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TRANSPORT IN THE SUSTAINABLE DEVELOPMENT GOALS FRAMEWORK

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Abstract

Transport plays an important role in achieving the sustainable development goals set by the UN member states for the period up to 2030. This article discusses the concept of sustainable economic development and its basic principles, which made it possible to substantiate and determine the content of sustainable transport development. It has been established that transport has a direct impact on ten sustainable development goals (SDGs): zero hunger; good health and well-being; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; sustainable cities and communities; responsible consumption and production; climate action; life below water; partnerships for the goals. The achievement of these SDGs is affected by transport factors such as Vehicle Regulations, Road Traffic and Safety, Transport Infrastructure, Dangerous Goods and Border Crossing Facilitation. Since transport is a complex organizational, economic and technical mechanism, it is impossible to assess the current state and progress of sustainability based on a single indicator. It is advisable to establish a set of indicators to determine the current situation and trends in sustainable transport. Moreover, the indicators must meet the requirements of their measurability on the basis of available statistics. It is proposed to assess the state and development of sustainable transport based on economic, social, human and environmental capital, the value of which depends on transport and individual accessibility, reliability, and safe environmental impact. Each of these factors was evaluated by a system of indicators, the measurement of which is possible based on official statistics. A study was also conducted to assess the level of achievement of the established indicators of sustainable development of transport in Belarus.

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1 INTRODUCTION

For a long time, sustainable development was considered as permanent economic growth in countries with developed economies. A similar approach to sustainable development at the present stage still takes place in some developed and especially in developing countries. On the one hand, the fallacy of this approach is that economic growth, as a rule, does not guarantee social justice, and on the other hand, is not based on the rational use of natural resources to ensure future generations and is not aimed at protecting the environment from pollution.

The main principles of sustainable development, laid down in the report of the World Commission on Environment and Development "Our Common Future" in 1987, as well as at the UN Conference on Environment and Development in Rio de Janeiro in 1992, are as follows:

- taking decisions must always consider the justice and the rights of future generations.
- a long-term view should be based on the precautionary principle of the threat of serious or irreversible damage.
- he fair distribution between generations and within generations to ensure the well-being of present and future generations of the world's population.
- the lack of a full scientific justification for the project should not be used as a reason for postponing cost-effective measures to prevent degradation.

Sustainable development involves complex relationships between the economy, society, and the environment. These relationships should ensure economic growth, social equality and public health, and environmental sustainability.

However, at present, the economy, the social sector, and the environment face growing problems. Unfair distribution of income within and between countries is growing, unreasonable volumes of production and consumption lead to a sharp deterioration of the environment and the depletion of natural resources. At the same time, the economic development of any country is based on efficient transport, which ensures both domestic and international distribution of goods flows. The level of development of the country's transport sector is one of the main indicators of its economic well-being. For example, transport employs more than five percent of the able-bodied population of the planet and creates 3-5 percent of value-added in world GDP (Transport for Sustainable Development. The case of Inland Transport, 2015).

2 SUSTAINABLE DEVELOPMENT OF TRANSPORT

The United Nations Department of Economic and Social Affairs (UNDESA) predicts that the world's population will reach more than 9.5 billion people by 2050 (Transport for Sustainable Development. The case of Inland Transport, 2015). Population growth, coupled with continued globalization and trade liberalization, will accelerate the demand for transportation, both people and goods. It is expected that the volume of freight and passenger traffic by 2050 will increase by 80% and 51% compared with 2005, respectively. (Miloslavskaya & Myskina, 2013). The constant increase in the volume of transport of people and goods necessitates careful monitoring of the development of this sector for sustainable development since efficient and effective transport systems play an important role in combating poverty, providing access to markets, increasing employment, access to education and basic services.

By 2050, the number of cars on the roads will double and reach 2 billion, which will increase the number of accidents and the load on the environment dramatically. Today, more than 1.25 million people die and up to 50 million are injured on the world's roads every year. Moreover, low- and middle-income countries account for 90% of deaths, although they own only half of the world's vehicles (Transport overview, 2019).

Transport is expected to be a major driver of growing global energy demand. Currently, transport accounts for about 64% of global oil consumption, 27% of total energy consumption and 23% of global energy-related CO2 emissions, which negatively affects the environment (Transport overview, 2019).

The above indicates the intensive development of transport in the coming decades. Therefore, today, the development of this industry must be given the character of sustainable one within the framework of the 2030 Agenda for Sustainable

Development, adopted by the UN member states in 2015. This agenda outlines 17 goals in the field of sustainable development and 169 related tasks that are designed to help humanity once again embark on the virtuous path of sustainable development (Sustainable Development Agenda, 2015). The analysis of goals and objectives made it possible to establish their direct connection with the functioning of transport, which confirms its special significance in the development of society.

The transport factors such as Vehicle Regulations, Road Traffic and Safety, Transport Infrastructure, Dangerous Goods and Border Crossing Facilitation (Figure 1) affect the achievement of the mentioned targets.

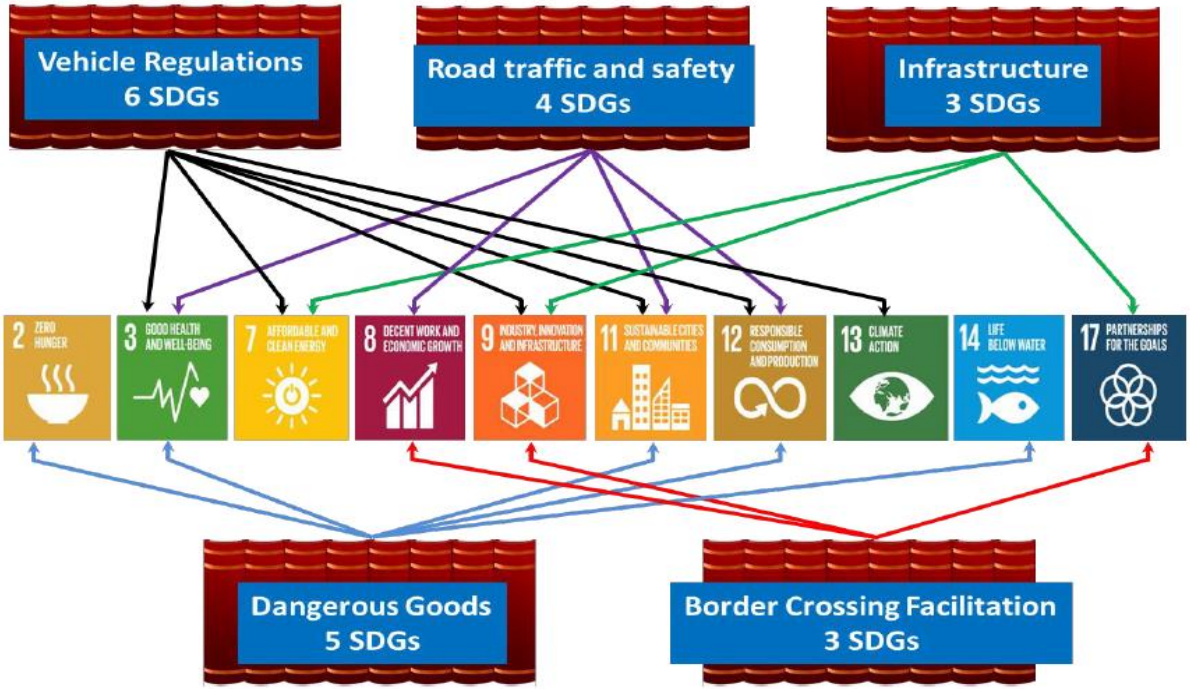

Figure 1 - The transport factors affect the achievement of the SDGsV
Source: UNECE Workshop on How to achieve Transport- and Trade-related SDGs, Chamber of Commerce (2017)

Vehicle Regulations affects six SDGs: Good Health and Well-Being, Affordable and Clean Energy, Industry, Innovation and Infrastructure, Sustainable Cities and Communities, Responsible Consumption and Production, and Climate Action.

Road Traffic and Safety – four SDGs: Good Health and Well-Being, Decent Work and Economic Growth, Sustainable Cities and Communities, Responsible Consumption and Production.

Transport Infrastructure affects three SDGs: Affordable and Clean Energy, Industry, Innovation and Infrastructure, Partnerships for the Goals.

Dangerous Goods affect five SDGs: zero hunger, Good Health and Well-Being, Sustainable Cities and Communities, Responsible Consumption and Production, life below water.

Border Crossing Facilitation– three SDGs: Decent Work and Economic Growth, Industry, Innovation and Infrastructure, Partnerships for the Goals.

3 INDICATORS OF SUSTAINABLE DEVELOPMENT OF TRANSPORT

The United Nations Economic Commission for Europe has identified the following key indicators for sustainable transport development:

- accessibility associated with the integration of countries into a wider market to eradicate poverty;
- the affordability of goods and services for the poor;
- life safety of the inhabitants of the planet;
- ecological state of the environment (Sustainable transport in the post-2015 sustainable development agenda, 2013).

UNECE also called on member states to promote sustainable housing and land management, intending to create compact cities for sustainable urban transport.

In turn, the Pan-European Programme on Transport, Health and Environment (THE PEP)

identified the following priority sustainable development goals in the field of transport:

- to promote sustainable economic development and job creation through investment in environmentally friendly transport and health.
- to ensure environmentally sustainable mobility and promote the development of more efficient transport systems.
- to reduce emissions of greenhouse gases and atmospheric pollutants of transport origin, as well as transport noise levels.
- to promote the implementation of strategies and the implementation of measures aimed at ensuring healthy and safe transport;
- to integrate goals in the fields of transport, health and the environment into urban development policies and spatial planning (The PEP Partnerships, 2019).

The World Bank focuses on poverty alleviation by simplifying small business start-ups and doing business to ensure employment, as well as expanding access to a wider market and transport services in rural areas, which will provide greater potential for economic growth (World Bank: Central Asia Poverty Reduction Slows Down, 2019).

The Asian Development Bank believes that the rapidly growing fleet of private vehicles in the poor countries of Southeast Asia will aggravate the environment, which will lead to climate change and reduce road safety in the region (ADB adopted a strategy until 2030 in response to the changing needs of the Asia-Pacific region, 2019).

The United Nations Economic Commission for Latin America and the Caribbean underlines the fundamental role of public transport in reducing the growing external factors of economic growth and in ensuring the savings and benefits of improved transport services, which helps reduce social and economic inequality, which remains a serious problem in the region (Road transport in Latin America: evolution of its infrastructure and impact between 2007 and 2015, 2019).

The International Road Transport Union has proposed expanding the transport of buses and taxis in the development of transport policies to double their volumes and achieve sustainable mobility for all segments of the population.

In this regard, for the sustainable development of transport, it is necessary to develop integrated approaches to land-use policies, infrastructure development, public transport systems, and the goods delivery network to ensure affordable, efficient and safe transportation, improve energy efficiency, reduce environmental pollution and reduce the effects of congestion.

4 METHODOLOGY AND INDICATORS OF EVALUATION OF SUSTAINABLE DEVELOPMENT OF TRANSPORT

The transport system is a complex organizational, economic and technical mechanism consisting of infrastructure facilities, vehicles, organizations, and workers providing its work. The work of this mechanism is complicated by the presence of various modes of transport, a multitude of regulatory legislative bodies and regulatory legal acts, a wide range of interacting parties and facilities, various financing and co-financing methods, and many other factors. Therefore, it is not possible to assess the current state and progress of transport sustainability based on a single indicator. It is advisable to establish a set of indicators to determine the current situation and trends in the field of sustainable transport. Moreover, the indicator must meet the requirements of its measurability based on available statistics.

It is possible to determine indicators for assessing the state and development of sustainable transport based on the stability of the total capital of society, which can be determined in the form of the following types of capital: economic, social, human and environmental.

Economic capital, in this case, is seen as the ability of transport to provide access to various markets, create jobs, connect people and business, forming high added value. From this point of view, transport is important for sustainable economic development.

Social capital is associated with relationships and norms that shape the quality and quantity of social benefits in society. Transport carries out the movement of people and provides access to basic social services.

Human capital is a combination of knowledge, skills used to meet the diverse needs of man and society as a whole. Through transport, various human needs are realized, in particular, access to sources of knowledge and skills, study of the world by moving people and various objects to research areas not only on earth but also in space.

Environmental capital is a natural character and includes land, natural resources and the ecosystem of the earth and the cosmos. Unlike previous capital, transport negatively affects environmental capital by polluting the environment, emitting harmful substances and greenhouse gases, using large amounts of non-renewable energy, generating waste and reducing the quality of the natural habitat (table 1).

Table 1 - Goals of sustainable development of transport and its indicators

Indicators	Effect on capital	Sustainable Development Goals	
1. Density and quality of transport infrastructure. 2. Volumes of transportation and cargo turnover 3. Volumes and cargo turnover of international transport. 4 Border crossing time.	***Economic capital:*** access to markets and employment. ***Social capital:*** access to basic social services. ***Human capital:*** access to sources of knowledge and skills.	To increase the volume of cargo and passenger traffic. To increase the share of paved roads. To ensure the growth of the export of transport services. To minimize the proportion of people without access at any time of the year to land transport. To develop strategic international relations, especially in landlocked countries. To develop effective border crossing methods.	Transport Accessibility
1. The costs of personal transport in total revenue. 2. The cost of fuel for private vehicles. 3. The volume of public and private investment in transport.	***Economic capital:*** accessibility to employment; long-term sustainable investment. ***Social capital:*** access to basic social services. ***Human capital:***	To ensure accessibility of income for all segments of the population. To implement long-term investment plans. To conduct a thorough analysis of pre-investment.	Individual Accessibility
1. Number of traffic accidents 2. The use of seat belts, driving with traffic violations 3. The share of active railway crossings.	***Social capital:*** safe transport for individuals. ***Economic capital:*** financing for safe transport to reduce the cost of eliminating the consequences of accidents	To minimize the number of casualties and injuries on the roads. To minimize the number of fatalities and injuries caused by rail and inland waterways. To minimize accidents involving dangerous goods. To prevent terrorist threats, attacks, and criminal activities.	Safety
1. The proportion of late delivery of goods and passengers 2. The amount of deviation from the appointed time of departure and arrival of transport.	***Social capital:*** transport should ensure the standards of human activity. ***Economic capital:*** transport must be safe to reduce infrastructure losses.	To ensure reliable year-round operation of transport. If necessary, to ensure the operation of the transport on schedule.	Reliability
1. Energy consumption in transport 2. The volume of greenhouse gas emissions. 3. Environmental pollution. 4. The noise level from vehicles.	***Environmental capital:*** transport should help reduce energy consumption, emissions of harmful substances and the use of other resources to maintain global natural capital.	To reduce dependence on non-renewable energy sources. To minimize greenhouse gases and pollutant emissions. To minimize traffic noise. To minimize waste from transport and improve its recycling.	Environment

Source: Luksha & Molokovitch (2020)

As the world economy develops, it is important to ensure the minimum negative impact of transport on the state of environmental, social and human capital, which are closely interconnected and ensure the sustainable development of society.

Assessment of the condition and risks associated with the sustainability of transport should be carried out based on the dynamics and forecasts of data in the field of transport and individual accessibility, reliability and safe environmental impact.

Transport accessibility can be measured by indicators of the density and quality of transport infrastructure. Important in transport accessibility are of international transport links, which can be determined by the volume of freight and freight traffic, the time and costs of border crossing. Since access to basic goods and services requires mobility, an accessible transport system is a prerequisite for the social and economic development of society.

Transport systems should also be accessible to society, so individual accessibility can be estimated by the share of private transport costs in total revenues, the cost of fuel for private transport, the volume of public and private investment in transport.

Transport poses a potential danger to society in the form of road traffic accidents that result in significant social and economic losses. Transport safety can be assessed by such indicators as the number of accidents, the number of fatalities and injuries, the use of seat belts while driving, driving with violations of traffic rules, drunk driving, the share of active railway crossings, and others.

The reliability of transport is determined by the share of untimely delivery of goods and passengers, as well as the deviation from the appointed time of departure and arrival of transport.

Since transport negatively affects the environment through the consumption of non-renewable energy sources, produces huge emissions of harmful substances and greenhouse gases, creates increased noise and destroys the ecosystem, then for assessment, it is possible to apply such indicators as the amount of energy consumed, the volume of greenhouse gas and harmful substances, the degree of environmental pollution by transport, the noise level from transport and others.

5 IMPLEMENTATION OF THE SDGs IN THE FIELD OF TRANSPORT IN BELARUS

Sustainable development of the transport system of Belarus until 2030 is aimed at meeting the needs of the economy and society in high-quality transport services while ensuring environmental requirements and road safety.

The criteria for achieving this goal are:

- increase in freight turnover of transport for 2016-2030 by 1.2 times.
- increase in passenger traffic by 1.4 times.
- increase in the proportion of paved roads in the total length of public roads from 86.3% in 2015 to 90.0% in 2030 (The national strategy for sustainable socio-economic development of the Republic of Belarus for the period until 2030, 2017).

The achieved and planned indicators of transport development within the framework of the SDGs are given in table 2

The data in table 2 show that for the period from 2016 to 2019 the growth rate of freight turnover amounted to 4.3%, and the passenger turnover - 12.8%. Consequently, there is a high probability that by 2020 the planned growth rate of freight turnover will be met, and the growth rate of passenger turnover has been exceeded that already planned by 2019.

Also, a network of high-speed motorways of the first category is being created in the republic with a bearing capacity of at least 11.5 tons per single axis and a speed of 120 km/h or more. The main international transport corridors connecting the republic with neighboring countries are of the first category. The network of local hard-surfaced local roads with year-round accessibility for the population and business entities is developing at an accelerated pace.

The volume of freight forwarding services in 2018 amounted to 2146.9 million US dollars. At the same time, 66.8% of the services were provided under contracts with non-residents, which indicates a low activity of domestic business entities. The total volume of freight forwarding services is dominated by road transport services -

50.8%, and railway transport - 44.1%. Water and air transport services are negligible. Although the volume of air cargo in the world is growing rapidly, in Belarus these services make up only 1.4% of the total.

Table 2 - Indicators of transport development

	Actual Value					Plan		
	2015	2016	2017	2018	2019	2020 to 2015	2025 to 2020	2030 to 2025
The growth rate of cargo turnover, as a percentage of the previous period	100.0	100.0	106.0	104.1	94.2	107.4	107.0	106.6
Passenger turnover growth rate, as a percentage of the previous period	100.0	100.0	103.5	103.6	105.7	111.8	112.5	113.0
The proportion of paved roads in the total length of public roads, percentage	86.3	86.5	86.5	-	-	87.5	88.0	90.0

Source: Transport and Communications in the Republic of Belarus (2018)

Despite the growth in freight forwarding services, the revenue of freight forwarders in this volume is falling. If in 2016 it was 12.5%, then in 2018 - 10.3%.

The study of cargo transportation volumes shows that until 2017, for all types of transport, they decreased and only in 2017 did a turnaround occur (Figure 2).

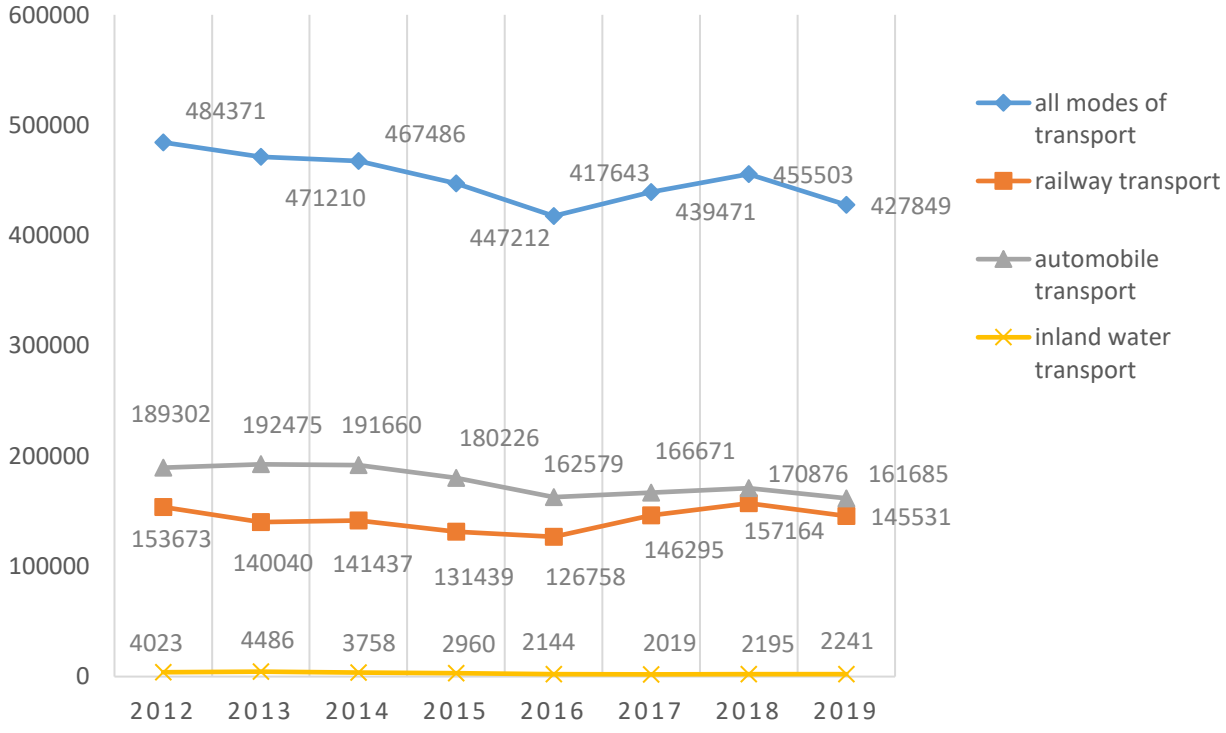

Figure 2 - Transportation of goods by mode of transport, thousand tons.
Source: Transport and communications in the Republic of Belarus (2018)

First of all, the recovery was associated with the revival of the economy in Russia, which had a positive effect on transportation in Belarus. At the same time, rail transport grew more rapidly. Recently, a gradual rapprochement of road and rail transportation has been observed. So, if in 2012 the share of road transport in the total

volume was 39.1%, and for rail - 31.7%, then in 2019 - 37.8% and 34.0%, respectively.

An analysis of the transport of goods by rail by types of communication showed that international traffic is growing, and transit is declining. In international traffic, goods are transported mainly to neighboring countries, since the average transportation distance is about 340 km. These are Russia, Poland, Ukraine, Lithuania, and Latvia.

Cargo turnover structure for the period 2011-2018 almost unchanged. International carriage of goods by road is much less than in the whole country. At the same time, the share of transit is only 1.7%. The average distance of road transport in international traffic is over 1400 km. Consequently, goods are transported to foreign countries. However, the volume of such traffic is negligible. Freight by road is transported mainly in urban, district and inter-district communication.

For the Republic of Belarus transit transportation by land as a part of China-Europe-China traffic is important. In modern conditions, an increasing range of goods requires fast delivery, as a result of which the volume of transportation by land will increase. From China to Europe and Russia, goods can be transported by land through Kazakhstan, Mongolia, Kyrgyzstan, and also directly to Russia. The shortest and most economical route from the western regions of China is through Kazakhstan.

In international traffic, Kazakhstan rail transport specializes in the transportation of bulk cargo, which occupies more than 80% of the total. Loads are transported from Kazakhstan to Russia or transit in the north-south direction.

Even before 2015, transit through Kazakhstan exceeded transit through Eastern Siberia and the Far East. However, already in 2017, transit through Kazakhstan became less than the volume of transit through Eastern Siberia and the Far East. Only 5.5% of transit cargo is transported through Kazakhstan to and from Russia and Europe, which amounts to 1,100 million US dollars per year.

Russia is intensively improving its international transport corridors, especially of the Trans-Siberian direction, which will affect the decrease in cargo transit to Europe through Belarus. Such a development of events will make it difficult to meet the SDG indicators related to transport. Therefore, it is necessary to diversify trade relations with foreign countries, gradually reducing dependence on the Russian market.

6 CONCLUSION

In the study were presented the main indicators of sustainable development, which determined the strategic approach to the definition of sustainable transport development. To assess the sustainable development of transport, a methodology and a system of indicators (Luksha & Molokovitch) based on dynamics and forecasts in the field of transport accessibility, individual accessibility, reliability, and safe environmental impact are proposed. For each of these areas, particular indicators are determined to depend on their impact on economic, social, human and environmental capital. Measures that ensure the implementation of sustainable transport indicators are proposed.

Study of the work of transport for the period 2016-2019 shows that it is necessary to make great efforts to find new markets for products of the export-oriented economy of Belarus in order to achieve the planned indicators of the SDGs for transport in 2020. The situation is complicated by the fact that recently Russia has been making great efforts to develop the infrastructure of its own transport corridors, especially the Baltic ones, which will negatively affect the volume of cargo flows through Belarus. Oil supplies from Russia to Belarusian refineries in the first quarter of 2020 also decreased significantly, which led to a decrease in pipeline cargo turnover. A decrease in traffic and cargo turnover has been observed in recent months due to the suspension of production in European countries and Russia, as well as the closure of the borders of these states due to the rapid spread of Covid 19. Therefore, it is necessary to intensify the work of transport in the second half of 2020 by increasing domestic demand for transportation and creating favorable conditions for the transit of goods through the territory of the Republic of Belarus. The level of achievement of the established indicators of sustainable transport development in Belarus will depend on the recovery of the economies of its main trading partners.

WORKS CITED

ADB adopted a strategy until 2030 in response to the changing needs of the Asia-Pacific region (2019). Retrieved from: https://www.adb.org/ru/news/adb-launches-strategy-2030-respond-changing-needs-asia-and-pacific#.

Miloslavskaya S.V., & Myskina A.B. (2013). *Prospects for the development of the transport system of the European Union*. Retrieved from: https://cyberleninka.ru/article/n/perspektivy-razvitiya-trasportnoy-sistemy-evropeyskogo-soyuza. Access date 6.05.2020.

Road transport in Latin America: evolution of its infrastructure and impact between 2007 and 2015 (2019). Retrieved from: https://repositorio.cepal.org/bitstream/handle/11362/44459/1/S1801183_en.pdf

Sustainable Development Agenda (2015). Retrieved from: https://www.un.org/sustainabledevelopment/ru/about/development-agenda/.

Sustainable transport in the post-2015 sustainable development agenda (2013). Retrieved from: https://www.unece.org/fileadmin/DAM/trans/doc/2014/itc/ECE-TRANS-2014-03r.pdf.

The PEP Partnerships (2019). UNECE, Geneva. 44 p.

The national strategy for sustainable socio-economic development of the Republic of Belarus for the period until 2030 (2017). Minsk, 2017. 148 p.

Transport and communications in the Republic of Belarus (2018). National Statistical Committee of the Republic of Belarus. Retrieved from: https://www.belstat.gov.by/ofitsialnaya-statistika/realny-sector-ekonomiki/transport/.

Transport for Sustainable Development. The case of Inland Transport (2015). Retrieved from: http://www.unece.org/trans/publications/transport-reviews/2015/transport-for-sustainable-development-the-case-of-inland-transport/doc.html.

Transportation of goods by mode of transport, thousand tons. Source: Transport and communications in the Republic of Belarus (2018). https://www.belstat.gov.by/ofitsialnaya-statistika/realny-sector-ekonomiki/transport/.

Transport overview (2019). Retrieved from: https://www.worldbank.org/en/topic/transport/overview.

UNECE Workshop on How to achieve Transport- and Trade-related SDGs, Chamber of Commerce (2017). Retrieved from: http://www.unece.org/index.php?id=47173. Access data 6.05.2020.

World Bank: Central Asia Poverty Reduction Slows Down (2019). Retrieved from: https://www.trend.az/business/economy/3134793.html.

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