips per capita per year) [7]. Finally, it should be taken into account that in a number of directions there is currently no suburban communication. Before the onset of the COVID-19 epidemic, 6.73 million passengers per year [3] (3.63 trips per year per capita) were transported by the trains of Krasprigorod JSC. Based on the data of the analysis, we note the key, in our opinion, directions for the development of railway passenger traffic in the southern group of regions of the Krasnoyarsk Territory and the Republic of Khakassia:

1) along the Eastern part of southern group of districts of the Krasnoyarsk Territory and the Republic of Khakassia. Restoration of daytime passenger traffic in the form of a fast commuter train with 2 class

layout. The expected average daily passenger traffic of the route will be 606 people, which corresponds to 5-6 carriages of daily traffic.

2) along the Western part of southern group of districts of the Krasnoyarsk Territory and the Republic of Khakassia. Organization of long-distance train service in the direction "Krasnoyarsk - Achinsk - Shira - Chernogorsk", including the movement of cars of direct traffic "Krasnoyarsk - Achinsk - Shira - Askiz - Abaza". The expected average daily passenger traffic in the direction will be 158-234 people and 29-38 people, respectively. Organization of regular suburban traffic on the route "Abakan - Kopyevo - Uzhur" with an expected passenger traffic of 348 pass / day.

In addition to the reducing the risks of passenger transportation in unfavorable climatic conditions and increasing the social distance during transportation, the implementation of this project will result in a decrease in the carbon footprint on the scale of the Yenisei Siberia macro-region. The development of logistics infrastructure traditionally acts as a driver of regional development [5, 11]. In addition, improving the social and environmental situation can have a positive impact on both the migration and investment attractiveness of the territories. An additional positive effect will have an increase in labor productivity due to a decrease in the loss of working time due to diseases and an increase in aggregate demand in the regions under consideration. This, in turn, leads to an increase in tax revenues. To sum up, the development of passenger railway communication is in the interests of all municipal authorities, the business community and residents of Krasnoyarsk Territory and Republic of Khakassia.

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