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## **Research of the transport and logistics infrastructure's transit potential of Kazakhstan**

### **Abstract**

*Object:* Study of the transit potential of international road transport corridors in the Republic of Kazakhstan.

*Methods:* General scientific methods were used: The method of the content analysis, which facilitated to organize and structure the main scientific research related to the study of the productivity of the transport sector, the role and importance of transport and logistics services; an analysis method that made it possible to assess the transit potential of Kazakhstan's road transport corridors; a generalization method aimed at establishing the existing relationships between the considered economic objects and phenomena; a method of graphical interpretation, which made it possible to visualize the results obtained.

*Findings:* The role of road transport in the organization and management of international transit traffic was considered, the international road transport corridors of the Republic of Kazakhstan were investigated. The volume of cargo transportation by road transport by types of transportation for the period 2016–2020 was analyzed. The volumes of exports and imports with the countries of the Eurasian Economic Union were reflected in modes of transport at the border, which shows that 20% of goods were exported from Kazakhstan with road transport, and 55% of goods were imported from the total volume of trade. A comparative analysis of the structure of the cost of road transport of goods in the Republic of Kazakhstan, the Russian Federation, the Republic of Belarus, in the EU countries was also carried out. The weak and strong points of the country's automotive industry were indicated.

*Conclusions:* The results obtained made it possible to assess the transit potential of Kazakhstan's road transport corridors, to identify the strengths and weaknesses of the country's automotive industry.

*Keywords:* transport and logistics infrastructure, international transport corridors, transit potential, road transport, volume of cargo transportation, prime cost of the transportation by track.

### **Introduction**

With the development of international trade relations between countries, commodity flows are increasing, requiring timely transport and well-established logistics. As a result, the requirements for the state of the transport and logistics infrastructure, the quality of the provided logistics services and transport services are increasing. International transport corridors provide Kazakhstan with access to international markets for goods and services. The cooperation of the republic with the countries of the EAEU, OECD, SCO, TRACECA, and other organizations contributes to the development of the road sector.

Road transport occupies an essential role in the organization and implementation of international transit traffic. The quarantine measures in Kazakhstan caused by the pandemic did not affect the main income from the transportation of goods by road, despite a decrease in the overall volume of transportation, which was associated with a decrease in business activity and a reduction in the geography of cargo deliveries. So, according to the Ministry of Industry and Infrastructure Development of Kazakhstan, for 6 months of 2020, the income from cargo transportation by road amounted to 80,3 billion tenge, which is 7% more compared to the same period in 2019 (74,7 billion tenge)\*. The activities of logistics companies were exempted from taxes and obligatory payroll payments.

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\*<https://primeminister.kz/ru/news/v-kazahstane-za-polgoda-2020-goda-avtomobilnym-transportom-perevezeno-poryadka-14-mlrd-tonn-gruza-675451>

### ***Literature Review***

Assessment of the current state and identification of development problems, as well as the productivity of the transport sector of Kazakhstan, is carried out not only by Kazakhstani but also by foreign scientists (Bazarbekova et al., 2018; Dauzova et al., 2018; Rauan & Zhanarys, 2015; Sabraliev et al., 2019; Sharapiyeva, 2017; Sladkowski et al., 2020; Sultanov et al., 2018; Yergaliyev & Raimbekov, 2015; Zhumatayeva, 2020). Among the weaknesses, they highlight the undeveloped transport infrastructure, the lack of skilled workers and specialists in the road sector, the low quality of roads, a disproportion between the growing demand for logistics services and the lack of logistics capabilities, and others. Bodaubayeva G. offers several actions for integrating logistics, industrial and commercial, such as ensuring the interaction and integration of information systems to form a single information space; creation of conditions for the development of the market of transport and logistics services; comprehensive development of modern innovative transportation technologies; improvement of the legal framework and tariff system (Bodaubayeva, 2015). This author proposes a model for the functioning of industrial logistics parks, which includes 4 blocks: logistics, production, innovation, and administrative and service.

The results of research conducted by Raimbekov Z., Syzdykbayeva B. (Raimbekov & Syzdykbayeva, 2021) are of particular interest. Using aggregate production, demand, and vector error correction models, they examined the factors and causality between logistics performance and economic growth in Kazakhstan from 1995 to 2019. The research showed that for stimulating economic growth in Kazakhstan; it is necessary to improve the functioning of road and sea transport. Since a country with a small economy, road and sea transport will lead to higher economic growth in the long run.

The problem of innovation in logistics is important and still relevant, as it stimulates activities, both theoretical and practical, aimed at finding and implementing the best solutions in supply chain management. The study of the most modern technologies, concepts, innovations that directly or indirectly affect or may affect the development of logistics in the future, as well as an analysis of the possibilities of their influence on individual subsystems and stages of the logistics process can be observed in the scientific works of many foreign scientists (Petrunya & Pasichnyk, 2018; Seder et al., 2018; Mankowski, 2017; Stojcic et al., 2019; Gubova, 2020), where it is recommended to look for the potential for improving the efficiency of logistics processes, first, in the latest technologies and various kinds of innovations based on such technologies as business analytics; mobile technologies and applications; electric vehicles; Internet of things; automatic identification and data collection; electronic commerce; cloud computing; multichannel logistics; unmanned vehicles and drones; 3D printing; embedded systems; intellectual production; circular economy logistics; truck platoon; robotics; machine-to-machine communications, etc. In the opinion of many researchers, a common problem with introducing innovations is a lack of understanding of the processes of introducing innovations, a lack of special knowledge and competencies among management personnel, and the vagueness of the prospects for such implementation.

Green innovation in logistics services can increase a company's competitive advantage and resilience, according to Karia N. and Asaari M.H.A. (Karia & Asaari, 2013; Zailani et al., 2010). For example, using reusable containers and boxes instead of paperboard can reduce waste and optimize product packaging; building a green warehouse will lead to lower overall operating costs and using a hybrid engine in trucks can reduce carbon emissions and reduce gas consumption.

### ***Methods***

The study used general scientific methods, including: the method of content analysis, which allowed organizing and structuring the main scientific research related to the research of the productivity of the transport sector, the role and importance of transport and logistics services; method of analysis, which made it possible to assess the state of the transit potential of the automobile transport corridors of Kazakhstan; a generalization method aimed at establishing the existing relationships between the considered economic objects and phenomena; a method of graphical and tabular interpretation, which made it possible to visualize the results obtained: the structure of the cost of road transportation of goods, the volume of transportation of goods by road, etc.

### ***Results***

The state program “Nurly Zhol” until 2025 provides for the creation of an extensive network of roads for both transit and national transportation. Six major international road corridors pass through the territory of Kazakhstan (capacity - 10 million tons of transit cargo per year):

- I. Tashkent - Shymkent - Taraz - Almaty - Khorgos (1122 km);
- II. Shymkent - Kyzylorda - Aktobe - Uralsk - Samara (2052 km);
- III. Almaty - Karaganda - Astana - Petropavlovsk with access to Omsk (1886 km);
- IV. Astrakhan - Atyrau - Aktau - the border of Turkmenistan (1190 km);
- V. Omsk - Pavlodar - Semey - Maikapchagai (1159 km);
- VI. Nur-Sultan - Kostanay - Chelyabinsk - Yekaterinburg (880 km).

All international road corridors of Kazakhstan are included in the road network of the Euro-Asian Transport Links (EATL) project. They provide access to many states, major ports, transport hubs and terminals. The EATL project is part of a long-term collaborative effort to improve trade and economic and social development on the continent. The largest volume of domestic, transit, export-import cargo transportation is carried out along corridors I, III and VI, the development of which must be given priority. International road corridors I and II (Khorgos - Taraz - Samara) are part of the Western Europe - Western China corridor. Road corridors I, II, III and IV coincide in the directions with the Central, Central Asian, Northern and Western railway corridors, respectively.

Road transport should be seen as a complement to rail transport and not as a direct competitor. In particular, the areas of application of road transport can be cross-border trade in small volumes; long-distance transportation in the absence of railways or their failure to provide conditions for perishable, valuable goods, etc.; and as a component in the system of intermodal transportation.

The automobile part of the transportation route between the sender (consignee) and the intermodal terminal/logistics center can reach hundreds and thousands of kilometers. This is especially true for Kazakhstan. The latter option is the most important in terms of supply chain logistics and EATL competitiveness. For achieving the efficiency of transportation by road over long distances, it is important to ensure the consistent weight and overall parameters for trucks along the main routes (Intykov T.S. et al., 2014).

The research of the volume of cargo transportation by types of messages shows that goods are transported in intra-republican, suburban and urban traffic. Since the transportation of goods in international traffic is carried out mainly by rail, due to their efficiency, the volume of traffic by road is small and does not exceed 0,1%. In addition, there is an insufficient number of modern trucks in Kazakhstan that would meet the requirements of Euro-4, Euro-5 and Euro-6. In 2020, the total volume of transit transportation of goods by road across the country decreased by half compared to the previous year (a decrease of 56%) and amounted to 125,9 thousand tons (Table 1).

Table 1. The volume of transportation by road freight transport (by type of traffic), thousand tons

Indicators	Years				
	2016	2017	2018	2019	2020
Freight, luggage, cargo luggage transported, thousand tons	3180655,7	3322267,3	x	3550471,3	3286969,5
including International	904,1	3323,20	1340,20	3909,70	4447,5
to the EAEU countries	-	2921,8	871,5	3360,5	4023,6
to countries outside the EAEU	-	340	321,9	263,5	298
Transit	19	61,4	146,8	285,6	125,9
Export	-	441,4	345	398,6	513,5
Import	-	2820,40	848,4	3225,40	3808,1
Intra-republican	23316,2	18234,40	22193,10	21711	33213
Suburban	10737,8	x	x	95053,80	95481,4
Urban	48047,0	x	43363	45657,60	38021,9
<i>Symbols: "-" - the phenomenon is absent; "x" - data is confidential</i>					
<i>Note - compiled by the authors according to the official source*</i>					

By road transport on international routes are transported more valuable, perishable, and other urgent goods. The largest share of international road transport in Kazakhstan is occupied by building materials (over 30%), products of plant and animal origin, foodstuffs, and others – almost 35%. However, the transportation of these goods is carried out mainly over short distances, where rail transport is not effective. If we consider

\*Transport in the Republic of Kazakhstan. 2016-2020: Annual Report / Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics, Nur-Sultan, 2021. – 119 p.

the indicators of exports and imports with the countries of the Eurasian Economic Union in terms of modes of transport, with the road transport 20,4% of goods from the total volume of trade of USD 1,2 billion were exported in 2020, and 55% were imported goods valued at 8,03 billion USD (Table 2).

Table 2. Export and import with the countries of the Eurasian Economic Union by modes of transport at the border for 2020

Type of transport	Export		Import	
	million US dollars	%	million US dollars	%
Total	5671,9	100	14798,5	100
Road transport	1158,4	20,4	8030,1	54,6
Railway transport	4103,6	72,3	4698,6	31,9
Other types (sea / river, air, pipeline, post, etc.)	409,9	7,3	2069,8	13,5

*Note – Compiled by the authors according to the official source\**

The main transport companies, mainly from Belarus, Ukraine, Russia, the Baltic countries, occupy the main share of import traffic.

More than 400 thousand trucks are registered in Kazakhstan; over 4 thousand companies with a fleet of 18 thousand carry out international road transport. For comparison, in the Republic of Belarus, 20 thousand vehicles are involved in international transportation, in the Russian Federation – 32 thousand, in Lithuania – over 50 thousand, in Poland – 100 thousand cargo vehicles. Thus, according to the corporate fund “KAZLOGISTICS”, the weakest point of the automotive industry is the fleet of vehicles (ATS) that do not meet European standards. Thus, out of 18 thousand vehicles involved in international transportation of goods in Kazakhstan, only 7462 vehicles (41%) meet the requirements of European standards. This aspect, together with the threat in the form of permission for carriers from the EAEU countries to carry out cabotage transportation on the territory of Kazakhstan from 2025, may lead to a decrease in the share of domestic carriers in the national market of international road freight transportation.

To expand the geography of cargo transportation, it is necessary to continue the conclusion of intergovernmental agreements with foreign states, which provide for mutually beneficial conditions for the transportation of goods.

The research of the cost of transporting goods by roadshows that, on average, in the EU, the Republic of Kazakhstan, the Republic of Belarus and the Russian Federation, its value per 1 km is approximately the same. If in the EU it is 0,660 euro/km, in Kazakhstan it is 0,692 euro/km, in Russia it is 0,685 euro/km and in Belarus it is 0,682 euro/km. In the cost structure, the driver's income and the cost of fuel are the largest: in the EU - 21% and 29%, respectively. Overhead costs in the EU countries are the lowest - 28%. Maintenance and repair costs, as well as other direct costs, are almost the same in all the countries studied (Figure 1).

With the expansion of regional trade and the creation of attractive conditions for transit business, Kazakhstan should expect foreign logistics service providers.

The Republic of Kazakhstan joined the cabotage regime within the EAEU on January 1, 2025<sup>†</sup>.

It should be noted that to preserve and maintain the quality of roads at the proper level, the Government of the Republic of Kazakhstan adopted Resolution No. 557 in 1995, which introduced restrictions on the weight parameters of a vehicle. According to the Decree, the maximum load on a single axle was set at 6 tons, and the gross vehicle weight was 30 tons. On January 23, 2017, the order of the Minister for Investment and Development of the Republic of Kazakhstan dated November 4, 2016 No. 761 came into force in Kazakhstan, according to which the maximum permissible weight should not exceed 44 tons for a single vehicle with six or more axles. Permissible load on a single axle is 10 tons.

\*Foreign trade of the Republic of Kazakhstan. 2016-2020: Annual Report / Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics, Nur-Sultan, 2021. – 277 p.

<sup>†</sup>Decision of the Supreme Eurasian Economic Council dated December 21, 2015 No. 39 “On Amendments to the Program for the Gradual Liberalization of Carriers Registered in the Territory of One of the Member States of the Eurasian Economic Union, Carrying Goods by Road between Points Located in the Territory of Another Member State of the Eurasian Economic Union, for the period from 2016 to 2025” // Information and legal system of normative legal acts of the Republic of Kazakhstan “Adilet” [Electronic resource]. – [Nur-Sultan, 2015].

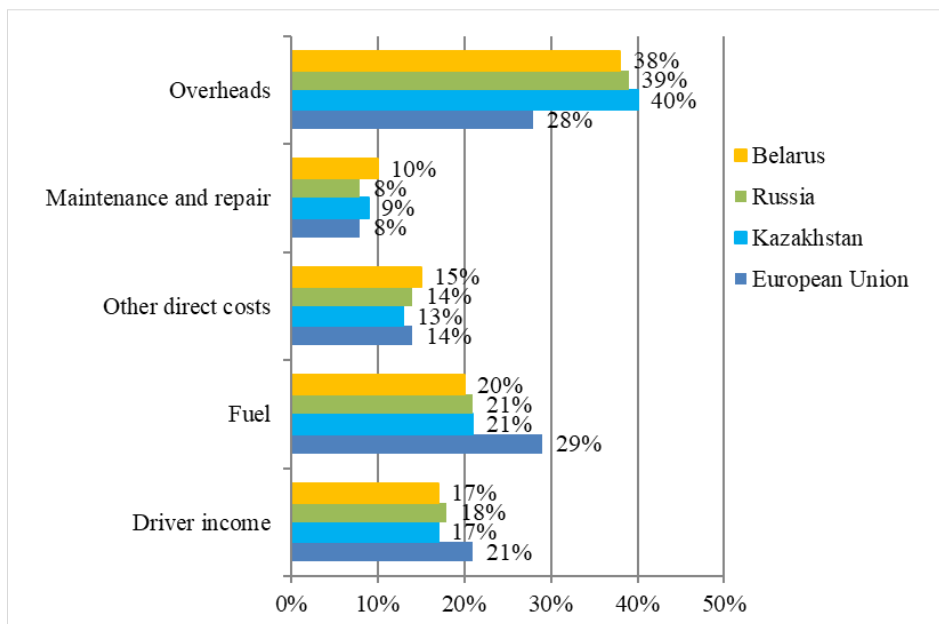


Figure 1. The structure of the cost of road transport of goods in the Republic of Kazakhstan, the Russian Federation, the Republic of Belarus, in the EU countries\*

Despite the restrictions being introduced, practice shows that charges for exceeding permissible loads do not save roads from destruction. In the international ranking of countries in terms of road quality in 2019, Kazakhstan took 93rd place out of 141. This rating assesses the quality of the road surface throughout the country, regardless of the congestion of road sections. The highest possible score in the rating is 7,0, the average for 2019 was 4,07<sup>†</sup>.

Significant costs characterize road works in Kazakhstan. Implementing 1 kilometer of the roadway of the 1st and 2nd category in 2016 accounted for an average of 300 million tenge<sup>‡</sup>.

Thus, the restoration of Kazakhstan's roads requires attracting a huge amount of investment.

Along with measures to restore and reconstruct the basic network of roads, equipping long-distance communication sites with service facilities is no less important for carriers. A comparison of the availability of service facilities in international corridors in Kazakhstan indicates a lack of service stations (especially for large vehicles) on certain routes, saturation of gas stations on international roads, and an apparent lack of motels and campsites for drivers and secure parking.

In general, we note following as weaknesses of the country's road transport: Due to the difficult terrain, the construction of roads requires large financial investments; undeveloped transport infrastructure in the regions; low quality of roads reduces the speed of delivery of goods, increasing the cost of transportation; a high level of depreciation of vehicles of Kazakh carriers and a small share of environmentally friendly vehicles.

As opportunities for further development of this sector, we single out an increase in transit cargo flows through Kazakhstan as a result of the growth of the Chinese economy and the countries of Southeast Asia; an increase in the number of toll roads with high-quality coverage and modern transport infrastructure; the use of modern technologies for the construction, maintenance and repair of roads (especially on sections of toll roads); integration within the EAEU of an information system that allows electronic control of the availability of permit forms for the passage of vehicles.

### Discussions

A significant volume of road transport in international transit traffic is carried out through the territory of Kazakhstan. Thus, only with the countries of the Eurasian Economic Union, the volume of exports by road transport is about 20,4% of goods from the total volume of trade, and imports – 55%. The growth of transit traffic increases the efficiency of using the reserves of carrying capacity of national transport systems,

\*[https://unece.org/DAM/trans/publications/Report\\_-\\_Kazakhstan\\_as\\_a\\_transport\\_logistics\\_centre\\_Europe-Asia\\_RU.pdf](https://unece.org/DAM/trans/publications/Report_-_Kazakhstan_as_a_transport_logistics_centre_Europe-Asia_RU.pdf)

†Ranking of countries by road quality //<https://nonews.co/directory/lists/countries/quality-roads>

‡[https://www.inform.kz/ru/skol-ko-stoilo-stroitel-stvo-dorogi-v-rk-v-2016-godu\\_a3029927/](https://www.inform.kz/ru/skol-ko-stoilo-stroitel-stvo-dorogi-v-rk-v-2016-godu_a3029927/)

stimulates their reproduction and improvement. Despite the growth of road transport in international transit traffic, some weaknesses do not allow using the transit potential to the full.

The changes caused by IT technologies dictate the inevitable digitalization of logistics processes, and this is of strategic importance for the development of the infrastructure of the digital economy of our country. Future scientific research of the authors will be continued with digital technologies used in logistics and supply chain management.

### Conclusions

The results obtained made it possible to assess the transit potential of Kazakhstan's road transport corridors, identify the strengths and weaknesses of the country's automotive industry, obtain a comprehensive analysis of the volume and structure of cargo transportation by road by type of communication, export and import with the countries of the Eurasian Economic Union in terms of modes of transport, cost structure Kazakhstan road transport of goods in comparison with other countries.

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**Л.В. Ташенова, А.В. Бабкин, Б.Ш. Кульжамбекова**

### **Қазақстанның көліктік-логистикалық инфрақұрылымының транзиттік әлеуетін зерттеу**

#### **Аңдатпа**

**Мақсаты:** Қазақстан Республикасының халықаралық автомобиль көлік дәліздерінің транзиттік әлеуетін зерттеу.

**Әдісі:** Зерттеу мақсатына жету үшін жалпы ғылыми әдістер кеңінен қолданылды, атап айтқанда: көлік секторының өнімділігін және көліктік-логистикалық қызметтердің маңыздылығы мен рөлін зерттеуге байланысты негізгі ғылыми зерттеулерді ұйымдастыруға және құрылымдауға мүмкіндік берген мазмұнды талдау әдісі; қазақстандық автомобиль көлік дәліздерінің транзиттік әлеуетін бағалауға мүмкіндік берген талдау әдісі; қарастырылып отырған экономикалық объектілер мен құбылыстар арасындағы қалыптасқан байланыстарды орнатуға бағытталған жалпылау әдісі; алынған нәтижелерді визуализациялауға мүмкіндік беретін графикалық интерпретация әдісі.

**Қорытынды:** Халықаралық транзиттік тасымалдауды ұйымдастыру мен басқарудағы автомобиль көлігінің рөлі қарастырылған, Қазақстан Республикасының халықаралық автомобиль көлік дәліздері зерттелген. 2016-2020 жылдар аралығында бағыт түрлері бойынша автомобиль көлігімен жүк тасымалдау көлеміне талдау жасалды. Шекарадағы көлік түрлері бөлінісінде Еуразиялық экономикалық одақ елдерімен экспорт пен импорт көлемі көрсетілді, онда автомобиль көлігінің көмегімен Қазақстаннан тауар айналымының жалпы көлемінің 20%-ы мемлекет территориясынан шығарылып, 55%-ы әкелінетіндігі анықталды. Сондай-ақ, Қазақстан Республикасында, Ресей Федерациясында, Беларусь Республикасында, ЕО елдеріндегі жүктерді автомобильмен тасымалдау құнының құрылымына салыстырмалы талдау жүргізілді. Еліміздің автомобиль өнеркәсібінің әлсіз және әлді тұстары көрсетілген.

**Тұжырымдама:** Алынған нәтижелер Қазақстанның автокөлік дәліздерінің транзиттік әлеуетін бағалауға, еліміздің автомобиль өнеркәсібінің күшті және әлсіз жақтарын анықтауға мүмкіндік береді.

**Кілт сөздер:** транспорттық-логистикалық инфрақұрылым, халықаралық көлік дәліздері, транзиттік әлеует, автомобиль көлігі, жүк тасымалдау көлемі, автокөлікпен тасымалдаудың өзіндік құны.

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### **Изучение транзитного потенциала транспортно-логистической инфраструктуры Казахстана**

#### **Аннотация**

**Цель:** Исследование транзитного потенциала международных автомобильных транспортных коридоров Республики Казахстан.

**Методы:** Для достижения цели исследования широко использованы общенаучные методы, в частности, метод контент-анализа, позволивший организовать и структурировать основные научные исследования, связанные с изучением производительности транспортного сектора, роли и значения транспортно-логистического обслуживания; метод анализа, который дал возможность оценить транзитный потенциал автомобильных транспортных коридоров Казахстана; метод обобщения, нацеленный на установление существующих взаимосвязей

между рассматриваемыми экономическими объектами и явлениями; метод графической интерпретации, позволивший наглядно представить получаемые результаты.

**Результаты:** Рассмотрена роль автомобильного транспорта в организации и управлении международных транзитных перевозок, исследованы международные автомобильные транспортные коридоры Республики Казахстан. Проанализирован объем перевозок грузов автомобильным транспортом по видам сообщений за период 2016–2020 годы. Отражены объемы экспорта и импорта со странами Евразийского экономического союза в разрезе видов транспорта на границе, где показано, что с помощью автомобильного транспорта из Казахстана вывозится 20 %, а ввозится 55 % товаров от общего объема товарооборота. Также проведен сравнительный анализ структуры себестоимости автоперевозок грузов в Республике Казахстан, Российской Федерации, Республике Беларусь и в странах ЕС. Обозначены слабые и сильные места автомобильной отрасли страны.

**Выводы:** Полученные результаты позволили дать оценку транзитному потенциалу автомобильных транспортных коридоров Казахстана, выявить слабые и сильные стороны автомобильной отрасли страны.

**Ключевые слова:** транспортно-логистическая инфраструктура, международные транспортные коридоры, транзитный потенциал, автомобильный транспорт, объем перевозок грузов, себестоимость автоперевозок.

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