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## **MANAGEMENT PROCESSES OF INFRASTRUCTURE PROJECTS AND PROGRAMS IN THE SPHERE OF WATER TRANSPORT DURING TURBULENCE IN UKRAINE**

## **ПРОЦЕСИ УПРАВЛІННЯ ІНФРАСТРУКТУРНИМИ ПРОЄКТАМИ ТА ПРОГРАМАМИ У СФЕРІ ВОДНОГО ТРАНСПОРТУ ПІД ЧАС ТУРБУЛЕНТНОСТІ В УКРАЇНІ**

The authors of the article describe the logical chain of influence and parameters of this infrastructure on the parameters of transport services in Ukraine and the competitiveness of the transport system in conditions of turbulence. The main types of infrastructure projects in water transport are modernization, reconstruction, renovation, development of existing facilities and construction of new facilities. The authors of this study defined the results of infrastructure projects as newly built or modified (rehabilitated, replaced, modernized or developed) infrastructure facilities. The nature and characteristics of infrastructure projects in water transport (the process of transportation, transportation and delivery of goods) were determined. Thus, the transport infrastructure during military influence (its material components) directly affects the quality of the transport process and servicing of goods and vehicles.

**Keywords:** water transport economics, maritime logistics, infrastructure project, innovation, turbulence, investments.

Автори у статті описують логічний ланцюжок впливу стану та параметрів інфраструктури на параметри транспортних послуг в Україні та конкурентоспроможність транспортної системи в умовах турбулентності. Головними типами інфраструктурних проєктів на водному транспорті є модернізація, реконструкція, реновація, розвиток існуючих об'єктів та будівництво нових об'єктів. Автори цього дослідження визначили результати інфраструктурних проєктів як новозбудовані або модифіковані (реабілітовані, замінені, модернізовані або розвинуті) об'єкти інфраструктури. Було визначено природу та характеристики інфраструктурних проєктів на водному транспорті. Це має вплив на характеристики транспортного процесу (процес перевезення, транспортування та доставки вантажів). Перш за все, це виражається в термінах часу, вартості та рівні обслуговування. Таким чином, транспортна інфраструктура під час військового впливу (її матеріальні складові) безпосередньо впливає на якість транспортного процесу та обслуговування вантажів і транспортних засобів. Автори визначили можливі портфелі різних розмірів і категорій програм з обслуговування, встановивши системний зв'язок між суднами, портами, інфраструктурними проєктами в секторі водного транспорту у повоєнний час в Україні. На практиці майбутні оператори інфраструктурних об'єктів здебіль-

шого виступають інвесторами відповідних інфраструктурних проєктів та програм з відновлення секторів економіки. У процесі дослідження було виявлено, що категорія спеціальних інфраструктурних проєктів з управління (експлуатації) об'єктами інфраструктури пов'язана з інфраструктурними повоєнними програмами відновлення. На думку авторів, практичне застосування результатів дослідження може підвищити релевантність процесу прийняття рішень, пов'язаних з інфраструктурою, шляхом врахування системних зв'язків інфраструктурних об'єктів як ефективність результатів проєкту. Таким чином, подальші дослідження в цій сфері мають широкий діапазон перспективи та глибину розгляду.

**Ключові слова:** економіка водного транспорту, морська логістика, інфраструктурний проєкт, інновації, турбулентність, інвестиції.

**Statement of the problem.** Today, transport as the economic infrastructure of Ukraine is a specific sector of the Ukrainian economy, especially in conditions of military influence, turbulence and is solely involved in the production of goods and technical production processes in all sectors of the economy. Unfortunately, the infrastructure that supports the export potential of this sector is often in a neglected state, which creates opportunities for investment and the need for modernization, affects the level of transport costs in Ukraine and the overall efficiency of production. The transport sector is recognized as one of the most important components of the overall infrastructure of the economy, since it is constantly connected with the development of all productive forces of the economy. Let us briefly describe the current state of the problems of the development of transport infrastructure in Ukraine, including water transport, and the necessary prospects. Most wartime infrastructure projects in Ukraine are characterized by high investment costs and long payback periods.

**Analysis of recent research and publications.** Today, if the relevant infrastructure program is not managed properly, then to ensure the success and effectiveness of such a project, an appropriate theoretical basis for its management is necessary. The modern methodology of organizational and economic management of infrastructure projects is based on the works of: Hutsaliuk O.M. [1], Piterska V.M., Vaisman V.O., Fesenko T.V., Chimshir V.I. The methodology of economic management in the field of water transport is presented in the works of such specialists as Zakharchenko O.V. [2; 6; 7], Darushin O.V. [3; 11; 12]. Certain problems of infrastructure project management are considered in the works of: Guo X. [9], Lozova T.P. [10], and Tarakanov M.L. [13], but the problem of managing the products of infrastructure projects in conditions of military influence is not sufficiently of interest to modern scientists.

**Formulation of the research task.** The purpose of the study is the management processes of infrastructure projects and programs in the field of water transport during military influence in Ukraine. The task of the study is to establish the essence, specificity and systemic relationships of infrastructure projects in the field of water transport.

**Summary of the main research material.** It should be noted that the water transport sector of Ukraine includes a combination of river and sea ports and infrastructure. Ukraine's competitive advantage is that all ports on the Black Sea coast are warm-water and have year-round access to the Mediterranean Sea and the Atlantic. The introduction of intermodal and technological solutions to meet Ukraine's diversified needs for imports and exports is an opportunity for additional investments in the post-war period. According to generally accepted ideas, infrastructure is a system that ensures the functioning of

other systems; these systems are subsystems. The main tasks of infrastructure at the regional level are defined in [1, p. 351]. In order for the transport system to achieve the necessary (desired) level of transport potential and competitiveness, the state of the infrastructure must reach a certain level, which is the main goal of the infrastructure project. This will allow ensuring the capacity and competitiveness of the transport system at a certain level. In other words, "the transport infrastructure of the region should guarantee the necessary conditions for the functioning of key industries and contribute to the effective use of the economic potential of the region". This perspective is applicable to transport infrastructure at all levels – urban, regional and national. Transport systems can be divided into separate transport subsystems, such as maritime transport and water transport, including rivers. Vehicles and transport infrastructure can be further divided into sectoral subsystems. It should be noted that currently there is no clear definition of the term "water transport infrastructure" [4, p. 161]. In the industry, water transport infrastructure is understood as a set of interconnected structures and objects that ensure the performance of various transport and related tasks on water transport. According to the generally accepted point of view, water transport infrastructure (in the context of hard infrastructure) includes waterways, information and navigation facilities, ports and companies providing services on waterways. Ports as a complex of technical structures are designed for the reception, storage, processing and transportation of cargo, embarkation and disembarkation of passengers, maintenance, repair and safe storage of transport vessels and interaction with related modes of transport [2, p. 523]. Therefore, such complexes include berthing and protective hydraulic structures, loading and unloading equipment and machinery, railways and access roads to the port, warehouses and well-equipped highways. It should be noted that development refers to qualitative changes in the system and that these changes are primarily the result of qualitative changes in subsystems or elements (for example, the depth of the bottom in the area of the berths or entrance channels). In addition, development as the acquisition of new characteristics by the system can also occur due to "quantitative growth", that is, the emergence of new elements or subsystems. This can lead, for example, to an increase in the throughput capacity of the port. "Renovation" can also be considered as one of the types of infrastructure development. "Improvement of existing facilities" is aimed at changing the nature of the infrastructure. For example, deepening the bottom of channels and berths allows ports to receive larger vessels [3, p. 120]. Increasing transit capacity and updating the port fleet are also examples of infrastructure improvement, in figure 1.

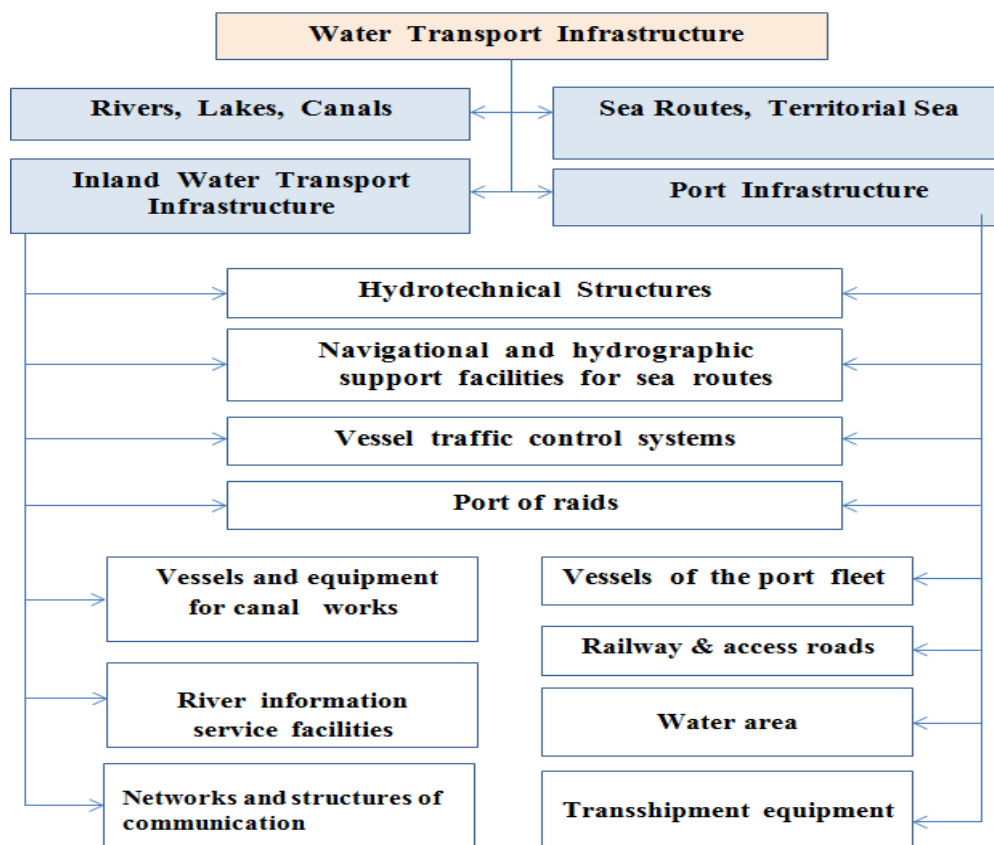


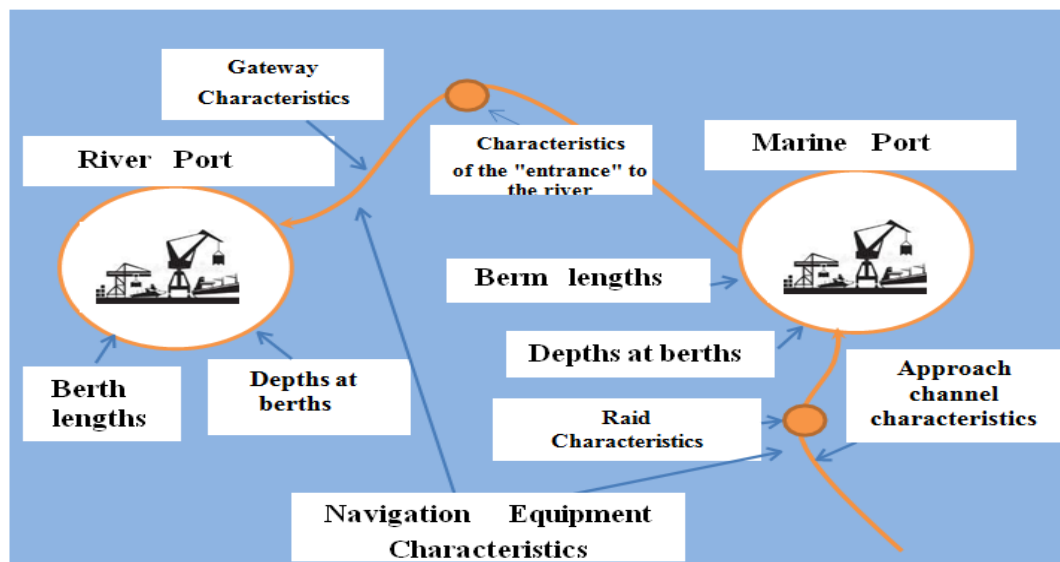
Figure 1. Composition of water transport infrastructure of Ukraine

Source: developed by the authors

Please note that modernization is one of the options for infrastructure development, and the proposed classification is not basic. However, modernization only applies to equipment and machinery and does not extend, for example, to waterways. Modernization is a “weak form of development” that does not fundamentally change the parameters or characteristics of the infrastructure. Construction of new facilities is the largest list of projects, ranging from new information, navigation and water systems to new ports and canals. Activities classified as infrastructure projects are selected in accordance with the logic of the systems approach. The system (in this case, the infrastructure) can be supplemented with new elements (creation of new facilities – global dimension), modernization of existing facilities (local quantitative dimension – increasing the number of facilities in existing subsystems, for example, the number of vessels in the port fleet, the number of transshipment capacities) or qualitative changes (modernization, repair and renewal – qualitative dimension) is supplemented [6, p. 314]. General infrastructure improvements, in other words, fundamental changes in the transport infrastructure. Even if the renewal of port vessels and cargo handling equipment is not actually considered an infrastructure project, these measures can still be attributed to infrastructure improvements, since they are part of it. However, the operation of an infrastructure facility, which can be defined as a project, is not considered an infrastructure project, since as a result of the implementation of the project nothing happens to the

infrastructure, but it brings financial benefits. After all, many infrastructure projects are implemented to fulfill the main goal of any infrastructure – improving the quality of life in Ukraine, especially during martial law – and not necessarily in connection with obtaining financial benefits or assistance. Naturally, ports are the “meeting points” of shipping (rivers) and related modes of transport. In addition, ports provide a wide range of services, not only the transshipment of cargo, which requires the appropriate infrastructure. Waterways are divided into internal and external. External waterways are seas or oceans where the water depth exceeds the draft of the vessel and therefore function in a practically natural state. Thus, generalizing these definitions and taking into account the above considerations, an infrastructure project is defined as the creation, modernization and development of infrastructure facilities [7, p. 21]. Moreover, some companies build and develop their own infrastructure (especially transshipment facilities) in modern ports [9, p. 183]. Special navigation measures and fleet operations are used only in cases where the water depth required for navigation is not guaranteed, for example, on the approaches to coastal landmarks (e.g. lighthouses), in shallow harbors and mouths of large rivers. Specifying how water transport infrastructure affects the characteristics of transport services in river and marine ports, in figure 2.

Therefore, given the established nature and results, water transport infrastructure projects can be interpreted as follows: A water transport infrastructure project is defined as an infrastructure project aimed at improving



**Figure 2. Impact of water transport infrastructure condition on services market in ports**

*Source: compiled by the authors based on open data [5]*

the quality of life in a country and increasing the quality of life in this country. Waterways are intended for the movement of vessels and can be divided into natural (rivers, lakes and seas) and artificial (canals, sluices with reservoirs and sections of rivers with regulated flow) [8, p.200]. Specialized dredgers ensure that waterways are maintained in good condition. Ship repair companies maintain and repair ships. Technical means of ship control (communication and navigation systems) ensure the exchange of information and the safety of navigation. The main task of water transport infrastructure is to provide the necessary conditions for efficient and safe sea, river and combined transport. Thus, it is obvious that transport infrastructure in Ukraine requires great attention, and to improve its level it is necessary to implement a number of infrastructure projects. Transport infrastructure, both at the regional and national levels, must provide the necessary conditions for the effective provision of freight (passenger) transport services market [14, p. 280]. According to the above definition, port infrastructure also includes transshipment complexes, railways and power lines. Thus, taking into account the above considerations and definitions, water transport infrastructure is a combination of waterways and shipping routes, inland waterway infrastructure and port infrastructure. The water transport infrastructure itself is a set of different subsystems, each of which can be considered as an independent system with certain connections with the external environment, some of which are connections within the system "water transport infrastructure". In addition, given the importance of transit transportation for the country's economy, the transport infrastructure must provide favorable conditions for attracting transit transportation [13, p. 93]. Thus, the water transport infrastructure must provide the necessary conditions for the relevant transport sector at all the levels listed above. Adequate transport infrastructure guarantees a certain level of transport services in post-war Ukraine in terms of cost, time, quality and safety. Efficiency of the transport sector and competitiveness of domestic

products (minimization of transport costs and ensuring competitive prices) [10, p. 42]. It should be noted that sea and river transport are part of the delivery process, in which at least two types of transport are used. In other words, sea and river transport includes, for example, the transportation of goods to ports by rail or road transport. Increasing the throughput capacity of ports without increasing the throughput capacity of access roads will not give the necessary results in terms of time and quality of transportation [12, p. 184]. For example, water transport infrastructure is subject not only to "moral" obsolescence, but also to natural "wear and tear" to a greater extent than other types of transport systems. This is due to the "aggressiveness" of the water environment and natural processes (sedimentation). Therefore, each water transport infrastructure object has a certain life cycle, and maintaining it in good condition (and not development) is part of this cycle [11, p. 180] and represents a basic infrastructure scheme that includes "maintenance" and "upgrade" at the "post-construction" and "operational" stages. However, improving the economic components of processes in water transport infrastructure alone is not enough to increase its efficiency in water, sea and freight transportation. Thus, the existing parameters and characteristics of water transport infrastructure provide a certain level of transport services for the transportation of goods by water transport, which determines the level of competitiveness and transportability of the transport system of Ukraine as a whole.

**Conclusions.** As a result of the analysis of this study, it should be concluded that the problems of organizational and economic management of infrastructure projects in water transport in the post-war period are relevant, starting with the definition of their essence and characteristics, ending with the absence of economic factors and the presence of practical requirements for infrastructure facilities. The authors of the study found that the infrastructure index in Ukraine is very low, and the transit potential has not been realized. This is due to Ukraine's participation in transport structures (corridors, hubs) that

are under military influence. The authors analyzed the main trends and directions of development of the post-war transport infrastructure of Ukraine, especially water transport. Thus, the water transport infrastructure should provide the necessary conditions for the safe and effective operation of water transport and the competitiveness of the transport system of Ukraine. Since the adaptation of the results of infrastructure projects & program to the

problems of economic justification of parameters during the preparation period and changes in the conditions of implementation and financing, as is observed in the current situation in Ukraine, is of crucial importance for ensuring the success and financial efficiency of infrastructure projects. Research in this area has a wider scope and depth, and further development of these scientific studies is expected in the future.

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