ЕКОНОМІКА

UDC 33.02:656.71.4 **DOI https://doi.org/10.33082/td.2025.1-24.01**

CURRENT INVESTMENT TRENDS IN THE PORT INDUSTRY

V.V. Zhykharieva[1], N.T. Ksandinov[2]
[1]D.Sc. (Economics), Professor, Head of the Department of Economics and Finance,
Odesa National Maritime University,
Odesa, Ukraine,
ORCID ID: 0000-0002-2179-8483
[2]Postgraduate of the Economics and Finance Department,
Odesa National Maritime University,
Odesa, Ukraine,
ORCID ID: 0000-0002-1844-4836

Summary

Introduction. *The tasks of sustainable development of the port industry, which cannot be solved without investing in port infrastructure, determine the relevance of the research of investment trends in the industry. To define the need for investments, economic justification of investment directions and sources of investment financing, it is necessary to study the main factors that affect investment activity in the port industry, and to determine current trends in this field.* ***Purpose.*** *The purpose of the article is to determine investment trends in the port industry at the current stage of its development.* ***Results.*** *The main economic and technological drivers of the investment activity in the port industry in the context of sustainable development have been systematized. Assessment of the dynamics of the gross volume of cargo handled in the ports and the directions of investment in the port infrastructure by cargo segments was carried out. The main trends in the development of investment in the port infrastructure were defined.* ***Conclusions.*** *The main trends in the development of investment in the port infrastructure include: changes in the geographic structure of investments due to the increase in the volume of maritime trade and cargo handled in the seaports of the countries of Southeast Asia and the Middle East; changes in the structure of investments by cargo segments due to the slowdown in the development of container trade and the higher growth rates of bulk dry cargo transportation; increased need for investment in the port infrastructure to eliminate technological constraints associated with increasing size and complexity of sea vessels; changes in the directions of investments for energy transition and sustainable development, intensification of the impact on investment activity of technological changes – digital transformation in seaports and greening of supply chains; change in the orientation of investment activity to the concept for the sustainable development of port companies, which often involves projects with high social value; investments in the industry contribute to the transformation of seaports from multimodal centers to centers of innovation and sustainable development;*

investments lead to an increase in the role of seaports as an important component of the geopolitical and economic stability of countries and regions; the need for investment in new port areas outside urban areas due to the impact of coastal urbanization on port development.

Key words: *investment, port industry, infrastructure, water transport, seaborne trade, shipping, strategic development, energy efficiency, digital transformation, ecologization.*

СУЧАСНІ ТЕНДЕНЦІЇ ІНВЕСТУВАННЯ В ПОРТОВІЙ ГАЛУЗІ

В.В. Жихарєва[1], Н.Т. Ксандінов[2]
[1]д.е.н., професор, завідувач кафедри «Економіка і фінанси»,
Одеський національний морський університет,
Одеса, Україна,
ORCID ID: 0000-0002-2179-8483
[2]аспірант кафедри економіки і фінансів,
Одеський національний морський університет,
Одеса, Україна,
ORCID ID: 0000-0002-1844-4836

Анотація

Вступ. *Актуальність теми дослідження обумовлена завданнями сталого розвитку портової галузі, які неможливо реалізувати без інвестування у портову інфраструктуру. Для визначення потреби в інвестиціях, економічного обґрунтування напрямів інвестування і джерел фінансування інвестицій необхідно вивчення основних факторів, які впливають на інвестиційну діяльність у портовій галузі, і аналіз сучасних тенденцій у цій сфері.* ***Мета.*** *Стаття присвячена визначенню тенденцій інвестування у портовій галузі на сучасному етапі її розвитку.* ***Результати.*** *Систематизовано основні економічні та технологічні драйвери інвестиційної діяльності портової галузі в контексті сталого розвитку. Проведено оцінку динаміки обсягів перевалки вантажів у портах та напрямів інвестування розвитку портової інфраструктури за вантажними сегментами. Визначено головні тенденції інвестування в портову інфраструктуру.* ***Висновки.*** *До тенденцій інвестування у розвиток портової інфраструктури віднесено: зміни географічної структури інвестицій у зв'язку зі збільшенням обсягів морської торгівлі та перевалки вантажів у морських портах країн Південно-Східної Азії та Близького Сходу; зміни структури інвестицій за вантажними сегментами через уповільнення темпів зростання контейнерної торгівлі та більш високі темпи зростання перевезень сухих масових вантажів; збільшення потреби в інвестиціях у портову інфраструктуру для усунення технологічних обмежень, пов'язаних зі збільшенням розміру та складності морських суден; зміни напрямів інвестицій для енергетичного переходу та сталого розвитку, посилення впливу на інвестиційну діяльність технологічних змін – цифрової трансформації в морських портах і екологізації ланцюгів постачання; зміна орієнтації інвестиційної діяльності на концепцію сталого розвитку портових компаній, яка часто передбачає проєкти з високою соціальною цінністю; інвестиції в галузь сприяють перетворенню морських портів із мультимодальних центрів у центри інновацій та сталого*

розвитку; інвестиції приводять до підвищення ролі морських портів як важливого компонента геополітичної та економічної стабільності країн і регіонів; потреба в інвестиціях у нові портові території за межами міських територій через вплив прибережної урбанізації на розвиток портів.

Ключові слова: *інвестиції, портова галузь, інфраструктура, водний транспорт, морська торгівля, судноплавство, стратегічний розвиток, енергоефективність, цифрова трансформація, екологізація.*

Introduction. Seaports in the 21st century face a number of new factors that significantly affect the development strategy and investment activities in the industry. The global goals of sustainable development until 2030, proclaimed by the UN Resolution adopted by the General Assembly on 25 September 2015 № 70/1 [1], include the promotion of progressive, inclusive and sustainable economic growth, full and productive employment and decent work for all; creation of sustainable infrastructure, promotion of industrialization and innovation; taking measures to combat climate change and its consequences; preservation and rational use of oceans, seas and marine resources. The specified goals are correlated with the concept of ensuring the sustainable development of port companies.

Taking into account that the study of trends is based on statistical data, the research used the method of comparison for analysis of international maritime trade by cargo type; methods of descriptive statistics, including correlation and regression analysis for study of relationship between world GDP and the volume of containers handling in seaports based on the polynomial regression model; as well as the logical-analytical method and analysis-synthesis of results for identifying and systematization the main drivers of the investment activity in the port industry.

Formulation of the problem. The strategic development of seaports is impossible without investments in various components of the port infrastructure. Therefore, identifying the main drivers and trends in the development of investment in the port industry is a current task.

Analysis of recent research and publications. In the article by B. Purvis, Y. Mao & D. Robinson [2] a study of the genesis of the concept of sustainability, consisting of three pillars (environmental, economic and social), was carried out. It is shown that there is no unified view of the status quo of these components, and their theoretically accurate description. The reason is the nature of the sustainability discourse, which has historically emerged from very different schools of economic thought. The lack of such a thorough concept destroys approaches to theoretically strict operationalization of sustainability. Increased attention and pressure from investors, regulators, employees and other stakeholders of maritime transport companies make environmental, economic and social factors important drivers of their development, and require the generalization of existing practices and the working-out of appropriate methodological approaches.

Criteria for the development of maritime transport companies include environmental, social and governance (ESG) criteria for assessing business. In [3] it is shown that there is a growing interest and pressure from investors, regulators and politicians to make ESG an important issue. The promotion of the ESG concept for the development of maritime companies is becoming increasingly widespread in all areas of business and government

activity. The paper by P. Matos [4] has developed ESG criteria to the fields of sustainable development. Investments that comply with ESG are growing in the total volume in the capital markets. The growing interest of investors in ESG reflects the view that issues of ecology, social responsibility and corporate governance, including risks and opportunities, can affect the long-term performance of companies and, therefore, should be adequately taken into account when making investment decisions.

The work by T. Notteboom, A. Pallis & J.-P. Rodrigue [5] shows that the implementation and directions of investment in the port industry depend on economic and technological changes, in particular, the digital transformation of the industry and the greening of supply chains in recent years. The characteristics of the demand for port terminal services determine the requirements for their design in terms of sea access conditions, quay walls, and terminal equipment. In the article by N.V. Smentyna [6] summarizes the approaches to defining the concept of a smart port, which uses innovative digital technologies to increase the efficiency, the level of security of operations and protection. It is determined that the cumulative average annual growth rate of the global smart ports market will reach 25% by 2032.

In the paper by V. Zhykharyeva, N. Primachev, T. Frasinyuk [7] features of transformation processes in the global seaborne trade is considered. All subsystems that form cargo flows are interested in the stable operations of maritime transport, which provides up to 80% of foreign trade.

Analysis of existing research makes it possible to summarize that infrastructure development is one of the most important priorities for the development of investment activities in the port industry. High capital intensity and rapid technological development of the port industry make it necessary to study the factors influencing investment in port infrastructure and identify the main investment trends, connection between investment aspects and directions of sustainable development of port companies, taking into account industry specifics, in particular, those aimed at greening and digitalization the activities of seaports.

Formulation of the goals of the article. The goals of the paper are to systemize the main economic and technological drivers of the investment activity in the port industry in the context of sustainable development, in particular, to assess of the dynamics of the volume of cargo handled in sea ports, the directions of investment in the port infrastructure by cargo segments, and to define the main trends in the development of investment in the port industry.

Presentation of the main research material. The main factor influencing the need to expand the production capacity of seaports and terminals is the demand for cargo handling services by port companies, which depends on the dynamics of international seaborne trade.

The volume of international maritime trade depends on the world GDP. In 2023, the maritime trade increased by 2.4%, the global GDP – by 2.7%. In 2021 and 2022, on the contrary, the GDP growth rate decreased significantly more than the maritime trade growth rate [8]. The ratio of the volume of international maritime trade to world GDP has been decreasing since 2010. The growth rate of this ratio has been increasing relatively slower than GDP, in particular, since 2018, when the USA imposed tariffs on exports from China.

Total volume of transportation reached 62,037 billion ton-miles in 2023, a 4.2% increase over 2022, driven by longer voyages across all segments, driven by supply disruptions due to the war in Ukraine, disruptions in the Red Sea, and a decrease in the water level in the Panama Canal, which led to longer voyages of ships and increased distances [8]. Dry cargo transportation is less prone to disruptions in the Red Sea and the Suez Canal. The disruptions have particularly affected exports of grain from the US and other dry bulk cargoes from the North Atlantic to Asia. Trade in iron ore and deliveries of steel products were also disrupted due to changes in routes and increased transit times.

Figure 1 shows the growth rates of international maritime trade by cargo segments in 2023.

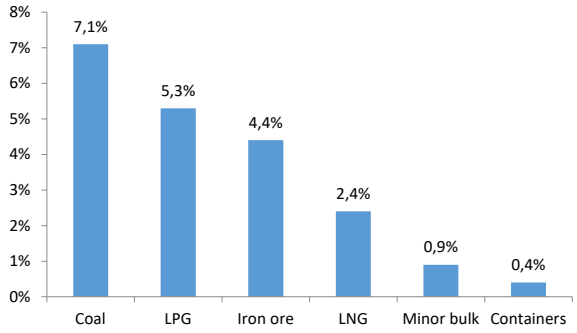

Fig. 1. Growth rates of international maritime trade by cargo type in 2023, % [8]

The growth rate of coal transportation (7.1%) was affected by the global energy crisis and geopolitical tensions, particularly in Europe, increasing dependence on coal as an alternative energy source, which increased demand and trade volume [8]. Growth in iron ore shipments (4.4%) was driven by strong demand from the metallurgical sector, especially in China and other rapidly developing countries [8]. The growth rate of transportation of minor bulks (0.9%), which does not include forest cargo and metal products, was affected by a slowdown in construction and manufacturing activity in key markets, combined with logistical problems [8].

The growth rate of liquefied petroleum gas (LPG) transportation (5.3%) was influenced by high demand for clean energy sources and growing industrial activity in Asia and other developing regions [8]. The growth rate of LNG transportation (2.4%) was influenced by weaker market conditions compared to recent years, due to softer gas markets and fleet growth [8].

Global economic uncertainty, disruptions in supply chains and reduced consumer spending on goods affected the growth rate of containerized cargo transportation – 0.4% in tons and -0.14% in twenty feet equivalent units (TEU) [8]. Improvements in economic prospects and changes in shipping routes from the Red Sea are factors that have supported a high level of container trade in 2024. This followed a decline in volumes in 2022 and low growth in container trade in 2023.

Figure 2 shows the annual growth rates of world real GDP and the volume of container handled in TEU in seaports around the world.

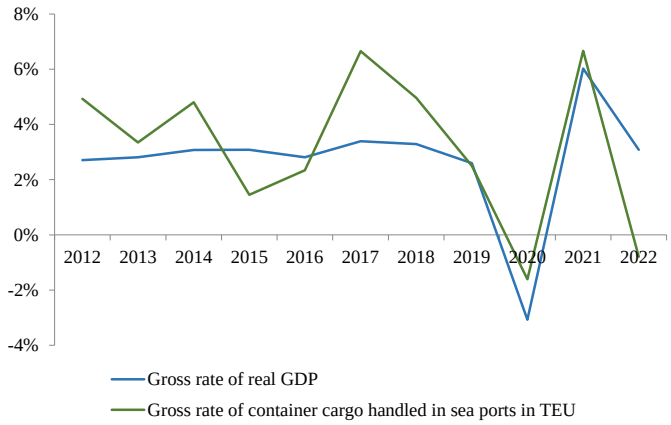

Fig. 2. Annual growth rates of world real GDP and the volume of containerized cargo handled in seaports around the world, determined using [9, 10], %

Table 1 shows descriptive statistics for annual growth rates of world real GDP and the volume of containerized cargo handled in seaports, calculated by authors.

Table 1

Descriptive statistics for annual growth rates of world real GDP and container cargo handled in seaports

Indicators	Growth rate of world real GDP	Growth rate of container cargo handled in seaports
Average	0.027	0.030
Standard Error	0.007	0.009
Median	0.031	0.029
Standard Deviation	0.023	0.028
Sample Variance	0.001	0.001
Kurtosis	6.157	-0.814
Skew	-1.896	-0.315
Interval	0.091	0.083
Minimum	-0.031	-0.016
Maximum	0.060	0.067
Level of reliability	0.271	0.303

Figure 3 shows the results of correlation and regression analysis of the relationship between the world real GDP and the volume of containers handled in seaports around the world based on the data presented in Figure 2.

The linear correlation coefficient of annual growth rates in percent for 2012–2022 was 0.70, the correlation of the world real GDP in USD and container handling in seaports for 2011–2022 was 0.99, indicating a very close positive correlation. The coefficients of determination indicate that the calculated parameters of the polynomial model explain the dependence between the annual growth rates by 49%, and between absolute values of the parameters – by 98% which indicates the high quality of the model.

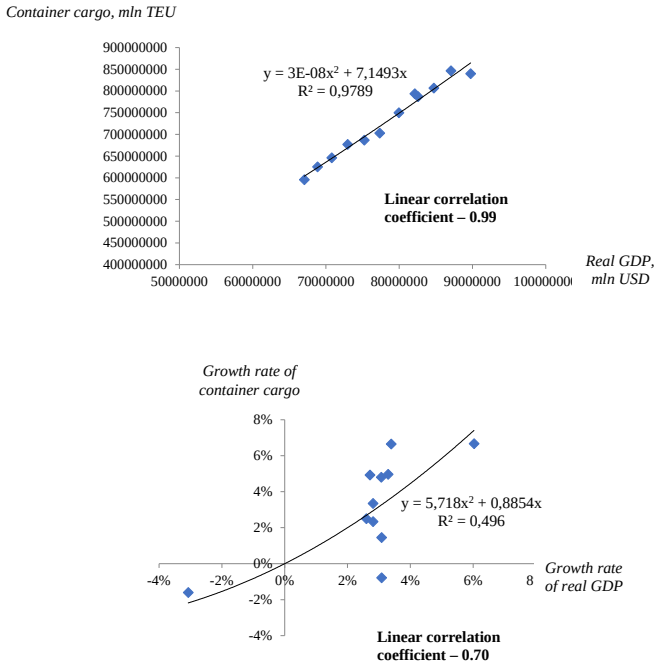

Fig. 3. Correlation and regression analysis the relationship between world real GDP and the volume of containers handled in seaports in terms of absolute values and growth rates (polynomial regression model)

Figure 4 shows the 10 largest container ports in the world as of 2023.

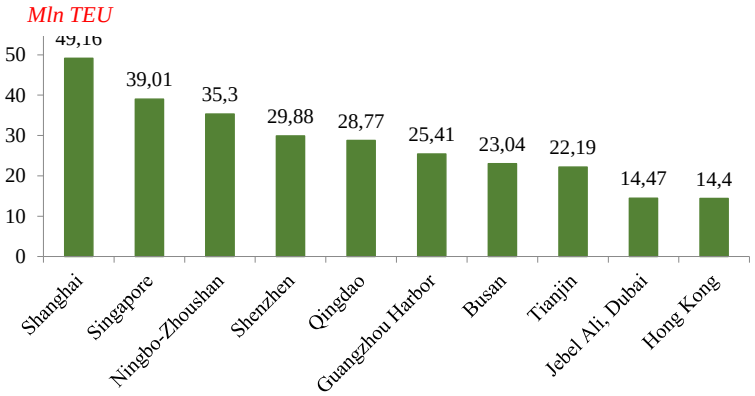

Fig. 4. Top 10 largest container ports in the world in 2023, million TEU [11]

As can be seen from the data, the only European port of Rotterdam, which was in the top 10 world largest ports, with a volume of 13.45 million TEU in 2023, gives position to the ports Jebel Ali, Dubai (9th place) and Hong Kong (10th place) [11]. Therefore, the dynamics of the port industry reflects the rapid development of the countries of Southeast Asia and the Middle East, in particular, China, South Korea, and the United

Arab Emirates, which affects the volume of maritime trade and the volume of cargo flows in seaports.

The cargo flow of Chinese ports grew at the highest rates from 2019 to 2023, in particular, Qingdao by 36.9%, Ningbo-Zhoushan by 28.4%, and Tianjin by 28.3% [11]. The cargo flows in Rotterdam, on the contrary, decreased by 9.2% to the level of 2019 [11].

Figure 5 shows the largest cargo ports in Europe, among which in 2023 the first place was taken by port of Rotterdam with a volume of 438.8 million tons [12].

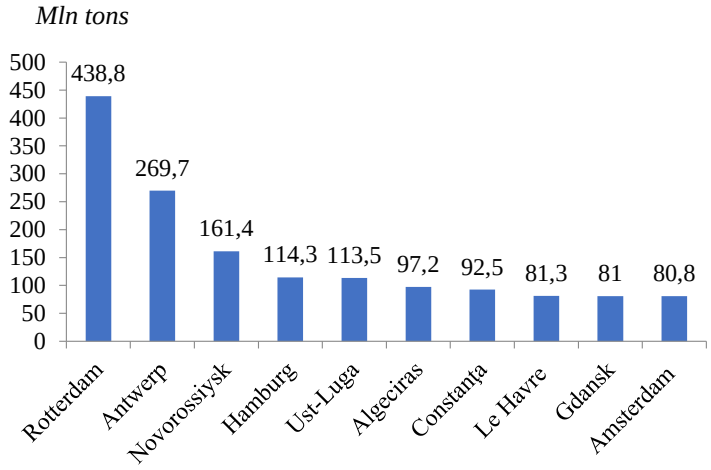

Fig. 5. Top 10 largest ports in Europe in 2023, million tons [12]

Figure 6 shows the dynamics of the gross volume of cargo transshipped in the seaports of the European Union and the trend line (linear filtering).

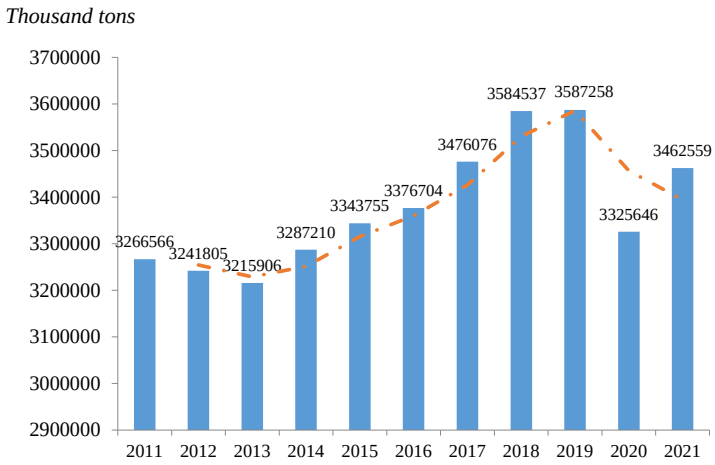

Fig. 6. Gross volume of cargo handled in seaports of the EU from 2011 to 2021, thousand tons [13]

As can be seen from the data in Figure 6, cargo volume increased from 2013 to 2019, but in 2020 there was a significant decrease (7%) to the level of 2019, in 2021 – a recovery (4%) to the level of 2020.

In EU countries, infrastructure development is one of the main directions of port investment, as well as ensuring a good business climate, proper governance and the development of intermodality [14]. The study of European Sea Ports Organization (ESPO) examines the investment landscape and challenges facing European ports, shedding light on their changing role and urgent needs [15]. The research is a comprehensive analysis based on data from 84 port authorities in European Union that shows a staggering 80 billion euro investment need over the next decade, highlighting the critical role of seaports in economic and environmental development [15].

Ports in the European Union are no longer just gateways; they are turning into centers of innovation, sustainable development and sustainability. The share of investments related to the transition to clean energy and the transition of ports and shipping to sustainable development has increased. While this category was less than 10% in 2018, its share will grow to nearly 25% in 2023 [15]. A closer look at the different types of investments in this category shows that a large share involves investments in "infrastructure and related services and the energy transition of the economy" (55 projects in total), another large share consists of investments in "infrastructure and facilities to reduce the environmental footprint of shipping (54 projects), while a smaller share concerns "investments in reducing the environmental footprint of port operations" (8 projects) [15].

The increase in investment in projects that contribute to the energy transition and sustainability is linked to a change in the services provided by EU port authorities. Almost two-thirds of all port authorities plan to start offering shore power for vessels and barges, while the rest (with a few exceptions) already provide such services [15]. Port authorities also aim to provide other services such as truck chargers, green energy supply for port companies, clean fuel for vessels and barges, pipeline services for the transportation of liquefied gases, and digital energy management. In terms of clean energy and decarbonization, the most common investment project is the power supply of ships.

More than 70% of all ports that provided data on their investment projects plan to invest in the power supply of vessels, about half of all port authorities plan to invest in means for transporting and/or storing electricity, about a third of ports plan to invest in renewable energy production and about 30% of them plan to invest in energy management systems [15]. The investment category "Expansion of port basins, berths and terminal sites" remains the largest of 123 projects [15].

According to the Trans-European Transport Network (TEN-T) project developed by the EU, European ports are classified as core ports and comprehensive ports [16]. The TEN-T Regulation establishes a set of quantitative thresholds to determine which seaports are core ports. Thresholds are set for both cargo volumes and passenger numbers [17]. Table 2 shows the maritime transportation segments for which investments in the expansion of core and comprehensive ports have been made.

The data show that while the container segment remains the most important for EU ports expansion (35% for key ports and 15% for comprehensive ports), reflecting the development of container trade, general cargo also plays an important role (30% for

Table 2

Segments of maritime transportation for which investments were made in the expansion of seaports of the EU countries in 2018–2023 [15]

Categories of seaports	Containers	Ro-Ro cargo	Passenger (ferries)	Cruise	Dry bulk	Liquid bulk	Breakbulk and general cargo
Core	35%	32%	11%	10%	26%	14%	30%
Comprehen-sive	15%	24%	12%	0%	30%	15%	45%

core ports and 45% for comprehensive ports), as well as bulk dry cargo (26% for core ports and 30% for comprehensive ports). Investment needs of seaports of EU countries amount to 80 billion euros for the next 10 years (until 2034) [15]. Investments in sustainable development and energy transition are becoming the second most important investment category for port authorities. Ports need access to sufficient public funding. They should be able to use the various financing instruments that should be available to contribute to the achievement of the established strategic goals. It is necessary to maintain a stable and attractive investment climate and make sure that investors will continue to invest in seaports of EU. The majority of projects involve the amount of investments from 20 to 50 million euros, in the second place – projects up to 10 million euros, and in the third place – from 50 to 100 million euros [15].

The increase in the size and complexity of the fleet, in particular ultra-large container vessels (ULCV), new types of Ro-Ro ships, tankers and gas carriers, affects the increase in the need for investments in the construction of berths, dredging, acquisition of loading equipment, expansion of storage capacities, etc. The technical requirements of some new classes of vessels, taking into account their size and design, affect medium-sized ports, which may need to overcome restrictions to handle these ships in terms of berth length, depth at berths, or lack of an adapted power supply system. These limitations can only be overcome by investing in port infrastructure.

The role of seaports as an important component of geopolitical and geoeconomic stability is increasing. Ports increase strategic effort, which help strengthen the country's control over important maritime and energy routes, and contribute to the strengthening of bilateral and multilateral relations. Ports improve connections between countries and regions, and facilitate trade and country participation in the global value chain through the integration of procurement, production and distribution systems, open opportunities for transactions in local currency, leading to its internationalization.

Most ports are located in or near cities that leads to pressure on the transformation of the port area into an urban space, and the development of new port facilities outside the urban areas. Therefore, the urbanization of the coastal zone is a driver of investments in new port areas. The paper by D. Pavlenko [18] examines the trend of increasing attention to the spatial strategy of port infrastructure development. The increasing complexity of port operations leads to diversification and intensification of land use, which requires finding new interactions between the port and the city. For example, the port of Amsterdam, the second largest port in the Netherlands, is facing strong pressure from urban growth. Management is looking for strategies to maximize the value of the port for both the community and the business [18]. In the future, those ports that increase their spatial

productivity will be successful. Other ports will lose their meaning of existence and will be absorbed by cities. Future ports will create ecosystems based on synergies between existing clusters in both the city and the port. Seaports will become even greater drivers of innovation and income for cities and improve employment in port cities.

Conclusions. The following main trends in the development of investment in the port infrastructure were highlighted.

– Changes in the geographic structure of investments due to the constant increase in the volume of maritime trade and cargo volume handled in the seaports in the Southeast Asia and the Middle East, in particular, China, South Korea, and the United Arab Emirates, by reason of their rapid economic development and continued containerization of sea transportation.

– Changes in the structure of investments by cargo segments due to the slowdown in the development of container trade and the higher growth rates of dry bulk cargo transportation.

– Increased need for investment in port infrastructure to eliminate technological constraints associated with increasing fleet size and complexity.

– Changing the directions of investments in port infrastructure for energy transition and sustainable development, intensification of the impact on investment activity of technological changes, in particular, digital transformation in the port industry, greening of supply chains, and the related increase in investment volumes.

– Change in the orientation of investment activity to the ESG concept for the sustainable development of port companies, which often involves investment projects with high social value, but slow or low return on investment and a high level of risk, and for some types of investment only environmental and/or social effect.

– Investments in port infrastructure contribute to the transformation of seaports from multimodal centers to centers of innovation and sustainable development – clean energy, industrial clusters and circular economy.

– Investments in port infrastructure lead to an increase in the role of seaports as an important component of the geopolitical and economic stability of countries and regions.

– The need for investment in new port areas outside urban areas due to the impact of coastal urbanization on port development.

The practical value of the research is the possibility of using the identified trends for further justification of investments in the port infrastructure and forecasting the need for capital investments. In particular, in the process of planning the post-war reconstruction and strategic development of Ukrainian seaports of Black Sea & Danube Region, it is advisable to take into consideration the experience of investing in the infrastructure of ports and sea terminals in Southeast Asia and the Middle East, to pay attention to structural changes in investing in port capacities by type of cargo, to take into account the increase in the size and other characteristics of sea vessels and technological limitations in Ukrainian seaports, to follow the global trend of investing in innovative projects for the greening of port activities, increasing energy efficiency, as well as projects with high social value. The implementation of these measures will allow not only increase the efficiency of the port system of Ukraine, but also the geopolitical and economic stability of regions and the country as a whole.

Prospective areas for further research include a more detailed study of the experience of investing in the infrastructure of the fastest growing seaports, classification of investment objects in the port industry and various sources of investment financing.

BIBLIOGRAPHY

1. Transforming our world: the 2030 Agenda for Sustainable Development: Resolution adopted by the General Assembly on 25 September 2015 № 70/1. United Nations, 2015. URL: http://surl.li/xsopxu.
2. Purvis B., Mao Y., Robinson D. Three pillars of sustainability: in search of conceptual origins. *Sustain Sci.* 2019. 14. P. 681–695.
3. Zhykharieva V.V., Yastrebnyi V.M. Environmental criteria for sustainable development in strategic management of sea transport companies. *Transport development.* 2024. 3. P. 20-29.
4. Matos P. ESG and responsible institutional investing around the world: A critical review. CFA Institute Foundation, 2022. 88 p.
5. Notteboom T., Pallis A., Rodrigue J.-P. Port Economics, Management and Policy. New York: Routledge, 2022. 690 p.
6. Smentyna N. Digital technologies in ensuring the efficiency of maritime transportation: use in the activities of smart ports. *Development of management and entrepreneurship methods on transport.* 2024. 3 (88). P. 7-22.
7. Zhykharyeva V., Primachev N., Frasinyuk T. Features of transformation processes in the global maritime trade market. *Economic journal of Odessa polytechnic university.* 2023. 4(26). P. 91-98.
8. Review of maritime transport. UNCTAD, 2024. URL: https://unctad.org/system/files/official-document/rmt2024_en.pdf.
9. Container port traffic 2020-2022. World Bank Group. 2023. URL: http://surl.li/cpcdvy.
10. Global GDP. 2024. URL: https://www.worldometers.info/gdp/#gdpyear.
11. The Top 50 Container Ports. World Shipping Council. 2024. URL: https://www.worldshipping.org/top-50-ports.
12. The Largest Ports in Europe. ShipHub. 2024. URL: https://www.shiphub.co/the-largest-ports-in-europe/.
13. Gross weight of seaborne goods handled at ports in the European Union (EU-27) from 2011 to 2021. 2022. URL: https://surl.li/ayheqf.
14. Priorities investments in ports. 2024. URL: https://www.feport.eu/media-corner-2/investments-in-ports.
15. The investment pipeline and challenges of European ports: Port investments study 2024. 13. Brussels: European Sea Ports Organization. 2024. 27 p.
16. List of Sea Ports in the Core and Comprehensive Networks: European Commission, 2014. URL: https://surl.li/gbjikz.
17. Position of the European Sea Ports Organization on the Regulation 1315/2013 on Union guidelines for the development of the Trans-European Transport network. ESPO, 2019. 11 p.
18. Pavlenko D. Global and national port trends 2030: Infrastructure Talks with experts. Deloitte, 2020. URL: https://surl.li/gszypo.

REFERENCES

1. Transforming our world: the 2030 Agenda for Sustainable Development: Resolution adopted by the General Assembly on 25 September 2015 № 70/1 (2015). United Nations. Retrieved from http://surl.li/xsopxu.
2. Purvis, B., Mao Y., Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. Sustain Sci, 14, 681–695.
3. Zhykharieva, V.V., Yastrebnyi, V.M. (2024). Environmental criteria for sustainable development in strategic management of sea transport companies. Transport development, №3, 20-29.
4. Matos, P. ESG and responsible institutional investing around the world: A critical review (2020). CFA Institute Foundation, 88 p.
5. Notteboom, T., Pallis, A., Rodrigue, J.-P. (2022). Port Economics, Management and Policy, New York: Routledge, 690 p.
6. Smentyna N. (2024). Digital technologies in ensuring the efficiency of maritime transportation: use in the activities of smart ports. Development of management and entrepreneurship methods on transport, 2024, 3 (88), 7-22.
7. Zhykharyeva, V., Primachev, N., Frasinyuk, T. (2023). Features of transformation processes in the global maritime trade market. Economic journal Odessa polytechnic university, 4 (26), 91-98.
8. Review of maritime transport (2024). UNCTAD. Retrieved from https://unctad.org/system/files/official-document/rmt2024_en.pdf.
9. Container port traffic 2020-2022 (2023). World Bank Group. Retrieved from http://surl.li/cpcdvy.
10. Global GDP (2024). Retrieved from https://www.worldometers.info/gdp/#gdpyear.
11. The Top 50 Container Ports (2024). World Shipping Council. Retrieved from https://www.worldshipping.org/top-50-ports.
12. The Largest Ports in Europe. ShipHub (2024). Retrieved from https://www.shiphub.co/the-largest-ports-in-europe/.
13. Gross weight of seaborne goods handled at ports in the European Union (EU-27) from 2011 to 2021 (2022). Retrieved from https://surl.li/ayheqf.
14. Priorities investments in ports (2024). Retrieved from https://www.feport.eu/media-corner-2/investments-in-ports.
15. The investment pipeline and challenges of European ports: Port investments study 2024 (2024). 16. Brussels: European Sea Ports Organization. 27 p.
16. List of Sea Ports in the Core and Comprehensive Networks (2014). European Commission. Retrieved from https://surl.li/gbjikz.
17. Position of the European Sea Ports Organization on the Regulation 1315/2013 on Union guidelines for the development of the Trans-European Transport network (2019). ESPO. 11 p.
18. Pavlenko D. (2020). Global and national port trends 2030: Infrastructure Talks with experts. Deloitte. Retrieved from: https://surl.li/gszypo.