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Financing the development of water infrastructure in Ukraine under conditions of full-scale military actions

Abstract. The purpose of the article was to investigate the sources, structure and mechanisms of financing the development of Ukraine's water infrastructure under conditions of full-scale military actions, as well as to substantiate directions for improving the financial provision of the sector in the context of post-war economic recovery. Particular attention was paid to assessing the role of state financing, international financial assistance and public-private partnership mechanisms in ensuring the functioning of river and port infrastructure. In the course of the research, a set of general scientific and specific methods was employed, including methods of analysis and synthesis, statistical analysis, comparison, generalisation, and systemic and institutional approaches. The informational basis of the research comprised Ukraine's regulatory and legal acts, statistical materials of state authorities, reports of international financial organisations, as well as the results of scientific research in the field of transport and water infrastructure development. The results of the research established that in 2020-2024 there was a substantial increase in the volume of financing for Ukraine's water infrastructure, which was driven by the need to ensure alternative logistics routes under conditions of the blockade of part of the seaports. In particular, the total volume of state financing of the sector grew from UAH 470 million in 2020 to UAH 2.77 billion in 2024, while international assistance attracted in 2022-2024 exceeded USD 500million. The main sources of financial provision of the sector were identified, including the state budget, international financial assistance and investments attracted through public-private partnership mechanisms. The growing strategic importance of Danube ports and inland waterways in ensuring export activity and maintaining the state's economic resilience was substantiated. The scientific novelty of the research lies in a comprehensive assessment of the current structure of financing Ukraine's water infrastructure under martial law and the identification of the features of the interaction

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between state, international and private financial resources in the processes of its development and recovery. The practical significance of the results obtained lies in the possibility of their use by public authorities, economic entities and potential investors in developing programmes for modernising water infrastructure and forming an effective financial policy in the field of transport logistics

Keywords: transport and logistics system; public-private partnership; international financial assistance; recovery; river corridors

INTRODUCTION

Water infrastructure is an important element of Ukraine's transport system, ensuring the functioning of logistics chains, the development of international trade and the stability of the economy. Water transport acquired particular significance during the period of full-scale military actions, when traditional maritime logistics routes were partially or completely blocked. The destruction of transport infrastructure, decline in investment activity, disruption of logistics links and restricted access to ports necessitated a revision of approaches to financing water infrastructure. Under these conditions, effective financial provision for the development of water transport became a critically important factor in ensuring the state's economic resilience. Financial provision for the development of water infrastructure and transport and logistics systems under conditions of war-induced crisis transformations is a relevant area of scientific research, given its significance for maintaining Ukraine's export capacity and economic recovery.

V.V. Prokhorova *et al.* (2025) investigated Ukraine's economic potential in the context of post-war recovery. The authors substantiated that the modernisation of the infrastructure complex is one of the basic prerequisites for accelerating economic growth and enhancing the state's competitiveness. At the same time, the issue of financing water infrastructure specifically remains insufficiently detailed. M. Hamdouna & M. Khmelyarchuk (2025) examined the impact of technological change on the economic development of enterprises. The researchers demonstrated that the introduction of innovations directly affects the efficiency of resource use and the formation of new competitive advantages. These conclusions are important for water infrastructure, the modernisation of which requires significantinvestment in digitalisation and technological renewal. F. Musiello-Neto *et al.* (2025) investigated a synergetic-emergent approach to developing enterprise competitiveness potential. The authors emphasised the need for a comprehensive combination of financial, organisational and innovative development mechanisms. This approach is also relevant for the field of water infrastructure, where the effectiveness of investments depends on the coordination of actions between the state, business and international partners. Research on the circular economy presented in the works of Yu. Danko & T. Shevchenko (2021) and T. Shevchenko & Yu. Danko (2022) is of significant interest. The authors substantiated the need to transition to resource-efficient development models and to introduce innovative mechanisms for managing infrastructure systems. The proposed approaches create a theoretical basis for forming long-term strategies for modernising transport and water infrastructure in accordance with the principles of sustainable development.

An important contribution to the study of mechanisms for developing transport infrastructure was made by a work that revealed the potential for using public-private partnership to modernise facilities of Ukraine's maritime economic complex. O.M. Aliabieva (2020) demonstrated that attracting private capital contributes to increasing the efficiency of infrastructure asset management and accelerating the implementation of investment projects. S.A. Mashkantseva (2020) investigated the innovative development of the transport industry within the system of multimodal transportation. The work substantiated the need to integrate different modes of transport and improve logistics chains, which is particularly relevant for the functioning of river and sea transport corridors. The project of the Ministry of Infrastructure of

Ukraine (2017) identified priorities for modernising the transport system and developing inland waterways. The document focused on the need to increase the investment attractiveness of the sector and form a modern infrastructure network in accordance with European standards. Practical aspects of port infrastructure development are covered in the "Kherson" specialized seaport concession (n.d.) and "Olvia" specialized seaport concession (n.d.). These documents present mechanisms for attracting private investment to modernise port facilities, demonstrating the promise of using concession models in the development of water infrastructure.

At the same time, an analysis of scientific works showed that the majority of studies are devoted to individual aspects of transport or water management infrastructure development, issues of innovative development, public-private partnership, or economic recovery. Insufficiently researched remain the issues of a comprehensive assessment of the sources of financing Ukraine's water infrastructure under conditions of full-scale military actions, their structure, effectiveness and the role of international financial support, which determines the relevance of this study. The purpose of the article was to substantiate the priorities of financial provision for the modernisation of Ukraine's water infrastructure under conditions of military challenges, taking into account available sources of financing, investment needs and prospects for improving the efficiency of resource management.

MATERIALS AND METHODS

The research was carried out on the basis of a comprehensive analysis of the processes of financing the development of Ukraine's water infrastructure under conditions of full-scale military actions. The type of research is an applied economic study using elements of comparative, statistical and institutional analysis. The research design involved a combination of quantitative and qualitative approaches for assessing the sources, structure and effectiveness of financing water infrastructure. The object of the research was the processes of financing the development of Ukraine's water infrastructure. The subject of the research comprised the economic relations, mechanisms, instruments and sources of financial provision for the development of river, port and logistics infrastructure under conditions of martial law. The informational basis of the research consisted of Ukraine's regulatory and legal acts, in particular Law of Ukraine No. 1054-IX (2020) and Law of Ukraine No. 2404-VI (2010), and materials of EU-Ukraine Solidarity Lanes (n.d.). The analysis also included the concessions of "Kherson" specialized seaport concession (n.d.) and "Olvia" specialized seaport concession (n.d.). The source and regulatory base was selected according to the following criteria: the official status of the source, the reliability of statistical data, the availability of quantitative indicators regarding the financing of infrastructure facilities, the relevance of information to the conditions of wartime and post-war recovery, and compliance with the subject of the research.

The time frame of the research covered 2020-2024. The choice of this period is due to several factors. First, it was during this period that significant institutional changes occurred in the field of inland water transport, associated with the adoption of specialised legislation and the reform of the sector's management system. Second, the period under study includes both the pre-war stage of water infrastructure functioning and the period of full-scale military aggression, which makes it possible to assess the transformation of financial mechanisms under conditions of crisis challenges. Third, it was during the selected period that the role of river logistics and international financial assistance in ensuring the resilience of Ukraine's export chains grew significantly. In the course of the research, a set of general scientific and specific methods was used. At the first stage, the method of analysis and synthesis was applied to generalise scientific approaches to financing infrastructure projects and to identify the features of water infrastructure development in Ukraine. At the second stage, an analysis was conducted of the dynamics of state financing, international assistance and investment inflows in 2020-2024. At the third stage, a comparative method was applied to assess the structure of financing and identify changes in investment priorities under the influence of military factors. At

the fourth stage, an institutional approach was used to investigate the role of state authorities, international organisations and public-private partnership mechanisms in financing the sector. At the final stage, the method of generalisation and logical modelling was applied to form conclusions and develop recommendations for improving the financial provision of the development of Ukraine's water infrastructure.

RESULTS AND DISCUSSION

The financing of water infrastructure in Ukraine during 2020-2024 became not only a subject of state policy but also an important element of the strategic provision of economic resilience under conditions of profound socio-political transformations caused by the war, the disruption of international supply chains and environmental threats. Water infrastructure, which includes river and sea ports, navigable waterways, locks, dams, canals, water transport facilities, and logistics hubs, plays a critically important role in ensuring the export potential of the agro-industrial complex, supporting international trade, and forming conditions for attracting investment in the transport and logistics sectors (Vasiliev & Simakhova, 2025). In the period after 2020, there was increased attention to the modernisation of water infrastructure both from the state and international partners. The adoption of Law of Ukraine No. 1054-IX (2020), the establishment of relevant state funds, and the active use of public-private partnership mechanisms made it possible to implement a number of projects aimed at improving the efficiency and environmental safety of water transport. At the same time, military actions, which significantly restricted maritime traffic in the southern regions of Ukraine, necessitated the prompt reorientation of export flows to alternative river routes, primarily through the Danube transport corridor. As a result, the need for additional financing of repair works, fairway dredging, modernisation of port infrastructure, and development of border crossings and logistics hubs increased.

International support programmes, in particular the EU-Ukraine Solidarity Lanes (n.d.) of the European Union (EU), gained particular importance during this period. Support was directed both towards restoring physical infrastructure and towards creating favourable institutional conditions for its further development. The engagement of private investors in the joint financing of water logistics projects within the framework of public-private partnership (PPP) became a new instrument for restoring economic activity in regions close to the front line, where infrastructure degradation had reached a critical level. During the period 2020-2024, the financing of Ukraine's water infrastructure from state budget funds was carried out in several key areas: modernisation of locks on the Dnipro, maintenance of inland waterways, investments in port infrastructure, and support for the sector through legislative and institutional changes. Following the adoption of Law of Ukraine No. 1054-IX (2020), budget expenditures for the maintenance of inland waterways were systematised for the first time, which made it possible to introduce a more predictable financing model. A special source was also created – funds from the river toll, which were directed to the State Specialised Fund for the Development of Inland Waterways. Table 1 shows the dynamics of budget financing of key areas of water infrastructure development in 2020-2024.

Table 1. State financing of Ukraine's water infrastructure, 2020-2024 (million UAH)

Year	Maintenance of IWW	Reconstruction of locks	Port infrastructure	Total volume
2020	0	150	320	470
2021	150	200	450	800
2022	380	290	500	1,170
2023	610	350	1,240	2,200
2024*	740	420	1,610	2,770

Note: IWW – inland waterways; * – forecast for the end of the year

Source: developed by the author based on Law of Ukraine No. 1054-IX (2020), Yurii Lytvyn: In 2023, cargo turnover... (2024), Y. Hryhorenko (2025)

As shown in Table 1, in 2020 no targeted financing of inland waterways was envisaged; however, the situation changed from 2021 onwards due to new legislation. The volume of financing grew steadily, reaching almost UAH 2.8 billion in 2024. The greatest dynamics was shown by the expenditure item related to the development of port infrastructure, in particular under conditions of the blockade of Black Sea ports and the rapid development of the Danube cluster. It is worth noting that in the structure of state financing, the main emphasis was placed on ensuring the navigational capacity of the main river arteries, primarily the Dnipro, through the maintenance of hydraulic structures, dredging works, and the modernisation of locks. In 2023, the state completed major repairs of the Kremenchuk lock, which made it possible to increase throughput capacity by more than 25%. In parallel with direct budget financing, the institutional structure of the sector was reformed: the Inland Waterways Administration was established, an electronic register of the river fleet was launched, and new mechanisms for public-private cooperation were introduced. Thus, state support was not only fiscal but also systemic in nature, contributing to the formation of prerequisites for private business participation.

Following the start of the full-scale invasion of Ukraine by the Russian Federation, international assistance became one of the key factors in the support, restoration and modernisation of critical water infrastructure, as confirmed by the initiatives of Updated Ukraine recovery... (2025), FAO launches a $150 million Emergency... (2025), and The European Bank for Reconstruction and Development... (2025). Against the backdrop of a decline in domestic investment resources, it was these sources that became the drivers of restoring the transport and logistics potential of Ukraine's river and port facilities. During 2022-2024, significant emphasis was placed on supporting logistics projects on the Danube, reconstructing facilities in the ports of Izmail, Reni and Ust-Dunaisk, and ensuring safe navigation. In 2023, the World Bank approved the allocation of $200 million for the development of critical infrastructure, part of which was directed towards dredging works at the mouth of the Bystre, which made it possible to restore navigation via an alternative sea corridor (Kolisnichenko, 2023a). Separate support was provided through the EU-Ukraine Solidarity Lanes (n.d.), within the framework of which measures were financed to increase the throughput capacity of Danube ports and improve integration with the European transport network. The volume and sources of support for Ukraine's water infrastructure are presented in Table 2.

Table 2. State financing of Ukraine's water infrastructure, 2020-2024 (million UAH)

Source of financing	Volume of support (million USD)	Main objectives
World Bank	200	Dredging, repairs, port modernisation
EBRD	120	Port infrastructure, export support
EU	100	EU-Ukraine Solidarity Lanes programme, technical assistance
FAO	35	Projects for adapting infrastructure to climate change
United States Agency for International Development, other donors	50	Logistics, navigation safety

Source: V. Kolisnichenko (2023a), The European Bank for Reconstruction and Development... (2025), EU-Ukraine Solidarity Lanes (n.d.)

An analysis of the data presented shows that the total volume of international financial support for Ukraine's water infrastructure exceeded USD 500 million, with almost half of the funds directed towards rapid-response projects in 2022-2023. International partners provided not only finance but also technical expertise, including assessment of the condition of critical facilities, modelling of export flows, logistics solutions and environmental impact. An in-depth analysis of the structure of financing Ukraine's water infrastructure shows that

during the period under study, significant changes occurred not only in the absolute volumes of financial resources but also in the ratio between individual sources of their formation. While before 2022 a development model prevailed that was based predominantly on state financing and limited attraction of private capital, since the beginning of the full-scale war a new financial architecture of the sector has been forming, in which international financial institutions, donor organisations and public-private partnership mechanisms are playing an increasingly important role. The growing importance of international financial support is explained not only by the need to restore damaged infrastructure facilities but also by the necessity of rapidly adapting the transport and logistics system to new operating conditions. The blockade of a significant part of maritime routes and the change in export routes caused substantial pressure on inland waterways and Danube ports. As a result, there arose a need for large-scale dredging works, modernisation of transshipment complexes, expansion of warehouse infrastructure, and renewal of navigation equipment. The role of the Danube transport cluster in ensuring Ukraine's export potential deserves particular attention. It was the ports of Izmail, Reni and Ust-Dunaisk that became important hubs for the transportation of agricultural products, metallurgical raw materials and other types of cargo during the period of military actions (Kolisnichenko, 2023b). As a result, cargo turnover at these ports increased several times compared to the pre-war period. At the same time, the rapid increase in transportation volumes revealed a number of infrastructure limitations related to insufficient berth capacity, a limited quantity of transshipment equipment, and the need to modernise logistics processes.

An analysis of international experience shows that the development of water infrastructure in EU countries is based on the principles of long-term strategic planning, integration of transport networks, and diversification of financial resources. As noted by Z. Xiao & J.S.L. Lam (2022), in most EU countries the financing of infrastructure projects is carried out through a combination of budgetary funds, credit resources of international financial institutions, grant programmes and private investment. It is precisely this model that ensures the resilience of infrastructure project implementation even under conditions of economic instability. For Ukraine, the use of a similar approach is becoming particularly relevant. Given the limited state financial resources and the significant scale of destruction caused by military actions, the further development of water infrastructure is impossible without the active attraction of external financing. At the same time, an important task is not only to increase the volume of investment but also to improve the efficiency of its use by enhancing the mechanisms of planning, monitoring and control over the implementation of infrastructure projects. An important area of water infrastructure modernisation is the introduction of digital technologies for managing transport flows. Under modern conditions, the competitiveness of transport systems is largely determined by the level of digitalisation of management processes. The use of automated vessel traffic monitoring systems, electronic document management, digital platforms for coordinating logistics operations, and technologies for forecasting cargo flows makes it possible to significantly reduce time and financial costs, increase the transparency of infrastructure facility operations, and minimise the risks of logistics delays (Raza *et al.*, 2023). In addition to the economic effect, investments in water infrastructure have a significant multiplier effect on the development of related sectors of the economy. The implementation of infrastructure projects stimulates the development of the construction industry, mechanical engineering, logistics, energy and the services sector. The creation of new logistics hubs and transport corridors contributes to the formation of additional jobs, increased business activity in regions, and expanded opportunities for attracting domestic and foreign investors.

At the same time, the analysis conducted makes it possible to identify a number of risks that may hinder the further development of the sector. These include a high level of war-related uncertainty, insufficient predictability of budget financing, lengthy approval procedures for infrastructure projects, and limited opportunities for insuring investment risks. The presence of these factors negatively affects the

investment attractiveness of the sector and may reduce the interest of potential investors in implementing long-term projects. In this regard, one of the priority areas of state policy should be the formation of a favourable institutional environment for attracting investment in the development of water infrastructure. This concerns improving the legislative framework, increasing the transparency of infrastructure project implementation, creating effective mechanisms of state guarantees, and ensuring the stability of the regulatory environment. The implementation of these measures will make it possible to create the prerequisites for the sustainable functioning of water infrastructure and its transformation into one of the key factors of Ukraine's economic recovery in the post-war period. FAO's technical assistance was particularly important in restoring irrigation systems and water intakes, as well as in equipping river harbours with communication facilities, GPS navigation, and hydrographic instruments (FAO launches a $150 million Emergency..., 2025). For its part, the EU supported the development of digital platforms for managing river transport and the throughput capacity of border logistics hubs (Ukraine: EU supports eQueue..., 2025). Thus, international assistance proved to be systemic, multi-level, and such that it not only compensated for losses but also created a new quality of logistics and water infrastructure. These initiatives enabled Ukraine, under critical conditions, not merely to preserve the functionality of river transport but also to adapt it to new geopolitical realities, making it a cornerstone element of agricultural export.

In the context of limited budgetary resources, the critical need for infrastructure restoration, and the strategic importance of waterways, Ukraine is actively implementing public-private partnership mechanisms as an instrument for attracting long-term investment in river and port infrastructure. During the period 2020-2024, PPP became one of the key forms of financing the modernisation of water transport, making it possible to attract private sector resources, reduce pressure on the state budget, and ensure flexibility in the implementation of infrastructure projects. PPP was most actively implemented in the field of port management. Thus, successful cases include the concession agreements at the ports of "Olvia" and "Kherson", signed before the full-scale invasion by the Russian Federation in 2022, the implementation of which nevertheless continued under extremely difficult conditions. Investors not only fulfilled their obligations regarding berth repairs but also launched new logistics services, including alternative channels for grain transportation by river (A memorandum was signed on the restoration..., 2025; "Kherson" specialized seaport concession, n.d.). Despite the military actions, these examples proved the effectiveness of PPP as an instrument for the development of the sector. Since 2022, an active dialogue has begun regarding the expansion of public-private cooperation mechanisms in the Danube delta (Kolisnichenko, 2023a). The Government of Ukraine has created conditions for private companies to invest in the creation of new transshipment terminals, the restoration of floating docks, and ship-repair capacities. In particular, in the territory of the port of Reni, a private operator launched a new transshipment line for agricultural products with a throughput capacity of over 1 million tonnes per year in 2023. The project was financed through the company's own funds and bank loans, but with state support through the simplification of permitting procedures. Table 3 demonstrates the key initiatives for the development of Ukraine's water infrastructure.

Table 3. Main PPP projects in the field of Ukraine's water infrastructure (2020-2024)

Facility	Type of project	Volume of investment (million USD)	Form of partnership	Results
Port of "Olvia"	Concession	125	PPP (concession agreement with QTerminals, Qatar)	Modernisation of berths, new warehouses
Port of "Kherson"	Concession	12	PPP with the company Risoil-Kherson	Restoration of terminals, attraction of cargo
Reni (terminal)	Private investment with state support	20	Investment project with simplified access to land	Creation of new capacities of 1 million tonnes

Table 3, Continued

Facility	Type of project	Volume of investment (million USD)	Form of partnership	Results
Ust-Dunaisk	Reconstruction of harbour	10	Support of private operators through the United States Agency for International Development programme	Renewal of navigation

Source: developed by the author based on V. Kolisnichenko (2023a; 2023b), A memorandum was signed on the restoration... (2025), "Kherson" specialized seaport concession (n.d.), "Olvia" specialized seaport concession (n.d.)

Considering the results of PPP implementation, it can be argued that one of the most significant achievements was the reduction of infrastructure's dependence on exclusively budgetary financing. The terms of partnership made it possible to attract innovations, technologies, and experience in managing port facilities. For example, the Qatari company that manages the port of "Olvia" introduced new logistics models that take into account the risks of the armed conflict and changes in export routes. The success of using PPP mechanisms is also confirmed by the active participation of international financial institutions – in particular, EBRD supports concession... (2020) and International Finance Corporation (IFC) and EBRD to help modernize Chornomorsk Port... (2021), which have repeatedly declared their readiness to participate in co-financing such initiatives. In addition to financial participation, these organisations provided advisory support and conducted assessments of the economic feasibility of projects. At the same time, the full-scale deployment of large-scale PPP in the water infrastructure sector requires the improvement of the regulatory framework. Law of Ukraine No. 2404-VI (2010) has undergone updates but still requires adaptation to wartime and post-war realities, in particular regarding investment security guarantees. The analysis conducted made it possible to generalise the features of financing the development of Ukraine's water infrastructure during the specified period and to assess the contribution of state, international and private sources to the restoration of port and river infrastructure. It was established that state financing predominantly ensured priority needs, while international support and private investment played the leading role in implementing modernisation and development projects. An analysis of public-private partnership mechanisms demonstrated the growing role of business in infrastructure modernisation. Enterprises, despite the risks, are initiating investments in river terminals, barge fleets, elevator capacities and transshipment hubs, particularly in the Danube basin. At the same time, legal and regulatory barriers significantly reduce PPP potential, which requires targeted reforms at the legislative level. As A. Pedko & O. Yemelianov (2025) emphasised, the experience of EU countries, in particular Poland, the Netherlands and Romania, could be integrated into the creation of a favourable institutional environment for implementing long-term infrastructure projects with the participation of private capital.

The results of the research conducted are generally consistent with the conclusions of contemporary scientific works devoted to the financial provision of water infrastructure development, water use, and institutional mechanisms of water resource management. Thus, O.I. Bondar *et al.* (2021) substantiated the need to diversify sources of financing the water sector and strengthen the role of investment mechanisms in ensuring its sustainable development. The results obtained in the present study confirmed this position, as it was established that exclusively budgetary financing does not provide the necessary volumes of water infrastructure modernisation, especially under conditions of martial law. The conclusions of D.O. Butskykh (2023) regarding the importance of state regulation in the field of water supply and sanitation also correspond to the results of this study. The author emphasised the need to improve institutional mechanisms for managing the sector. In turn, the analysis showed that the effectiveness of financial resource use largely depends on the quality of regulatory provision and coordination between state institutions. O. Labenko & M. Klymenko (2025) examined

the financial provision of water resource reproduction as a component of environmental economics. In contrast to their approach, this article focuses not only on the natural resource aspect but also on the logistics and transport function of water infrastructure. At the same time, both studies confirmed the need for long-term investment programmes and the combination of state and private sources of financing.

A. Pedko & O. Yemelianov (2025), in their comparative study of budget financing models for water supply in Ukraine and Group of Seven countries, proved the feasibility of using mixed financial models. The results actually confirmed this conclusion, as the greatest effectiveness in water infrastructure development was demonstrated by projects implemented with the participation of the state, international organisations, and private capital. N. Andryeyeva *et al.* (2021) substantiated the influence of state economic policy on the development of infrastructure and natural resource systems. The results obtained supplemented these conclusions, demonstrating that under conditions of military challenges, it is state policy that determines the priorities for allocating financial resources among various segments of transport and water infrastructure. M.V. Slobodianyk (2025) emphasised the need to ensure the financial and economic sustainability of water sector enterprises by modernising sources of financing and improving the efficiency of resource management. Similar trends were identified in this study regarding port and river infrastructure, where the level of sustainability directly depends on the diversification of financial sources. J. Berbel *et al.* (2017) and V. Vyhovska *et al.* (2022) examined economic instruments for stimulating rational water use. Despite the difference in the subject area of research, their conclusions confirm the importance of economic incentives as a factor in improving the efficiency of managing water resources and infrastructure facilities. Z. Derii *et al.* (2021) investigated problems of water use in the context of the sustainable development paradigm. In contrast to that work, the present study focuses primarily on the financial mechanisms of water infrastructure development. At the same time, both approaches demonstrated the need to combine economic, environmental and institutional instruments to ensure the long-term effectiveness of the water sector. Thus, the results of the research conducted do not contradict contemporary scientific approaches but extend them through a comprehensive analysis of state financing, international assistance, and public-private partnership mechanisms in the development of Ukraine's water infrastructure under conditions of full-scale war.

CONCLUSIONS

In the course of the research, it was established that it was river ports and shipping canals that ensured the stability of exports under conditions of the maritime blockade. The growth in transshipment volumes through the ports of Izmail, Reni and Ust-Dunaisk became a critical compensator for losses caused by the blockade of the Black Sea gateway. The materials analysed showed a 3.5-fold increase in cargo turnover at these ports over the period 2021-2023, which confirmed the effectiveness of resource mobilisation and management decisions under crisis conditions. At the same time, this dynamic could not have been sustainable without significant capital investment in the restoration of locks, dredging, the procurement of new vessels, and the repair of hydraulic structures. The implemented initiatives for the digitalisation of logistics processes, including systems for tracking the movement of cargo and vessels, indicated a gradual transition to a modern model of water infrastructure management. However, the pace of innovation implementation remained slower than in comparable sectors in European countries. This necessitated the stimulation of investment in technology startups capable of ensuring the accuracy, safety and predictability of logistics flows.

The overall results demonstrated that the main prerequisite for the long-term restoration of water infrastructure was the coordination of efforts between the state, international partners and private business. To this end, it is necessary to strengthen strategic planning, adopt a medium-term financing programme with transparent monitoring mechanisms, update legislation on inland water transport, and ensure scientific and analytical support for each project. It is emphasised that, in the future,

Ukraine could transform river infrastructure into one of the centres of post-war economic recovery, where waterways would serve not only for transportation but also as a mechanism for deeper integration into the European space of sustainable development. An important result of the study was the establishment of a direct relationship between the level of water infrastructure development and ensuring the resilience of Ukraine's agricultural exports. During the period of full-scale war, it was river transport corridors that made it possible to partially compensate for the loss of maritime port throughput capacity and to ensure the continuity of foreign economic activity. This provides grounds for considering the financing of water infrastructure not only as a sectoral instrument of transport policy but also as a component of the state's food security system and support for the competitiveness of the agro-industrial complex. The analysis conducted also demonstrated that further improvement in the efficiency of financial resource use requires the introduction of a comprehensive infrastructure project monitoring system that would ensure the assessment not only of the volumes of funds disbursed but also of the socio-economic results of the implementation of relevant measures. The prospects for further research should be linked to modelling the effectiveness of investment in water infrastructure, optimising sources of financing for post-war recovery, and assessing the impact of river logistics modernisation on the export potential and competitiveness of Ukraine's economy.

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None.

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Фінансування розвитку водної інфраструктури в Україні в умовах повномасштабних військових дій

Анотація. Метою статті було дослідження джерел, структури та механізмів фінансування розвитку водної інфраструктури України в умовах повномасштабних військових дій, а також обґрунтування напрямів удосконалення фінансового забезпечення галузі в контексті післявоєнного відновлення економіки. Особливу увагу приділено оцінці ролі державного фінансування, міжнародної фінансової допомоги та механізмів державно-приватного партнерства у забезпеченні функціонування річкової та портової інфраструктури. У процесі дослідження використано комплекс загальнонаукових і спеціальних методів, зокрема методи аналізу та синтезу, статистичного аналізу, порівняння, узагальнення, системного та інституційного підходів. Інформаційну базу дослідження становлять нормативно-правові акти України, статистичні матеріали державних органів влади, звіти міжнародних фінансових організацій, а також результати наукових досліджень у сфері розвитку транспортної та водної інфраструктури. За результатами дослідження встановлено, що у 2020-2024 роках відбулося суттєве зростання обсягів фінансування водної інфраструктури України, що було зумовлено необхідністю забезпечення альтернативних логістичних маршрутів в умовах блокування

частини морських портів. Зокрема, загальний обсяг державного фінансування галузі зріс з 470 млн грн у 2020 році до 2,77 млрд грн у 2024 році, а залучена міжнародна допомога у 2022-2024 роках перевищила 500 млн дол. Визначено основні джерела фінансового забезпечення галузі, серед яких державний бюджет, міжнародна фінансова допомога та інвестиції, залучені через механізми державно-приватного партнерства. Обґрунтовано зростання стратегічного значення дунайських портів та внутрішніх водних шляхів у забезпеченні експортної діяльності та підтриманні економічної стійкості держави. Наукова новизна дослідження полягає у комплексній оцінці сучасної структури фінансування водної інфраструктури України в умовах воєнного стану та визначенні особливостей взаємодії державних, міжнародних і приватних фінансових ресурсів у процесах її розвитку та відновлення. Практична значущість отриманих результатів полягає у можливості використання сформульованих висновків і рекомендацій органами державної влади, суб'єктами господарювання та потенційними інвесторами під час розроблення програм модернізації водної інфраструктури та формування ефективної фінансової політики у сфері транспортної логістики

Ключові слова: транспортно-логістична система; публічно-приватне партнерство; міжнародна фінансова допомога; відновлення; річкові коридори