RESEARCH AND ENGINEERING INNOVATION PROJECTS OF THE NATIONAL ACADEMY OF SCIENCES OF UKRAINE

https://doi.org/10.15407/scine19.02.031

LAIKO, O. I. (http://orcid.org/0000-0001-7082-0862),
KHUMAROVA, N. I. (https://orcid.org/0000-0001-5255-8004),
ILCHENKO, S. V. (https://orcid.org/0000-0001-6924-2225),
GRYSHCHENKO, V. F. (https://orcid.org/0000-0003-0009-605X),
and GRYSHCHENKO, I. V. (https://orcid.org/0000-0001-8801-3217)
Institute of Market and Economic & Ecological Researches
of the National Academy of Sciences of Ukraine,
29, Frantsuzkyi Blvd., Odesa, 65044, Ukraine,
+380 48 722 2905, oss_iprei@ukr.net

CONCEPTUAL MODEL OF UTILIZING THE COMPETITIVE ABILITY OF MARITIME TRANSPORT IN THE ECONOMIC SECURITY SYSTEM

Introduction. *In order to function successfully in the market, the water transport business entities, in addition to material and financial resources, need the utilization of their internal unique capabilities in the existing business environment, which determine the competitive potential.*

Problem Statement. *The successful operation and development of water transport requires the development of a scientific approach to utilizing its competitive potential in the country's economic security system.*

Purpose. *The purpose of this research is to form a conceptual model of the utilization of competitive potential of water transport in the economic security system of the Black Sea region.*

Material and Methods. *We have used the following methods: system structural, abstract logical analysis, grouping, and economic mathematical modeling, for studying the essence and structure of the competitive potential of water transport, for assessing its utilization in security system of the Black Sea region.*

Results. *The essence of the category "competitive potential of water transport" has been determined. The structure of the competitive potential of water transport has been studied, and the conceptual model of its use in the economic security system has been developed. Based on the proposed conceptual model, the utilization of the competitive potential of water transport in the economic security system has been assessed by the example of the Black Sea region.*

Conclusions. *In order to enhance the competitive potential of water transport of Ukraine and the level of its utilization, in the context of economic security, it has been proposed to stimulate an increase in the number of ship calls to the ports of Ukraine and the number of Ukraine-flagged vessels belonging to domestic businesses and to create favorable conditions for the development of the shipbuilding industry of Ukraine.*

Keywords: potential, competitiveness, water transport, concept, and model.

Citation: Laiko, O. I., Khumarova, N. I., Ilchenko, S. V., Gryshchenko, V. F., and Gryshchenko, I. V. (2023). Conceptual Model of Utilizing the Competitive Ability of Maritime Transport in the Economic Security System. *Sci. innov.*, 19(2), 31—43. https://doi.org/10.15407/scine19.02.031

At the present stage of economic relations development, when the risk and uncertainty of the conditions of the operation of economic entities in the field of maritime transport increase, their dependence on the business environment becomes stronger and competition gets intensified. That is, for the successful operation of the market and business entities in the field of maritime transport it is not enough just to have material and financial resources. Under such conditions, the realization of their internal opportunities comes to the fore. Business entities in the field of maritime transport have been increasingly paying attention not only to the study of their business environment (suppliers, customers, competitors, etc.), but also to their one-of-a-kind opportunities determining the availability of competitive potential that largely depends on knowledge and information awareness. The relevance of the study is due to the fact that under such economic conditions the successful functioning and development of maritime transport requires an appropriate approach to the use of its competitive potential, which, in turn, requires the development of the concept of utilizing the maritime transport competitive potential in the system of economic security of the country.

While studying the problem of utilizing the maritime transport competitive potential in the system of economic security, we have analyzed the scientific results presented in the works of domestic and foreign scientists devoted to issues of economic potential (R. Aliiev [1], O. Babyna [2], O. Balatskyi, E. Balatskyi [3], K. Vaskivska, L. Lozinska, Yu. Halimuk [4], Yu. Doroshenko, A. Zhulavskyi [5], Yu. Hudz [6], L. Koval [7], O. Maslak, L. Kviatkovska, O. Bezruchko [8], A. Oriekhova [9], N. Shtykhan, L. Bezzubko [10]), competitive potential (Ya. Barybina [11], N. Bieliaieva [12], V. Varha [13], I. Kyrchata, O. Shersheniuk [14], I. Kyrchata [15], V. Koiuda [16], A. Luzhetskyi [17], A. Orel [18], T. Romanchyk, Ye. Pavlenko [19], N. Yakymenko-Tereshchenko, Ya. Nikolaiesh [20]), sustainable economic development (M. Petrushenko, B. Burkynskyi, H. Shevchenko & Y. Baranchenko [21], H. Shevchenko, M. Petrushenko, B. Burkynskyi, N. Khumarova & A. Kodzhebash [22], B. Burkynskyi, O. Laiko & V. Talpa [23], N. Andryeyeva, O. Nikishyna, B. Burkynskyi, N. Khumarova, O. Laiko, & H. Tiutiunnyk [24], M. Petrushenko, H. Shevchenko, N. Vernydub, O. Kravchenko & N. Ovcharova [25], T. Shevchenko, & Yu. Danko [26; 27]), entrepreneurial development (O. Laiko, S. Kovalenko, & O. Bilousov [28], O. Laiko, T. Umanets, & N. Shlafman [29],), transport economics (P. Kelle, J. Song, M. Jin, H. Schneider, C. Claypool [30], O. Kotlubai [31], V. Kukharchyk [32], CS. Onyshchenko [33], N. Prymachev [34], S. Ilchenko [35], N. Khumarova, N. Maslii, M. Demianchuk, V. Skribans [36], S. Kotenko, N. Maslii, V. Kasianova, M. Bezpartochnyi & I. Nadtochii [37], V. Gryshchenko, I. Gryshchenko [38]), and economic modeling (V. Koval [39], V. Nitsenko, S. Kotenko [40]) in the system of ecological and economic security (B. Burkynskyi, V. Stepanov [41], O. Dreval [42]).

At the same time, further issues related to the development of a conceptual model for utilizing the maritime transport competitive potential in the system of economic security of the country require further studies. Insufficient development and scientific methodological significance of these issues led to the choice of the subject and the purpose of this research.

The object of the paper is to form a conceptual model for utilizing the maritime transport competitive potential in the system of economic security through the example of the Black Sea region countries. In accordance with the object in view, the following tasks were defined: 1) to determine the economic substance of the category "maritime transport competitive potential"; 2) to study the composition and structure of maritime transport competitive potential; 3) to develop a conceptual model of maritime transport competitive potential using in the system of economic security; 4) to conduct an economic assessment of maritime transport competitive potential using in the system of economic security by the example of the Black Sea region countries.

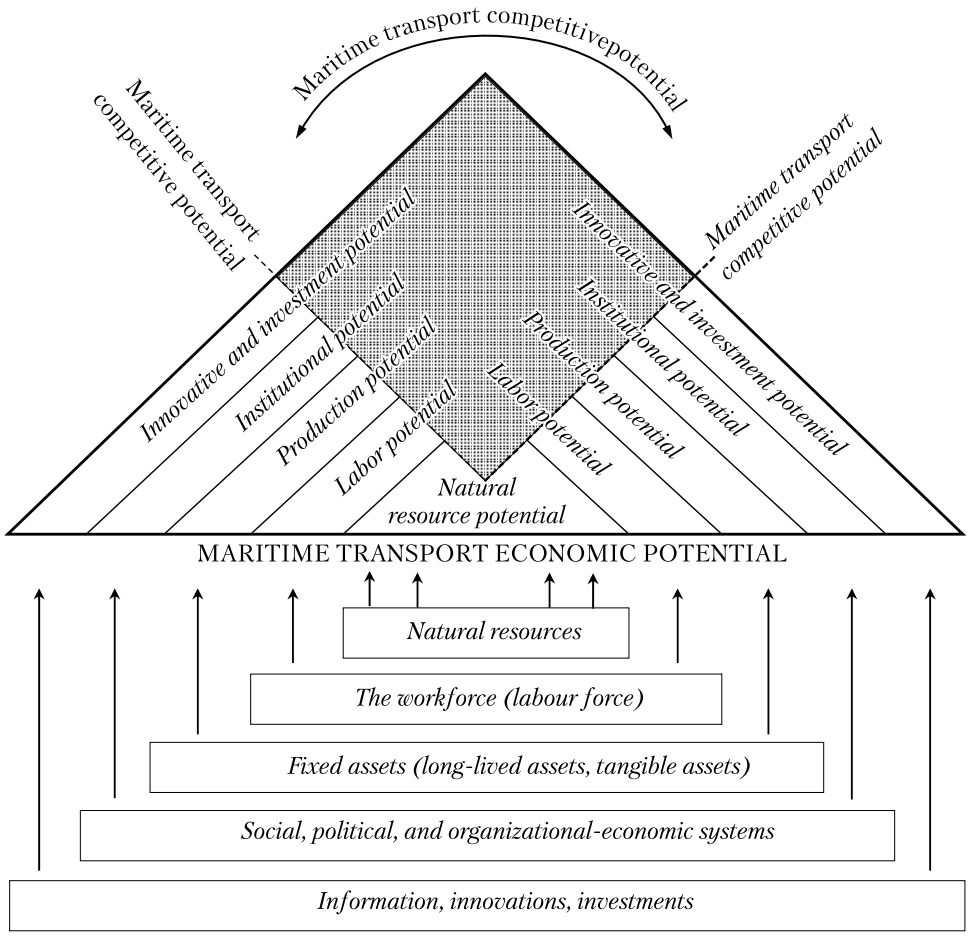

Fig. 1. Structure of maritime transport competitive potential
Source: prepared by the author.

The results of the conducted study permit to argue that in the economic literature there are many different approaches to defining such a concept as potential. Each author tries to classify it in his/her own way, to describe the relationships and interdependence of its components. Competitive potential is one of the basics of maritime transport development. Success in meeting the needs of individuals and legal entities in high-quality, safe, and affordable transportation directly depends on its mobilization.

Under the maritime transport competitive potential of Ukraine, we mean the maximum possible volume of transport services by maritime transport of Ukraine upon the condition of the most effective use of all factors of production. It characterizes maritime transport from the perspective of its development, i.e. it demonstrates the degree of development that can be obtained by maritime transport under certain conditions, opportunities and competitive advantages it has. The competitive potential of maritime transport is a characteristic of its internal opportunities to generate appropriate income in the field of transport services.

In our opinion, when studying the composition and structure of maritime transport competitive potential it is necessary to base on the principle of systematicity. According to this principle, the maritime transport competitive potential is con-

sidered by us as a system consisting of subsystems, represented, in turn, by potentials of different order. They form the levels of this system of maritime transport competitive potential. In such a system, lower-level potentials form part of higher-level potentials.

In the structure of maritime transport competitive potential, in our opinion, we can point out its main elements such as natural resource potential, production potential, labor potential, institutional potential, innovation and investment potential. Each of them is characterized by a certain quantity and quality. In this regard, when considering the maritime transport competitive potential, we can point out five main hierarchical levels (Fig. 1).

In our opinion, at the first level, it is necessary to consider such a basic structure-forming element of maritime transport competitive potential as natural resource potential that is determined by the amount of natural resources, as well as by their readiness for use in the operation of business entities in the field of maritime transport.

Labor potential (that can also include intellectual potential), as an element of maritime transport competitive potential, is based on the available labor resources in the field of maritime transport (both their employed and unemployed part). It should be noted that the labor resources involved in the field of maritime transport should be considered in both public and private sectors of the economy, both in the field of material production and in the non-productive sphere.

As an element of maritime transport competitive potential, from the perspective of modern economic theory, production potential can be defined as the potential of material production sphere that includes the material resources involved in the operation of business entities in the field of maritime transport. Such an interpretation of the production potential as an element of maritime transport competitive potential largely coincides with the content of such a concept as capital that is one of the key elements of the economic potential in market economy.

The institutional component of maritime transport competitive potential can be represented by a set of social, political, and organizational-economic subsystems. Institutional potential, as an element of maritime transport competitive potential, can be understood as the potential of organizational management systems, i.e. the relationship in the field of maritime transport between people, collectives, business entities, public organizations, and political parties.

Innovative potential as an element of maritime transport competitive potential in general can be considered as the potential of knowledge acquired in the process of realization of scientific and technological progress. The basis of the investment component of maritime transport competitive potential are labor means and objects produced by a man and intended for the production of goods and services for both industrial and non-industrial purposes. This includes the part of economic resources that can be directed to the restoration of fixed assets of maritime transport (both industrial and non-industrial), as well as stocks of labor means (industrial goods).

Thus, the study of the impact of any component of competitive potential on the value of maritime transport competitive potential in general is possible only with the interaction of such components. The efficiency of maritime transport competitive potential using depends both on the availability of appropriate types of resources and on their optimal involvement in the process of functioning of business entities in the field of maritime transport. Elements of maritime transport competitive potential can be considered from the perspective of qualitative and quantitative assessment of their structural composition, spatiotemporal parameters, as well as conditions, factors, and mechanisms of their use.

We believe that one of the key factors for building a conceptual model of maritime transport competitive potential using in the system of economic security of the country may be the dependence that connects the maritime transport competitive potential and its resources.

We propose a conceptual economic and mathematical model of maritime transport competitive potential using in the system of economic security of the country:

$$\begin{cases} \theta = \psi(P_\Sigma) = \psi(\sum_{j=1}^{n} p_j) = \psi(\sum_{j=1}^{n}\sum_{i=1}^{m}\sum_{k=1}^{q} p_{ikj}) \to \max \\ R_\Sigma = \sum_{j=1}^{n} R_j = \sum_{j=1}^{n}\sum_{i=1}^{m}\sum_{k=1}^{q} R_{ikj} = \sum_{j=1}^{n}\sum_{i=1}^{m}\sum_{k=1}^{q} u_1(p_{ikj}) \to \min \\ W_\Sigma = \sum_{j=1}^{n} W_j = \sum_{j=1}^{n}\sum_{i=1}^{m}\sum_{k=1}^{q} W_{ikj} = \sum_{j=1}^{n}\sum_{i=1}^{m}\sum_{k=1}^{q} f_3(p_{ikj}) \to \min \\ D_\Sigma = D_{BH} + D_I + D_{TP} + D_E = \sum_{j=1}^{n}\sum_{i=1}^{m}\sum_{k=1}^{q} D_{ikj} \\ Y = F(\Delta D) = F(P_\Sigma, D_\Sigma) = \sum_{j=1}^{n}\sum_{i=1}^{m}\sum_{k=1}^{q} F(p_{ikj}, D_{ikj}) \\ P_\Sigma \geq D_\Sigma \\ R_\Sigma \in O_R \\ W_\Sigma \in O_W \\ i \in \overline{1,m} \\ k \in \overline{1,q} \\ j \in \overline{1,n} \end{cases}$$

where R_{ikj} is the resources assigned for the i-th domestic, transit, export or import commodity flow ($i \in \overline{1, m}$) that can be realized by k-th water transport business entity ($k \in \overline{1, q}$) for the j-th type of goods ($j \in \overline{1, n}$); W_{ikj} is the economic costs necessary for the use of maritime transport competitive potential for handling the i-th domestic, transit, export or import commodity flow ($i \in \overline{1, m}$) that can be provided by the k-th business entity of the maritime transport industry ($k \in \overline{1, q}$) for the j-th type of goods ($j \in \overline{1, n}$); P_{ikj} is the competitive potential of the country's maritime transport in terms of the j-th type of goods as the sum of the potentials of all business entities of the country in the field of maritime transport ($k \in \overline{1, q}$) in terms of handling domestic, transit, export and import commodity flows ($i \in \overline{1, m}$) for the j-th type of goods; Y is the function characterizing the general level of meeting the demand for handling the domestic, export, transit, and import commodity flows by maritime transport; D_{ikj} is the demand for components of the i-th domestic, transit, export or import commodity flow ($i \in \overline{1, m}$), which can be satisfied by the k-th business entity of the maritime transport industry ($k \in \overline{1, q}$) for the j-th type of goods ($j \in \overline{1, n}$); D_{BHj} is the demand for domestic transportation of the j-th type of goods by maritime transport; D_{TPj} is the demand for transit transportation of the j-th type goods by maritime transport; D_{Ej} is the demand for handling the export flow of the j-th type of goods by maritime transport; D_{Ij} is the demand for handling the import flow of the j-th type of goods by maritime transport; D_{BH} is the demand for domestic transportation of all types of goods by maritime transport; D_{TP} is the demand for transit transportation of all types of goods by maritime transport.

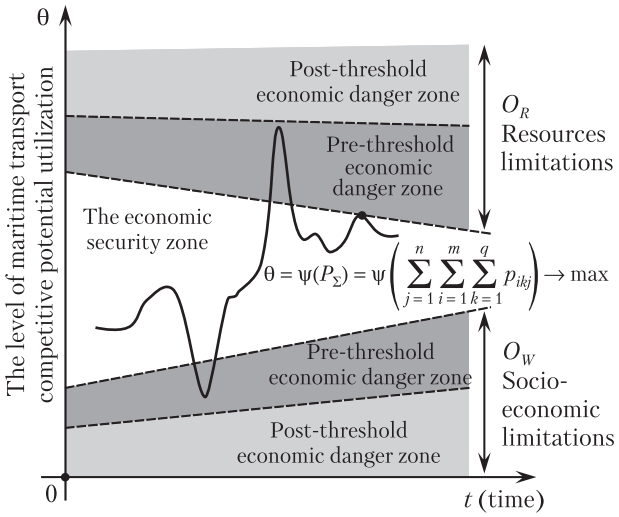

Fig. 2. Conceptual model for utilizing the maritime transport competitive potential in the economic security system

The proposed conceptual model for utilizing the maritime transport competitive potential in the system of economic security can be graphically represented as follows (Fig. 2).

In our opinion, the indicator characterizing the utilization of maritime transport competitive potential in the system of economic security may be the amount of transport services provided in value terms. In turn, the level of utilizing the maritime transport competitive potential in the system of economic security can be characterized by the amount of services provided by maritime

transport per unit of measurement of its competitive potential.

Based on the conceptual model for utilizing the maritime transport competitive potential in the system of economic security of the country presented in the paper, the maritime transport competitive potential can be represented by a summarizing indicator. It combines natural-resources, production, labor, socio-cultural, institutional, R&D, and investment opportunities of maritime transport as an economic system. The value of maritime competitive potential can be determined by the size, structure, and the degree of perfection of the productive forces of maritime transport, which can be described with the use of a special system of indicators.

The indicators of maritime transport competitive potential can include generally accepted indicators that are widely used in economic research and planning for monitoring the dynamics of development. Comparing their values over a period of time, we can assess the effectiveness of maritime transport competitive potential in the system of sustainable development goals.

We use five main criteria that can characterize broadly enough, given the economic security factor, the ability of both maritime transport as a whole and its separate subsystems and their components to resist competitors, namely: natural resource potential, labor potential, production potential, institutional potential, innovation and investment potential of maritime transport.

Within each criterion, separate indicators of economic assessment of maritime transport competitive potential can be pointed out. In our opinion, indicators that, given the economic security

Table 1. **Indexes for Economic Assessment of the Level of Maritime Transport Competitive Potential**

Criterion	Indicator	Reference value
Natural resource potential	Length of the coastline, %	0.5*
	Ratio of the coastline to the country space, m/km^2	10.6*
Labor potential	Population, mln. persons	84.339*
	Number of sailors, persons	69000*
	Health level, points	100
	Qualification level, points	100
Production potential	Number of ships flying the national flag, pcs.	1224*
	DWT ships flying the national flag, thous. DWT	7076*
	DWT ships owned, thous. DWT	28177*
	Shipbuilding, GT	103119*
	Disposal of ships, GT	1598348*
	Capacity of ports, TEU	11679100*
Institutional potential	Number of ship entries	169964*
	Service quality of seaports, points	100
	Coverage of liner shipping, points	100
	Quality of state institutions, points	100
Innovation and investment potential	Innovativeness, points	100
	Stability of the financial market, points	100
	Macroeconomic stability, points	100

* — among the Black Sea region countries.

Table 2. **Economic Assessment of the Maritime Transport Competitive Potential of the Black Sea Region Countries**

Index name, measurement unit	Measurement unit	Country					
		Bulgaria	Georgia	Moldova	Romania	Turkey	Ukraine
Competitive potential	**points**	**0.364**	**0.256**	**0.194**	**0.370**	**2.112**	**0.663**
Length of the coastline	%	0.03	0.02	0.01	0.04	0.5	0.3
	points	0.06	0.04	0.02	0.08	1	0.6
Ratio of the coastline to the country space	m/km^2	4.2	5.4	0	3	10.6	8.6
	points	0.396	0.509	0	0.283	1	0.811
Population	mln. persons	6.948	3.989	4.034	19.238	84.339	43.734
	points	0.082	0.047	0.048	0.228	1	0.519
Number of sailors	persons	33269	7970	2590	16000	38985	69000
	points	0.482	0.116	0.038	0.232	0.565	1
Health level	items	77.7	74.4	71.9	77.2	87.1	65.6
	points	0.777	0.744	0.719	0.772	0.871	0.656
Qualification level	items	67.9	69.8	61.5	62.5	60.8	69.9
	points	0.679	0.698	0.615	0.625	0.608	0.699
Number of ships flying the national flag	pcs.	81	24	127	120	1224	410
	points	0.066	0.02	0.104	0.098	1	0.335
DWT ships flying the national flag	thous. DWT	152	58	492	80	7076	361
	points	0.021	0.008	0.07	0.011	1	0.051
DWT ships owned	thous. DWT	1776	125	0	1045	28177	3175
	points	0.063	0.004	0	0.037	1	0.113
Shipbuilding	GT	0.01	0	0	35783	103119	0
	points	0	0	0	0.347	1	0
Disposal of ships	GT	0	0	0	0	1598348	853
	points	0	0	0	0	1	0.001
Capacity of ports	TEU	261900	277125	818	664700	11679100	1340400
	points	0.022	0.024	0	0.057	1	0.115
Number of ship entries	times	3214	1414	143	5331	169964	11091
	points	0.019	0.008	0.001	0.031	1	0.065
Service quality of seaports	items	55.4	45.9	21.9	49.1	62.1	48.8
	points	0.554	0.459	0.219	0.491	0.621	0.488
Coverage of liner shipping	items	6.8	6.7	0	29.8	59.7	30.1
	points	0.068	0.067	0	0.298	0.597	0.301
Quality of state institutions	items	56.8	61	51.4	58.1	53.9	47.9
	points	0.568	0.61	0.514	0.581	0.539	0.479
Innovativeness	items	45	32.7	29.9	42.3	44.5	40.1
	points	0.45	0.327	0.299	0.423	0.445	0.401
Stability of the financial market	items	59.6	56.2	46.8	57	61.2	42.3
	points	0.596	0.562	0.468	0.57	0.612	0.423
Macroeconomic stability	items	90	74.4	73.4	89	61.3	57.9
	points	0.9	0.744	0.734	0.89	0.613	0.579

factor, quantitatively characterize the ability of both maritime transport as a whole and its separate subsystems and their components to resist competitors, can be indicators listed in Table 1. At the same time, it is necessary to take into account the fact that whatever the system of indicators, it will never be able to fully describe the maritime transport competitive potential, and therefore can always be supplemented. The use of such a system of indicators allows formalizing the description of maritime transport competitive potential and the level of its use at the sectoral and international levels in the system of sustainable development goals.

Today in business practice there has been developed a wide range of methods that can systematize all the variety of production resources and bring them to a single quality with the use of such universal tools of economic accounting and planning, as cost and comparative meters. These indicators of the value of maritime transport competitive potential allows structuring it into separate components, tracking their changes, and determining the economic effect of their use.

In our opinion, the most successful graphical interpretation of the economic assessment of the level of maritime transport competitive potential is the radar method. The source data for our calculations are the data from UNECE [43], UNCTAD [44], World Bank [45], Eurostat [46], State Statistics Service of Ukraine [47, 48], publicly available on the web-sites of the above-mentioned organizations.

The specific values of the relative indexes that, given the economic security factor, quantify the ability of both maritime transport as a whole and its separate subsystems and their components to resist competitors have been calculated and are presented in Table 2.

According to our analysis of the data from UNCTAD, World Bank, Eurostat, State Statistics Service of Ukraine, which are publicly available, over the past 16 years, the volume of transport services provided by maritime transport of Ukraine has decreased from USD 1620 million, in the first quarter of 2005, to USD 1595 million, in the first quarter of 2021. Moreover, the lowest amount of transport services provided by maritime transport of Ukraine was reported in the first quarter of 2020 and totaled USD 1475 million, while the highest one was recorded in the third quarter of 2008 and reached USD 3866 million (Fig. 3).

According to our calculations, the level of volume of the provision of transport services by maritime transport of Ukraine has decreased from high to low and ranges from 0.75 to 0.24 points.

The competitive potential of Ukraine's maritime transport is 0.662 points out of 3.08465 possible (standard among the Black Sea region countries), which corresponds to the low level. It is almost twice as much as Romania's one, but three times lower than Turkey's one.

Having a sufficiently high level of natural resource component and labor potential, Ukraine is significantly inferior to other countries of the Black Sea region in such components of maritime transport competitive potential as production, institutional, and innovation and investment.

In addition, the level of utilizing the maritime transport competitive potential by Ukraine is constantly decreasing. According to our calculations, it decreased from 1.0 in 2005 to 0.3 in 2020 and is now at a low level, as compared, for example, with Romania that uses the competitive potential of its maritime transport at the maximum possible level, or Turkey that has significant competitive potential and consistently uses it at the average level, having the reserves for its increase.

In order to increase the maritime transport competitive potential of Ukraine and the level of its use, given the economic security factor, we consider it necessary: firstly, to stimulate an increase in the number of ship entries to the ports of Ukraine. To this end, we have proposed: a) to accelerate the completion of the draft of the methods of calculation of the rates of port dues collected in seaports and bring their structure to a competitive level; b) to place on the existing AMPU website for each separate port transparent and

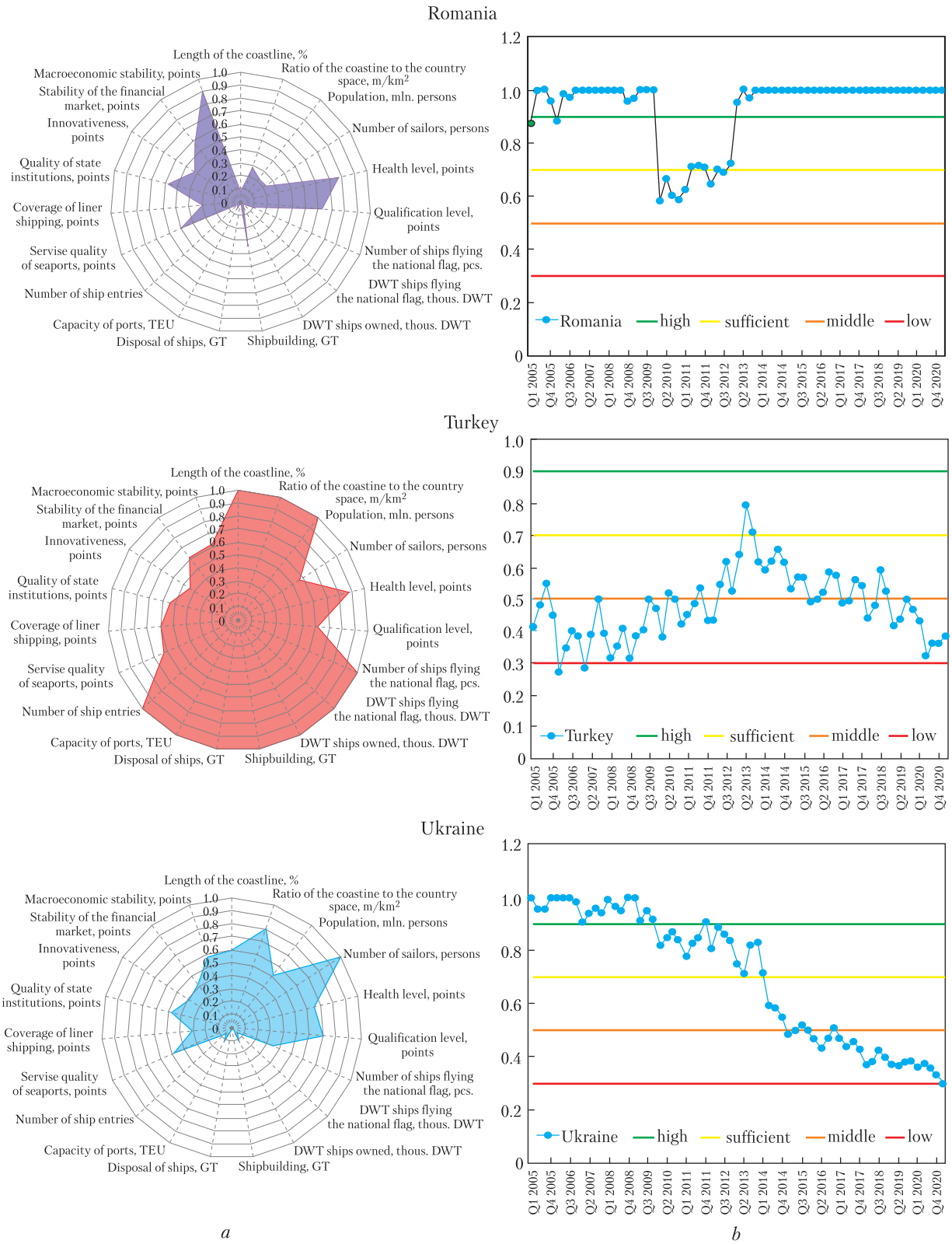

Fig. 3. Maritime transport competitive potential of some countries of the Black Sea region and the level of its use

up-to-date information on port dues collected during the entry and departure of ships, and other services for ship maintenance and cargo handling operations, both regulated by the state and free; secondly, to increase the number of ships flying the flag of Ukraine and belonging to the business entities of Ukraine due to: a) the development of sea and river shipping; b) the modernization of port facilities; c) the development of fishing industry; d) ship repairing, modernization, and construction of modern civilian and military environment friendly ships that meet international standards of shipbuilding and have minimal emissions of pollutants into the environment.

For stimulation of the development of shipbuilding industry of Ukraine, we have proposed. first of all: a) to accelerate the approval of the draft Strategy for the development of the shipbuilding industry of Ukraine for the period up to 2030; b) to appoint a central executive body that will be responsible for the development and functioning of the shipbuilding industry; c) to update the R&D and production base of the shipbuilding industry through the transfer of innovative technologies and the implementation of joint projects with foreign partners with the maximum possible localization of production processes in Ukraine.

The further studies in this direction allow building a profile of competitive strategy of maritime transport of Ukraine and justifying it economically.

The research contains the results of the study within R&D project of the National Academy of Sciences of Ukraine *Institutional and Economic Mechanisms of the Water Transport Competitiveness in Ukraine* (0121U108151).

REFERENCES

1. Aliyev, R. (2019). The essence of "enterprise potential" concept and its components. *Entrepreneurship and Innovation*, 9, 54—59 [in Ukrainian]. https://doi.org/10.37320/2415-3583/9.8.
2. Babyna, O. Ye. (2011). Potential as a systemic economic category. *The bulletin of transport and industry economics*, 36, 23—26 [in Ukrainian]. URL: http://nbuv.gov.ua/UJRN/Vetp_2011_36_4 (Last accessed: 02.02.2021).
3. Balatskyi, Ye. O. (2010). The composition and structure of the economic potential of socio-economic systems. In: *Socio-economic potential of the region:* monograph. (Ed. Balatskyi O. F.). Sumy: Universytetska Knyha [in Russian].
4. Vaskivska, K., Lozinska, L., Galimuk, Yu. (2020). The enterprise economic potential in the face of change: the essence and characteristics. *Journal* "*Efektyvna ekonomika*", 5, 71—78 [in Ukrainian]. https://doi.org/10.32702/2307-2105-2020.5.7
5. Doroshenko, Yu. A., Zhulavskyi, A. Yu. (2006). The composition and structure of economic potential. In: *Economic potential of administrative and production systems*: monograph. (Ed. Balatskyi O. F.). Sumy: Universytetska Knyha [in Russian].
6. Gudz, Y. F. (2016). Positioning scientific and methodological approaches to the formation of the economic potential of enterprises. *Scientific Bulletin of Kherson State University*, 19(1), 69—74 [in Ukrainian]. URL: http://www.ej.kherson.ua/journal/economic_19/1/18.pdf (Last accessed: 02.02.2021).
7. Koval, L. V. (2010). Economic potential of the enterprise: essence and structure. *Journal of Lviv Polytechnic National University*, 690, 59—65 [in Ukrainian]. URL: https://ena.lpnu.ua/handle/ntb/11340 (Last accessed: 02.02.2021).
8. Maslak, O. I., Kvyatkovska, L. A., Bezruchko, O. O. (2012). Peculiarities of enterprises' economic potential formation under the conditions of cyclical fluctuations. *Actual Problems of Economics,* 9(135), 36—46. URL: http://www.irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?C21COM=2&I21DBN=UJRN&P21DBN=UJRN&Z21ID=&IMAGE_FILE_DOWNLOAD=1&Image_file_name=PDF/ape_2012_9_5.pdf [in Ukrainian] (Last accessed: 02.02.2021).
9. Oriekhova, A. I. (2018). Economic potential of the enterprise: intrinsic characteristics and structuring. *Economy and Society*, 17, 308—313 [in Ukrainian]. URL: https://economyandsociety.in.ua/journals/17_ukr/45.pdf (Last accessed: 02.02.2021).
10. Shtykhan, N. V., Bezzubko, L. V. (2019). The analysis of the economic potential of an enterprise. *Proceedings of Donbas National Academy of Civil Engineering and Architecture*, 4(18), 54—60 [in Ukrainian]. URL: https://donnaba.edu.ua/journal/images/4-2019-18/54-60.pdf (Last accessed: 02.02.2021).
11. Barybina, Ya. O. (2013) Theory and genesis of the category "competitive potential". *Scientific Bulletin of Poltava University of Economics and Trade. Series "Economic Sciences"*, 1(56), 147—153. http://journal.puet.edu.ua/index.php/nven/article/download/602/622

12. Bieliaeva, N. (2013). Assessment methods and a value chain role in the competitive potential formation of industrial enterprises. *Scientific journal "Herald of Khmelnytskyi national university: Economical sciences"*, 4(2), 43—52 [in Ukrainian]. URL: http://journals.khnu.km.ua/vestnik/pdf/ekon/VKNU-ES-2013-N4-2-e_202.pdf (Last accessed: 02.02.2021).
13. Varga, V. (2020). Competitive potential as the basis of entrepreneurship stability, *Efektyvna ekonomika*, 3, 45—50 [in Ukrainian]. https://doi.org/10.32702/2307-2105-2020.3.158
14. Kirchataya, I. N., Shershenyuk, E. N. (2018). Theoretical aspects of interaction of competitive potential with basic categories of competition theory. *Problems and Perspectives of Entrepreneurship Development*, 21, 84—98 [in Ukrainian]. https://doi.org/10.30977/PPB.2226-8820.2018.21.0.84
15. Kirchataya, I. M. (2015). Developing competitive potential as a basis of competitiveness during restructuring of enterprise. *Scientific Bulletin of Kherson State University*, 14(2), 75—78 [in Ukrainian]. URL: http://www.ej.kherson.ua/journal/economic_14/61.pdf (Last accessed: 02.02.2021).
16. Kouda, V. (2019). Developmeny and use of the enterprise competitive potential. *Market Infrastructure*, 29, 195—204 [in Ukrainian]. URL: http://www.market-infr.od.ua/journals/2019/29_2019_ukr/31.pdf (Last accessed: 02.02.2021).
17. Luzhetskyi, A. I. (2013). Identification of the concept of "competitive potential of the enterprise" and approaches to its management. *Innovative economy*, 8(46), 125—128 [in Ukrainian]. URL: http://nbuv.gov.ua/UJRN/inek_2013_8_27 (Last accessed: 02.02.2021).
18. Orel, A. (2019). The scientific and methodological principles of enterprise competition potential determination. *Economic scope*, 151, 170—184 [in Ukrainian]. https://doi.org/10.32782/2224-6282/151-15
19. Romanchyk, T. V., Pavlenko, E. V. (2017). Competitive potential of the enterprise: the essence of the concept. *E-conomics,* 1(1), 136—140 [in Ukrainian]. URL: http://repository.kpi.kharkov.ua/handle/KhPI-Press/36734 (Last accessed: 02.02.2021).
20. Yakimenko-Tereshchenko, N., Nikolaes, Ya. (2018). Essence and principles of development of competitive potential of economic system. *Ekonomika ta derzhava,* 2, 32—35 [in Ukrainian]. URL: http://www.economy.in.ua/pdf/2_2018/10.pdf (Last accessed: 02.02.2021).
21. Petrushenko, M., Burkynskyi, B., Shevchenko, H., Baranchenko, Y. (2021). Towards sustainable development in a transition economy: The case of eco-industrial parks in Ukraine. *Environmental Economics*, 12(1), 149—164. http://dx.doi.org/10.21511/ee.12(1).2021.13
22. Shevchenko, H., Petrushenko, M., Burkynskyi, B., Khumarova, N., Kodzhebash, A. (2021). Input-output analysis of recreational assets within the inclusive sustainable development in Ukraine. *Entrepreneurship and Sustainability Issues*, 8(3), 90—109. https://doi.org/10.9770/jesi.2021.8.3(5)
23. Burkynskyi, B., Laiko, O., Talpa, V. (2020). Tax instruments for ensuring economic development and cooperation of territorial communities. *Economic Innovations*, 22(2), 7—16. https://doi.org/10.31520/ei.2020.22.2(75).7-16
24. Andryeyeva, N., Nikishyna, O., Burkynskyi, B., Khumarova, N., Laiko, O., Tiutiunnyk, H. (2021). Methodology of analysis of the influence of the economic policy of the state on the environment. *Insights into Regional Development,* 3(2), 198—212. https://doi.org/10.9770/IRD.2021.3.2(3)
25. Petrushenko, M. M., Shevchenko, H. M., Vernydub, N. O., Kravchenko, O. V., Ovcharova, N. V. (2019). The forming of industrial and national natural parks networks in Ukraine based on the principles for responsible investment. *Financial and credit activity: problems of theory and practice*, 31(4), 221—229. https://doi.org/10.18371/fcaptp.v4i31.190880
26. Shevchenko, T., Danko, Yu. (2021). Progress towards a circular economy: new metric for circularity measurement based on segmentation of resource cycle. *International Journal of Environment and Waste Management*, 28(2), 240—262. https://doi.org/10.1504/IJEWM.2021.10040079
27. Shevchenko, T., Danko, Y. (2022). Circular Data Framework throughout the Whole Value Chain from Mining to Manufacturing, from Refurbishing to Recycling. (Eds. Ghadimi P., Gilchrist M.D., Xu M.). *Role of Circular Economy in Resource Sustainability. Sustainable Production, Life Cycle Engineering and Management*. Springer, Cham. https://doi.org/10.1007/978-3-030-90217-9_2
28. Laiko, O., Kovalenko, S., Bilousov, O. (2020). Prospects for the development of cluster forms of entrepreneurship in Euroregions. *Baltic Journal of Economic Studies*, 6(5), 118—128. https://doi.org/10.30525/2256-0742/2020-6-5-118-128
29. Laiko, O., Umanets, T., Shlafman, N. (2021). Strategic directions of tax regulations of tax regulation of economic development in the conditions of reforms. *Economic Innovations*, 23(1), 115—125. https://doi.org/10.31520/ei.2021.23.1(78).115-125
30. Kelle, P., Song, J., Jin, M., Schneider, H., Claypool, C. (2019). Evaluation of operational and environmental sustainability tradeoffs in multimodal freight transportation planning. *International Journal of Production Economics*, 209, 411—420. https://doi.org/10.1016/j.ijpe.2018.08.011
31. Kotlubai, O. M. (Ed.). (2011). *Competitiveness and sustainable development of the maritime complex of Ukraine*. Odesa: IMPEER NAS of Ukraine [in Ukrainian].

32. Kotlubai, O. M., Kukharchyk, V. H. (2009). *Fundamentals of the economy and organization of service activities in merchant shipping*. Odesa: IMPEER NAS of Ukraine [in Ukrainian].
33. Onyshchenko, S. P. (2009). *Modeling the processes of organization and functioning of the marketing system of maritime transport enterprises*: monograph. Odesa: Phoenix [in Russian].
34. Prymachev, N. T. (Ed.). (2006). *Strategy for positioning national maritime transport in the global transport market*. Odesa: Avtohraf [in Russian].
35. Ilchenko, S. (2017). Economic conditions of the functioning and existence of asymmetry in the development of transport services markets of Ukraine. *Problems and Perspectives in Management,* 15(1), 93—98. http://dx.doi.org/10.21511/ppm.15(1).2017.09
36. Ilchenko, S., Khumarova, N., Maslii, N., Demianchuk, M., Skribans, V. (2021). Instruments for ensuring the balanced development of maritime and inland waterway transport in Ukraine. *E3S Web of Conferences*, 255, 01021. https://doi.org/10.1051/e3sconf/202125501021
37. Kotenko, S. V., Maslii, N. D., Kasianova, V. A., Bezpartochnyi, M. G., Nadtochii, I. I. (2021). Optimization of the management system for mitigating the consequences of water area pollution during the crisis. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu,* (6), 118—123. https://doi.org/10.33271/NVNGU/2021-6/118
38. Gryshchenko, V., Gryshchenko, I. (2021). The impact of changes in the volume of freight and passenger transportation by water on the GDP of Ukraine. *E3S Web of Conferences*, 255, 01036. https://doi.org/10.1051/e3sconf/202125501036
39. Koval, V., Duginets, G., Plekhanova, O., Antonov, A., Petrova, M. (2019). On the supranational and national level of global value chain management. *Entrepreneurship and Sustainability Issues*, 6(4), 1922—1937. https://doi.org/10.9770/jesi.2019.6.4(27)
40. Nitsenko, V., Kotenko, S., Hanzhurenko, I., Mardani, A., Stashkevych, I., Karakai, M. (2020). Mathematical Modeling of Multimodal Transportation Risks. In: *Recent Advances on Soft Computing and Data Mining. SCDM 2020*. (Eds. Ghazali R., Nawi N., Deris M., Abawajy J.) *Advances in Intelligent Systems and Computing*, 978, 439—447. Springer, Cham. https://doi.org/10.1007/978-3-030-36056-6_41
41. Burkinskyi, B. V., Stepanov, V. M. (Eds.). (2009). *Economic and environmental security of maritime activities*. Odesa: Phoenix [in Ukrainian].
42. Gryshchenko, V., Dreval, O., Gryshchenko, I. (2015). Regional export-import potential use management within the system of ecological and economic security. *Actual Problems of Economics*, 8(170), 226—238 [in Ukrainian]. https://eco-science.net/archive/2015/APE-08-2015.zip. (Last accessed: 07.02.2022).
43. The United Nations Economic Commission for Europe. (2021). Transport. URL: https://unece.org/transport (Last accessed: 07.02.2022).
44. United Nations Conference on Trade and Development. (2021). UNCTAD Stat: Country Profiles. URL: https://unctadstat.unctad.org/CountryProfile/en-GB/index.html (Last accessed: 07.02.2022).
45. The World Bank. (2021). World Development Indicators. URL: https://datacatalog.worldbank.org/search/dataset/0037712/World-Development-Indicators (Last accessed: 07.02.2022)
46. Eurostat, the statistical office of the European Union. (2021). Transport: Database. URL: https://ec.europa.eu/eurostat/web/transport/data/database (Last accessed: 07.02.2022).
47. State Statistics Service of Ukraine. (2021). Transport of Ukraine 2020: Statistical publication. URL: http://www.ukrstat.gov.ua/druk/publicat/kat_u/2021/zb/10/zb_Transpot.pdf [in Ukrainian]. (Last accessed: 07.02.2022).
48. State Statistics Service of Ukraine. (2020). Transport of Ukraine 2019: Statistical publication. URL: http://www.ukrstat.gov.ua/druk/publicat/kat_u/2020/zb/10/zb_trans_19.pdf [in Ukrainian]. (Last accessed: 07.02.2022).

Received 05.04.2022
Revised 10.09.2022
Accepted 21.09.2022

О.І. Лайко (http://orcid.org/0000-0001-7082-0862),
Н.І. Хумарова (https://orcid.org/0000-0001-5255-8004),
С.В. Ільченко (https://orcid.org/0000-0001-6924-2225),
В.Ф. Грищенко (https://orcid.org/0000-0003-0009-605X),
І.В. Грищенко (https://orcid.org/0000-0001-8801-3217)

Державна установа «Інститут ринку і економіко-екологічних досліджень НАН України»,
Французький бульвар, 29, Одеса, 65044, Україна,
+380 48 722 2905, oss_iprei@ukr.net

КОНЦЕПТУАЛЬНА МОДЕЛЬ ВИКОРИСТАННЯ КОНКУРЕНТНОГО ПОТЕНЦІАЛУ ВОДНОГО ТРАНСПОРТУ В СИСТЕМІ ЗАБЕЗПЕЧЕННЯ ЕКОНОМІЧНОЇ БЕЗПЕКИ

Вступ. Для успішного функціонування на ринку суб'єктам господарювання у галузі водного транспорту, окрім володіння матеріальними та фінансовими ресурсами, в умовах існуючого бізнес-середовища необхідно реалізовувати свої внутрішні унікальні можливості, які визначають наявність конкурентного потенціалу.

Проблематика. Успішне функціонування і розвиток водного транспорту потребує розробки наукового підходу та концепції щодо використання його конкурентного потенціалу в системі забезпечення економічної безпеки країни.

Мета. Формування концептуальної моделі використання конкурентного потенціалу водного транспорту в системі створення економічної безпеки на прикладі країн Чорноморського регіону.

Матеріали й методи. Застосовано методи системно-структурного, абстрактно-логічного аналізу і групування, економіко-математичного моделювання — при дослідженні сутності, складу і структури конкурентного потенціалу водного транспорту, при проведені економічної оцінки його використання і безпеки в країнах Чорноморського регіону.

Результати. Визначено сутність категорії «конкурентний потенціал водного транспорту». Досліджено склад і структуру конкурентного потенціалу водного транспорту. Розроблено концептуальну модель використання конкурентного потенціалу водного транспорту в системі забезпечення економічної безпеки. Ґрунтуючись на запропонованій концептуальній моделі, проведено економічну оцінку використання конкурентного потенціалу водного транспорту та його роль в секторі економічної безпеки країни.

Висновки. З метою підвищення конкурентного потенціалу водного транспорту України та рівня його використання з урахуванням фактору економічної безпеки запропоновано стимулювати збільшення кількості судозаходів у порти України та кількості суден під прапором України, що належать вітчизняним суб'єктам господарювання, а також стимулювати розвиток суднобудівної галузі України.

Ключові слова: потенціал, конкурентоспроможність, водний транспорт, концепція, модель.