

The article contains an analysis of Kazakhstan's path of development of the transport and logistics industry. The analysis of statistical indicators of the development of transport and logistics complex of Republic of Kazakhstan is presented, as well as the main directions of development of the industry.

This article considers aspects of the development of transport and logistics complex in the country, which depend on many factors, including different government support tools. As a result, in the Republic of Kazakhstan in 2021 the cargo turnover by modes of transport increased by 2.26 %, with stable indicators of cargo transportation by rail (accounting for more than half of the total cargo transportation), there is a significant increase in cargo transportation by pipeline transport – by 11.9 % and a slight decline in road transport – 1.06 %. In 2021, positive dynamics of cargo turnover by modes of transport has observed in Kazakhstan, which has increased by 4.96 %, it is caused by the increase of cargo turnover in three main directions: air transport – by 116.2 %, pipeline transport – by 21.4 % and road transport – by 11.93 %. It is proved, that low level of information and digital technologies and high physical and moral wear and tear of major part of infrastructure are key factors limiting development of transport and logistic complex.

These findings illustrate how the existence of laws and regulations governing the transport industry, as well as the favorable geographical location of Republic of Kazakhstan for the transit of goods along international transport corridors are important for the development of the transport and logistics complex of the Republic of Kazakhstan.

The practical application of the results of the study is the possibility of forecasting further directions of development of transport infrastructure

Keywords: transport infrastructure, pipeline, automobile transport, railway, air transport, cargo turnover

ANALYSIS OF THE TRANSPORT AND LOGISTICS COMPLEX OF THE REPUBLIC OF KAZAKHSTAN

Elena Polukhina

PhD Student

Department of Marketing and Logistics

Turan University

Satpayev str., 16A, Almaty,

Republic of Kazakhstan, 050013

Salima Mizanbekova

Corresponding author

Doctor of Economic Sciences, Professor

Department of Management

and Organization of Agribusiness

Kazakh National Agrarian Research University

Abay ave., 8, Almaty,

Republic of Kazakhstan, 050010

E-mail: salima-49@mail.ru

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1. Introduction

Countries providing high quality transport infrastructure and more efficient logistics services have a cost advantage in the delivery and production of goods. Logistics services are important inputs in the supplying of goods abroad and in the sourcing of intermediates. Poor transport infrastructure and logistics lead to an increase in average costs. Even if a firm in a country produces goods in the most efficient manner in the world, but it must manage high transport costs because of the low-quality of the domestic transport infrastructure and logistics, then they cannot be competitive in foreign markets [1].

Transport and logistics infrastructure plays a special role in the development of economic. The interrelations between transport and economic growth are a topic that has received renewed interest in recent years [1].

An increase in the competitiveness and quality of transportation services for the economy should be promoted by the creation of sustainable, cost-effective system of transport and logistics [2].

In most theories the occurrence of positive effects of the transport infrastructure development has been noted, nevertheless, there is no consensus as to the direction and force of these effects [3].

It is important to analyze the role played by transport in modern economy and indicate the mechanisms affecting

the socio-economic development and its links with modern factors of development [3].

The transport policy of the EAEU member states is a priority direction of country's development and as a mechanism of realization of industrial-innovative development programme of the state [4].

The infrastructure has important influence on the location of economic activity and population centres. Empirical macroeconomic analyses of transport infrastructure productivity provide insufficient information on the linkages between transport improvements and the broader economy. For instance, the empirical evidence suggests that benefits of transport infrastructure improvements tend to be concentrated near the infrastructure projects [5].

All the aforementioned arguments substantiate the relevance of research subject devoted the transport and logistics complex of the participating countries.

2. Literature review and problem statement

The Eurasian Economic Union integrates five countries: Armenia, Republic of Kazakhstan, Kyrgyzstan and the Russian Federation [6].

Thanks to The Eurasian Economic Union (in fact, a part of it, i. e., the customs union), goods transported by land

between China and the European Union cross only two customs boundaries: between China and the EAEU (customs union) and between the EAEU (customs union) and the European Union. This results in a number of interesting opportunities for the development of services and trade as well as transport and logistics infrastructure [7].

The establishment of the EAEU has given the opportunity to create a platform for cooperation and the normalization of mutual relations with the European Union [8].

Experts perceive the EAEU as an initiative that is focus on solutions that can be used to improve the functioning of the routes. They assume that, regardless of the current political background of the land routes, the Belt and Road Initiative branches running through the territory of the EAEU are going to be developed [9].

For the actual possibilities of the EAEU to create harmonious political and economic relations with China, the EU and other countries it is need:

- to implement and actual application of the customs union rules for the transit of goods by the EAEU;
- to analyze of the external factors and international structural factors;
- to use geographical, technical and logistical potential for creating transport and logistics routes;
- to use skills and willingness to eliminate administrative, border and other barriers restricting the transit of goods [10].

After the disintegration of the U.S.S.R., the independent countries of Central Asia, in particular, their natural resources have attracted the attention of world powers, simultaneously becoming a place of conflict of interests. In order to preserve stability in the region, and, as a consequence, to ensure the status of a Eurasian transit traffic channel, the Central Asian republics are not only modernizing the existing communications, but are also implementing alternative infrastructure projects. Numerous attempts at integration of post-Soviet countries have been made since the early 1990s in the framework of establishing the Commonwealth of Independent States, the Eurasian Economic Community, and the Customs Union. However, the EAEU is currently the most efficient organization, furnished with the required regulatory framework and articulated strategic goals [10].

Integration in the post-Soviet space is determined by numerous factors. One of them is the relatively low competitiveness of goods produced in the countries of the former Soviet Union compared to foreign goods, while cooperation is based primarily on building and maintaining the connections established in the Soviet era. In addition, efficient integration requires partners' relative economic equality for the purpose of ensuring mutual economic benefits and excluding the possibilities of influence and domination among Union participants. In the case of EAEU, under conditions of globalization, a lack of access to open sea, and the need to preserve regional security and stability, Kazakhstan, just as other participating countries, requires strategic and long-term contacts with its closest neighbors. This is why today the Central Asian region is not only the arena for the conflict of geopolitical interests, but also a platform for cooperation in the framework of international organizations. The EAEU, which sets the tasks of ensuring a continuous flow of goods through all the member countries, creates additional opportunities for the access of Kazakhstan's energy resources to external markets, and the efficient utilization of the country's transport potential [10].

The role of port infrastructure in international trade begun to examine by researchers [11, 12]. A number of studies highlight the importance of other modes of logistics for economic performance. In particular, author [13] examines the impact of quantitative and qualitative improvements for five different transport infrastructure types on trade, and shows that there are indeed differences in the trade effects of improvements in certain types of transport infrastructure. These studies clearly indicate the importance of transport infrastructure for economic performance. Collectively, these studies outline a critical role of the analysis of transport infrastructure, meanwhile need to identify a connection between the main factors affecting the economic efficiency and prospects for the development of these resources.

To date, several studies have investigated the interdependencies between the demand for transport and the socio-economic development and revealed a strong correlation. To examine this issue author [3] carried out a series experiments: basic trends in the GDP growth rate, the freight and passenger transport volumes over a 20-year period in the EU-28 countries were analyzed. This study indicates a link between the development of transport and economic growth. However, such studies remain narrow in focus dealing only with countries of Europe.

There is a large volume of published studies describing the role of transport infrastructure and logistics on economic of region [1]. Surveys such as that conducted by researcher [2] have shown the positively influence of the number, size and quality of logistics facilities on export flows. The study [1] calls our attention to that a country's ability to provide high-quality transport infrastructure and logistics is a source of comparative advantage, whereby export performance is measured by domestic value added in exports. The authors [5] attempted to evaluate the spillover effects of the main transport modes such as road, railway, airport, and seaport infrastructure. These studies [1] indicate that efficient transport infrastructure and logistics are crucial for production and exports. This indicates a need to understand the various perceptions of inefficient transport infrastructure and logistics incur high production costs and identify their weaknesses.

Most scientific studies [14–16] identify several major problems in the development of transport and logistics complex of the participating country. They determined the following disadvantages:

- limited logistical and technical capabilities of carriers,
- underdeveloped infrastructure,
- lack of developed transport and logistics centers, warehouses and terminals,
- lack of qualified specialists,
- low quality of service.

Thus previous studies have failed to find significant advantages of transport and logistics complex of the country.

The article [15] discusses and analyzes in detail the following current tasks: modernization of the country's transport infrastructure, further development of integration cooperation between the states of the common economic space in the field of transport, development of mutually beneficial solutions for the interaction of transport complexes of member states, renewal of the vehicle fleet, creation of joint productions, which is to become an important factor in creating a common transport space within the CES in the future [17]. According to the results of this study, the relevant principles of infrastructure development of the transport

system were defined. In addition, a conclusion is made about the creation of a global system of information support of transport vehicles. In other words, the development of optimal transport infrastructure using the principles of logistics, the creation of multimodal transport corridors, a network of terminals and transport and logistics centers, opens up opportunities for technological interaction between all types of transport in the organization and implementation of the transportation of passengers and goods [17]. Consequently, in accordance with this, it is important to use advanced technologies (intelligent transport system) and global experience in the strategic directions of development of transport infrastructure. To date, there has been little empirical evidence that defined principles of infrastructure development of the transport system.

The study of global trends shows that there are no universal methods of improving the transport and logistics complex. This is due to the fact that the choice of a particular development and direction depends on many factors. A significant role is played by the resource factor, through which the state has the opportunity to allocate funds, for example, to implement digitalization in the areas of transport and logistics to increase the volume of transit traffic through the territory of the EAEU member state [16]. The limitation of this approach is that used only the resource factor, however, this method clearly is not valid for analyzing long-term prospects for the development of the transport and logistics complex.

The study [18] stresses that the formation and development of logistics, transport, trade and information systems contributes to the acceleration of the country's integration into the global economic and information space. The estimated volume of exports and imports in the participating country mainly to the countries of Central Asia and Europe is estimated, in particular the growth of air cargo transportation by 2030 will be 6.6 % (11–12 million tons per year), and then prospects for the development of transport and logistics systems are put forward. This study highlights the need for the principles of logistics: speed, service, stability, safety and cost. The principal limitation of the experimental approach is that a forecast method that depends on many factors.

In contrast to the previous ones, the article [19] considers the formation of a competitive environment of the transport services market, through the strengthening of small and medium entrepreneurship. It highlights the problem of imperfection of the regulatory framework and insufficient protection of the interests of small and medium entrepreneurship in the sphere of transport. An overview of possible interaction between the state and the private sector was presented. The study proposes a form of mutually beneficial participation of entrepreneurship in the development of the transport industry on the basis of partnership with public authorities [19]. What remains unclear is how such policies and practices affect the defined sides and weaknesses of the infrastructure of the transport system.

The study [20] pays attention to the growth of the volume of transit through the territory of the EAEU member state, which was facilitated not only by its favorable geographical location, but also by the active participation of the republic in all regional integration initiatives, as well as the implementation of state policy measures aimed at turning the participating country into a powerful transport and logistics hub. State support measures, in particular, included

the state program for subsidizing the interest rate for the purchase of rolling stock on lease or loan [21], the Unified Program “Business Road Map 2020” [22], tax incentives for the transport industry [23], tax incentives for small and medium-sized businesses involved in the development of transport, logistics and postal projects [17]. However, a number of additional questions remain about the unanswered of the current situation in the geopolitical space.

The authors [20] have contributed to the structuring of data on transit and transit container traffic through the country in Central Asia. As a result of the study, the authors confirm that in the coming years the member state of the EAEU will act as a leader in the organization, operation and management of transportation and transit between the countries of the Eurasian Economic Union. This study has been concentrated on transit and transit container traffic through the country.

For instance, in this research [24] authors list five key areas of logistics development in the EAEU member state:

1. Development and creation of public TLC, both domestically and in major border transport hubs.
2. Creation of logistics centres for internal trade serving, namely, the creation of wholesale and distribution logistics centres.
3. Development of logistics infrastructure based on customs warehouses, in particular, on existing cargo terminals in the Republic of Kazakhstan of the JSC ‘Kedentransservice’.
4. Creation and development of trade and logistics centres in foreign countries.
5. Development of logistics infrastructure in the enterprise [24]. In this case study provides in-depth analyses of the logistics infrastructure; however this research uses qualitative data to focusing specifically on TLC.

Summarizing the review of literary sources allows to assert that it is expedient to conduct a study on to ensure the development of transport infrastructure in the EAEU member state:

- firstly, the works studied give general recommendations for the development of transport and logistics complex;
- secondly, the above studies contain individual problems of transport and logistics complex development, which do not demonstrate their comprehensive analysis.

3. The aim and objectives of the study

The aim of this study is to determine the features and the current state of the transport and logistics complex of the Republic of Kazakhstan. This will make it possible to development, working out proposals to improve efficiency.

- To achieve the aim, the following objectives were solved:
- to conduct a study of rail, road, air, water transport, transport logistics, analysis of internal and external factors;
 - to find ways of the prospects for the development of transport and logistics complex of the Republic of Kazakhstan and its individual industries;
 - to analyze of development opportunities and identification of weaknesses.

4. Materials and methods

The object of this study is the transport and logistics complex of Republic of Kazakhstan. Research hypothesis

assumes that, despite the weaknesses and constraints, the transport and logistics complex of Republic of Kazakhstan has great potential. This paper presents the methodological assumptions in research into the country's transport infrastructure. One of the more common assumptions made in is the geographical location of the Republic of Kazakhstan has a strategically advantageous benefit for the creation of alternative transport corridors. A potential problem is that the scope of our research may be too broad. Due to practical constraints, this page cannot provide a comprehensive review of the impact of transport infrastructure and logistics on trade.

To obtain the most objective, accurate, systematic information was used principles: objectivity, consistency, substantial analysis of domestic and foreign scientific publications.

The methodology of the study of this problem used general scientific (analysis, synthesis, analogy, classification) methods, qualitative analysis and a quantitative approach. Information and empirical component of the work is represented by official materials of the state statistics of the Republic of Kazakhstan, reviews and analytical reports, publications in periodicals and collections of scientific and practical conferences on the development of the transport complex.

5. Results of analysis of the transport and logistics complex of the Republic of Kazakhstan

5.1. Analysis of the state of transport in the Republic of Kazakhstan

Analysis of Kazakhstan's freight transportation industry has shown that freight turnover increased by 3.5 % in 2020 relative to 2019 and amounted to 231.8 million ton-kilometers. More than 256.5 million tons of cargo were loaded on KTZ's network, which is 1.4 million tons more than in the previous year. The range of cargoes transported by rail has remained virtually unchanged [23].

The loading of iron and manganese ore increased by 2 % (to 27 million tonnes), the loading of non-ferrous ore and sulphuric raw materials increased by 13 % (to 23 million tonnes) and the loading of ferrous metals increased by 10 % (to 5 million tonnes) [23].

Compared to a year earlier, there was a slight decrease in the volume of construction and oil cargo shipments. 19 million tons of construction cargo were loaded, which is 94 % of the 2019 figure, oil cargo—17 million tons (92 %). Factors that influenced the volume of shipments were a decrease in demand for construction cargo due to the coronavirus epidemic and a drop in oil prices [23].

To achieve this goal, the Ministry is taking measures to build railway infrastructure, upgrade rolling stock, containerize cargo, develop alternative routes, and develop international corridors. Three key infrastructure projects are planned to be implemented by 2025 in order to increase the throughput capacity on the so-called "bottlenecks" in railway transport: *"Dostyk-Moynty"*, *"Darbaza-Maktaaral"*, *"Bypassing the railway line of Almaty station"* [25].

In order to support the domestic railcar industry, government support tools in the form of subsidized interest rates for railcar operators when lending for the purchase of domestic railcars were introduced. About 3.5 thousand fitting platforms and more than 2 thousand freight cars were purchased under this program. Also this year KTZ plans to purchase 1.5 thousand freight cars [25].

In order to increase the competitiveness of domestic carriers the work on increasing the number of vehicle fleet from 7,615 units to 15,000 units by 2025 is carried out. For these purposes, during the period from 2023 to 2028 tractor units of ecological class Euro-5 will be exempted from the initial registration. Also this type of vehicles with the weight of 12 to 50 tons will be exempt from the recycling fee. These measures will allow domestic entrepreneurs to save up to 4.27 mtg when buying tractors [25].

The forecast volume of transit road transport by 2025 will increase to 3.5 million tons. The capacity of international corridors is of paramount importance for the development of transit. As of today, 8 road transit corridors run through the territory of Republic of Kazakhstan. In general, all corridors are functioning at full capacity. Some sections are being reconstructed, which are planned to be completed in 2030 [25].

In 2021, the operational cargo turnover was 239.3 million tons/km, which was a historical maximum for the years of independence of the Republic of Kazakhstan. Transit reached 39.6 million tons/km (21 million tons). By the level of 2020 transit growth was 2 %. The final profit amounted to 120.6 million tenge, which is 7.4 times higher than in 2020. The average salary of KTZ employees for February 2022 amounted to 273 thousand tenge, which is 41.5 % more than the same period last year [25].

The ports of Kuryk and Aktau contribute to the expansion of transport and logistics flows of the Republic of Kazakhstan through the Caspian Sea.

The design capacity of LLP "Port Kuryk" – 6 million tons per year. By the end of 2020 the volume of transshipment was 1560 thousand tons, including 500 thousand tons of wheeled vehicles. An obstacle to effective operation is the geographical remoteness of the port Kuryk from the Central, Northern and Eastern Kazakhstan, where the main transshipment cargoes are formed [25, 26].

To improve its efficiency, it is necessary to increase the competitiveness of national goods, including by reducing transport, logistics costs and to realize the full transit potential of the country [25, 26].

The main reasons are insufficiently perfect management structure of the branch, absence of organized and coordinated activity of shipping companies and ship owners, absence of scientific, marketing and logistical support of the branch, obsolete fleet of vessels, unsatisfactory condition of water transport infrastructure and navigable ways, shortage of highly qualified personnel and weak system of their training [26].

Currently, the infrastructure of airports in the Republic of Kazakhstan, primarily regional airports, not only does not meet international requirements, but also are in a very poor condition. This primarily applies to special equipment, providing air craft maintenance [26].

The first area of such support is the integration of TLCs with specialized terminals, including wholesale distribution centers, mail, and private investors, if their commercial interests converge in terms of locations and the format of hub terminals. This will concentrate demand for terminal infrastructure, increase the return on investment of the TLC, and possibly distribute infrastructure costs among a larger number of participants [25, 26].

Also affecting efficiency are:

- lack of warehouse space;
- development of intermodal (multimodal) transport of standard ISO containers;
- lack of port facilities;

Table 1

Transportation by types of transport (million tons)

Name	2017	2018	2019	2020	2021
All modes of transport					
Eurasian Economic Union (EEU)	12,518.2	12,767.2	13,125.1	12,342.6	12,474.7
including:					
Armenia	28.1	29.2	14.7	14.8	17.2
Belarus	439.5	455.5	427.8	398.7	384.9
Kazakhstan ¹⁾	3,946.1	4,103.8	4,222.7	3,944.8	3,999.4
Kyrgyzstan	31.9	33.0	34.2	24.6	28.6
Russia	8,072.6	8,145.7	8,425.7	7,959.7	8,044.6
pipeline					
EEU	1,497.5	1,577.9	1,552.6	1,428.5	1,510.2
including:					
Armenia	1.8	1.8	1.8	1.9	2.0
Belarus	124.4	125.2	118.4	111.2	99.0
Kazakhstan ¹⁾	232.8	281.4	273.0	253.7	267.4
Kyrgyzstan	0.2	0.2	0.2	0.3	0.3
Russia	1,138.2	1,169.3	1,159.2	1,061.4	1,141.4
without pipeline					
EEU	11,020.8	11,189.4	11,572.5	10,914.1	10,964.5
including:					
Armenia	26.3	27.4	12.9	13.0	15.2
Belarus	315.1	330.4	309.5	287.5	285.9
Kazakhstan ¹⁾	3,713.3	3,822.4	3,949.7	3,691.1	3,731.9
Kyrgyzstan	31.7	32.8	34.0	24.4	28.3
Russia	6,934.4	6,976.4	7,266.5	6,898.2	6,903.2
railway					
EEU	1,922.4	1,851.7	1,946.6	1,891.0	1,834.0
including:					
Armenia	2.6	2.9	3.2	3.2	3.1
Belarus	146.3	157.2	145.5	125.0	128.6
Kazakhstan ¹⁾	387.2	397.9	397.0	402.3	416.1
Kyrgyzstan	1.9	2.3	2.2	2.0	2.1
Russia	1,384.3	1,291.5	1,398.6	1,358.5	1,284.1
automobile					
EEU	8,946.3	9,191.7	9,488.8	8,883.5	8,997.8
including:					
Armenia	23.7	24.5	9.7	9.7	12.1
Belarus	166.7	170.9	161.7	159.8	154.8
Kazakhstan ¹⁾	3,322.3	3,421.4	3,550.5	3,287.0	3,314.2
Kyrgyzstan	29.8	30.5	31.7	22.3	26.2
Russia	5,403.9	5,544.4	5,735.3	5,404.7	5,490.5
air					
EEU	1.4	1.3	1.4	1.4	1.6
including:					
Armenia ²⁾	0.02	0.02	0.02	0.02	0.02
Belarus	0.06	0.05	0.03	0.03	0.04
Kazakhstan	0.02	0.04	0.03	0.02	0.03
Kyrgyzstan	0.000	0.001	0.000	0.000	0.000
Russia ³⁾	1.3	1.2	1.3	1.3	1.5

Note: compiled on the basis of [28];

1) – taking into account the estimate of the volume of transportation by individual entrepreneurs engaged in commercial transportation;

2) – the data also includes cargo shipments performed by aircraft from other countries;

3) – according to Rosaviatsia.

– insufficient implementation of intermodal logistics technology, including telematics systems, the use of which today are a prerequisite for the existence of the logistics market;

– the high cost of IT-technologies [27].

5. 2. Prospects for development of transport in the Republic of Kazakhstan

From the chart 1, it can be seen that gross domestic product (GDP) from services in the Republic of Kazakhstan averaged 10272.8 billion tenge from 2013 until 2021, reaching an all time high of 32497.2 billion in the fourth quarter of 2018. GDP from services in this country is expected to be 8334.9 billion tenge by the end of this quarter, according to Trading Economics global macro models and analysts expectations. In the long-term, the Republic of Kazakhstan GDP from services is projected to trend around 11464.8 billion tenge in 2023 and 11866.1 billion in 2024.

From the data in Fig. 1, it is apparent that Gross domestic product (GDP) from transport in the Republic of Kazakhstan averaged 1408.0 billion tenge from 2013 until 2021, reaching an all time high of 5399.9 billion in the fourth quarter of 2021. Gross domestic product (GDP) from transport in this country is expected to be 1041.0 billion tenge by the end of this quarter, according to Trading Economics global macro models and analysts expectations. In the long-term, the Republic of Kazakhstan GDP from transport is projected to trend around 5834.8 billion tenge in 2023 and 6039.1 billion in 2024.

The provision of intermediary services and transportation services in cross-border deliveries of goods through the territory of the Republic of Kazakhstan and through the territory of other states can bring high income in foreign currency, which suggests the need for support from the state [25, 26].

The volume of freight transportation by all modes of transport in the EEU in 2021 increased by 1.07 % compared to 2020. The increase was due to freight transportation by road transport – by 1.28 %, by air transport – by 14.2 %, as well as freight transportation by pipeline, which increased by 5.71 %. At the same time, as Table 1 shows, transportation by rail decreased by 3.01 %.

As can be seen from the Table 2, in the Republic of Kazakhstan in 2021 compared with 2020, the cargo turnover by modes of transport increased by 2.26 %, with stable indicators of cargo transportation by rail (accounting for more than half of the total cargo transportation), there is a significant increase in cargo transportation by pipeline transport – by 11.9 % and a slight decline in road transport – 1.06 %.

Closer inspection of the Table 3 shows that in 2021, compared with 2020, positive dynamics of cargo turnover by modes of transport is observed in the Republic of Kazakhstan, which has increased by 4.96 %, it is caused by the increase of cargo turnover in three main directions: air transport – by 116.2 %, pipeline transport – by 21.4 % and road transport – by 11.93 %.

In general, in 2021, compared with 2020, positive dynamics of cargo turnover by modes of transport is observed in EEU, which has increased by 9.74 %, it is caused by the increase of cargo turnover in four main directions: air transport – by 34.2 %, pipeline transport – by 16.4 %, road transport – by 8.34 % and rail transport – 4.36 %.

Table 2

Freight turnover by type of transport
(millions of ton-kilometers)

Name	2017	2018	2019	2020	2021
All modes of transport					
EEU	6,192.1	6,391.0	6,414.4	6,115.5	6,419.0
including:					
Armenia	4.2	4.4	4.8	4.7	5.1
Belarus	133.3	138.8	130.8	123.2	118.8
Kazakhstan	564.0	609.5	597.6	584.0	597.2
Kyrgyzstan	2.6	2.8	2.9	2.4	2.6
Russia	5,488	5,635.5	5,678.3	5,401.1	5,695.3
pipeline					
EEU	2,805.1	2,868.2	2,880.1	2,649.3	2,840.0
including:					
Armenia	2.8	2.8	2.9	3.0	3.2
Belarus	57.7	58.1	54.0	51.9	44.6
Kazakhstan	129.5	139.4	136.7	124.2	139.0
Kyrgyzstan	0.2	0.2	0.2	0.2	0.2
Russia	2,614.9	2,667.8	2,686.2	2,470.1	2,653.0
without pipeline					
EEU	3,387.1	3,522.8	3,534.3	3,478.2	3,579.0
including:					
Armenia	1.4	1.6	1.9	1.7	1.9
Belarus	75.6	80.8	76.8	71.3	74.2
Kazakhstan	434.5	470.2	460.9	463.6	458.2
Kyrgyzstan	2.5	2.6	2.7	2.2	2.4
Russia	2,873	2,967.7	2,992.1	2,939.3	3,042.4
railway					
EEU	2,810.2	2,935.4	2,939.1	2,888.8	2,984.9
including:					
Armenia	0.7	0.7	0.9	0.8	0.8
Belarus	48.5	52.6	48.2	42.4	44.5
Kazakhstan	266.6	283.3	286.7	299.2	299.2
Kyrgyzstan	0.9	1.0	0.9	0.9	1.0
Russia	2,493.4	2,597.8	2,602.5	2,545.3	2,639.4
automobile					
EEU	449.9	474.8	480.2	462.7	475.7
including:					
Armenia	0.7	0.9	1.0	0.9	1.1
Belarus	27.0	28.1	28.5	28.8	29.6
Kazakhstan	166.1	185.2	173.5	160.0	158.3
Kyrgyzstan	1.5	1.6	1.8	1.3	1.4
Russia	254.5	259.1	275.4	271.8	285.3
air					
EEU	8.0	8.0	7.5	7.3	7.3
including:					
Armenia	0.0	0.0	0.0	0.0	0.0
Belarus	0.1	0.1	0.0	0.1	0.1
Kazakhstan	0.1	0.1	0.1	0.1	0.1
Kyrgyzstan	0.01	0.01	0.01	0.01	0.01
Russia	7.9	7.8	7.4	7.1	7.1

Note: compiled on the basis of [28]

Table 3

Dynamics of freight turnover by types of transport
(as a percentage of the previous year)

Name	2017	2018	2019	2020	2021
All modes of transport					
EEU	105.8	103.3	100.4	95.4	104.7
including:					
Armenia	109.5	103.1	108.7	98.5	108.1
Belarus	106.0	104.1	94.2	94.1	96.4
Kazakhstan	108.7	108.1	98.0	96.6	101.4
Kyrgyzstan	107.1	105.2	104.9	83.4	109.0
Russia	105.5	102.8	100.8	95.3	105.3
pipeline					
EEU	105.3	102.3	100.4	92.1	107.2
including:					
Armenia	111.3	98.8	104.1	101.7	108.7
Belarus	97.2	100.6	93.1	96.0	86.0
Kazakhstan	113.1	107.6	98.1	91.5	111.1
Kyrgyzstan	116.2	117.9	100.0	108.2	119.0
Russia	105.1	102.0	100.7	92.0	107.4
without pipeline					
EEU	106.2	104.3	100.3	98.1	102.9
including:					
Armenia	106.6	111.8	116.8	93.5	107.2
Belarus	113.8	106.8	95.1	92.8	104.1
Kazakhstan	107.5	108.2	98.0	98.1	98.8
Kyrgyzstan	106.5	104.3	105.3	81.6	108.1
Russia	105.8	103.6	100.8	98.3	103.5
railway					
EEU	107.1	104.5	100.1	98.6	102.9
including:					
Armenia	104.8	106.1	118.0	97.5	96.4
Belarus	118.1	108.3	91.7	88.0	104.9
Kazakhstan	111.6	106.3	101.2	104.5	99.0
Kyrgyzstan	116.1	101.4	91.6	107.7	107.0
Russia	106.4	104.2	100.2	98.1	103.4
automobile					
EEU	102.3	105.8	101.5	94.7	102.6
including:					
Armenia	107.3	117.2	117.1	90.2	117.1
Belarus	106.9	104.1	101.5	100.9	102.8
Kazakhstan	101.8	111.5	93.7	88.0	98.5
Kyrgyzstan	101.7	106.3	113.4	69.2	107.8
Russia	102.2	101.8	106.3	98.7	105.0
air					
EEU	114.9	99.3	95.0	96.4	129.4
including:					
Armenia	...	50.0	291.3	233.3	300.0
Belarus	76.6	90.2	65.0	157.5	121.6
Kazakhstan	125.4	107.1	145.5	67.2	145.3
Kyrgyzstan	77.5	74.8	86.7	84.7	288.9
Russia	115.4	99.4	94.6	96.3	129.2

Note: compiled on the basis of [28]

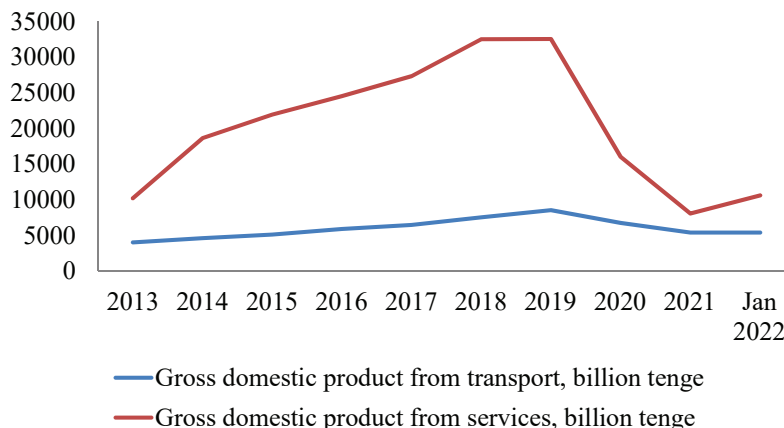


Fig. 1. Gross domestic product from transport and services in the Republic of Kazakhstan
 Note: compiled on the basis of tradingeconomics.com

5.3. Advantages and disadvantages of transport in the Republic of Kazakhstan

As shown in Fig. 2, among the advantages of road transport, the fact that the activities of road transport and road industry entities are sufficiently covered by the normative legal regulation (legislative and by-laws) stands out.

These results suggest that there are government support tools for an institutional framework for the development of toll roads, administrative barriers to international road transport have been reduced, and a simplified regime has been introduced [26].

What emerges from the results reported here is that there are risks that Kazakh carriers may lose direct traffic from Europe to the Republic of Kazakhstan: an outdated fleet and insufficient number of vehicles for international cargo transportation. Therefore, special importance should be given to measures to support domestic international carriers [26].

Currently, rail transport mainly uses technically obsolete models of rolling stock, the physical deterioration of fixed assets exceeds 55 % on average in the industry, as can be seen in the Fig. 3.

From the chart 3 it can be seen that the distinct advantage of railway transport is location of the Republic of Kazakhstan and basic network of main railways.

The level of development of water transport in the Republic of Kazakhstan does not fully meet the needs of the economy for transport services, and also lags behind the development of water transport in neighboring countries. The main disadvantages are unresolved customs procedures, inconsistency in the recognition of electronic customs documents for the transit of goods, significant physical and moral wear on infrastructure and rolling stock, as can be seen from Fig. 3.

Currently, the infrastructure of airports in the Republic of Kazakhstan, primarily regional airports, not only does not meet international requirements, but also are in a very poor condition (Fig. 5). This primarily applies to special equipment, providing aircraft maintenance [26].

As can be seen from Fig. 5, the main disadvantages of air transport are low domestic solvent demand for civil aviation services, shortage of qualified aviation personnel, and the presence of the only major national air carrier, while advantages are the transition of civil aviation to functioning according to international standards and availability of a network of airports for air transport.

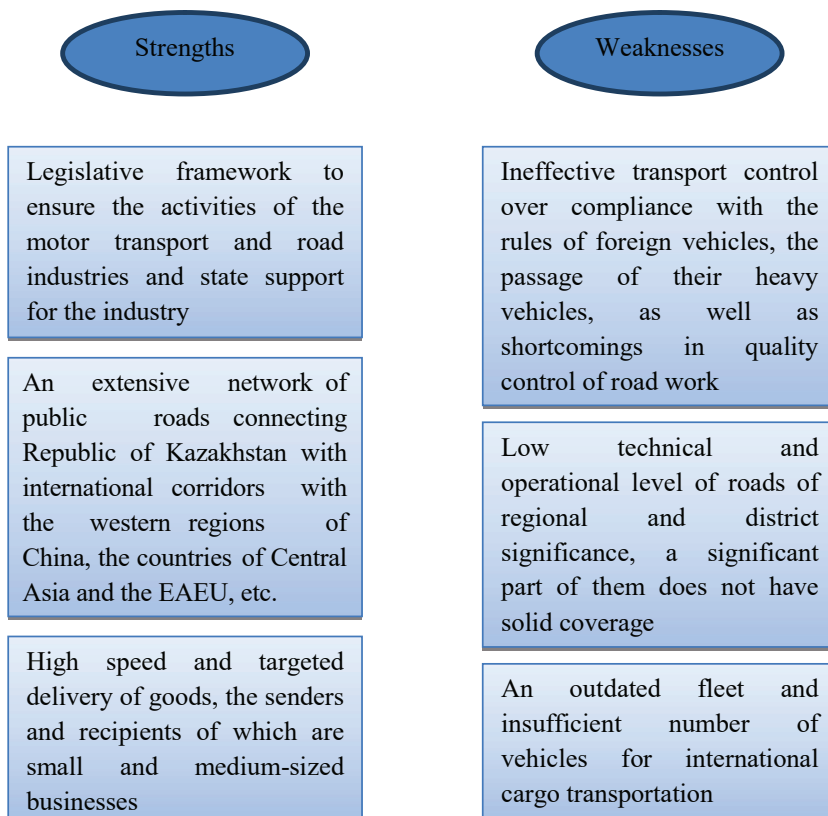


Fig. 2. Advantages and disadvantages of road transport
 Note: compiled on the basis of [26]

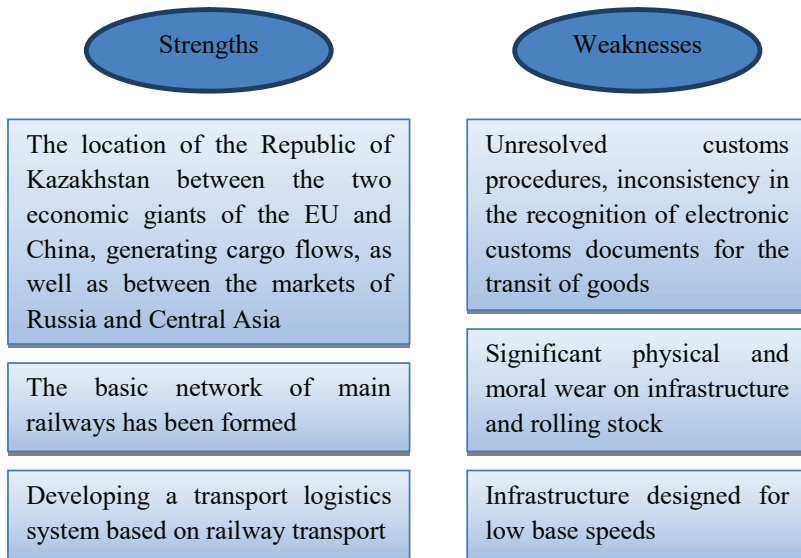


Fig. 3. Advantages and disadvantages of railway transport
 Note: compiled on the basis of [26]

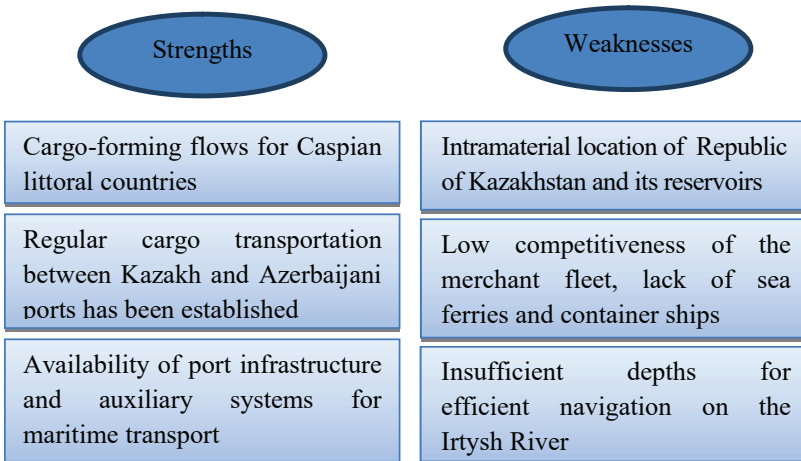


Fig. 4. Advantages and disadvantages of water transport
 Note: compiled on the basis of [26]

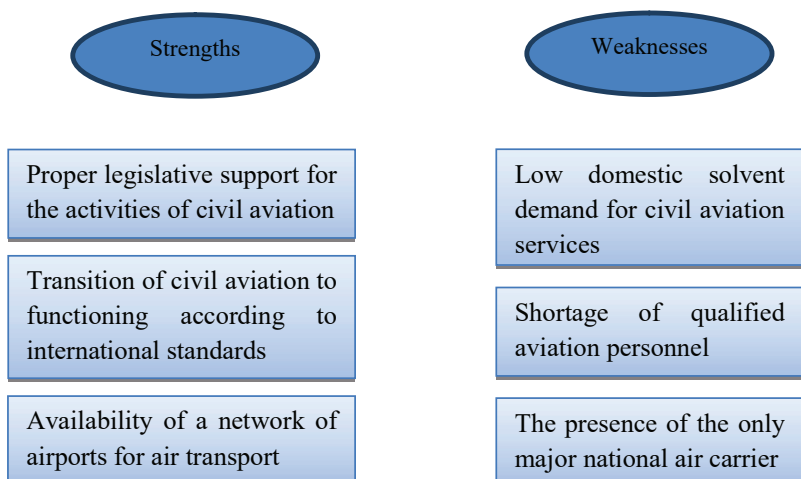


Fig. 5. Advantages and disadvantages of air transport
 Note: compiled on the basis of [26]

6. Discussion of results of the analysis and development prospects of the transport infrastructure

As can be seen from Fig. 2–5, the trends that have emerged in recent years of growth in the volume of passenger and freight transportation by road and rail with the existing level of funding in the development of transport infrastructure, as well as the use of innovations create favorable prospects for the development of transport logistics. Moreover, road transportation will contribute to the development of both individual regions and industries, and the country as a whole [26].

These results further support the idea [24] that in the Republic of Kazakhstan there are problems with infrastructure imperfection, poor material and technical base, public policies (tariff, pricing, investment), imperfection of legal and regulatory documents and the mismatch of national legislation with international standards, lack of funding, low quality of services, low competence of experts in the transport infrastructure.

Based on these results, it can be argued that it is important to include the following measures:

- to proceed from the needs of customers in priority areas, in particular, to create a register of major carriers that can provide growth points, synchronize international routes;
- to connect Kazakh cargo to transit flows;
- to solve issues of subsidizing transportation, to subsidizing lending rates for the purchase of rolling stock;
- to fitting platforms and containers, reimbursement of export-import costs to determine the issues of tariff policy;
- to achieve the integration of all transportation documents within the EEU for all modes of transport and their translation into electronic format [26].

According to this study [1] due to the implementation of a wide package of state support measures, the transport and logistics industry of the Republic of Kazakhstan has demonstrated accelerated growth. It is also advisable to note that if the transport infrastructure is poorly developed, productivity and efficiency indicators of the TLC decline, constraining the social and economic development of the country and its regions [26].

The governments support plays significant role in issues of the transport infrastructure. In the last decade, approximately \$30 million has been invested in key transport and logistics infrastructure

projects: new railway lines such as Zhetygen-Khorgos, Zhezkazgan-Saksaul-Beineu, which provided a transport link within the country from East to West and reduced the transit routes by 1,000 km, were built. This allowed increasing the infrastructure capacity and development of Euro-Asian transport corridors, taking into account container technologies. The railway line Kazakhstan-Turkmenistan-Iran has provided access to the seaports of the Persian Gulf, and in the future it is possible to gain access to the TLC of the Republic of Kazakhstan to the trade flows of India. In general, the country has created a basic network of trunk railroads, modernized most of the roads of national importance, expanded the capacity of the port infrastructure on the Caspian Sea, updated the fleet of aircraft, and implemented a large-scale program to build and modernize runways, passenger and freight terminals [26].

Logistics performance and trade facilitation improvements in developing countries have a bigger effect on exports and imports. The impact of transport infrastructure and logistics on trade is larger for developing countries than for developed countries. Overall, there seems to be some evidence to indicate that the transport and logistics complex is one of the fundamental spheres of the economy. The energy sector and agriculture, it is a strategically important sector as the basis for the process of economic development.

Between 1985 and the 2000s, the governments of many Western European countries, in order to create conditions for regional development and solve the transport problems associated with the dominance of road transport in freight transport, adopted a number of programs that support the construction of TLCs. In EU countries, government agencies play a significant role in the development of logistics centers. In the Czech Republic, the main role in the development of logistics is played by the Ministry of Transport, the Ministry of Industry and Trade, and the Czech Logistics Association [29].

In the French Republic, the policy in the field of logistics is formed by the Ministry of Ecology, Energy, Sustainable Development and Land Development. Large projects in the field of logistics are implemented on the principles of partnership between the state and regions.

Thus, as the European experience shows, the creation of a national logistics system is practically impossible without the support of the state, without partnership with cargo carriers and other participants providing logistics processes. Development of transport and logistics complex of the countries primarily contributes to a set of measures of state support, creating the appropriate regulatory, financial and educational conditions for the activity. The key trends in the development of transport services market are as follows: digital platform solutions, allowing the creation of a homogeneous information environment; the need for reliable delivery channels, with the participation of international transport and logistics centers; the increase in shippers' requirements for the list and quality of service provided [29].

The development of maritime transport will accelerate the dynamics of economic growth in the countries of the Caspian Sea coast. Development of the Trans-Caspian International Transport Route "East-West" through the Caspian Sea will increase the efficiency of the use of resources and facilities of the marine infrastructure of Republic of Kazakhstan [30]. This project is also called the "Middle Corridor". Its route runs through China, Republic of Kazakhstan, the

Caspian Sea, Azerbaijan, Georgia and further to Europe. There is also a branch to Turkey with the continuation of the corridor to the European continent. The international transport route was conceived about ten years ago to connect China and Europe and increase the volume of transit of Chinese goods. Republic of Kazakhstan, Azerbaijan, Turkey, Georgia, Ukraine, Poland, Romania became participants of the Trans-Caspian International Transport Route. The route is 10 thousand kilometers by rail and includes 10 seaports. One of the key sections of the corridor was the Baku-Akhalkalaki (Georgia)-Kars (Eastern Turkey) railway. The development of multi-vector transport and logistics projects will solve the issues of the economic security of the state.

Some evidence suggests that a well-developed transport system and good accessibility are factors that increase the investment attractiveness of an area and attract foreign direct investment, although further work using multivariate analysis is required to confirm this finding.

It is possible that these results are limited to statistical analysis that might be biased because of a limited sample of countries.

The present study extends our knowledge of current situation of the transport system of the Republic of Kazakhstan and will serve as a base for future studies.

The disadvantages of this research are theoretical approach and weak instrumentation for a discussion of the implication of the findings to future research into transport and logistics complex of the Republic of Kazakhstan. It needs to use the specific methods by which the analyses bring together the various theoretical and empirical strands in order to find factors influencing on development of transport and logistics industry.

7. Conclusions

1. The research it is established that in order to support the transport and logistics industry of the Republic of Kazakhstan different government support tools were inserted: build railway infrastructure, upgrade rolling stock, containerize cargo, develop alternative routes, and develop international corridors. In addition, the form of subsidized interest rates for railcar operators when lending for the purchase of domestic railcars were introduced.

2. It was found that the existence of laws and regulations governing the transport industry, as well as the favorable geographical location of the Republic of Kazakhstan for the transit of goods along international transport corridors are important prerequisites for the development of transport and logistics complex of Republic of Kazakhstan. Furthermore in the country in 2021 the cargo turnover by modes of transport increased by 2.26%. In 2021, positive dynamics of cargo turnover by modes of transport has observed in Republic of Kazakhstan, which has increased by 4.96%. This testifies to the possibility of opportunities to increase gross national product through the export of transport services. According to Trading Economics global macro models and analysts expectations in the long-term, the Republic of Kazakhstan GDP from transport is projected to trend around 5835 billion tenge in 2023 and 6039.1 billion in 2024. It has been shown that the in the country GDP from services is projected to trend around 11465 billion tenge in 2023 and 11866.1 billion in 2024.

3. Currently, the physical deterioration of fixed assets of rail transport exceeds 55 % on average in the industry, at the same time the distinct advantage of railway transport is location of the Republic of Kazakhstan and basic network of main railways. The main disadvantages are unresolved customs procedures, inconsistency in the recognition of electronic customs documents for the transit of goods, significant physical and moral wear on infrastructure and rolling stock. Among the advantages of road transport, the fact that the activities of road transport and road industry entities are sufficiently covered by the normative legal regulation stands out. These results suggest that there are government support tools. Meanwhile, there are an outdated fleet and insufficient number of vehicles for international cargo transportation. The level of development of water transport in the Republic of Kazakhstan lags behind the development of water transport in neighboring countries. At the same time the main advantages of water transport are cargo-forming flows for Caspian littoral countries, regular cargo transportation

between Kazakh and Azerbaijani ports, availability of port infrastructure and auxiliary systems for maritime transport. The infrastructure of airports in the country, especially regional airports is in very poor condition. This primarily applies to special equipment, providing aircraft maintenance. The main disadvantages of air transport are low domestic solvent demand for civil aviation services, shortage of qualified aviation personnel, and the presence of the only major national air carrier, while advantages are the transition of civil aviation to functioning according to international standards and availability of a network of airports for air transport.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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