IRSTI 73.01.11
UDK 332.1
JEL L91

https://doi.org/10.46914/1562-2959-2023-1-2-259-271

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MAIN TRENDS IN THE DEVELOPMENT OF TRANSPORT INFRASTRUCTURE: KAZAKHSTAN AND INTERNATIONAL EXPERIENCE

Abstract

The main and important element of infrastructure is transport, therefore, in order to increase the efficiency of public production, it is necessary to develop transport infrastructure, high-quality transport services in order to ensure the connectivity of the economic area. Currently, any country sets a goal – that is the formation of a modern highly efficient transport and logistics infrastructure. Transport needs to be viewed in a dynamic context in terms of its ability to contribute to the economy. The development of transport infrastructure is multidimensional, which depends on many factors. It has several directions, the evaluation of which requires a new approach to the development of new methods that would ensure the objectivity of research in modern conditions. The paper substantiates the need for effective interaction of railway, automobile, river and sea modes of transport in a balanced distribution of cargo flows, reducing transport costs in the price of goods, which will increase the competitiveness of domestic goods on the world market. The authors discuss the main trends in the development of foreign and domestic transport infrastructure. It is concluded that the development of transport infrastructure is possible due to the development, development of methods and methods of high-performance and efficient use of high-tech technologies, innovative forms and methods of organization, information, and digital technologies.

Key words: economy, transport infrastructure, logistics, modes of transport, knowledge-intensive technologies, development trends, transport sector.

Introduction

In the global economy, as you know, the transport system is one of the most important industries. For the effective development of the national economy, the improvement of this sphere is one of the main tasks. According to the World Bank Group, world transport services amount to $4.2 trillion (6.8%) and $110 billion annually. tons of cargo and 1 trillion More than 100 million passengers are transported, and the transport infrastructure is over 100 million [1].

The experience of Kazakhstan and foreign countries shows that the development of transport is one of the key factors in the development of territories. Transport infrastructure ensures the mobility of the population and goods, creates conditions for the growth of labor productivity, increasing the efficiency of production, distribution, consumption of goods and services, thereby forming the competitiveness of the economy of the region.

European policy in recent decades has focused on the harmonisation of technical systems and safety and operational regulations, and on increasing competition in the market for international passenger rail transport [2–3]. Despite this, rail's share of the international transport market within Europe has not changed much (remaining at around 7.8%) [4]. Considering the importance of transport infrastructure, we will consider the issues of its development abroad.

Materials and methods

The methodology of comparative analysis of the transport systems of the world is based on indicators characterizing the transport system, which is a combination of transport infrastructure, enterprises, facilities and transport management, to ensure the coordinated development and functioning of all modes of transport in order to maximize the satisfaction of transport needs at minimal cost.

The study of transport and logistics enterprises of transport systems was conducted on the basis of studying the ratings of world transport companies in terms of cargo turnover per year and logistics companies in terms of annual revenue. The research has been used efficiently by comparing economic analysis, systematic approach, selection tracking, and logical approach.

Main provisions

The transport system is understood as the transport infrastructure, transport enterprises and vehicles and management complexes. Another important element in assessing the country's transport potential is the transit potential and the potential of the country's logistics system.

The transport system is important for the socio-economic development of any state. The specificity of transport is that this industry does not produce goods, but provides raw materials, materials, production equipment of the enterprise, delivers finished products to the consumer, that is, participates in the value chain of goods.

In this connection, transport in Kazakhstan is the most important sphere. One of the main factors contributing to the formation of a highly developed transport services market in the country is the attention paid at the government level to the development of domestic infrastructure.

The purpose of this study is to analyze foreign experience in the development of transport and identify trends affecting the development of transport infrastructure.

Literature review

Theoretical and methodological problems of integrated development of transport systems are reflected in the works of Bracaglia V., D'Alfonso T., Nastasi A., Sheng D., Wan Y., Zhang A. [2], Martí-Henneberg J. [3]. Also, Rakhimov H.S. [5], Kunanbayeva D., Kozhamkulova Z., Nurseiytova G., Sharapiyeva M. [6] were engaged in research of complex transport problems.

The works of both Kazakh scientists Raimbekov Z.S., Syzdykbayeva B.U., Mussina K.P., Dulatbekova Z.A., Sadykov B.Y., Baktymbet A.S. [7], Zhenskhan D. [8], Azatbek T., Sharipbekova K. [9] and foreign economists Sładkowski A. [9], Peter B. [10], Fribel G., Ivaldi M., Vibes C. [11], Ahlfeldt G., Feddersen A. [12], Carbo J. [13], Albalate D., Bel G. [14], Golskay Y.N. [15] and others are devoted to modern trends in the development of the world transport system, international transport corridors.

Results and discussions

When analyzing the Logistics Performance Index results, the highest percentage of surveillance and competition and timely delivery are relatively high. However, logistics efficiency in developed countries is significantly lower compared to performance [4].

According to Professor Raimbekov Zh., the logistics system is based on the effective use of the geographical location of Kazakhstan. The location of our republic has predetermined the development of certain sectors of the economy, which only benefit due to the presence of the country at the intersection of important transport corridors [7–9].

Kazakh scientists write in their research that Kazakhstan, in order to take a worthy place in the world transport system, needs to improve international transport corridors, improve the technical level of roads and railways in the country, introduce innovative technological processes, create transport and logistics centers, improve the quality of passenger transportation [6].

The infrastructure complex is the most important system-forming element of the national economy. Infrastructure capital goods have a number of features [15]:

1. Significant capital intensity, high costs for the creation, operation and repair of infrastructure facilities.

2. Long-term investments and their payback period with an increasing level of technical and operational depreciation. Infrastructure facilities should serve for a long time, while with the increase in the life of the wear increases, and the additional costs of maintaining the facilities.

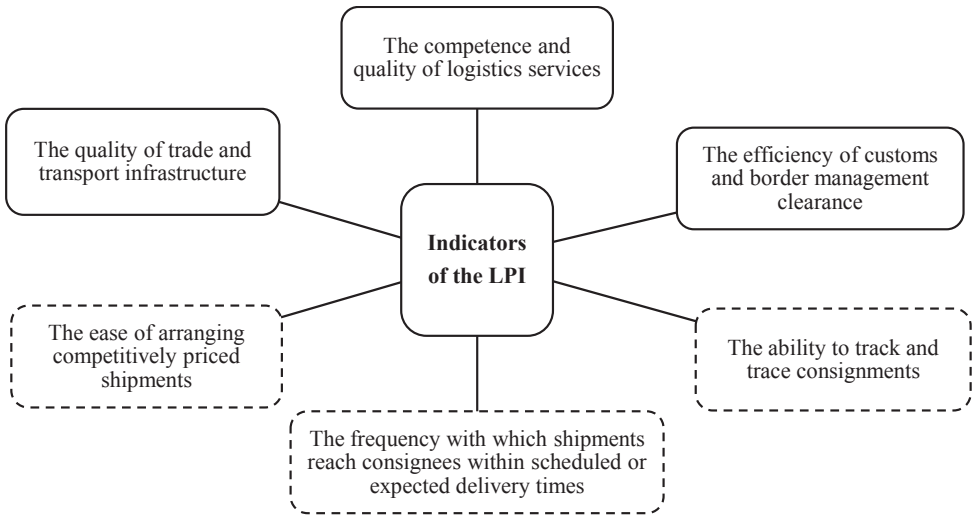
3. Long service life. The specificity of the current maintenance, repair, modernization of infrastructure facilities determines the specification of all ownership rights to them.

4. The overall social utility of infrastructure resources and services limits the competition of producers, effectively monopolizing local markets, infrastructure complexes and services.

5. The leading role of the state and organizations affiliated with the state in the creation of infrastructure resources and the formation of infrastructure capital.

6. Negative environmental consequences resulting from the construction and operation of infrastructure facilities and systems, as well as the provision of infrastructure services. The highlighted features cause specific requirements for infrastructure: they must be strong, durable, must be designed taking into account future trends in the emergence of new technologies, new materials and new requirements from the users of infrastructure facilities. That is, they must be advanced and meet not only current but also future demands.

In recent years, various studies have been regularly conducted, ratings of the development of logistics, transport infrastructure, and the effectiveness of communication routes are compiled, among which one could be distinguished [16, 17]. Every two years, from 2007 to 2018, the World Bank has been presenting a publication on the study of logistics opportunities [12], which contains the "Logistics performance index" (LPI) (Figure 1).



—— areas of state regulation
- - - - performance indicators

Figure 1 – Indicators of the Logistics Performance Index (LPI)

Note: Compiled by the source [16].

Based on the data obtained, the logistics efficiency index is calculated, reflecting its convenience and safety.

According to the final average scores, a rating is compiled in which Kazakhstan took 71st place in 2018 (after 2018 this rating was not carried out). In 2012–2016, the Republic of Kazakhstan occupied 88th to 77th places. The dynamics of Kazakhstan's indicators is shown in Figure 2 (p. 262) The low position of the Republic of Kazakhstan indicates that international logistics operators consider the Republic of Kazakhstan not very attractive from the point of view of international trade partnership.

Germany is the long-term leader of the rating, followed by the Netherlands, Sweden, Belgium, Singapore, but the area of the territory, the length of the transport infrastructure, the volume and structure of the economy of these countries are not comparable with Kazakhstan's. Source [17] is an annual study of emerging logistics markets from Agility. The first four lines of the final rating were traditionally occupied by China, India, the UAE, and Malaysia. Kazakhstan ranks 22nd in the ranking.

Let's consider countries with similar economic, spatial and other characteristics that occupy leading positions in these studies. These are the United States of America (10th place in the ranking), China (27th place), Germany. The values of the LPI indicators of these countries are shown in Figure 3.

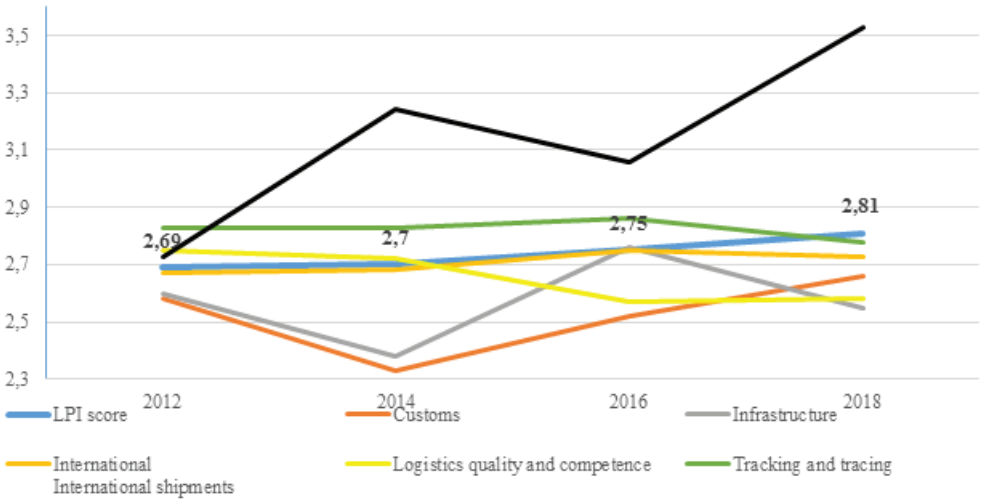


Figure 2 – Dynamics of indicators of LPI of Kazakhstan

Note: Compiled by the source [16].

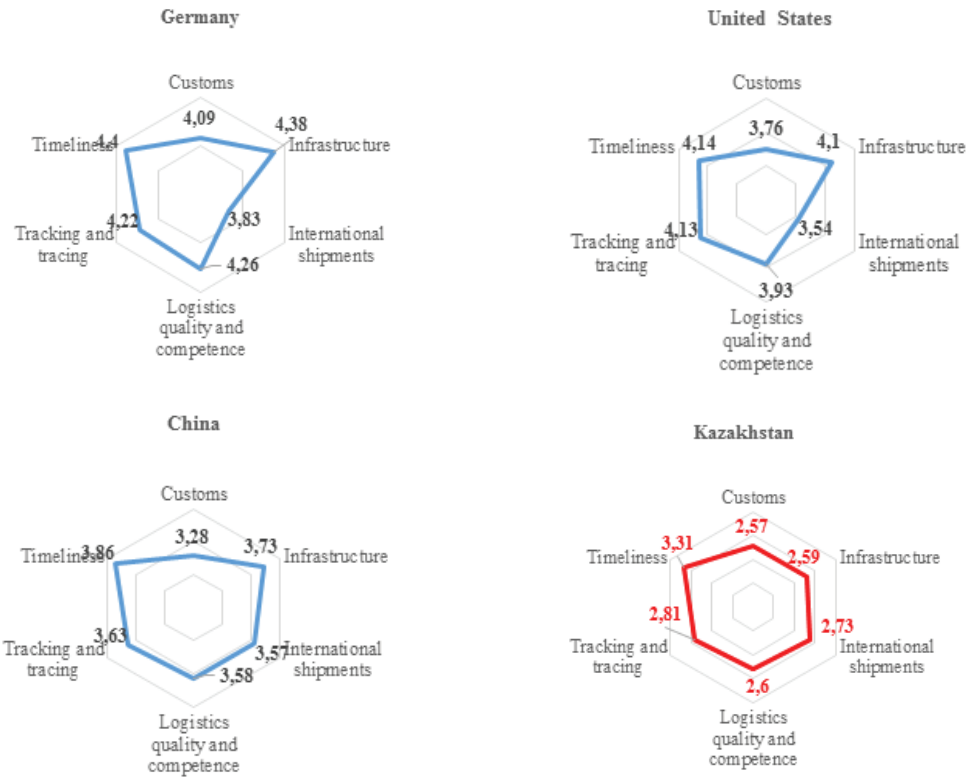


Figure 3 – Aggregated international LPI results across four editions

Note: Compiled by the source [16].

Also, the level of the logistics system was assessed by the Global Competitiveness Index in the Infrastructure component until 2020 (Global Competitiveness Report). This index was evaluated by the World Economic Forum. Despite some improvements, an improvement in the position in the ranking, the main planned indicators of the Nurly Zhol state program have not been achieved. The main reason in the market of transport and logistics services was increased competition. Data on the "Transport infrastructure" sub-index for the Republic of Kazakhstan are presented in Table 1.

Table 1 – Kazakhstan in the "Global Competitiveness Report" rating, "Transport infrastructure" sub-index

Index	2018	2019
Overall rating	59 (61,8)	55 (62,9)
2. Transport infrastructure	69 (67,3)	73 (48,7)
2.01 Road connectivity	59 (69,0)	56 (79,3)
2.02 Quality of road infrastructure	106 (37,1)	93 (43,2)
2.03 Railroad density km/1,000 km²	64 (14,2)	66 (14,9)
2.04 Efficiency of train services	34 (55,5)	33 (53,4)
2.05 Airport connectivity score	72 (46,4)	72 (46,4)
2.06 Efficiency of air transport services	82 (55,9)	89 (54,0)
2.08 Efficiency of seaport services	92 (41,1)	99 (38,9)
Note: Compiled by the source [16].		

World practice shows that transport infrastructure can play different roles in the development of the economy of territories, while the functions of the state and the private sector differ. Three models of transport infrastructure development could be presented (Figure 4).

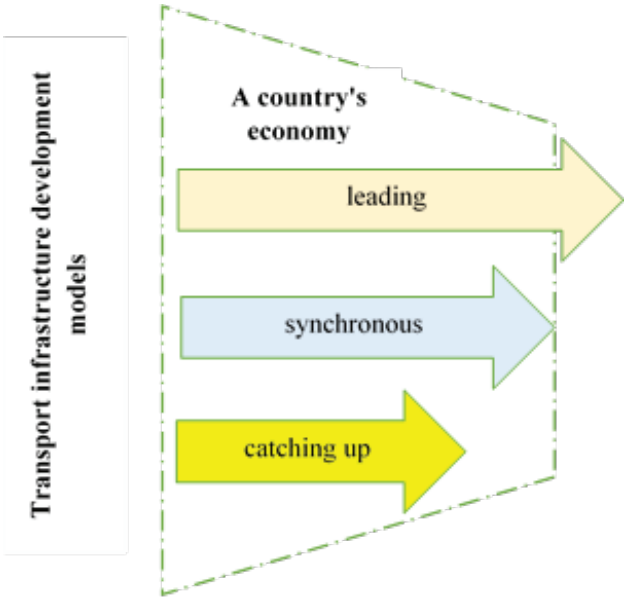


Figure 4 – Transport infrastructure development models

Note: Compiled by the authors.

The advanced development of transport determines its leading role in the formation of spheres and points of economic growth. The state determines the necessary directions for the development of transport infrastructure and finances them. The insignificant participation of private business in such projects is explained by high risks and significant initial investments.

With catching up development, it is characteristic to respond to the needs of production through the elimination of infrastructural constraints that restrain its growth. A leading role in planning and financing the construction of transport infrastructure is played by a business interested in expanding bottlenecks.

Synchronous infrastructure development is characterized by a combination of elements of both catching up and advancing development: the absence or minimal barriers to business, state participation in the management of individual modes of transport, which attracts private capital to the development of transport infrastructure. The key factors determining the development model are presented in Figure 5.

Examples of advanced infrastructure development are the USA until the middle of the XX century and modern China. Currently, the US is characterized by a model of catch-up development.

The modern transportation network of the USA is the most powerful in the world and includes all traditional modes of transport. Highways have the greatest length in the USA (more than 6.5 million km). These indicators are explained by the large share of automobile transportation (both passenger and freight), as well as the high level of motorization of the population (more than a third of American households have 2 cars).

The USA has the longest pipeline system in the world – about 1.3 million km (oil pipeline system – 325 thousand km, product-wire infrastructure – 245 thousand km, gas pipelines – 549 thousand km), this is due to the long history of the formation of the oil and gas industry, significant dispersion of the resource base, high level of energy consumption.

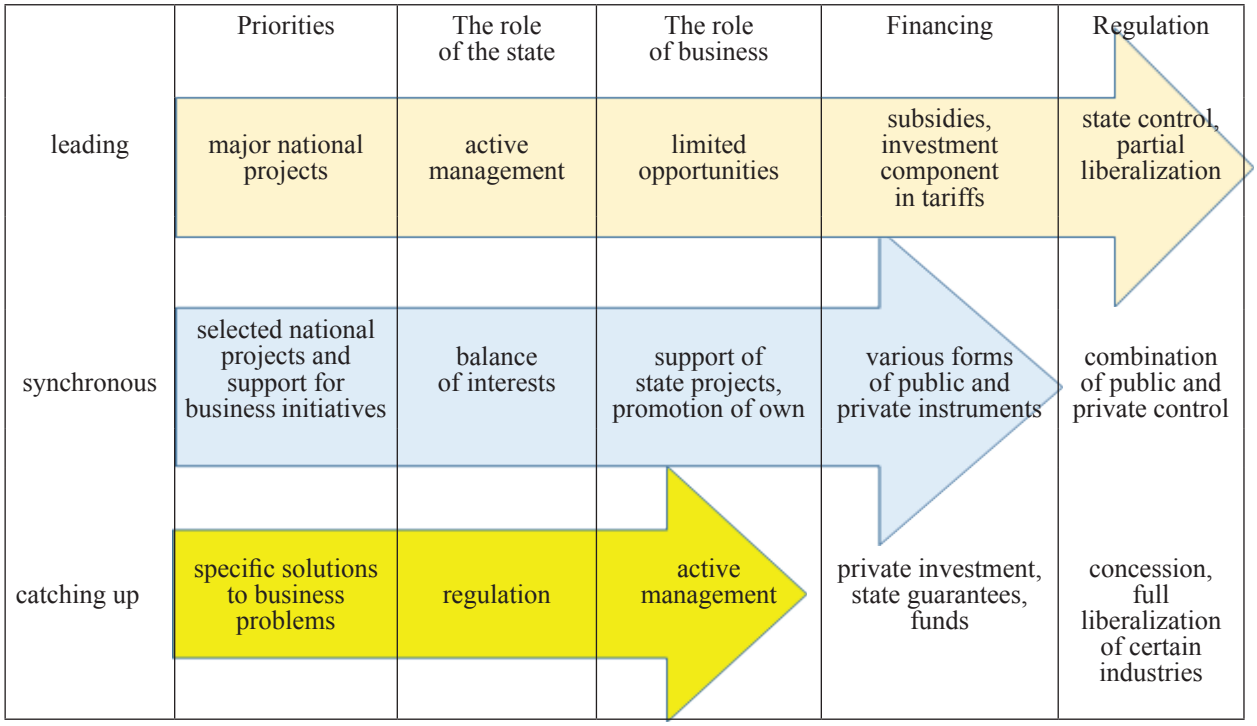


Figure 5 – Factors determining the infrastructure development model

Note: Compiled by the authors.

Recent years have been characterized by significant changes in the US economy and its transport industry, which have led to increased competition in the transport market, an increase in traffic volumes and transport costs, and increased requirements for the quality of transportation. These factors significantly affect the functioning and development of railway transport. U.S. railroads are the world's leading and most efficient freight transportation industry. The peculiarities of rail transportation in the United States are the absence of a shortage of capacity, the presence of parallel lines on which freight transportation is carried out by vertically integrated companies, and passenger transportation is carried out by a separate company.

The US rail transport system includes 7 major first class roads. This group includes companies with annual revenue of at least $490 million. Each such railroad operates in several states over thousands of miles of track. At the same time, they own both infrastructure and locomotives. They account for the bulk of the work: about 68% of freight train mileage, 88% of employees and 94% of income.

For a long time, the railways of the United States suffered not from a shortage of infrastructure, but from its redundancy. The maximum length of the operational railway network was recorded in 1916, which is more than 400 thousand km on Class I roads. According to the Association of American Railroads, this indicator has been steadily decreasing since then, but is currently the highest in the world and is more than 200 thousand km.

At the same time, small Class II railways operating on short segments are the most numerous in the USA. Many, in fact, on the access roads of enterprises. There are over 600 such "first and last mile" roads. Together, the freight railways of the United States form an integrated system with a length of almost 140 thousand miles (225.3 thousand km), which in 2019 brought revenue of $ 80 billion. In total, the share of railways accounts for about 40% of traffic in the country.

If 40 Class I railways were registered at the beginning of the 1980s (18 of them are large), at present there are only 7 of them left.

This gave more opportunities for capacity consolidation, opened up opportunities for integrated planning of operations and investments.

As for short lines, their activities are supported by the state. In March 2020, the US Department of Transportation (USDOT) announced the allocation of grants totaling $248.5 million to modernize and improve the safety of railway infrastructure.

As part of the provision of long-term low-cost loans for short lines and regional transportation, RRIF Express has allocated over $1 billion in recent years.

In the conditions of competition, railway companies are forced to reduce the cost of transportation, trying to compensate for the loss of coal transportation at the expense of other goods – cars, agricultural and chemical, but intermodal transportation, door-to-door and just-in-time cargo delivery with the prospect of an increase of 5-7% are of particular relevance from the point of view of traffic volume growth per year.

In addition to optimization and innovation, U.S. railroads have shown a remarkable ability to adapt to changing market conditions.

In parallel with deregulation in the 1980s, two important events took place in the country's freight transportation market, which largely predetermined the development of freight transportation.

Firstly, it is a shift in international trade from Europe to Asian countries. Imports from Japan, Taiwan and South Korea arrive in the United States at ports on the western (Pacific) coast, and then move to densely populated cities in the east.

To do this, two-tier container trains were introduced on the American railway. The cost of intermodal transportation was also halved, which made it possible to compete with road transportation. As a result, containers are now the fastest growing and most profitable segment of the U.S. railroad business.

In 2013, revenue from intermodal transportation (about $15 billion) exceeded revenue from coal transportation ($14.3 billion), which has been the main cargo for a long time. Intermodal transportation in the USA breaks records almost every year. If we take the time interval from 1980 to 2018, they grew from 3 to 14 million TEU, that is, almost 5 times. According to the Intermodal Association of North America (IATA), 54% of the total volume is international cargo.

The second important event that contributed to the development of the US railways was the rapid expansion of coal mining in the Powder River Basin (Montana).

Despite the achieved high level of development of all types of transport infrastructure, federal budget investments in transport infrastructure amount to 3% of GDP. At the same time, the private sector has taken a leading role in infrastructure development.

Historically, access to the railway network is an important driver of long-term growth. Studies on the economic impact of railway expansion tend to consider population growth as their outcome of interest.

High-speed (HS) rail investment provides economic benefits if major economic hubs anchor the routes. Ahlfeldt and Feddersen [12] find that 10 percentage point faster growth in market access following the construction of a HS railway between Cologne and Frankfurt leads to 2-3 percentage point higher GDP per growth during 1992-2006. Similar results are found by Carbo et al. [13] for the HS rail corridor connecting Madrid to Barcelona. The main difference between traditional and HS

railway investment is that while traditional railway also serves the purpose of shipping goods, HS railway eases passenger traffic and business trips. Therefore, while the first-order impact of traditional railway investment is likely to be on the manufacturing sector, the most likely consequences of HS railway investment are trade in services and a reorganisation of production in multi-establishment firms. A cautionary note is that the cost of HS railway investment is high, both for the initial development and for the subsequent operation of the lines. Most currently existing lines connect major cities with substantial passenger flows between them. The costs and required subsidies vary substantially even between these major lines [14], which means that any development requires careful evaluation of the potential demand.

The effect of shutting down a railway is negative. Most academic studies focus on the development of new infrastructure, few studies analyse the impact of disinvestments, partly due to the rarity in the occurrence of disinvestment projects. The economic interest for this type of projects should be high given that current infrastructure faces the risk of becoming obsolete in face of newer technologies.

An example of synchronous infrastructure development is the experience of Germany. The development of transport in Germany is inextricably linked with the increase in domestic and foreign trade. Today, the country's transport system is a complex intersectoral complex, one of the leading in the world. There are about 2 km of various roads and communications per 1 sq. km of territory.

The German railway system is the longest in Western Europe (more than 37 thousand km), represented by a large vertically integrated holding Deutsche Bahn AG (DB), divided by type of activity into 3 groups: passenger transportation, freight transportation and logistics, infrastructure maintenance. Deutsche Bahn AG has competitors in passenger and freight transportation.

After the unification of Germany and the GDR, in the context of the general deregulation of the public sector, the reform of railways also began, since excessive regulation proved ineffective and led to two negative consequences: transportation tariffs exceeded market prices by 20%, German goods could not be competitive due to the opening of national markets and the inefficiency of railways. Based on this, the following recommendations were developed:

- exclusion from government railway management functions;
- removal of responsibility from railways for fulfilling the tasks of the state in the economic and social spheres;
- separation of infrastructure and transportation activities;
- introduction of competition in the railway transportation market [18].

Reform goals:

- creation of a market commercial company in the form of a joint-stock company on the basis of two state-owned companies;
- reduction of government spending on the maintenance of railways;
- stabilization and increase of the share of railways in the total volume of traffic;
- opening access to infrastructure to third-party carriers [19].

The results of the reforms allow us to conclude that all the goals have been achieved to one degree or another. The liberalization of the industry has led to the development of competition, its scale is increasing every year. The share of rail transport in the total volume of passenger and freight traffic has increased. Competition in subsidized local transport has reduced government spending and attracted passengers to rail transport.

Germany has a well-developed transport infrastructure, and the private sector is capital-intensive, while the management and financing of the bulk of infrastructure construction costs is carried out by the state through DB. The business owns roads, ports, and also manages transportation.

In modern China, there is an explosive growth of transport infrastructure. Over the past 10 years, China's comprehensive three-dimensional transport network has accelerated its development, China has built the world's largest network of high-speed railways and highways, as well as a group of world-class ports. Flights and sea routes closely connect China with the world. Integrated transport network China has exceeded 6 million kilometers. The operational length of the railways has reached 150 thousand km, of which 40 thousand km is accounted for by a high-speed railway, which is comparable to the length of the Earth's equator. The length of expressways exceeded 160 thousand km, and the density of the road network reached 55 km per 100 km2, which is 24.6% more than in 2012. In 51

cities of China, urban rail transport has been opened and put into operation, while the total mileage has increased 4.2 times compared to 2012. The total number of civil aviation airports has reached 250 units, more than 3,000 new routes have been opened, as a result, the total number of routes has reached 5,581 units. The shipping route of the inland waterway reaches 128 thousand km and has 2,659 berths with a carrying capacity of 10 thousand tons and above [20].

An integrated transport system with huge scales and uninterrupted internal and external communications effectively supports development China as the world's second largest economy and the world's largest commodity trader. The main indicators, such as passenger and cargo turnover of railway, automobile, water transport and civil aviation, as well as cargo turnover of ports, the volume of China's postal express delivery has been one of the first places in the world for many years in a row. In 2021, on average, more than 69 thousand ships were serviced daily at ports, 26,800 aircraft were serviced at airports, and almost 300 million express shipments were processed. During peak hours, on average, more than 10 thousand passenger trains run daily on the railway, and the capacity of the expressway exceeds 60 million units of vehicles. China has become one of the busiest countries in the world in the field of transport.

Transport has shortened space-time distances, accelerated the flow of goods and personnel, and profoundly changed the face of rural areas and the way of life of people in China. Railways covered 81% of the counties of the country, and the high-speed railway covered 93% of cities with half a million people. At the end of 2021, the number of passengers served by high-speed rail reached 2.53 billion, which is five times more than in 2012. We can say that the concept of "seeing China on a high-speed railway" has become a reality for ordinary people who enjoy their wonderful lives. Online taxi booking covers more than 300 cities China, while the average daily volume of orders is about 21 million times. Door-to-door passenger transportation services have been launched in 27 provinces, which fully meets the needs of customers. China is diligently promoting "paperless travel", and at this time electronic tickets have reached full coverage in the field of railways and civil aviation. They are also actively promoting "universal" tourist services, accelerating the development of combined air and rail transport, expanding mutual recognition of safety checks of railway and urban rail transport.

The development of transport in China not only effectively guarantees the uninterrupted movement of domestic and international traffic, but also makes an important contribution to the development of the world economy. China has become the world economy with the highest degree of maritime communication and trade in goods. China has signed bilateral air service agreements with 128 countries and regions and opened 895 international air routes. Under normal conditions, Chinese airlines operate international scheduled passenger flights to 153 cities in 62 countries around the world, at the same time, about 5,000 international cargo flights are operated weekly, which effectively ensures the stability of the global production chain and supply. China's international shipping volume is 1/3 of the world's shipping volume. In addition, China actively promotes cooperation in foreign railway projects and consistently opens the Mombasa-Nairobi railway, Djibouti–Addis Ababa and China-Laos Railways [20].

Large transport projects abroad often bring both direct and indirect profits, new sources of financing are attracted, including public-private partnerships.

The development of Kazakhstan's transport system does not correspond to any of the formulated models. There are not enough resources for advanced development, insufficient infrastructure, entrepreneurship capable of playing a leading role for catching up and synchronous.

As previously noted, in Kazakhstan, transport infrastructure plays a major role in the infrastructure complex, ensuring economic development. Unfortunately, today the domestic transport infrastructure cannot meet all the needs of the economy. According to the International competitiveness rating developed by the world economic forum, Kazakhstan is in 73rd place out of 141 rated countries in terms of the quality of transport infrastructure. According to official data, over 1 trillion tenge was allocated in 2020–2021 for the construction, repair and maintenance of roads. Although roads remain one of the main items of budget expenditures, out of 96 thousand km of highways of republican significance, only 13.4 thousand km were built during the years of independence of the Republic of Kazakhstan. The Engel coefficient – density of the road network adjusted for population density – is significantly lower than in all BRICs countries. There are no high-speed Railways in Kazakhstan.

The network of airports and airfields is extremely rare. Kazakhstan is in the third world cluster in terms of the quality of transport infrastructure. The degree of depreciation of fixed assets for transport enterprises is 33.2% in 2021.

The existing model of transport development is focused on meeting the transport demand of raw materials sectors of the economy, involves the financing of infrastructure projects on a residual basis and the development of backward technological bases. The level of expenditures of state budget on transport infrastructure over the past 10 years has been at the level of 2–2.9% of GDP, which is a high indicator relative to many OECD countries, but insufficient relative to countries actively developing transport infrastructure.

Until 2025, Kazakhstan plans to invest $20 billion to diversify transit and transport routes and introduce integrated logistics solutions. Over the past 15 years, about $35 billion has already been invested in the development of the transport industry in Kazakhstan.

Conclusion

The analysis of the world experience in the development of transport allows us to identify the following trends:

- developed countries are increasing the competitiveness of harmonized transport systems by abolishing quotas, tariff and other restrictions for modes of transport and carriers;
- there is an integration of elements of the transportation process and logistics in the conditions of digitalization and complexity of the transport services market;
- transport (logistics) centers have become managing elements, transport corridors have turned from a set of routes into a system of managing transportation centers and transport hubs;
- the competitiveness and quality of transport services are growing.

New technologies should be introduced in the transport infrastructure, taking into account the main trends of world development. We will highlight the main technological trends and technologies developed in the world that will affect the development of transport infrastructure.

1. New concepts and technologies of cargo and passenger transportation: high-speed railway transport:

- magnetic levitation transport, or Maglev; Actively developed and operated in the world since the 1980s, Technology is at the stage of concept;
- hyperloop (hyperpaths) – vacuum trains project.

Technologies are not currently represented in Kazakhstan.

2. Unmanned passenger and cargo transport.

3. ”Uberization” of passenger and cargo transportation.

4. General Autonomous electric Vehicles.

5. The spread of satellite technology.

6. Create safer roads with electronic devices for drivers.

7. Targeted delivery to end users, due to the growth of the e-Commerce market.

8. The use of digital technologies: the introduction of the Internet of things in transport, the formation and use of big data, the concept of Maas (mobility as a service), the introduction of blockchain technologies.

The results of the functioning of the transport infrastructure have an impact on the overall parameters of the country’s life. Domestic and foreign experience shows that the development of growing volumes of transport work is possible not only due to the quantitative increment of infrastructure, human resources, technologies, but also due to the development, development of methods of high-performance and efficient use of knowledge-intensive technologies on the existing infrastructure, more advanced forms and methods of organization, information, and digital technologies.

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КӨЛІК ИНФРАҚҰРЫЛЫМЫН ДАМЫТУДЫҢ НЕГІЗГІ ТРЕНДТЕРІ: ҚАЗАҚСТАНДЫҚ ЖӘНЕ ШЕТЕЛДІК ТӘЖІРИБЕ

Андатпа

Көлік инфрақұрылымның негізгі және маңызды элементі болып табылады, сондықтан қоғамдық өндірістің тиімділігін арттыру үшін экономикалық кеңістіктің байланысын қамтамасыз ету мақсатында көлік инфрақұрылымын, сапалы көлік қызметтерін дамыту қажет. Қазіргі уақытта кез-келген ел заманауи тиімділігі жоғары көлік-логистикалық инфрақұрылымды қалыптастыруды мақсат етіп отыр. Көлікті экономикаға үлес қосу қабілеті тұрғысынан динамикалық контекстте қарастыру қажет. Көлік инфрақұрылымын дамыту мәселесі көп қырлы және көптеген факторларға байланысты. Оның бірнеше бағыттары бар, қазіргі жағдайда оларды бағалау зерттеудің объективтілігін қамтамасыз ететін жаңа әдістерді әзірлеудің жаңа тәсілін қажет етеді. Жұмыста әлемдік нарықтағы отандық тауарлардың бәсекеге қабілеттілігін арттыру үшін жүк ағындарын теңгерімді бөлуде теміржол, автомобиль, өзен және теңіз көлігі түрлерінің тиімді өзара іс-қимылының және тауарлар бағасындағы көлік шығындарын төмендетудің қажеттілігі негізделеді. Авторлар шетелдік және отандық көлік инфрақұрылымын дамытудың негізгі трендтері қарастырылады. Көлік инфрақұрылымын дамыту ғылымды қажетсінетін технологияларды, ұйымдастырудың инновациялық нысандары мен әдістерін, ақпараттық және цифрлық технологияларды жоғары өнімді және тиімді пайдаланудың әдістері мен тәсілдерін әзірлеу есебінен мүмкін болады деген қорытынды жасалды.

Тірек сөздер: экономика, көлік инфрақұрылымы, логистика, көлік түрлері, ғылымды қажет ететін технологиялар, даму трендтері, көлік секторы.

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ОСНОВНЫЕ ТРЕНДЫ РАЗВИТИЯ ТРАНСПОРТНОЙ ИНФРАСТРУКТУРЫ: КАЗАХСТАНСКИЙ И ЗАРУБЕЖНЫЙ ОПЫТ

Аннотация

Основным и важным элементом инфраструктуры является транспорт, в связи с чем для повышения эффективности общественного производства необходимо развивать транспортную инфраструктуру, качественные транспортные услуги с целью обеспечения связности экономического пространства. В настоящее время любая страна ставит цель – формирование современной высокоэффективной транспортно-логистической инфраструктуры. Транспорт необходимо рассматривать в динамичном контексте с точки зрения его способности вносить вклад в экономику. Вопрос о развитии транспортной инфраструктуры многоаспектен и

зависит от множества факторов. Имеет несколько направлений, оценка которых требует нового подхода к разработке новейших методов, которые обеспечили бы объективность исследований в современных условиях. В работе обосновывается необходимость эффективного взаимодействия железнодорожного, автомобильного, речного и морского видов транспорта в сбалансированном распределении грузопотоков, снижения транспортных издержек в цене товаров, что повысит конкурентоспособность отечественных товаров на мировом рынке. Авторы рассматривают основные тренды развития зарубежной и отечественной транспортной инфраструктуры. Сделан вывод, что развитие транспортной инфраструктуры возможно за счет разработок, развития методов и способов высокопроизводительного и эффективного использования наукоемких технологий, инновационных форм и методов организации, информационных и цифровых технологий.

Ключевые слова: экономика, транспортная инфраструктура, логистика, виды транспорта, наукоемкие технологии, тренды развития, транспортный сектор.