Interaction in transportation as the basis for implementation of intergovernmental cooperation

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Abstract. The purpose of this paper is to define the role and place of the transportation component of the adjacent subjects of two countries in their economic potential for implementation of intergovernmental cooperation. The role and place of the transportation component in estimation of the benefits of the transportation and geographical position becomes evident only when the population, resources and economy of the border regions are jointly analyzed. The analysis of such parameters of the border regions of Russia (Western Siberia) and Kazakhstan performed by means of comparison and association of their economic and transportation potentials, showed that territorial production complexes in them have been developed, and the prospective development within the framework of the Eurasian Economic Union will be determined by the joint use of the benefits of the transportation and geographic position implemented with participation of railway transport.

Introduction

Interaction in transportation has always been considered an integrating factor that determined the *implementation* of the transportation process within the scope of international exchange. The parameters of interaction in transportation in intergovernmental cooperation are determined by the simultaneous presence of geographic or territorial, technical, socio-economic, resource-economic and other factors.

One of the parameters that determine interaction of participants in implementation of transportation services is the geographical factor or the location factor (Bugromenko, 1987; Golts, 1984; Bezrukov, 2004).

The essence of the research problem is that interaction, both as a process and as a result, has territorial boundaries within which this phenomenon can be studied, understood, simulated and estimated for the future. Thus, in paper [1], the authors considered the complex problem of transport development in the east of Russia, paying considerable attention to new directions in the railway network, to their structure, subsequent operation and "integration" into the system of regional transport and economic connection. The models of interaction and the value of the railway transport component within the scope of implementation of the economic potential have been considered within the borders of

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Russian in the "west-east" and "north-south" direction. In paper [2], the author takes into consideration theoretical foundations of the economic and geographical position (Baransky, 1980) and shows the simulation peculiarities of the transport-geographical position (TGP) as part of the EGP.

This paper shows that the transportation component is a parameter of comprehensive estimation of the economic potential, along with socio-economic, resource-economic and other factors. The TGP of territorially close subjects of countries acts as the prerequisite for creation of a transportation cluster for implementation of intergovernmental cooperation.

The border regions of Russia and Kazakhstan, the territorial production complexes (TPCs) of which are similar and can interact between each other, are viewed as the testing ground for the research. The interaction factors are the socio-demographic, natural-resource and economic potential of the territories. The cooperation conditions are technical capabilities, in this case, railway border crossings (RBCs) or stations where customs clearance, transfer of freight carriages and containers, technical works are performed. Availability of a unity of factors and conditions shall be the basis and the problem of interaction, the research and practical content of which has not been studied yet. Judging by [3], a comprehensive analysis of these issues within the scope of the EGP estimation to understand the role and the place of the transportation component in estimating the TGP benefits has not been performed to date. Separate economic and geographical problems are considered in works of domestic and foreign authors [4–6]. The issues of international cooperation through railway logistics are revealed in paper [5] but without estimation of the interaction subjects' economic potential. Paper [6] shows the potential of transportation routes but only natural and economic factors in interaction are taken into consideration. Strategic documents [7, 8] designate the technical component as a condition for arrangement of interaction between subjects but do not pay attention to demographic, resource and economic factors.

The novelty of this study is revealed in the peculiarities of applying a single methodological approach, i.e., in selection of parameters and indicators from literature references, mapping and statistical sources, in their comparison and association, in approbation of the methodology for specific border subjects.

Study method

The methodological approach consists in a comparative-analytical association of the social, resource, economic and transport potentials of the border areas, namely, Omsk and Novosibirsk region, the Altai territory and the Altai Republic; of Pavlodar and East Kazakhstan region. Initially, according to the transport-geographical maps published in [11] and to earlier mapping products published, it was found out that several dozens of transportation customs clearance points were key points for the interstate deliveries in the east of Russia. Only 20 out of them are RBCs where carriages and containers are transferred.

The longest section is the border with Kazakhstan, which determines the vector of the study. The initial data for the research analysis were the topical maps of regions published in the geographical atlases of the USSR, Russia and Kazakhstan. Then, territories were selected that had direct access to the borders of the neighboring state within each of the four constituent entities of the Russian Federation. Those were 6 districts in Novosibirsk region, 7 districts in the Altai Territory, 8 districts in Omsk region. The Altai Republic is not connected with Kazakhstan with railway routes. All subsequent actions to estimate social, resource, economic potential were taken on the basis of comparison, association and analysis of tables in statistical reference books as related to those districts. Similarly, two

territories of Kazakhstan, which had access to the borders of the West Siberian regions, were studied.

In selecting significant information, the following main principles of the economic and geographical characteristics of economic entities were taken into consideration: location and availability of common borders, administrative and territorial status, availability of comparable information on demographic, resource, production and transportation indicators [9: Section 4,15,16,17,25 , 26; 10: Section 2,4,6,7,8,14; 12].

Indicators of population density, length of railways, transport availability in the territory, etc., were calculated using known formulas. Reliability and comparability of the initial data was ensured by the fact that the information had been obtained from official published sources. Estimation of the "natural resources" and "production" parameters was performed by the method of sampling information, both from statistical and other sources [9,13,14,16]. Regarding the natural-resource potential, the information obtained from research and monographic publications published 10 or more years ago was used. Names were assigned to resource types based on the generally accepted classification (A. A. Minz, 1972; I. V. Komar, 1975). The nomenclature adopted in statistical sources was used in names of industries. The time limit for selection and analysis of production indicators was selected for the 3 to 5 year period. The "last date", but not later than three years ago, was used for demographic indicators. The registration parameters were taken in traditional units of measurement, i.e., square and linear kilometers when estimating the areas of entities and the extent of transport routes; absolute and relative meters when assessing the population, resource availability and production in the TPC.

In the region under consideration, the territorial-production complexes of the eastern regions of Russia (Western Siberia) and territorial socio-economic systems of the border areas of eastern Kazakhstan were integrated into a single transportation and logistic chain.

Results

The main results of implementation of the methodology adopted for determining the role and the place of the transportation component in assessing the benefits of the TGP are summarized in Table 1. It represents the social, natural-resource and economic characteristics of the border territories of the two states, i.e., Russia (within the Siberian Federal District) and Kazakhstan. The role and the place of the transportation component in the total economic potential of the regions become apparent when taking into consideration the demographic, natural-resource and economic peculiarities of geographically close subjects of the two countries. The mapping analysis showed that the length of the border lines of the Siberian regions with Kazakhstan in Omsk region was 1,020 km, in Novosibirsk region, it was 317 km, in the Altai Territory, it was about 850 km, and in the Altai Republic, it was more than 500 km.

Statistically, the demographic potential of these regions of Russia is more than three times higher than that of the regions of the Republic of Kazakhstan. Almost 13% of the country's population live in the border regions of Kazakhstan, and about 5% of the country's population live in the regions of Russia under consideration, but it is more than 38% of the number of residents of the constituent entities of the Siberian Federal District (SFD).

Table 1. Socio-Demographic, Natural-Resource, Economic and Transportation Potential of Border Territories Sources of data: [8-11].

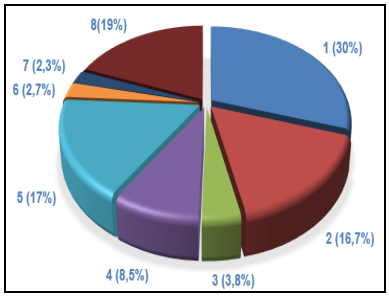
Indicators	Border regions	
	Russia	Kazakhstan
Districts of border states	Omsk, Novosibirsk region, the Altai territory. the Altai Republic	Pavlodar, East Kazakhstan region
Quantity of population	more than 7.3 million people	about 2.2 million people
Natural resources	coal, iron ore and non-ferrous metal ores, non-metallic industrial raw materials, timber, hydro resources	coal and slates, iron ore and non-ferrous metal ores, hydro resources, non-metallic industrial raw materials, timber
Production	mining, processing, power engineering	mining, processing, power engineering
Transportation availability, km (railways)	over 4.1 thousand km	about 2.0 thousand km

The values of the population living in the "nearest neighborhood" regions have the following indicators by districts.

In the south-west of Novosibirsk region, where the border with Pavlodar region of the Republic of Kazakhstan runs, the population density does not exceed 5 people/sq.km, on average. In the districts of the Altai territory that have access to the border with Kazakhstan, the population density also does not exceed 5 people/sq.km. The longest segment of the Russian-Kazakh border belongs to Omsk region. Railways are laid closer to the southern part of the region, where the population density is 5 to 10 people/sq.km on an average. The population density in the Altai Republic is 2 people/sq.km and below, but the region is not connected with the neighboring East Kazakhstan region by railway lines.

Analysis of various literature references revealed that the resource availability of border entities of Russia and Kazakhstan has similar structural characteristics, but the types of natural raw materials of the Altai territory, Novosibirsk and Omsk region of Russia is largely complementary. Thus, the Altai territory is rich in mineral and raw materials base, namely, polymetallic ores, iron ore, coals and non-metallic minerals, mainly developed and used. In the Altai Republic, connected with the Altai territory by roads, the resource potential is extremely diverse in terms of natural raw materials, but the main deposits are mostly explored, evaluated and prepared for mining. There are more than 500 deposits of various types of natural raw materials In Novosibirsk region, about a third of which is concentrated in the railway zone of gravity and is operated. Omsk region does not have major deposits of non-metallic industrial raw materials in the proximity zone.

The resource supply of Pavlodar and East Kazakhstan regions is characterized by great diversity and integrity of the mineral and raw materials complex. More than a third of reserves of energy coals, polymetallic ores, rare metal ores and non-metallic industrial raw materials is concentrated here [12–14]. The scale of deposits' operation largely depends on their relevance to the complex of processing industries in the country. Processing and mining industries of the border regions of both countries also have their own peculiarities. See the structure of the economic complex of the West Siberia regions in Figure 1.

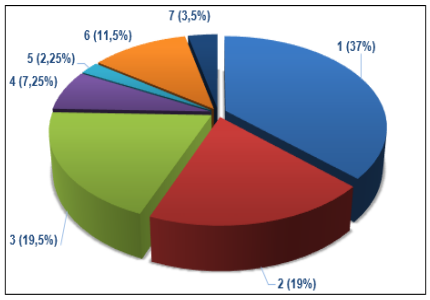


1. Chemical production, production of petroleum products, rubber products and mineral products;
2. Production of machinery, various equipment, agricultural equipment and other equipment;
3. Manufacture of metal products;
4. Production of building materials and cement;
5. Production of food and consumer goods;
6. Production of wood and products from it;
7. Production of other products;
8. Production of agricultural and industrial complex (grain, flax, livestock, feed production).

Fig. 1. The economic complex structure of border regions of Russia (Western Siberia).

According to petrochemical production and many types of machine-building and agricultural production, Omsk region's own production exceeds the level of domestic consumption, while the energy potential of this region is clearly not sufficient. The region is energy-deficient, therefore, supplies from neighboring regions of Siberia and the nearest regions of Kazakhstan are an important condition for the future development of the multi-profiled industrial structure of the region [9]. Industrial specialization of enterprises in Novosibirsk region is more balanced and unites, both with its own resources and raw materials, and with the benefits of the TGP. The profile of enterprises of Novosibirsk region was formed due to machine-building products, agricultural enterprises, chemical, woodworking industries and cement production. There are electricity and power generating capacities in Novosibirsk region, but the production area is based on the fuel imported from Kemerovo region and the Khakassia [9]. The Altai territory participates in interregional exchange in agricultural and textile products, food products, agricultural accessories, various chemical products with nanotechnological characteristics. Electric power engineering facilities of the region (thermal power plants and gas turbine power plants) are operated on imported and local coal [9].

The structure of industry in the border regions of Kazakhstan, namely, Pavlodar and East Kazakhstan, was mainly formed in the "Soviet era" and the profile of industrial enterprises is largely preserved at present. See the structure of the economic complex of Kazakhstan regions in Figure 2.



1. Production of mining and processing plants, coalmines;
2. Metallurgical and metal-working products;
3. Mechanical engineering products (equipment, tools, valves);
4. Mineral production;
5. Agricultural products;
6. Production of food and consumer goods;
7. Production of wood and products from it.

Fig. 2. The structure of economic complex of border regions of Kazakhstan.

Mining enterprises of Pavlodar region are developing coal and other deposits, mainly of polymetallic ores. Significant volumes of GRP are formed in processing industries specialized in metallurgy and metal working, production of manufacturing equipment and tools. The share of agricultural industry is less than 5% in the GRP structure and the increase in this indicator is virtually impossible due to inadequate hydration of the region.

Power engineering and electric generating capacities of the region are characterized by their development and self-sufficiency. Overhead power transmission lines connect the region with adjacent regions of Kazakhstan and Russia. Production is also the leading branch of the economy in the East Kazakhstan region. The developed and operated mineral resource base of the region is the basis for development of mining industries. Production at processing enterprises is associated with production of ore concentrates, refined gold and silver, cement, silicate bricks, reinforcement, equipment and wood products. Specialization of enterprises in production of food and products and a wide range of consumer goods is due to the availability of the agricultural production base and the socio-economic needs of the population that resides in the region. The energy potential of the East Kazakhstan region is significant. There are hydroelectric power plants and facilities for generation of electric and thermal power in the region [12–14].

Thus, with all unification of the products manufactured in economic complexes of the border states, a number of commodity groups remain unique. Mutual deliveries could create the commodity basis for the transportation and economic cluster, the ability of which is largely determined by the transportation availability in the border regions. [15]

The transportation component of the economic potential has its own peculiarities. From the standpoint of the railway transport development, almost all border entities, both in Kazakhstan and Russia (with the exception of the Altai Republic), are provided with railways with the 1,520 mm tracks, but the TGP benefits for arrangement of mutual social, economic and transport links are more typical of geographically close border districts of the border entities. Thus, the southeastern and the southwestern parts of Novosibirsk region, the central and southern parts of Omsk region, the central, western and southwestern parts of the Altai territory have railway connections with the districts of Central and Eastern Kazakhstan, and the Irtysh-Karasuk line directly crosses a section of Kazakhstan territory. The Kurgan-Petropavlovsk-Omsk railway line also runs through Kazakhstan territory. The southern line, which runs from Novosibirsk through the Altai territory, is a branch of the railway line from the Tatarskaya station that crosses the extreme west of Novosibirsk region and the Altai territory and also “emerges” at the border with Kazakhstan, is connected with Kazakh railways. By the length of the railway lines, the indicator of the West Siberian border regions of the Russian Federation is a quarter of the SFD index and, in fact, it is twice as large as the one for the regions of the Republic of Kazakhstan.

The key railways of Pavlodar and East Kazakhstan region have the “north-south” direction. A line in the “west-east” direction was built not long ago. Railway branches ensure connection of the northern and the eastern Kazakhstan with both inner regions of the Republic of Kazakhstan and with the border regions of the Russian Federation [11]. The total length of the railway lines of Pavlodar and East Kazakhstan region is more than 13% of the country’s railway network.

Conclusion

Analysis of mapping materials, statistical data and information from literature references on the resource availability, population and peculiarities of the economy of the border territories of the two states showed that the TPCs of the regions are mainly formed and are conditioned by the peculiarities of the available natural conditions and resources. The comparative analytical association of the indicators made it possible to state the special significance of the transportation component in the economic potential of the proximity of the entities of the two countries for implementation of intergovernmental cooperation. It was possible to show that the border regions have all the prerequisites, i.e., industrial, economic, social, organizational ones, for uniting and interaction in the form of the transportation and the economic cluster.

Taking into consideration the intercontinental position of this transportation and economic cluster, railway transport can initially play the core role in arrangement of the transportation flow and "connection" to the European transportation routes. Research of the activities of the transportation and economic cluster will prove to be very productive in simulation of new managerial approaches to intergovernmental uniting of productive forces and the expansion of foreign economic relations of the geopolitically united states of the continent [16].

References

1. V.A. Lamin, V.Y. Plenkin, V.Y. Tkachenko, *Global track: development of transport system in the East of the country* (Ural branch of the Russian Academy of Sciences, Yekaterinburg, 1999). (in Russian)
2. Y. Kanemoto, Evaluating benefits of transportation in models of new economic geography, **J, E 2 (2-3)**, p.53-62 (2013).
3. D. Snidal, M. Sampson, Interstate Cooperation Theory and International Institutions. Oxford Bibliographies (2017), available at: http://www.oxfordbibliographies. com/view/document/obo-9780199743292/obo-9780199743292-0093.xml (May 20, 2018).
4. N.B. Popova, Y.M. Buintseva, E.A. Sidenkova, M.S Chikinova, E.A. Korchovaya, *Integrated transport system* (STU Publishing house, Novosibirsk, 2014).
5. N.K. Isingarin, *Logistics of international rail transport* (Economtransconsulting Publ., Almaty, 2006). (in Russian)
6. S.E. Rakisheva, A.A. Saipov, *Geography of integration of the transport system of Kazakhstan into the world transport and communication system*, **Vol. 1,** International scientific conference on Geosystem approach to the study of the natural environment of the Republic of Kazakhstan, Eurasian national University, Astana, 2018, 251-254.
7. Transport strategy of the Russian Federation for the period up to 2030: order of the government of the Russian Federation from 22 November, 2008 № 1734-R (as amended on June 11, 2014). (in Russian)
8. KazPortal.kz, Transport system of Kazakhstan, available at: kazportal.kz›transportnaya-sistema-kazahstana (Febryary 23, 2018). (in Russian)
9. Russian statistical yearbook. 2017 (Rosstat, Moscow, 2017). (in Russian)
10. Russia and the world. 2016 (Rosstat, Moscow, 2016).
11. Atlas Railways (Omsk cartographic factory, Omsk, 2012). (in Russian)
12. WWW.LIBRARY/PUBLICATIONS/THE-WORLD-FACTBOOK. The World Factbook – East&Southeast Asia, available at: http://www.library/publications/the-world-factbook (April 24, 2018).
13. WWW.ECONOMY.GOV.KZ. Ministry of national economy of the Republic of Kazakhstan: available at: http://economy.gov.kz/ru/kategorii/itogi-socialno-ekonomicheskogo-razvitiya-rk (April 24, 2018).
14. WWW.STAT.GOV.KZ. Official website of the state statistics service of Kazakhstan: available at: http://stat.gov.kz/faces/wcnav_externalId/publicationsCompilations?(April 24, 2018).
15. S.U. Niyazbekova, I.T. Grekov, T.K. Blokhina, Economy of Region, **J, E 4**, 1263-1273 (2016).
16. A. Lesh, *Spatial organization of economy* (Nauka, Moscow, 2007). (in Russian)