The role of the Kama river system in regional development

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Abstract. The role and functions of the Kama river system as a natural basis for the socio-economic development of Perm Region are considered. The competitive advantages of the Kama region in the context of the development of the transport and logistics system, energy production, fisheries and aquaculture, tourism and recreation are identified. Special attention is paid to the problems of interaction of the leading industries of Perm Region with the Kama river system. The main directions of involvement of the river system in the national economic complex of the region in the new market conditions are shown. The necessity of positioning Kama as a brand of the Perm Region is justified.

1. Introduction
Perm Territory, like many industrial regions, is experiencing difficulties in transition to the post-industrial stage of development. World practice and the experience of highly developed countries testify: old industrial regions can be developed on new forms of organization of production and moving to innovative activities. An important role in these transformation processes is played by the profitability of the economic and geographical position, which determines the possibilities for the development and implementation of the natural resource potential of the territory, its connection with adjacent regions, the degree of involvement in the processes of the international division of labor.

The territory of the Kama region occupies a favorable economic and geographical position, which is facilitated by the presence of a complex polymodal transport system. Its formation was based on the river network, thanks to which the settlement and development of the region began, its industrial specialization was formed, and a modern settlement system arose. Historically, the Kamskaya river network has been a driver of regional development for five centuries.

The Kama river system, being an object of interdisciplinary research, is traditionally in the focus of attention of hydrologists [2, 6, 8, 13], hydrogelogs [12], physical geographers [9, 14], ecologists [17, 21], tourists [19, 20] and others. The role of the river system in the socio-economic development of the region has been studied at different times by economic geographers [7, 16, 22] and others.

The Perm Territory, taking an accelerated course towards the development of market relations, the transition to a post-industrial economy and innovative production, risks losing its main competitive advantage – the presence of an extensive river system and the transport and logistics infrastructure formed on it. The socio-economic development of the region requires the revival of the river infrastructure as an important element of the communication system of the Kama region.

2. Materials and discussions
It is not for nothing that the territory of the Perm Territory is called the Ural Prikamye. It is almost entirely located in the basin of the Kama River, the largest tributary of the Volga. The basin character
of the territory's borders gives integrity to its natural and economic complex, facilitates environmental control in the territory, and creates favorable preconditions for the rational use of natural resources [2, 4, 11].

At one time, the Kama and its tributaries served as the most important route for the Russians to penetrate into Siberia, and later – the main source of energy and the main transport artery for the export of products from the Ural mining plants. As of 1733, of the 33 metallurgical plants in the Urals, 11 were located in a strip along the Kama and in the Sylva basin, five plants - along the Chusovaya and the rivers flowing into it [7].

Currently, the Kama is part of a single deep-water system of the European part of the country with guaranteed depths of 4 m and a length of 6.5 thousand km, which through a number of channels provides the edge with access to five seas (Caspian, Azov, Black, Baltic and White) and plays the role of its "sea gate".

The transport and geographical position leaves its mark on the functioning of the main industries of the Kama region. Leading in the Perm Territorial Industrial Complex is the mining and chemical cluster, represented by the enterprises of OJSC Uralkali, CJSC Verkhnekamsk Potash Company and EuroChem. They are the only ones in the country who mine sylvinite, enrich it and produce the final product - potash fertilizers.

While in the whole world the production of fertilizers is close to the places of their consumption, the potash business is "tied" to the places where ore is mined, since it is unprofitable to transport it even over short distances. There are few sylvinite deposits in the world. Almost 80% of the world's reserves of this mineral are concentrated in just two deposits in Russia and Canada. And if potash fertilizers are consumed in almost all countries of the world, then only fifteen companies from eleven countries are engaged in their production.

Research shows that our potash enterprises are no longer the leaders in terms of the final cost of production. Their production costs have risen rapidly in recent years, along with wages and energy prices. And the factory cost advantages were offset by high transportation costs.

The main competitive disadvantage of production is its remoteness from export terminals (table 1), which in turn forces enterprises to build up their transport infrastructure. The producers of potash fertilizers were forced to purchase sea loading terminals to export their products, since over 90% of Silvinit's production goes outside the country.

| In relation to export ports, distance by rail | In relation to sales markets, travel time of a vessel |
|---------------------------------------------|--------------------------------------------------|
| Route | km | Route | travel time of a vessel | days |
| Uralkali - Ventspils | 2260 | China - Ventspils settlement, St. Petersburg | 38 |
| Uralkali - St. Petersburg | 1180 | China - Vancouver | 17 |
| Potash Corp., Mozaic, Agrium | 1130 | India - Ventspils, St. Petersburg | 23 |
| "Belaruskali" - Ventspils | 760 | India - Eilat, P. Aqaba | 10 |
| Kali & Salz - Hannover | 330 | Brazil - Ventspils, St. Petersburg | 21 |
| SQM - Antofogasta | 220 | Brazil - Antofogasta | 12 |
| ArabPotash - Aqaba | 220 | | |
| ICL - Eilat | 220 | | |

After the merger in 2011 of Silvinit with Uralkali, the logistics policy of the combined company has changed radically. The ships were sold, orders for their construction were canceled and the Kama shipyard eventually went bankrupt. Today the company pays little attention to the development of inland waterway transport.
The given example of the development of a key industry in the Perm Territory confirms the need for the development of a river transport system, which makes it possible to strengthen not only intraregional, but also foreign economic relations of Russia.

Projects for the development of the transport and logistics system of the Perm Territory provide for the use of the river transport system as its integral part. In three of the six transport and logistics districts allocated on the territory of the region (North-East, Central and South-West), stable river cargo transportation developed in the last century. Currently, they operate with varying degrees of intensity, but with a proper management approach, they have great prospects. In the rest of the districts, the rivers are used for passenger traffic [16]. In a number of cases, water transport remains the only option for communication for rural residents of the region. Today, 34 settlements in Prikamyje have no other means of communication [9].

Weighty hydropower potential of the waterways of the Kama region. In terms of the availability of water resources, the region occupies one of the leading positions in the European part of the country and first in the Urals. A significant value of the average long-term annual surface runoff and a large altitude gradient determined the region's first place in the Ural economic region in terms of hydropower resources. They are estimated at 4 million kW (more than 60% of the reserves of all rivers in the Urals), but 40% are already in use [1].

Hydropower resources provide a high level of profitability for generating companies. For example, the cost of kW/h of electricity generated at the Votkinskaya HPP in the Perm Territory amounted to 42.2 kopecks in 2020, and the tariff for the population for the first half of 2020 was set at 4.13 rubles, i.e., it exceeded the cost by almost ten times [18].

A significant part of this profit ends up with federal and regional intermediaries - FOREM, Permenergo, municipal grid companies, etc. The largest hydroelectric power plants of the region - Kamskaya and Votkinskaya belong to the company "RUSHYDRO", therefore the plant's profit goes outside the region, which also does not correspond to the interests of the territory. This situation deprives the region of incentives for the efficient use of the available hydropower potential.

A promising area in the region is the development of small hydropower, that is, the construction of hydroelectric power plants with a capacity of less than 10 thousand kW [23]. The peak of its development in the Perm region came in 1958, when small rural hydroelectric power plants with a total capacity of 12.1 thousand kW were operating on the territory of the modern region, producing 14.7 million kW/h of electricity per year [15].

It should be noted the important fishery and aquaculture importance of the Kama river basin. According to experts, only commercial fish catch in the waters of the region is approximately 700-8000 tons per year and the development of these resources does not damage the commercial stock [3].

A significant competitive advantage of the Perm Territory is the dynamically growing tourist and recreational activity, where a special role belongs to the Kama and its tributaries. Traditionally, rivers are considered as the most important element of the tourist and recreational potential of the region and a bright territorial brand. The Perm Territory has unique opportunities for the development of the tourism industry. According to experts, more than 100 thousand people annually take part in water sports travel along the rivers of the region [5]. In the context of a significant decline in outbound tourism due to the pandemic, Kama opens up broad prospects for the development of domestic tourism on local rivers. It is not possible to replace this type of communication in cruise tourism and commuter traffic. During the navigation of 2019, 16 tourist campaigns on 23 routes worked on the inland waterways of the Kama basin [9].

Thus, the socio-economic development of the Perm Territory is closely related to the intensive use of the river system and water resources. Playing an important role in the development of industrial and agricultural production, providing foreign economic relations, they are the basis for the development of transport infrastructure and services, which is especially important in the transition to a post-industrial society.
3. Conclusions
Transport communications are the "circulatory system" of the economy at all territorial levels. The presence of a developed river system and its favorable geographical position is a competitive advantage of the Perm Territory in its socio-economic transformations.

The revival of efficient multimodal cargo transportation using river transport will require huge time and cost efforts, but this is possible if the regional authorities so wish, their mutually beneficial cooperation with business structures and the scientific community.

The Kama river system should play an important role not only in the development of the extractive and processing industries of the Kama region and the transportation of its products, but also in the production of electricity. This issue is especially relevant in the context of the development of "green energy".

In the context of the transition to the post-industrial stage of socio-economic development, the sectors of the service sector are acquiring leading importance, among which tourism plays a special role. The first step towards using the Kama as a driver of regional development can be the revival of organized river freight, passenger and tourist traffic. Kama, a recognizable tourism brand of the Perm Territory, opens up prospects for the development of the regional river tourism industry.

Acknowledgments
The study was done with the financial support of the Russian Foundation for Basic Research within the framework of scientific project No. 19-010-00562.

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