УДК 338.47:656.6+504 https://doi.org/10.31520/ei.2021.23.2(79).119-129
JEL R40, R49

МАСЛІЙ Н.Д.
д-р екон. наук, доцент, с.н.с.
Інститут проблем ринку та економіко-екологічних досліджень НАН України
Французький бульвар, 29, м. Одеса, Україна, 65044
E-mail: masliy.natalia@gmail.com
ORCID: 0000-0002-3472-5646

ЧЕСНОКОВА М.В.
канд філол. наук, начальних відділу міжнародних зав'язків
Національний університет «Одеська морська академія»
вул. Дідріхсона, 8, Одеса, Україна, 65029
E-mail: fad@onma.edu.ua
ORCID: 0000-0001-9383-5012

ДЬЯКОВ В. О.
адвокат
вул. Леонтовича, 6Б, м. Одеса, Україна, 65014
E-mail: Diakov.Vitalii@gmail.com
ORCID: 0000-0001-7081-215X

ОБҐРУНТУВАННЯ ЕКОНОМІКО-ЕКОЛОГІЧНОЇ ДОЦІЛЬНОСТІ ПЕРЕВЕЗЕННЯ ВАНТАЖІВ ВНУТРІШНІМИ ВОДНИМИ ШЛЯХАМИ

Актуальність. *На даний час постійно зростає попит на перевезення внутрішніми водними шляхами, особливо в економічно розвинутих країнах. Для підтримки національної економіки та створення більш ефективної та стійкої логістичної системи в Україні перевезення внутрішніми водними шляхами необхідно розвивати, адже внутрішній водний транспорт має низку переваг перед іншими видами транспорту, що створює передумови зміни логістичних маршрутів. Для скорочення транспортних витрат, покращення інфраструктури та логістики в умовах невизначеності важливим є взаємозв'язок стейкхолдерів залізничного та автомобільного транспорту із представниками водного транспорту. Переорієнтація перевезень з автомобільного транспорту на внутрішній водний, активізація міжнародної торгівлі та залучення нових вантажних потоків на внутрішній водний транспорт сприятиме загальному зростанню економіки країни і можлива за умови лібералізації перевезень.*

Мета та завдання. *Метою статті є обґрунтування економіко-екологічної доцільності перевезення вантажів внутрішнім водним транспортом в умовах глобальної тенденції необхідності збереження довкілля та раціонального використання ресурсів.*

Результати. *Портова інфраструктура українських річок також не відповідає сучасним вимогам та фактично знаходиться у занепаді. Більшість портів розташовані у центральних районах міст, що спричиняє руйнування міських доріг вантажівками, які прямують для завантаження/розвантаження у ці порти. В умовах глобальної тенденції необхідності збереження довкілля для більшості країн світу внутрішній водний транспорт є найдешевшим та найекологічнішим видом транспорту, придатним для перевезення значних обсягів продукції, в основному сировини. В України обсяги перевезених вантажів річковим транспортом за останнє десятиріччя значно скоротилися. Із наявного обсяги вантажних перевезень річкового транспорту більш всього переважають будівельні матеріали, продукція зерна та металургії. Певного поштовху до розвитку перевезень внутрішнім водним транспортом надало прийняття Закону України «Про внутрішній водний транспорт», що означило перспективи при підвищенні вантажообігу річкового транспорту. Враховуючи обсяги викидів річкового транспорту, він є найбільш екологічним у порівнянні із автомобільним. При цьому наявний рухомий склад водного транспорту здатен замінити декілька тисяч вантажівок. Встановлено, що основну роль у перевезеннях внутрішніх вантажів і пасажирів відіграє Дніпровський басейн. По Дніпру та його найбільших притоках Прип'яті та Десні здійснюється понад 90 % всіх перевезень річкового транспорту в країні. Проте низькі експлуатаційні характеристики флоту є одним з факторів, які стримують розвиток вантажних перевезень на внутрішніх водних шляхах. Виділено чотири судноплавні компанії, що забезпечують перевезення вантажів річками Дніпро та Дунай, що здатні забезпечити потенційний розвиток та конкурентні переваги водного транспорту України.*

Висновки. *Проведені дослідження дозволили провести обґрунтування економіко-екологічної доцільності перевезення вантажів внутрішнім водним транспортом України. На основі визначення частки перевезень*

внутрішнім водним транспортом у Країнах ЄС та України, встановлені потенційні можливості розвитку даної сфери, враховуючи інші схожі показники, а також зростання експортних потоків зерна та металургійної продукції з центральної частини України. Тому розвиток вітчизняних внутрішніх водних шляхів з економічного аспекту є необхідним та доцільним і матиме позитивний ефект для всієї країни та економіки в цілому, враховуючи невисокий рівень забруднення та екологічне навантаження на повітря, земельні, водні ресурси, біорізноманіття, які, в свою чергу, впливають на зміну клімату, екосистеми загалом та здоров'я населення. Враховуючи загальну довжину судноплавних шляхів України та тенденції скорочення наявного флоту, внаслідок морального та фізичного старіння, важливим є сприяння залученню інвестицій у річковий флот, що надасть потенційні техніко-технологічні можливості розвитку всього внутрішнього водного транспорту та його ключових гравців.

Ключові слова: *внутрішній водний транспорт, екологізація, перевезення вантажів, річкова інфраструктура.*

MASLII N.D.
Dr. Sc. (Economics), Professor, Senior Research
Institute of market problems and economic&ecological research of the National Academy of Sciences of Ukraine, Frantsuzkyi boulevard, 29, Odesa, Ukraine, 65044
E-mail: masliy.natalia@gmail.com
ORCID: 0000-0002-3472-5646

CHESNOKOVA M.V.
PhD (Philological), Head of International Cooperation Department
National University "Odessa Maritime Academy",
Didrikhson street, 8, Odessa, Ukraine, 65029
E-mail: fad@onma.edu.ua
ORCID: 0000-0001-9383-5012

DIAKOV V. O.
lawyer
Ukraine, Leontovich street, 6Б, Odesa, Ukraine, 65014
E-mail: Diakov.Vitalii@gmail.com
ORCID: 0000-0001-7081-215X

JUSTIFICATION OF ECONOMIC AND ENVIRONMENTAL FEASIBILITY OF CARGO TRANSPORTATION BY INLAND WATERWAYS

Topicality. *Currently, the demand for transport by inland waterways is constantly growing, especially in economically developed countries. In order to maintain the national economy and create a more efficient and sustainable logistics system in Ukraine, transportation by inland waterways must be developed, because inland waterway transport has a number of advantages over other modes of transport, which creates the preconditions for changing logistics routes. To reduce transport costs, improve infrastructure and logistics in the face of uncertainty, the relationship between the stakeholders of rail and road transport with representatives of water transport is important. Reorientation of transportation from road transport to inland waterway transport, intensification of international trade and attraction of new freight flows to inland waterway transport will contribute to the overall growth of the country's economy and is possible subject to liberalization of transportation.*

Aim and tasks. *The purpose of the article is to substantiate the economic and environmental feasibility of transporting goods by inland waterway transport in the context of the global trend of the need to preserve the environment and rational use of resources.*

Research results. *The port infrastructure of Ukrainian rivers also does not meet modern requirements and is actually in decline. Most of the ports are located in the central areas of cities, causing the destruction of city roads by trucks that are sent for loading / unloading at these ports. In the context of the global trend of the need to preserve the environment for most countries of the world, inland waterway transport is the cheapest and most environmentally friendly mode of transport, suitable for transporting significant volumes of products, mainly raw materials. In Ukraine, the volume of cargo transported by river transport has significantly decreased over the past decade. Of the available volumes of freight transport by river transport, building materials, grain and metallurgy products prevail in the nomenclature. A certain impetus to the development of inland waterway transport was the adoption of the Law of Ukraine "On Inland Waterway Transport", which outlined the prospects for increasing the cargo turnover of river transport. Considering the volume of emissions from river transport, it is the most environmentally friendly compared to road transport. At the same time, the existing rolling stock of water transport is capable of replacing several thousand trucks. It has been established that the Dnieper basin plays the main role in the transportation of domestic*

cargo and passengers. More than 90% of all river transport in the country is carried out along the Dnieper and its largest tributaries Pripyat and Desna. However, the low operational characteristics of the fleet are one of the factors holding back the development of freight traffic on inland waterways. The four selected shipping companies provide cargo transportation on the Dnieper and Danube rivers, and are also capable of ensuring the potential development and competitive advantages of Ukrainian water transport.

Conclusion. *The studies carried out made it possible to substantiate the economic and environmental feasibility of transporting goods by inland water transport in Ukraine. Based on the determination of the share of transportations by inland water transport in the EU countries and Ukraine, the potential opportunities for the development of this area were established, taking into account other similar indicators, as well as the growth of export flows of grain and metallurgical products from the central part of Ukraine. Therefore, the development of domestic inland waterways is economically necessary, expedient and will have a positive effect for the entire country and the economy as a whole, given the low level of pollution and environmental pressure on air, land, water resources, biodiversity, which, in turn, affect climate change. , ecosystems in general and public health. Taking into account the total length of the navigable routes of Ukraine and the tendency to reduce the existing fleet, due to moral and physical aging, it is important to assist in attracting investments in the river fleet, will provide potential technical and technological opportunities for the development of all inland water transport and its key players.*

Keywords: *inland waterway transport, greening, cargo transportation, river infrastructure.*

Problem statement and its connection with important scientific and practical tasks. In the world, especially in economically developed countries such as Germany, China and the USA, the demand for transportation by inland waterways is constantly growing. In Ukraine, transport by inland waterways needs to be developed to support the Ukrainian economy due to an increase in the number of transport and logistics alternatives in order to create a more efficient and sustainable logistics system. Water transport stakeholders are trying to reduce transport costs, improve infrastructure and logistics in the face of uncertainty, pandemic and conflict in the east of the country. Transportation by inland waterways is becoming more and more relevant and in demand in Ukraine. Inland waterway transport can increase its capacity using the competitive advantages of environmental friendliness and economy compared to rail and road transport.

In recent years, the volume of cargo traffic on inland waterways has been decreasing, and only in 2018 there is a positive result, and in 2019 it increased by 19.1%, compared to 2018 (11,790 thousand tons of cargo), even with the trend of a decrease in the number of ship passes (-27.16%). According to expert analytical studies in the field of freight transport (CFTS, COWI), the potential cargo base of 12 regions, from the territory of which goods can be transported along the Dnieper River, subject to the overall growth of the country's economy, is about 60 million tons with an increase of up to 80 million tons. t by 2030 (subject to the reorientation of transportation from roads to inland waterway transport, the intensification of international trade and the attraction of new goods to inland waterway transport through the liberalization of transportation). At the same time, given that the Ukrainian economy tends to export, potentially p. The Dnieper, subject to the modernization of locks, the carriage of goods by inland water transport, can reach 45 million tons per year (30 million tons of export, 15 million tons of imports).

The goals set by the Decree of the President of Ukraine until 2030 provide for a solution only as a result of effective technological improvements in inland waterways and navigational aids on rivers, an effective modern river information service, the formation of multifunctional port hubs, as well as the presence of a modern, energy efficient and ecological cargo fleet. In terms of social benefits, the development of inland waterway transport in Ukraine and its inclusion in the multimodal transport system will not only reduce energy costs and reduce harmful emissions into the atmosphere, but also transport goods by river-sea vessels between large industrial centers of the country and the Black Sea ports without additional overload. Therefore, research on the development of inland waterway transport, stimulating regulatory transformations, infrastructural development and interregional integration remains relevant.

Analysis of recent publications on the problem. Many scientists are engaged in the study of water transport, in particular its legislative and legal framework, individual components and the relationship between them. The characteristics of water transport and its elements are given in the works of domestic scientists: Vereshchaka M. A. [1], Hryhorak M. Yu., Kostiuchenko L. V. and Sokolova O. Ye. [2], Zatulko K. A. [3], Ilchenko S. V. [4-5] and others. Volik V. V. [6], Kliuieva Ye. M. [7], Metelenko N. H. and Shmyhol N.M. consider the issues of legislative and administrative-legal regulation of the activity of transport systems of Ukraine, in particular, water transport [8] and others.

Contributed to the study of the current state and development of river transport, determination of the potential of river transport and river ports Anishchenko A. V., Belousova S. V., Vernigora G. M., Okorokov A. N., Rossomakha A. A., Rossomakha A.I., Tsuprov P.S., Shakhov A.V. et al. Issues of organization and functioning of river transport were considered in the works of Kanivets O. P., Okorokova A. M., Ponomarova

A. S., Posashkovoi S. E., Reshniaka V. I., Reshniaka K. V.and others. In particular, Pavlyuk S. I and Samolevskaya Ya. A. [9] identified the resource potential of river transport in Ukraine and the feasibility of stimulating the development of river transport. Valyavskoy N. A. [10] presents the organizational and economic mechanism for the development of river ports in Ukraine; the necessity of reorientation of cargo flows to river transport is revealed. The problems and prospects for the development of inland water transport are studied by such domestic scientists as: Horoshko K. O. [11], Karamushko A. S. and Bogdanov S. M. [12], Koba V. G., Koba A. V., Pidlisnyi P. I. [13] and others.

The analysis of scientific literature indicates the problems of regulation in the field of inland water transport in Ukraine, despite the adopted Law of Ukraine "On Inland Water Transport" [14], which is designed to revive river transport and build efficient river logistics. Currently, only less than 1% of all cargoes are transported by rivers. In addition, inland waterway transport has a rather negative image. This mode of transport is seen as inefficient, consisting of older ships with high levels of polluting emissions and slow transport of low-cost cargo.

Allocation of previously unsolved parts of the general problem. That is, river transport in Ukraine is actually in decline. The port infrastructure of Ukrainian rivers also does not meet modern requirements. Most of the ports are located in the central areas of cities, causing the destruction of city roads by trucks that are sent for loading / unloading at these ports. Therefore, it is relevant, in our opinion, to further substantiate the economic and environmental efficiency of the use of inland waterway transport, which is effectively used by the EU countries, and to become an alternative to all types of cargo transportation. It can be incorporated into multimodal supply chains, generating new economic activities along the river and creating additional jobs.

Formulation of research objectives (problem statement). The purpose of the article is to substantiate the economic and environmental feasibility of transporting goods by inland water transport in the context of the global trend of the need to preserve the environment and rational use of resources.

An outline of the main results and their justification. An important task for Ukraine in accordance with the "National Transport Strategy of Ukraine until 2030" [15] is the reorientation of transportation from rail and road transport to inland waterways. In 2012-2019, the volume of transport by inland waterways in Ukraine was only 0.2-0.8% of all transport, while in the Netherlands the share of transport by inland waterways is more than 30%, and the average for the EU countries - 5-6%. Ukraine ranks last in transportation by inland waterways in Europe and accounts for only 0.6% (Fig. 1.).

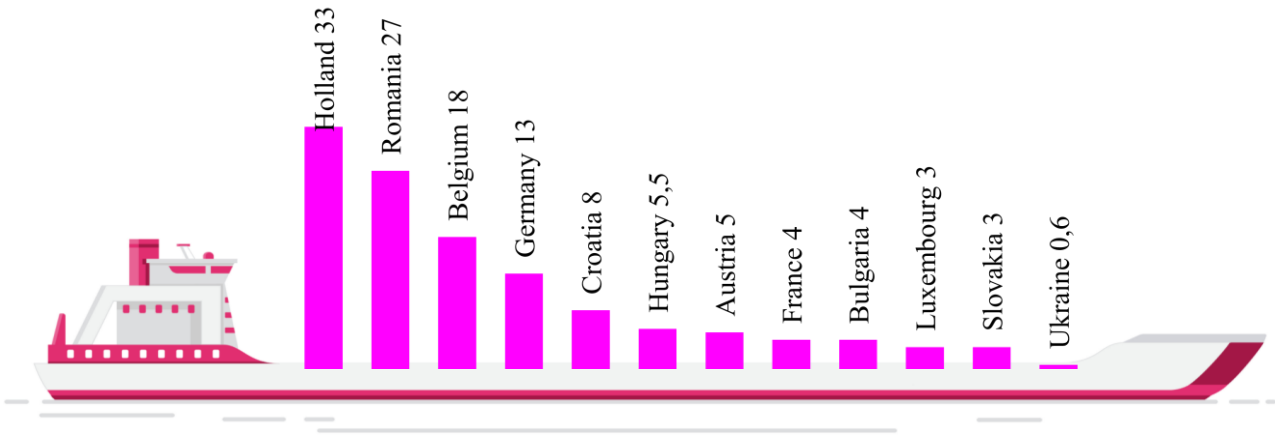

Fig. 1 Share of inland waterway transport in the EU countries in 2019,%

Source: compiled according to [16].

For most countries in the world, inland waterway transport is the cheapest and most environmentally friendly mode of transport, suitable for transporting significant volumes of products, mainly raw materials. In terms of cargo turnover on inland waterways, countries such as the United States, Russia, Canada, Germany, the Netherlands, Belgium, and also China are distinguished in the world. The largest volume of cargo transportation by inland waterway transport falls on China, where annual traffic accounts for about 1/4 of the total volume of traffic in the country, and in the USA - more than 11%. The introduction of new reforms in Ukraine allows an annual growth of GDP from the transportation of goods and passengers by inland waterways by 6-7% (Fig. 2).

The analysis shows that in recent years, the volume of cargo traffic on inland waterways has decreased, and only in 2019 showed a positive result. The volume of freight traffic by river transport is 3698

thousand tons in 2018 and 3990.2 thousand tons in 2019, which shows an absolute increase by 292.2 thousand tons, or in relative terms by 0.02%.

The main driver of the market is the growth of exports of grain and metallurgical products from central Ukraine, in particular, the transportation of raw materials to the Black Sea ports, provided that the supply from road and rail transport operators is not fully satisfactory.

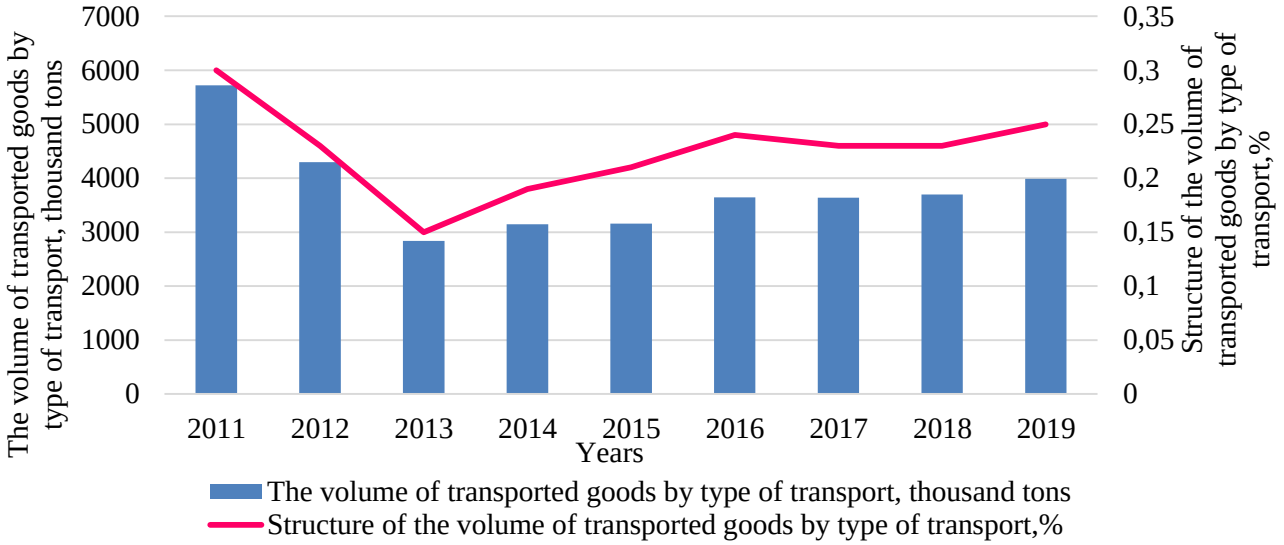

Fig. 2. The structure of the volume of cargo transported by river transport for 2011-2019

Source: compiled by the authors based on data from [17].

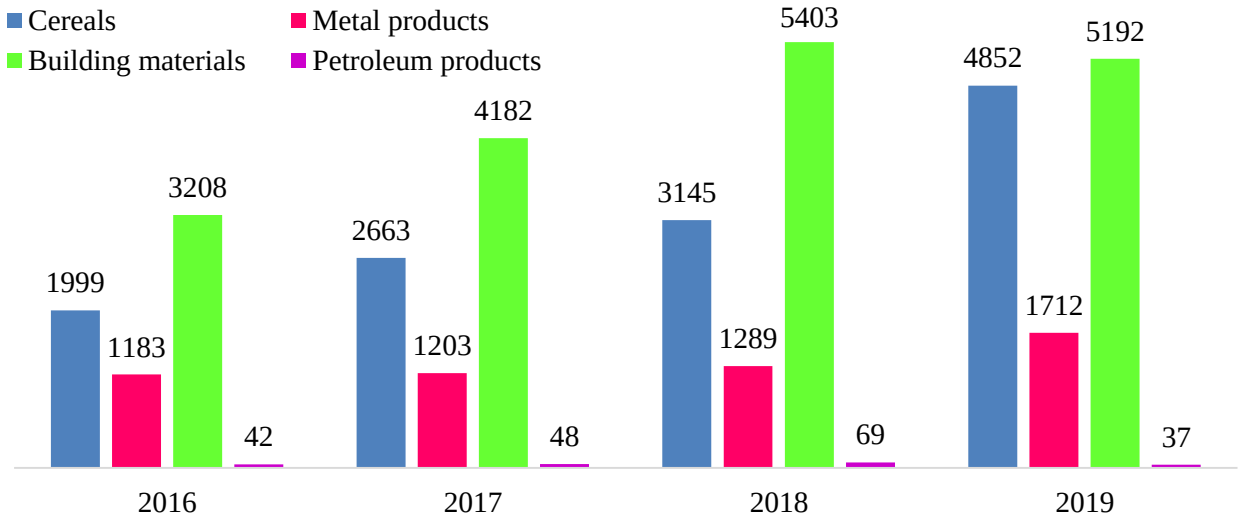

Fig 3. Freight turnover of river transport in Ukraine in terms of products in the dynamics of 2016-2019 (million tonn-kilometers)

Source: compiled by the authors based on data from [17].

The volume of grain shipments along the river last year amounted to 4800 thousand tons of cargo. The total volume of traffic on the river is 12 million tons. Analyzing the data presented, we can say that river transport is slowly, but growing annually. The introduction of the Law of Ukraine "On Inland Water Transport" [14] also gives impetus to the development of the industry. The perspectives provided by this bill are given in table 1.

The development of inland waterways in Ukraine, taking into account the economic aspect, is necessary and expedient and will have a positive effect for the whole country and the economy as a whole. Studies have shown that transport causes a large environmental load on air, land, water resources, biodiversity, which affects climate change, ecosystems in general and public health. The share of road transport in emissions of harmful substances is 90%, including: 94% in nitrogen oxide emissions, 92% in carbon monoxide emissions, 90% soot, 75% in methane and non-methane organic compounds emissions, 70% in sulfur dioxide emissions, 62-65% of

nitrogen dioxide emissions. The share of road transport in greenhouse gas emissions increased from 40.2% in 2010. up to 84.5% in 2020 [19]. Water transport accounts for only 0.3% of greenhouse gases from the total emissions of the industry due to the practical loss of Ukraine's fleet. River transport has a low level of environmental pollution, but it is also characterized by emissions of combustion products into the atmosphere and untreated discharges from river vessels into the water environment. Comparison of emissions from road transport and inland waterways is given in Table. 2.

Table 1.

Prospects for Ukraine in increasing the turnover of river transport

Indicators	10 million tons	20 million tons	30 million tons
Volume of transportations by inland waterways, million tons / year	10	20	30
Number of fleet, units, including:	214	428	642
Towing	60	120	180
Barge	120	240	360
Floating cranes	11	22	33
Dredgers	6	12	18
Other	17	34	51
Number of transshipment terminals for shipping to water transport	34	68	102
Number of employees involved in transportation by inland waterways, thousand people	12.1	24.2	36.3
Shipbuilding and ship repair	2.9	5.8	8.7
Shipping	1.4	2.8	4.2
Transfer terminals	3.7	7.4	11.1
Others (administrative staff, trucks	4.1	8.2	12.3
Budget receipts, various taxes and fees, UAH million	1204	2408	3612
Saving money on road repairs, UAH million	7800	15600	23400

Source: compiled on the basis of data from [18].

Table 2.

Composition of exhaust gases of various types of internal combustion engines

Components	Volume content,%	
	Gasoline Engines	Diesel Engines
Nitrogen, vol.%	74-77	76-78
Oxygen, vol.%	0,3-8,0	2,0-18,0
Water (steam),% vol.	3,0-5,5	0,5-4,0
Carbon dioxide, vol.%	0,0-16,0	1,0-10,0
Carbon monoxide, vol.%	0,1-5,0	0,01-0,5
Nitrogen oxides, vol.%	0,0-0,8	0,0002-0,5
Hydrocarbons, vol.%	0,2-3,0	0,09-0,5
Aldehydes, vol.%	0,0-0,2	0,001-0,009
Soot, g / m^3	0,0-0,04	0,01-1,10
Benzopyrene, 3.4 g / m^3	$10\text{-}20*10^{-6}$	$10*10^{-6}$

Source: compiled on the basis of data from [20].

There are over 100 different components in the exhaust gases of automobile engines, most of which are toxic. Exhaust gases from ships are also considered to be a significant source of air pollution. The main pollutants of the hydrosphere during the operation of ships are oil and oil products. Oil spills are devastating. Also, the discharge of sewage, which may contain harmful bacteria, pathogens, viruses, intestinal parasites and harmful nutrients, and the release of solid waste generated on the ship, have a negative impact on the environment As a result of the study, it can be concluded that road and water transport is not environmentally friendly, however, in comparison with the information given in Fig. 4 shows that the river fleet of Ukraine is

able to replace 264,480 trucks per year, significantly reduce the load on the roads and reduce environmental pollution.

So, we can conclude that with all the negative factors that river transport has, it still remains the most environmentally friendly, since it can replace several thousand cars. At the same time, inland waterway transport is one of the important elements in the development of Ukrainian infrastructure and an effective alternative to international highways and rail transport, capable of meeting the needs of the population and sectors of the economy in transport services. The total length of navigable routes operated in Ukraine is less than 3000 km. In almost all indicators of cargo and passenger transportation, this type of transport is in last place. The share of river transport in the total transportation of goods does not exceed 1.1%, and passengers - 0.2%. Summarized information on the main ports on the main rivers and the possibility of transshipment of goods to other types of transport is presented in table 3.

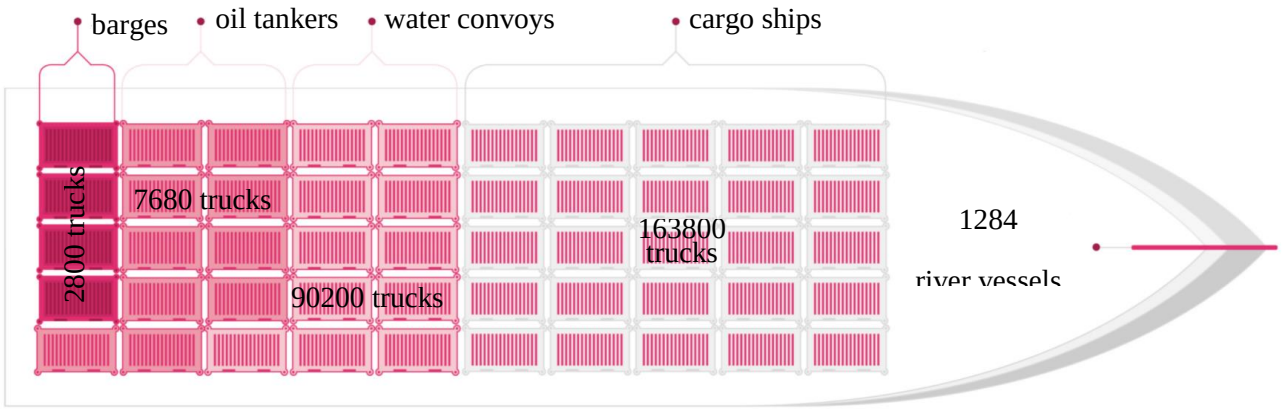

Fig. 4. Comparative characteristics of the possibility of carriage of goods by water and road transport
Source: compiled by the author.

Table 3.

River infrastructure taking into account transportation by other modes of transport

No	Port name	River	Port length, km	Combination with other modes of transport		
				Railway connection	Auto messages	River-sea connection *
1	Dneprodzerzhinsk river port	Dnipro	428.7	+	+	-
2	Dnipropetrovsk river port	Dnipro	392	+	+	-
3	Dnieper river port	Dnipro	86	+	+	-
4	Zaporizhzhya river port	Dnipro	306	+	+	-
5	Kiev river port	Dnipro	862	+	+	-
6	Kremenchug river port	Dnipro	543	+	+	-
7	Nikopol river port	Dnipro	213	+	+	-
8	Novokakhovsky river port	Dnipro	94	+	+	+
9	Kherson river port	Dnipro	28	+	+	+
10	Cherkasy river port	Dnipro	660	+	+	+
11	Ishmael	Danube	93	+	+	+
12	Kiliya	Danube	47	+	+	+
13	Reni	Danube	128	+	+	+
14	Ust-Dunaisk	Danube	0	+	+	+

Note: * "river-sea" traffic is a transport operation carried out partly by inland waterways (GDP) and partly by sea without congestion. It can be carried out by inland navigation vessels or sea vessels.
Source: compiled on the basis of data from [21].

Inland waterway transport has a number of advantages over other modes of transport, which creates the prerequisites for changing logistics routes: carrying capacity - 2 barges and a tug replace 250 trucks, or 100 rail cars and 2 locomotives; the ability to transport bulky cargo; savings on road repair - 1 million tons of cargo

transported by the river (redirected from land transport) reduces the cost of road repairs by up to UAH 1 billion. within 4 years environmental friendliness - modern river transport is the most environmentally friendly compared to rail and road, which significantly increases its competitiveness, given the latest trends in EU greening and the introduction of relevant standards [22].

The main role in the transportation of domestic cargo and passengers is played by the Dnieper basin. More than 90% of all river transport in the country is carried out along the Dnieper and its largest tributaries Pripyat and Desna. The Dnieper ports of Kiev, Dnepropetrovsk, Kherson and Zaporozhye account for more than 85% of the total volume of work on the transportation of goods and passengers in the Dnieper basin. On the Danube, transportation is carried out abroad, to countries such as Romania, Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Bulgaria, and Moldova.

The poor performance of the fleet is one of the factors holding back the development of freight traffic on inland waterways. According to the State Statistics Service, in 2020 there are 1284 units of small-tonnage merchant river vessels that can be used for inland water transport, which is about 4.5% of the number that was used in 1990. Due to the moral and physical aging and wear and tear of the Ukrainian fleet, the downward trend in the existing fleet continues. The solution to this problem should be attracting investment in the river fleet.

On the Ukrainian market in the field of inland water transportation, 4 shipping companies are involved: Private Joint Stock Company (PJSC) Shipping Company (SC) Ukrrichflot, Limited Liability Company (LLC) SC NIBULON, PJSC SC Ukrainian Danube Shipping Company and LLC SK "ARGO". PJSC SC Ukrrichflot, established in 1992 and is state-owned, operates on the Dnieper River and owns 175 vessels. SC NIBULON LLC was established in 2009, is privately owned, has 82 vessels, also operating on the Dnieper River. These two operators operate under the Ukrainian flag, are vertically integrated companies and simultaneously transport operators, cargo owners, river terminal owners and shipbuilders. Two shipping companies operate on the Danube River: PJSC SC "Ukrainian Danube Shipping Company", which was established in 1944 and operates 75 self-propelled ships and 245 units of non-self-propelled fleet, and LLC SC "ARGO", which was created in 2001 and is in use of which there are 193 ships. Pointing to the key players in the Ukrainian river transport market, it is worth noting that their technological and financial capabilities are still forming the industry's potential.

Conclusions and perspectives of further research. The studies carried out made it possible to substantiate the economic and environmental feasibility of transporting goods by inland water transport in Ukraine. Based on the determination of the share of transportations by inland water transport in the EU countries and Ukraine, the potential opportunities for the development of this area were established, taking into account other similar indicators, as well as the growth of export flows of grain and metallurgical products from the central part of Ukraine. Therefore, the development of domestic inland waterways in the economic aspect is necessary and expedient and will have a positive effect for the entire country and the economy as a whole, given the low level of pollution and environmental pressure on air, land, water resources, biodiversity, which, in turn, affect climate change, ecosystems in general and public health. Taking into account the total length of the navigable routes of Ukraine and the tendency to reduce the existing fleet, due to moral and physical aging, it is important to assist in attracting investments in the river fleet, provide potential technical and technological opportunities for the development of all inland water transport and its key players.

ЛІТЕРАТУРА

1. Верещака М. А. Моделі управління продуктами інфраструктурних проектів та програм в сфері водного транспорту: автореф. дис. на здобуття наук. ступеня кандидата технічних наук: 05.13.22. Одеса, 2021. 22 с. URL: https://onmu.odessa.ua/spec_rada/Vereshchaka/aref_Vereshchaka.pdf (дата звернення: 21.04.21).

2. Григорак М. Ю., Костюченко Л. В., Соколова О. Є. Логістична інфраструктура: навч. посібник. Київ: Логос, 2013. 400 с.

3. Затулко К. А. Щодо змісту та значення поняття інфраструктури внутрішнього водного транспорту. *Україна в системі сучасного міжнародного правопорядку та Європейської інтеграції: загальнотеоретичні та практичні проблеми:* матеріали міжн. наук.-практ. конф. (м. Київ, 18 грудня 2018 р.). Київ: Таврійський національний університет імені В. І. Вернадського, 2018. С. 98–101. URL: http://www.tnu.edu.ua/sites/default/files/normativbasa/ukraina-v-sistemi-sucasnogo-miznarodnogo-pravoporadku-ta-evropeiskoi-integracii-zagalnoteoreticni-ta.pdf#page=98 (дата звернення: 23.04.21).

4. Ilchenko S. V. Public management of national markets of transport services: status and principles of formation. *Science and education : trends and prospects.* New York: Ascona Publishing, United States of

America, 2018. P. 38–47. URL: http://conferencii.com/files/archive/2018-02.pdf (дата звернення: 26.05.2021).

5. Ilchenko S., Khumarova N., Maslii N., Demianchuk M., Skribans V. Instruments for ensuring the balanced development of inland waterway and maritime transport in Ukraine. *Sustainable, Circular Management and Environmental Engineering*: International Conference. (Odesa (Ukraine), April 16, 2021). Odesa, 2021. Т. 255. Article Number 01021. DOI: https://doi.org/10.1051/e3sconf/202125501021.

6. Волік В. В. Правове регулювання транспортної діяльності в Україні: навч. метод. посібник. Маріуполь: МДУ, 2020. 195 с. URL: http://repository.mdu.in.ua/jspui/bitstream/123456789/1416/3/NMP_pravove_reguliuvannia.pdf (дата звернення: 21.04.21).

7. Клюєва Є. М. Адміністративно-правове регулювання діяльності транспортних систем України, зокрема водного транспорту, в умовах євроінтеграції. *Європейські перспективи*. Київ, 2018. № 3. С. 37–41. URL: http://nbuv.gov.ua/UJRN/evpe_2018_3_8 (дата звернення: 19.04.2021).

8. Метеленко Н. Г., Шмиголь Н. М. Законодавче регулювання та управління якістю транспортної системи України. *Приазовський економічний вісник.* Запоріжжя, 2018. Вип. 3(08). С. 25–29. URL: http://pev.kpu.zp.ua/journals/2018/3_08_uk/7.pdf (дата звернення: 19.04.21).

9. Павлюк С. І., Самолевський Я. О. Потенціал річкового транспорту України: стан та перспективи розвитку. *Modern Economics.* Миколаїв, 2020. № 20(2020). С. 192–198. URL: http://dspace.mnau.edu.ua/jspui/bitstream/123456789/7772/1/pavliuk.pdf (дата звернення: 24.04.21).

10. Валявська Н. О. Організаційно-економічний механізм розвитку річкових портів України. *Інвестиції: практика та досвід.* Київ, 2016. № 4. С. 58–61. URL: http://www.investplan.com.ua/pdf/4_2016/14.pdf (дата звернення: 24.04.21).

11. Горошко К. О. Оцінка сучасного стану та перспективні шляхи розвитку внутрішнього водного транспорту України. *Збірник наукових праць ДЕТУТ. Сер. «Економіка і управління».* Київ, 2013. Вип 26. С. 169–173. URL: http://nbuv.gov.ua/UJRN/Znpdetut_eiu_2013_26_24 (дата звернення: 24.04.21).

12. Карамушко А. С., Богданов С. М. Проблеми та потенційні шляхи розвитку водного транспорту України. *Менеджмент та підприємництво: тренди розвитку.* Запоріжжя, 2017. Вип. 2. С. 87–92. URL: http://nbuv.gov.ua/UJRN/mnnt_2017_2_13 (дата звернення: 23.04.21).

13. Підлісний П. І. Внутрішній водний транспорт: історія, проблеми, напрями розвитку. *Економіст*. Київ, 2016. № 1. С. 10–20. URL: http://nbuv.gov.ua/UJRN/econ_2016_1_5 (дата звернення: 22.04.21).

14. Про внутрішній водний транспорт: Закон України від 03.12.2020 № 1054-IX. Дата оновлення: 03.12.2020. URL: https://zakon.rada.gov.ua/laws/show/ 1054-20#Text (дата звернення 26.04.2021).

15. Про схвалення Національної транспортної стратегії України на період до 2030 року: Розпорядження Кабінету Міністрів України від 30.05.2018 № 430-р. Дата оновлення: 30.05.2018. URL: https://zakon.rada.gov.ua/laws/show/430-2018-%D1%80#Text (дата звернення: 26.04.2021).

16. Центр транспортных стратегий. Аналитика. URL: https://cfts.org.ua/analitika (дата звернення: 14.04.2021).

17. Державна служба статистики України. Статистична інформація. Транспорт. URL: http://www.ukrstat.gov.ua/operativ/menu/menu_u/tr.htm (дата звернення: 26.02.2021).

18. Сталий розвиток для України. Транспорт. URL: http://www.sd4ua.org/golovni-temi-stalogo-rozvitku/transport/ (дата звернення: 09.04.2021).

19. Приміський І. В. Нормування викидів відпрацьованих газів автомобілів та перехід до стандартів Євро. *Східно-Європейський журнал передових технологій.* Харків, 2014. № 4(11). С. 43–49. URL: http://nbuv.gov.ua/UJRN/Vejpte_2014_4%2811%29__8 (дата звернення: 03.04.2021).

20. Allianz Group companies. News & Insights. Expert Risk Articles. URL: https://www.agcs.allianz.com/news-and-insights/expert-risk-articles.html (дата звернення: 01.04.2021).

21. Філія «Дельта-лоцман» державного підприємства «Адміністрація морських портів України». Річкова інформаційна служба України. URL: https://ukrris.com.ua/hydraulics/ports/ (дата звернення: 03.04.2021).

22. Міністерство інфраструктури України. Інформація про водний транспорт України. URL: https://mtu.gov.ua/content/informaciya-pro-vodniy-transport-ukraini.html (дата звернення: 03.04.2021).

REFERENCES

1. Vereshchaka, M. A. (2021). Modeli upravlinnia produktamy infrastrukturnykh proektiv ta prohram v sferi vodnoho transportu [Infrastructure Project Product Management Modeling and Programmable Water Transport]. Extended abstract of candidate's thesis. Odessa: ONMU. Retrieved from https://onmu.odessa.ua/spec_rada/Vereshchaka/aref_Vereshchaka.pdf [in Ukrainian].

2. Hryhorak, M. Yu., Kostiuchenko, L. V., & Sokolova, O. Ye. (2013). Lohistychna infrastruktura *Logisty`chna infrastruktura [Logistic infrastructure]*. Kiev: Logos. [in Ukrainian].

3. Zatulko, K. A. (2018). Shchodo zmistu ta znachennia poniattia infrastruktury vnutrishnoho vodnoho transportu [Concerning the content and meaning of the concept of inland waterway transport infrastructure]. Materials of the international scientific and practical conference: *Ukraina v systemi suchasnoho mizhnarodnoho pravoporiadku ta Yevropeiskoi intehratsii: zahalnoteoretychni ta praktychni problemy – Ukraine in the system of modern international legal order and European integration: general theoretical and practical problems - translation.* (pp. 98–101). Kiev: Tavriiskyi natsionalnyi universytet imeni V. I. Vernadskoho. Retrieved from http://www.tnu.edu.ua/sites/default/files/normativbasa/ukraina-v-sistemi-sucasnogo-miznarodnogo-pravoporadku-ta-evropeiskoi-integracii-zagalnoteoreticni-ta.pdf#page=98 [in Ukrainian].

4. Ilchenko, S. V. (2018). Public management of national markets of transport services: status and principles of formation. *Science and education: trends and prospects*, 38–47. Retrieved from http://conferencii.com/files/archive/2018-02.pdf.

5. Ilchenko, S., Khumarova, N., Maslii, N., Demianchuk, M., & Skribans, V. (2021). Instruments for ensuring the balanced development of inland waterway and maritime transport in Ukraine. *International Conference "Sustainable, Circular Management and Environmental Engineering", 255,* 01021. DOI: https://doi.org/10.1051/e3sconf/202125501021.

6. Volik, V. V. (2020). *Pravove rehuliuvannia transportnoi diialnosti v Ukraini [Legal regulation of the transport industry in Ukraine]*. Mariupol: MDU. Retrieved from http://repository.mdu.in.ua/jspui/bitstream/123456789/1416/3/NMP_pravove_reguliuvannia.pdf [in Ukrainian].

7. Kliuieva, Ye. M. (2018). Administratyvno-pravove rehuliuvannia diialnosti transportnykh system Ukrainy, zokrema vodnoho transportu, v umovakh yevrointehratsii [Administrative and legal regulation of the activity of transport systems of Ukraine, the growth of water transport, in the minds of the integration]. *Yevropeiski perspektyvy – European perspective, 3,* 37–41. Retrieved from http://nbuv.gov.ua/UJRN/evpe_2018_3_8 [in Ukrainian].

8. Metelenko, N. H., & Shmyhol, N. M. (2018). Zakonodavche rehuliuvannia ta upravlinnia yakistiu transportnoi systemy Ukrainy [Legislative regulation and management of the transport system of Ukraine]. *Pryazovskyi ekonomichnyi visnyk – Priazovskiy ekonomichny visnik, 3(08),* 25–29. Retrieved from http://pev.kpu.zp.ua/journals/2018/3_08_uk/7.pdf [in Ukrainian].

9. Pavliuk, S. I., & Samolevskyi, Ya. O. (2020). Potentsial richkovoho transportu Ukrainy: stan ta perspektyvy rozvytku [Potential of the river transport of Ukraine: the future development perspective]. *Modern Economics – Modern Economics, 20(2020),* 192–198. Retrieved from http://dspace.mnau.edu.ua/jspui/bitstream/123456789/7772/1/pavliuk.pdf [in Ukrainian].

10. Valiavska, N. O. (2016). Orhanizatsiino-ekonomichnyi mekhanizm rozvytku richkovykh portiv Ukrainy [Organizational and economic mechanism of development of brochure ports in Ukraine]. *Investytsii: praktyka ta dosvid – Investments: practice and experience, 4,* 58–61. Retrieved from http://www.investplan.com.ua/pdf/4_2016/14.pdf [in Ukrainian].

11. Horoshko, K. O. (2013). Otsinka suchasnoho stanu ta perspektyvni shliakhy rozvytku vnutrishnoho vodnoho transportu Ukrainy [Assessment of the current country and promising routes for the development of inland water transport in Ukraine]. *Zbirnyk naukovykh prats DETUT. Seriia "Ekonomika i upravlinnia" – Collection of Science Practitioners DETUT. Seria "Economics and Management", 26,* 169–173. Retrieved from http://nbuv.gov.ua/UJRN/Znpdetut_eiu_2013_26_24 [in Ukrainian].

12. Karamushko, A. S., & Bohdanov, S. M. (2017). Problemy ta potentsiini shliakhy rozvytku vodnoho transportu Ukrainy [Problems of potency and development of water transport in Ukraine]. *Menedzhment ta pidpryiemnytstvo: trendy rozvytku – Management and production: development trends, 2,* 87–92. Retrieved from http://nbuv.gov.ua/UJRN/mnnt_2017_2_13 [in Ukrainian].

13. Pidlisnyi, P. I. (2016). Vnutrishnii vodnyi transport: istoriia, problemy, napriamy rozvytku [Internal water transport: history, problems, direct development]. *Ekonomist – Economist, 1,* 10–20. Retrieved from http://nbuv.gov.ua/UJRN/econ_2016_1_5 [in Ukrainian].

14. Zakon Ukrainy «Pro vnutrishnii vodnyi transport» [Law of Ukraine “On inland water transport”]. (2020, December 03). *zakon.rada.gov.ua*. Retrieved from https://zakon.rada.gov.ua/laws/show/1054-20#Text [in Ukrainian].

15. Rozporiadzhennia Kabinetu Ministriv Ukrainy «Pro skhvalennia Natsionalnoi transportnoi stratehii Ukrainy na period do 2030 roku» [Order of the Cabinet of Ministers of Ukraine “On approval of the National Transport Strategy of Ukraine for the period up to 2030”]. (2018, May 30). *zakon.rada.gov.ua*. Retrieved from https://zakon.rada.gov.ua/laws/show/430-2018-%D1%80#Text [in Ukrainian].

16. Tsentr transportnыkh stratehyi [Center for Transport Strategies] (n.d.). Analytyka [Analytics]. *cfts.org.ua.* Retrieved from https://cfts.org.ua/analitika [in Russian].

17. Derzhavna sluzhba statystyky Ukrainy. Statystychna informatsiia. Transport. [State Statistics Service of Ukraine. Statistical information. Transport]. (n.d.). *ukrstat.gov.ua*. Retrieved from http://www.ukrstat.gov.ua/operativ/menu/menu_u/tr.htm [in Ukrainian].

18. Stalyi rozvytok dlia Ukrainy [Sustainable development for Ukraine]. (n.d.). Transport [Transport]. *www.sd4ua.org.* Retrieved from http://www.sd4ua.org/golovni-temi-stalogo-rozvitku/transport/ [in Ukrainian].

19. Prymiskyi, I. V. (2014). Normuvannia vykydiv vidpratsovanykh haziv avtomobiliv ta perekhid do standartiv Yevro [Standardization of exhaust emissions of cars and the transition to Euro standards]. *Standardization of exhaust emissions of cars and the transition to Euro standards]*. *Skhidno-Yevropeiskyi zhurnal peredovykh tekhnolohii – Eastern European Journal of Advanced Technology, 4(11),* 43–49. Retrieved from http://nbuv.gov.ua/UJRN/Vejpte_2014_4%2811%29__8 [in Ukrainian].

20. Allianz Group companies. News & Insights. (n.d.). Expert Risk Articles. *www.agcs.allianz.com.* Retrieved from https://www.agcs.allianz.com/news-and-insights/expert-risk-articles.html.

21. Filiia “Delta-lotsman» derzhavnoho pidpryiemstva “Administratsiia morskykh portiv Ukrainy” [Branch “Delta-pilot” of the state enterprise “Administration of seaports of Ukraine”]. (n.d.). Richkova informatsiina sluzhba Ukrainy [River Information Service of Ukraine]. *ukrris.com.ua.* Retrieved from https://ukrris.com.ua/hydraulics/ports/ [in Ukrainian].

22. Ministerstvo infrastruktury Ukrainy [Ministry of Infrastructure of Ukraine] (n.d.). Informatsiia pro vodnyi transport Ukrainy [Information about the water transport of Ukraine]. *mtu.gov.ua.* Retrieved from https://mtu.gov.ua/content/informaciya-pro-vodniy-transport-ukraini.html [in Ukrainian].