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Prospects for North–South Transport Corridor

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ABSTRACT

International transport corridors play a leading role in shaping an integrated global transport services market.

In this context, the objective of the paper was to study the current state of North–South international transport corridor (hereinafter referred to as ITC), which connects India, Iran, the Gulf countries through the countries of the Caucasus and Central Asia with Russia and the countries of Europe. A brief review of scientific publications on the subject under consideration allows to draw a general conclusion from opinions of various authors: it is necessary not only to develop the transport corridor infrastructure, but also to solve organizational, regulatory and tariff issues.

The main advantage of North–South ITC is that most of the route passes by land and the route itself is shorter than the sea route, providing thus significant acceleration of cargo delivery.

As a result of development of the railway network in the Caspian region and Central Asia, today there are several options for the ITC route. The western route to Iran through Azerbaijan was examined in more detail. It is expected that the missing railway section Astara–Rasht will be completed in the nearest future. Test shipments of goods from India to Russia (and vice versa) have already been carried out via western route.

The characteristics of the route options by transportation distance, delivery time and cost of cargo transportation are given. Today, cost of transportation along the western branch of ITC significantly exceeds cost of sea transportation through the Suez Canal. This and other factors, reducing the efficiency and competitiveness of transportation via ITC, it is proposed to first organize container transportation on ITC section between Russia, Azerbaijan, and Iran. Such transportations might be especially in demand for food products (including perishable goods) in direction from south to north. To this end, it is proposed to organize a scheduled container train service along Astara–Moscow–St. Petersburg route using new Freight Express 2.0 transportation technology.

Keywords: *transport, railways, North–South international transport corridor, container transportation, expedited freight trains, Freight Eexpress 2.0, multimodal transportation, development of railway infrastructure.*

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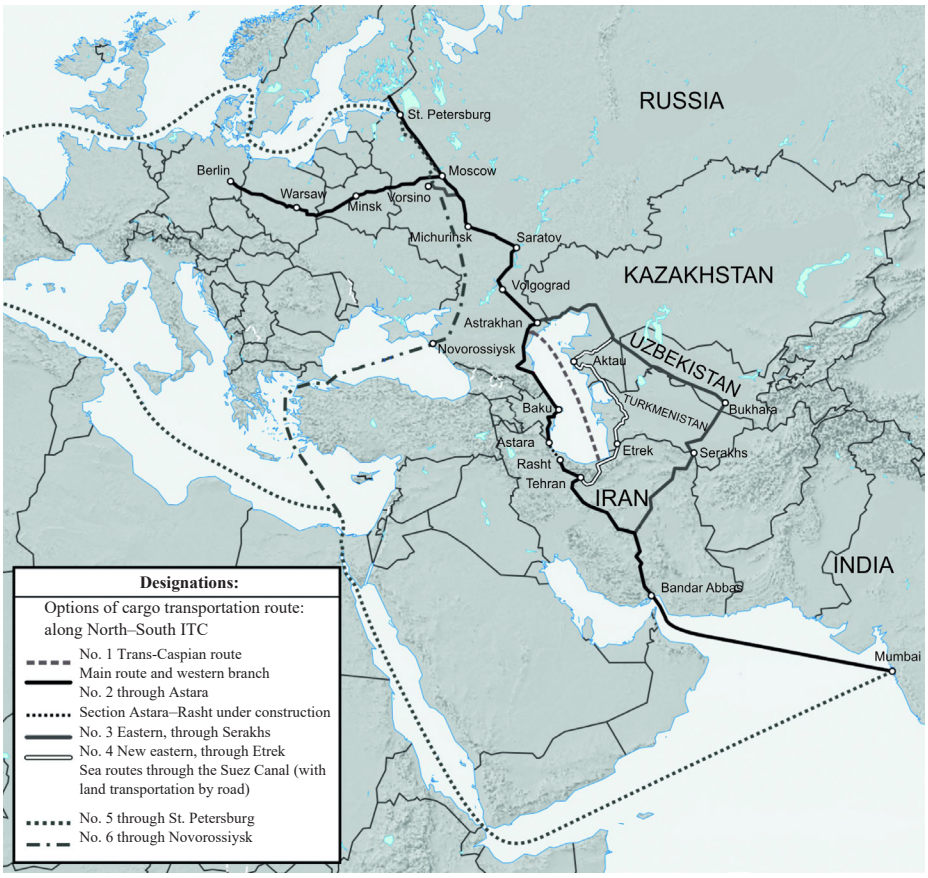
Background. In recent years, significant successes have been achieved in development of North–South international transport corridor (hereinafter, ITC). An agreement on North–South International Transport Corridor was signed between Russia, Iran, and India on September 12, 2000. Later, Belarus, Kazakhstan, Oman, Tajikistan, Azerbaijan, Armenia, Syria, Bulgaria, Kyrgyzstan, Turkey, and Ukraine joined the Agreement [1]. The main route of ITC is shown in Pic. 1 (the map Wikipedia.org was used to build the scheme). The North–South ITC is considered in various research publications and media news [2–7].

Research overview

The work of Alevtina G. Kirillova [2] considers aspects of development of international transport corridors passing through the territory of Russia. The author notes that development of the North–South ITC will «*contribute to development of Euro-Asian transit transportation, which will lead to strengthening of the geostrategic and geopolitical positions of the participating countries,.. will allow to reduce transport costs due to reduction of cargo delivery time, give significant growth to the transit transport market, and attract Iranian and Indian investors to invest in joint projects*». The work highlights the success of first test dispatch of containers along North–South ITC route from India to Russia via Iran and Azerbaijan [2].

The work of I. N. Dianov [3] contains calculations of timing and cost of delivery of a 40-foot container from the port of Bandar Abbas to Germany using North–South ITC route options based on the simulation method. After analyzing the data obtained, the author concluded: «*...when transporting by land routes, it is more expedient to use the second route provided that Rasht-Astara line is built. This route wins in terms of time and cost of transportation...*» [3].

In [7], the authors examine in detail the infrastructure of ITC: Russian and Iranian ports on the Caspian Sea; ITC route options; ports of the Indian Ocean basin; the infrastructure of the



Pic. 1. North–South ITC and sea route through the Suez Canal (scheme for illustrative purposes only).

Pic. 2. Options of North–South ITC (scheme for illustrative purposes only).

countries, Pakistan and Myanmar, whose participation in the project will be promising. The authors note that «*in order for the North–South ITC to fully function, it is necessary to create an interconnected transport and logistics system from separate existing elements; that, in turn, will require a higher level of transport and terminal and logistics infrastructure*» and describe specific measures to develop the infrastructure of facilities in the area of the ITC [7]. The article concludes that «*...transport corridor is an ambitious project, but so far only the Caspian segment operates in more or less stable way; to integrate individual segments into a single route, it is necessary to create a new and modernize the existing transport and logistics infrastructure; it is necessary to... achieve the emergence of a single logistics operator, develop a flexible tariff policy, solve a wide range of regulatory issues*» [7].

Similar conclusions were drawn in papers of the authors from some other countries [8–11]. The works [9; 12] particularly focus on the necessity of participation in transportation along the ITC of private, small-scale companies, while currently there are no suitable conditions for that. The paper [13] focuses on consideration of international economics and political aspects.

Results.

North–South ITC project has been developing since 2000. To some extent, it is already operational since Iran is quite actively forwarding its goods to Russia. Nevertheless, North–South ITC is still far from complete implementation. For example, India continues to carry out most of its transport links with Europe along the long sea route passing through the Suez Canal.

The main advantage of North–South ITC is that most of the route passes by land and the route itself is shorter than the sea route, which

provides significant acceleration of cargo delivery. But so far, transportation of goods by rail along this route has not been organized in such manner as to be completely convenient for shippers.

In recent years, a lot of work has been done to create a single railway system along ITC route, and today there are several options for North–South ITC route in the Caspian region and Central Asia (Pics. 1, 2; the above-mentioned map from Wikipedia.org was used to construct the scheme).

ITC route options:

• 1. Trans-Caspian route, with transportation of goods by sea along the Caspian Sea;

• 2 Western branch of North–South ITC: a railway route bypassing the Caspian Sea from the west and passing through Azerbaijan and then by the border crossing Astara (Azerbaijan)–Astara (Iran) to Iran;

• 3. Eastern branch of North–South ITC: a railway route bypassing the Caspian Sea from the east through Kazakhstan, Uzbekistan and Turkmenistan, and then by the border crossing Serakhs (Turkmenistan)–Serakhs (Iran) accessing the Iranian railway network;

• 4. New eastern railway route Aktau (Kazakhstan)–Bereket (Turkmenistan)–Etrek (Turkmenistan)–Inche Burun (Iran) via Kazakhstan and Turkmenistan opened in 2014. As compared with option 3 it does not go through Uzbekistan.

Iran intensively develops its railway infrastructure [14], new railroads are being built within ITC area.

In 2018, JSC Russian Railways launched a large-scale project to electrify the Iranian railway, Garmsar–Inche Burun, which will improve transport links between the Iranian railway network and ports on the Caspian Sea and the border crossing with Turkmenistan [15].

Regarding development of sea transport Iran pays great attention to development of the port of Chabahar [16]. Railroad will be constructed towards that port in future.

Railway transportation along the western branch of ITC through Azerbaijan provides the following advantages:

• It is the shortest route to the capital of Iran (Tehran) and to the key port of Bender Abbas. Compared with the new eastern route 4, reduction in distance is about 1150 km (see Table 1 below).

• There is only a single country along the transit route, which is Azerbaijan.

• The railway infrastructure is more equipped. There is a double-track electrified section through Makhachkala, Derbent and Baku. The eastern route 4 runs exclusively along single-track non-electrified railway track.

• Western branch of ITC passes through a more populated area with a more developed industry and infrastructure (the Russian cities of Makhachkala, Kaspiysk, Derbent and Azerbaijani cities of Sumgayit and the capital city Baku). The new eastern route 4 through Uzen–Etrek passes through a predominantly sparsely populated area (while it passes two large cities of Atyrau and Aktau in the territory of Kazakhstan).

The railway infrastructure of the western branch of North–South ITC is currently under construction. The total length of the line under construction Astara (Azerbaijan)–Rasht (Iran)–Qazvin (Iran) is about 340 km. The railway passes through terrain with complex topography and requires construction of numerous bridges and tunnels.

In 2016, a railway crossing was built across Azerbaijan–Iran border between Astara station in the territory of Azerbaijan and Astara station in the territory of Iran with a length of 10 km. In the autumn of 2016, test shipments of containers along ITC route from India to Russia via Iran and Azerbaijan were carried out [3]. Also, in February 2018, a test freight train moved from Russia to Iran, consisting of six cars loaded with wood and MDF [17].

Transport experts note that during test dispatch of containers along the western branch of ITC, the following difficulties were identified: impossibility to issue a single transport document for the entire transportation route; absence of direct sea communication between the ports of Nava-Sheva (port in the south of Mumbai – *authors' note*) and Bandar Abbas; for such transportation, vessels must enter the port of Jabal-Ali, UAE [3].

Although Astara (Azerbaijan)–Astara (Iran) section is insignificant in length, its opening is of great importance. In July 2017, two companies, the Iranian Railways and the Azerbaijani Railways, signed an agreement on construction of a large railway terminal in Iranian Astara, through which Azerbaijan

Table 1

Length, delivery time and cost of cargo transportation according to the options of the route Mumbai–Vorsino

Route	Total length, km	Length of sections between Astrakhan I station and Bandar Abbas station, km	Delivery time, days	Cost of transportation, US$/FEU[1]
1. Trans-Caspian route of ITC	6801	2983	25	4750
2. Western branch of ITC through Azerbaijan	6752	2934	23	4500
3. Eastern branch of ITC through Kazakhstan–Uzbekistan–Turkmenistan	7878	4060	30[2]	6400[2]
4. Eastern branch of ITC through Kazakhstan–Turkmenistan	7899	4081	29[2]	5900[2]
5. Sea route to St. Petersburg + road transport	14397	–	37	3340
6. Sea route to Novorossiysk + road transport	9257	–	29	3170

Notes: [1] FEU – forty-foot equivalent unit. [2] Data according to expert estimates.

intends to transit its cargoes in large quantities. The Azerbaijani side is ready to invest $60 million in this project [18].

Rasht–Qazvin railway section has already been put into operation [19]. The remaining section Astara (Iran)–Rasht (Iran) is planned to be completed in 2020 [20].

The Indian port of Mumbai, one of the most densely populated cities in the world, is the most important point of origin of cargo flows for North–South ITC. The city is located on the coast of the Arabian Sea and is one of the main ports of the region located at the crossroads of many international routes. India's interest in North–South ITC project will contribute to its development.

Table 1 shows the characteristics of the various options for North–South ITC route during transportation of a laden 40-foot container along Mumbai–Vorsino route (see Pic. 1). Vorsino is the station at Kiev railway direction located at 89 km distance from Moscow. One of the most modern container terminals in Russia is located in the station area.

The length of the sea route between the ports of Mumbai and Bandar Abbas is assumed to be 1976 km. The length of the sections between Bandar Abbas and Astrakhan I stations according to the route options is indicated in the third column of Table 1. Astrakhan I–Vorsino route section was laid through Volgograd–Saratov–Kochetovka in accordance with ITC route and its length is 1842 km.

To estimate the cost of transporting a container, we used the data of company JSC Russian Railways Logistics [21], rates of road carriers[*], and sea carriers[**, ***]. The cost estimate for routes 3 and 4 has a low reliability. Routes 5 and 6 include sea transportation and road transportation. The transportation time with route 6 was taken with a considerable margin of time (the minimum period is about 25 days).

As can be seen from Table 1, the cost of transportation even along the western (not yet completed) branch of ITC significantly exceeds the cost of sea transportation: $4500 versus $3170. At the same time, delivery time of the container to Vorsino is reduced by about 6 days compared to sea transportation through the Suez Canal and Novorossiysk and by about 14 days compared with the route through St. Petersburg.

Delivery time via ITC can be reduced in the process of improving traffic organization, and with an increase in the volume of transportation of goods along the route. Also, costs can be reduced by improving the infrastructure of the railway lines through which ITC passes (electrification of lines and other measures).

When transporting along the considered route, a gauge change is required from 1435 mm

[*] AutoTransInfo Auto Carrier Exchange [*Birzha avtoperevozchikov «AvtoTransInfo»*] AutoTransInfo Auto Carrier Exchange, 2019. [Electronic resource]: https://ati.su. Last accessed 22.10.2019.

[**] Delivery by sea from any port in the world [*Dostavka morskim transportom iz lyubogo porta mira*]. Marine Service Trading Group of Companies, 2019. [Electronic resource]: https://gkmst.ru/services/dostavka-morskim-transportom/. Last accessed 22.10.2019.

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to 1520 mm when crossing Iran–Azerbaijan border and from 1520 mm to 1435 if cargo is transported to European countries with a gauge of 1435 mm (for example, on the border between Belarus and Poland). To reduce financial and time costs for changing the gauge, it is proposed to use rolling stock with gauge-changeable wheelsets [22], e.g. Talgo-RD system of Talgo company and the Polish SUW 2000 system. A gauge change between Iran and Russia is not needed for Trans-Caspian route 1, and cargo can be delivered along a gauge of 1520 (1524) mm to countries operating the railways of this gauge without cargo transshipment.

Since transportation of containers via ITC through Russia to European countries will have an even higher cost and delivery time than to Vorsino (Table 1), it is necessary to further develop the calculations in detail, e.g. regarding transportation to Germany, considering mentioned measures to reduce time and costs of haulage.

Suggestions

In light of the foregoing, as a «first step» it is necessary to organize container transportation on ITC section between Russia, Azerbaijan and Iran, including for goods intended for Russian domestic market. Such transportations are especially in demand for food cargo (including perishable goods) in the direction from south to north.

Currently, in Russia on North–South direction, most goods are transported by road transport and handling of accelerated container block trains is not organized. Therefore, it is proposed to organize a scheduled container train service via Astara–Moscow–St. Petersburg route using new Freight Express 2.0 transport technology [23; 24].

Freight Express 2.0 technology is built on the following basis:

- circulation of trains on schedule and without marshalling and re-composition along the route;
- comprehensiveness of transport services;
- use of an automated control system to ensure control of all components of the transportation process;
- information on routes, timetables, train schemes and availability of cargo packages should be available to all interested parties;
- organization of sale of pre-provided packages (places for transported containers) in trains of established composition using an electronic online system;
- train assignments, timetables and schemes (composition) of trains are dynamically determined by the carrier in accordance with changes in demand for freight transportation;
- train delivery to the cargo loading line of the terminal-warehouse complex can be carried out by train locomotive;
- freight operations are carried out without marshalling of the train wagons thanks to the fact that the length of the cargo loading line corresponds to the length of trains.

Accelerated container trains will stop at the basic stations for loading and unloading operations with containers without uncoupling of wagons. Due to this, it will be possible to consolidate the cargo flow for stable handling of the container train.

Transportation using this technology has good chances of commercial success, and in the future, the route can be extended through Iran to the port of Bandar Abbas.

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