Development of rail freight from China to the EU: Russia's opportunities

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Abstract. Russia may play a role of transit country when transporting the goods from Asia-Pacific region to European countries, gaining an economic advantage from it. It is important to develop railroad container traffic on China – Eurasian Economic Union – European Union axis. Russian transporters receive an opportunity to increase carriage volumes and seek an additional income. Russian government, in this case, may receive additional tax payments into the budget. In order to increase the number of freight trains with the usage of railroad transit services on 1520mm gauge it is necessary to improve transport and logistics infrastructure. New transport corridor for delivering container freights into Europe through Kaliningrad Region and the use of railroad route through Mongolia are considered to be perspective solutions. Based on the analysis results it was stated that there is a possibility to redeploy existing and perspective container transit volumes on the China-Europe lane through border crossing points Dostyk, Zabaikalsk and Zamyn-Uud. Goods for e-commerce has the greatest importance in the structure of transit freights. The switch of international flow of goods from airplane to rail transportation for the purpose of e-commerce is also another opportunity to increase the volume of transit traffic through Russian territory. It will give benefits as for clients, as for Russian Railroad company. In order to implement these opportunities, it is necessary to solve a set of legal, organizational and technical tasks.

1. Introduction

Globalization is now becoming the leading characteristics of modern world economy. Its development is facilitated by digital technologies, which are now the determinant of economic development of countries and the indicator of economic welfare. Enormous contribution to the globalization process is made by infrastructure components of postindustrial world, the most important part of which is the transportation and logistics system. For any country the development of transportation industry is a primary task, as it allows to become an additional national competitive advantage on the global scope.

Undisputable competitive advantage of Russian economy is in the energy sector, defense and other industries. But the level of national transport development requires modernization on the innovative basis, considering the perspective of entering the frames within Sixth Technological Way. Innovations in transport industry will become the driver of development for almost all spheres of economy, increase the quality of life of Russians and the effectiveness of managing business and strengthen international relations and trade.
China figures prominently in the structure of Russian foreign trade system. Goods traffics from China are directed on the export to our country and to European Union countries. According to analytics of the Center of infrastructure economy, in the future, goods traffic between China and EU should increase more rapidly (Figure 1).

![Figure 1. Volume of trade between Europe – Asia – Europe.](image)

EU and China trade for the last 20 years is characterized by changing tendencies (Figure 2). Rapid increase in trade volumes between China and EU happened in the first half of twenties, as in tons, as in monetary equivalent with average yearly growth rate more than 15%. After 2007 the trend has changed profoundly due to significant reduction of trade volume in tons (the volume), while in monetary equivalent (the value) it has kept higher rates. For instance, from 2007 the volume of trade increased only on 14%, while the value – on 98%. It reflects the significant increase in average price of trading goods and, moreover, the increase in trading of goods with high value-added. Such goods are suitable for container logistics and are sensitive to transportation time and security of delivery. Consequently, this trend has a considerable impact on development of container railroad traffic.

![Figure 2. Dynamics of the rate of change in the volume of trade between the EU countries and China, % (Source: Eurostat).](image)
Main volume of trade (around 98%) between EU and China is associated with maritime transport, around 1.5% accounts for air and less than 1.5% - on railroads [1]. Exploitation of Trans-Siberian railway for the purpose of moving the goods traffic between two macroeconomic centers – China and Europe – places an important task for Russia as from economic, as from geopolitical perspective. According to evaluations, realization of transit potential of Russia in international goods traffic from Pacific Rim countries is equal to doubling the national income [2].

In order to solve this issue, it is vital to change goods stream from maritime to rail transportation, while increasing the container goods traffic. Railways are well adapted for regular goods transportations on quite long distances, disregarding the weather conditions. When using the maritime transport, international ships are delivering goods avoiding Russian ports. Maritime transport is the biggest carrier in intercontinental shipments. The advantages are: low freight tariffs and high transporting capacity, the disadvantages – low speed, strict rules for goods packaging and low frequency of deliveries. Changing situation in respect to rail transportation may be performed through attraction of additional freights, in particular for e-commerce, through the rapidness of delivery services, high level of provided to clients’ services (especially in digital economy), security and eco-friendliness of transportation, and moreover, through consistency in legal documentation of foreign carriers.

Questions about connecting the global railway networks and systems for sustainability of fright transportation via railroads were addressed in the International railway Congress in Vienna (Austria) in 2019. The aim was to develop sustainable railway infrastructure projects in the future and to lower the associated risks. The main accent was put on the international cooperation, standardization and balanced proportional growth.

Aim of the research: basing on the competitive analysis of containers’ traffic on China – Europe axis develop recommendations about improving the organization and service quality of goods transportation via Trans-Siberian railway towards China – EU countries, putting the emphasis on increased volume of trade flows for e-commerce. Moreover, formulate recommendations on the optimization of traffic routes.

Research methods include systematic approach, methods of scientific abstraction, economic analysis, comparison methods, graphics and tables interpretation.

2. Research results

In this paper the systematic approach was used in order to study the question of rail transportation development in the international goods traffic on the Russian territory from countries of Asian-Pacific Region (APR) to European countries.

Nowadays, on the space of 1520mm gauge four main transit routes pass through. They connect countries of APR and Europe from the following border points: Manzhouli (China) / Zabaikalsk (Russia), Alashankou (China) / Dostyk/Altynkol (Russia), Erlian (China) / Zamyn-Uud (Mongolia) and Far Eastern ports (Figure 3).

The key counterparty, which generates container traffic in Euro-Asian trade and economic ties, is China, which share accounts for 60% from total international container traffic. According to forecast of Chinese railways, yearly growth of container trains quantity, in the direction from China to Europe in 2019-2023, will be more than 10%, disregarding container trains to Russia and Belarus.

The volume of heavy-tonnage containers traffic in the China – Europe – China direction in 2018 accounted for 350 772 units of Twenty-foot equivalent (TEU), which is on 34% higher than in 2017 (Figure 4). Of those: through Dostyk and Altynkol – 282,8 thousand TEU (increase by 59%), through Zamyn-Uud – 31,2 thousand TEU (-9%), though Zabaikalsk – 36,7 thousand TEU (-27%). Main traffic is moving directly from China to Europe, which is confirmed by Russian Railways data, according to which yearly volume of container import from China by railroad accounts for 200-250 thousand TEU per year [1] with a tendency to grow. The reverse flow to China is smaller.

In order to increase the volume of transit container traffic by railroads within countries from Eurasian Economic Community in 2018 the Eurasian Rail Alliance (ERA) was created. JSC “UTLC
ERA” provides services for transportation of containers by regular container block trains on the route China-Europe-China through the territories of Kazakhstan, Russian Federation and Belarus. Within JSC “UTLC ERA” services the volume of regular routes from Dostyk and Altynkol in 2018 reached the number of 57. The volume of transit transportation within UTLC ERA on the route China-Europe-China in 2018 had grown in comparison with 2017 level and accounted for 280.5 thousand TEU.

Transit services of “UTLC ERA” involves more than 20 terminals in EU countries. Totally, 3,342 container trains were departed. The share of “UTLC ERA” routes in the China – Europe – China communication accounts for 76% considering transport communication with Belarus). Due to increase of container transportation on the China – Europe – China route “UTLC ERA” together with “Belintertrans–Germany” in March 2018 have launched new route for container trains via border crossing Semyanuvka / Svisloch from Lodz station towards Chinese city of Chengdu (According to international association “Coordinating Council on Trans-Siberian Transportation”).

Figure 3. Main routes of container transit from China and Europe via Belarus.
The diversification of routes network and organization of services through Kaliningrad region became a significant achievement in 2018. New transport corridor to Europe from Kaliningrad region allows to conduct as only land traffic via border crossing Mamonovo – Branevo (Poland), as multimodal transportation (railroad and land) using ports of Kaliningrad region. Both variants are cost-appealing for clients and comparable in delivery timing [3]. Development of corridor, which passes through border crossings of Kaliningrad railroad, and creation of distribution hub for transit container in the Dzerzhinskaya-Novaya station in China – Europe – China communication are one of the key objectives for “UTLC ERA” for year 2019. In 2018 on the China – Kaliningrad – Europe route 48 trains departed with 41 containers on each. Overall volume of transported containers accounted for 7 238 TEU.

There are infrastructural limitations on the crossings with EU railroads, which result in significant decrease of transportation speed after switching from “space 1520” to European gauge. It negates all speed advantages of railroads, time of delivery becomes comparable to time of maritime transport. As
a result, one of the directions of further transit services development is the implementation of project on multimodal container transportation via Kaliningrad region ports.

Transport and logistics center Kaliningrad, situated on the Dzerzhinskaya station, is oriented on the Central and North part of Europe. Thus, the distance from Russian border to Berlin is 530 km, to Hamburg – 700 km. On the 28 hectares center territory containers, heavy and bulky cargo are reloaded from 1520 gauge to wagons on 1435 gauge. Terminal is equipped with open-space board platform, with capability to store 1200 TEU and 100 thousand of tons of bulky cargo simultaneously, and with all necessary technical machines to process 2 million of tons of cargo per year.

Thus, multimodal route via Kaliningrad region ports extremely increases transportation geography and allows to build new regular transit routes in China – Europe – China communication.

Development of alternative routes when delivering containers to Europe from APR region is connected also with the use of the route, which crosses the Mongolia territory. Transit via Mongolia is viewed according to several international programs and projects. Within Chinese initiative “One belt – one road” in June 2016 the trilateral agreement was signed between the leaders of Russia, China and Mongolia about the Program of building an economic corridor “Russia – China – Mongolia”. Corridor creation was aimed at providing conditions for active trade traffic, supporting the competitiveness of products, facilitation of international transportsations and at infrastructure development. Among Program objectives there is a task of interrelated development of transport infrastructure of all three countries. This task should be solve based on:

- completion of increased volume of international container transportations between countries;
- building of transport and logistics hubs;
- construction of infrastructural objects, eliminating of bottlenecks, extending of optical fibre communication lines etc.

For practical implementation of Program of building an economic corridor it is necessary to completely modernize railroads of Mongolia. Because of this, in 2017 Russian Railways together with JSC “Ulaanbaatar Railways” (JSC “UR”) developed Long-term program of modernisation and development of JCS “UR” before 2030 (hereinafter – LPD). LPD is based on the long-term forecasting documentation, approved on the presidential level of Mongolia, including the Agreement on a strategic partnership for the modernization and development of the Ulan Bator Railway that was signed between OJSC Russian Railways and the Ministry of Road and Transport of Mongolia in 2014.

The main advantage of Mongolian railways is the width of the gauge, which is 1520mm – the same as for Russian railways and for railways of most countries – former members of CIS.

JCS “UR” may be considered as a perspective partner for international transportations from China to Russia and Europe. In order to achieve such goals as the increase of integration into global transport corridors system and the use of transit potential, JCS “UR” purposefully develops the scope of international operations while promoting its own economic interests inside global organizations and unions. One of the areas of international operations is the delivery of complex transport and logistics services together with foreign partners, directed to transit increase. JCS “UR” successfully cooperates with foreign partners on the delivery of container trains from Asia to European countries and back.

Container traffic with transit via Mongolia from 2011 to 2018 has increased twenty-three-fold [5]. Meanwhile, it can be noticed with interest that in the structure of total volume of transit on the Mongolian territory transportations between China and Europe prevail. At the end of 2017 share of container transit via border crossing Zamyn-Uud in total volume of transit between China and Europe accounted for 14%. Among the reasons, that caused the development of such transits, the following ones should be outlined:

- geographic attractiveness of Mongolian route, which provides the lesser distance of expensive route on Chinese territory in comparison with Zabaikalsk route or Kazakhstan one (through Dostyk), and reduction of transit time (comparing to Zabaikalsk route);
- inclusion of Mongolian route into the list of subsidized by Chinese government directions of transportation between Russia and Europe.
So as to confirm the stated arguments the analysis of container transits in China – Europe – China direction through Mongolia was conducted, considering economic and political factors. Pricing, as well as geographic criteria of transit distance and processing capability of border crossings highly effect on the choice of transit route of transportations from China and Europe and back. Relocation of existing and future volume of containers transit within China – Europe – China communication between routes, which come through border crossings Dostyk, Zabaikalsk and Zamyn-Uud, is happening with influence of infrastructure, primarily of processing capabilities of border crossings, pricing and political factor, including governmental decisions on subsidizing certain traffic directions.

In October 2016 within Chinese initiative “One belt – one road” the Chinese National Development and Reform Commission approved the Development Plan of China-Europe Freight Train Construction in 2016-2020 (hereinafter – Plan). Besides the establishment of common principles and directions of further development of container transit services, in this document significant emphasis is put on the geographic segmentation of traffic departure and arrival points on Chinese territory. Thus, in the Plan three rail transport corridors between China and Europe are shown: Western, which passes through border crossing Dostyk (involving north-eastern, eastern and central regions of China) and Central, which passes through border crossing Zamyn-Uud (involving north, central and south regions of China). Meanwhile, in a context of Chinese party desire to diversify political and technological risks of container trains organization on the transit routes, considerable attention is put on the development of corridors through Mongolia. The reason for that is to the great extent undisclosed transit potential on Mongolia, as the region where Central corridor passes by, and its great opportunities for attracting traffic from regions of adjoining corridors.

Prerequisites of further development of Mongolian route are:
- complex realization of development plans by Chinese government, including the Central Corridor (Mongolian route) to China – Europe direction;
- building and setting into operation of new transport and logistics center on border crossing between China and Mongolia Erlian/Zamyn-Uud;
- realization of Program on creation of economic corridor Russia – China – Mongolia (signed on 23rd of June 2016 in Tashkent).

Actions on the development of Mongolian transit direction fully comply with aims of Program on creation of economic corridor Russia – China – Mongolia. Exploitation of this route will allow to make the freights delivery from China to Europe via Russia faster and increase the attractiveness of the use of its transition potential. However, currently together with the change of subsidizing policy from Chinese side the use of Mongolian direction is limited, and the main freight stream goes through border crossing Dostyk.

Opportunities of development of rail transportation on the Russian territory are not bounded by questions of containers development and of new delivery routes search. The perspective segment for developing the railway transit on Russian territory is the transportations of goods for e-commerce, because together with the rise of Internet on the e-commerce market the sales volumes are also growing.

According to International Telecommunications union (ITU), formed by UN, in 2018 3,9 billion of people on the planet had been using Internet. It accounts for 51,2% of total world population [4]. According to Internet World Stats, for may 2019 the access to Internet is mostly available for North American and European population. E-commerce allows to receive an access to wider variety of goods and services, uniting sellers and buyers from all over the world, using information and communication technologies for effective cooperation of participants of trade operations. Before 2014 growth rates on international Internet-based trade accounted for 20-30% per year. Afterwards, growth rate has decreased, but still it remains quite high. The largest market for e-commerce is Asian-Pacific region. For the several latest years China is a leader in volumes of e-commerce: within the global market, which turnover is 2,4 trillion of dollars, China accounts for 1,5 trillion.
Geographic location of Russia let domestic companies receive advantages while transporting the goods for e-commerce from Chinese producers to consumers in Europe and Russia. Potential points of departure and arrival – large logistic hubs, which will process the traffic of e-commerce are:

- China: Shanghai, Hong Kong, Beijing, Guangzhou, Zhengzhou etc.
- Europe: Frankfurt, Amsterdam, Leipzig, Lyon etc.

That is why Russia need, firstly, to be oriented on export and freight transit from China and on development of transport infrastructure in order to increase the transportation volume for e-commerce as in Russia, as in other countries. Transit of freight and mail deliveries for e-commerce via Russian territory will be of big interest for railway transport, but such transits are not properly developed yet.

In retail e-commerce, basically, small piece goods are purchased (clothes, housing and garden goods etc.). Such products are mostly sent as parcels (small package – up to 2 kg) via air or railways. In China deliveries are performed by National Chinese Post, which sends parcels all over the world. Senders in China are represented by small shops, which have registrations on big internet-based platforms (AliExpress, eBay and TaoBao). Most of international postal deliveries are carried out using air transportations, while the main stream of export mailing operations runs through international airports of Beijing and Shanghai. Express-delivery to Russia within 2 weeks from EMS China Post costs 50 dollars for a parcel that weighs 1 kg. Thanks to development of e-commerce the volume of mail deliveries increases each year on 20-25%, moreover, most of Chinese e-shops offer free international shipping services. As a result, the Chinese Post cannot cope with such big volume of postal export, there is not enough place in processing centers and a lack of transportation opportunities for international flights.

Railroads freight delivery for e-commerce has undisputable advantages for international transits via Russian territory. Especially the advantages for railway transport are visible in case of heavy postal carriage, in particular for parcels and secured mails – boxes with registered letters and parcels, journals. Railway transportation of postal deliveries are performed in freight wagons, which are added to passenger trains, and consequently, they move together with quite high speed and to any directions.

One of the priority tasks for Russian Railways together with Post Administration of China and administration of Chinese Railways is to develop the cooperation mechanism and diversify freight traffic to railway transport keeping high competitiveness level of the service. It will allow to attract new freight base to Russian railroads network and to receive additional income. Developed and launched high speed transits from China to Europe may create the competition for traditional mail delivery methods on these routes. From February 2014 “RZD Logistics”, as a part of International Association “Coordination Council on Trans-Siberian Transportation” (CCTT), was changing technological process of mail deliveries in containers using rail transport, which allowed to launch and test the technology in the peak load. Yearly transit potential of mail deliveries from countries of Asian-Pacific region to Europe via Russia was estimated at 200.000 FEU (forty-foot equivalent). By 2030 volumes of freight base for high speed trains may account for 4.9 million of tons [6].

Tasks, which are needed to be solved in order to diversify the goods flow for e-commerce to rail transport, are the following:

- elaboration of routes for express mail delivery using rail transport from central, western and eastern parts of China;
- signing the contracts with Post administrations of provinces in central, western and eastern parts of China;
- elaboration of mail deliveries to offices of international mail exchange in Ekaterinburg, Orenburg and Novosibirsk;
- submission of technologies of transporting the mail deliveries in freight wagons of Federal Passenger Company (FPC);
- submission of technology of mail deliveries from China to Europe.

In 2015 for testing purposes pilot container delivery on the Haerbin – Moscow route was conducted. During 2016-2017 period from time to time pilot deliveries were conducted from China to Germany and Poland with transit through Russia. Such pilot tests were declared to be successful.
Currently, “RZD Logistics” is ready to carry out international mail deliveries regularly, basing on its own container services and ensuring the minimal delivery time from China to Russia – 10-16 days [7].

3. Results discussion

Results, received from this paper, prove the necessity to develop container transits from China via Russian territory to EU countries in order to unleash transit potential of Russia. Cross-cutting technology of Eurasian container traffic was developed. In order to perform such transportations, the route through Mongolian territory may be used. It is in line with economic and geopolitical interests of Russia, because it provides the acceleration of transit freight deliveries and increases the attractiveness of domestic transit potential. Openness to discussion of this variant can be explained by the fact that for its realization Russian investments into development of rail transport of Mongolia are needed. So, at the beginning this route will be quite costly for Russian Railways (“RZD”). But with respect to perspective volumes and to the fact that the choice of this route is preferable, investments will pay off. Russian carriers should foster their competitiveness on the global market using infrastructural solutions. The increase of volume and improvement of service quality in railway connections are of a distinct interest, when talking about transportation of goods for e-commerce. Questions about harmonization of international transport legislation in the sphere of freight traffic in the China – Europe communication are actively discussed.

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