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MARITIME CLUSTERS AS AN INNOVATIVE FORM OF DEVELOPMENT OF COASTAL REGIONS OF UKRAINE

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Abstract. The subject of the research is the scientific substantiation of the theoretical foundations and development of recommendations for the creation and functioning of maritime clusters in Ukraine as an innovative form of development of coastal regions. *Methodology*. General scientific methods used in the study, in particular: theoretical generalization; methods of positive and normative analysis, statistical analysis. The *aim* is the scientific substantiation of the theoretical principles and development of recommendations for the creation and functioning of marine clusters in Ukraine as an innovative form of development of coastal regions. *The conclusion of the study*. The analysis showed that the dynamics of profitability indicators against the background of a gradual increase in gross profit of enterprises in 2010–2013, 2016–2018 and 2019–2020. It should be noted that in 2014, 2015, 2017 and 2018 the enterprises of transport and logistics industry of Ukraine were unprofitable, which indicates an increase in the growth rate of costs over profits. However, Russia's war against Ukraine has made significant adjustments to the efficiency of transport and logistics companies. Due to the blockade of ports, the economy loses about $170 million every day. Ukraine has currently lost control of four ports: Mariupol, Berdyansk, Skadovsk and Kherson (concessionaire – Risoil and Georgian Industrial Group).
As the results of the study showed, the coastal regions of Ukraine currently need a separate public policy. For this purpose it is necessary to mobilize the scientific potential of Ukrainian marine biologists, geographers, specialists in the field of maritime and environmental law and economics, as well as to initiate cooperation of central, regional and local authorities in the cluster development of the maritime complex in coastal regions.
The development of clusters is a distinctive feature of the modern innovation economy. The topic of clusters is becoming increasingly relevant for both theory and business practice all over the world. Clusters have become an effective tool for the development of individual areas and regions, which has contributed to improving overall national competitiveness for many countries. In this regard, further research can be aimed at developing a comprehensive mechanism for the functioning of marine clusters (classified in this study) in specific coastal regions as an innovative form of sustainable development of these regions, as well as the implementation of this mechanism in the domestic practice of national economic management.

Key words: coastal region, maritime cluster, maritime ship repair and shipbuilding cluster, maritime transport and logistics cluster, maritime fish cluster, maritime tourism cluster, maritime research and education cluster.

JEL Classification: F29, O18, R58

1. Introduction

Various aspects of innovation processes and factors influencing them develop unevenly in different regions of Ukraine. Probably this tendency has formed because socio-economic conditions of innovative activity in one or another region mainly depend on the activities of local authorities, which build their policy on the principle of leveling conditions and opportunities in different regions. At the same time the innovation policy carried out by the local authorities is primarily formed under the influence of the resources available in the region. It is obvious that the reduction of measures to stimulate regional innovation processes will increase the differentiation of territorial

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formations of Ukraine by the level of their innovation development. Modern regional policy of the EU member states focuses on the aspects of implementation of the policy of regional development of coastal areas, using the principles of economic growth based on innovations. Given the strategic importance of coastal regions for the development of the country, the use of their innovation potential becomes especially relevant in the conditions of European integration of Ukraine.

Some aspects of innovation development of the coastal regions of Ukraine have been considered by the researchers Polyakova Yu.V. (2016), Mokiy A.I., Polyakova Yu.V., Vlasenko L.V. (2017). However, these studies do not mention the maritime and coastal potential, that is, the specific resources available in coastal regions, which constitute an important factor for the implementation of innovation policy in these territorial units of Ukraine.

Results of the present research, undoubtedly, have theoretical and practical value. They illuminate actual problems and prospects of innovative development of coastal regions of Ukraine, estimate the level of innovative activity at the enterprises of coastal regions in comparison with the enterprises of other regions of the country. At the same time there are still unresolved questions of cluster development of maritime complex in coastal regions of Ukraine, although it is a distinctive feature of modern innovation economy.

The aim of the article is the scientific substantiation of the theoretical principles and development of recommendations for the creation and functioning of marine clusters in Ukraine as an innovative form of development of coastal regions. Accordingly, the study sets the following tasks:

– to systematize conceptual approaches to interpretation of the term "maritime cluster";
– to study the principles, major stages and measures of the formation of a maritime cluster in a coastal region;
– to propose a functional classification of maritime clusters;
– to substantiate the feasibility of their creation and operation in the coastal regions of Ukraine with the purpose of intensification of innovation activities.

The regional development policy of EU member states' coastal territories is closely integrated with innovation and research policy. It involves the general principles of economic growth based on innovation.

2. Analysis of the effectiveness of the transport and logistics industry of Ukraine during the war

The development of these indicators in dynamics will indirectly characterize the directions of implementation of economic, social and environmental priorities in the transport sector of Ukraine. Figure 1 shows the dynamics of profitability and profitability of enterprises of transport and logistics sector of the country for the period 2010–2020.

The dynamics of profitability indicators show that against the background of a gradual increase in gross profit of enterprises in 2010–2013, 2016–2018 and 2019–2020. It should be noted that in 2014, 2015, 2017 and 2018 the enterprises of transport and logistics industry of Ukraine were unprofitable, which indicates an increase in the growth rate of costs over profits. Thus, one of the main priorities of sustainable development, namely the transition of the industry to a break-even point by reducing costs and increasing the efficiency of resource use, is not performed at the proper level. The main causes of losses in the industry are, first of all, the state of transport infrastructure, which prevents the development of fuel-efficient speeds, high rates of duties and taxes, which encourages individual entrepreneurs to reduce profits, underutilization, especially of port and railway infrastructure, reduced business activity and reduction of the transit territory of Ukraine.

Improving the economic efficiency of the transport and logistics industry requires, above all, the formation of clear, understandable and transparent conditions for doing business by minimizing bureaucratic pressure, creating mechanisms to encourage investment in the industry, including innovation, increasing public investment in important infrastructure projects, increasing the effectiveness of decision-makers and ministries in the implementation of international agreements and the responsible use of foreign investments and loans.

It is no coincidence that Russian attacks are increasingly targeting transportation infrastructure. As a result, thousands of wagons and trucks carrying grain and metal cannot leave for the European Union (EU), and diesel tankers and gasoline tankers, weapons, and humanitarian aid cannot leave Europe for Ukraine.

Ukraine's seaports are normally used to export more than 70 percent of all cargo worth about $47 billion. However, since February 24, these seaports have been blocked by the Russian navy and anti-ship mines. As a result, hundreds of thousands of tons of cargo have been trapped in ports and on ships in Ukraine. Some of this cargo has been removed by road and rail, while the bulk has been shelled or seized by the Russian military (Kyiv Post, 2022).

Ports are more important for the trade balance than for Gross Domestic Product (GDP). Due to the port blockade, the economy loses about $170 million every day. Ukraine has currently lost control of four ports: Mariupol, Berdyansk, Skadovsk and Kherson (concessionaire – Risoil and Georgian Industrial Group). Currently, transshipment is only possible on the Danube River, via the ports of Izmail, Reni and Ust-

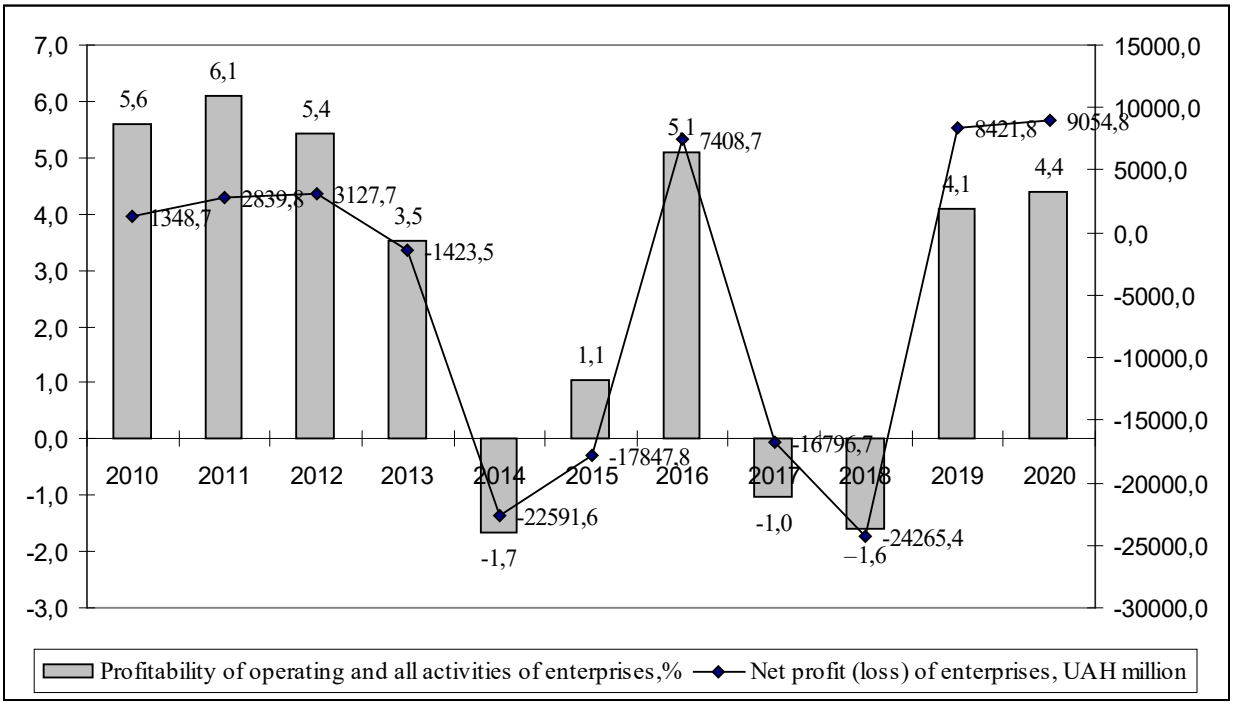

Figure 1. Dynamics of profitability and profitability of enterprises of the transport and logistics industry of Ukraine in 2010–2020

Source: State Statistics Service of Ukraine (2022)

Dunaisk. To date, these sites have accumulated cargo belonging to Ukrainian farmers, waiting to be shipped.

Since the beginning of the war, general freight traffic by rail has changed dramatically. Previously, a large share of export cargo was transported to the ports of the Black Sea. At present, it remains possible to transport export cargo only to the ports remaining at the mouth of the Danube (Izmail, Reni, Kiliya, Ust-Dunaisk) or the western border crossings.

Unfortunately, only about 55% of this available capacity is used. Daily transshipment of cargo from all connections is just over 1,900 cars (124,000 tons), covering a range of commodities. As for grain, only 43% of the potential is used per day (314 grain wagons carrying about 21,000 tons).

But cross-border infrastructure projects require large infrastructure investments and EU funding in the form of grants and financial assistance from the European Commission. That is why the formation of logistics clusters as a form of innovative development in wartime is crucial.

3. Formation of sea clusters as an innovative form of development of coastal regions of Ukraine

Marine shipbuilding and ship repair cluster. At present, the shipbuilding industry of Ukraine is in a critical condition, and the negative phenomena have even intensified recently. Russia's aggression against Ukraine has led to significant structural changes in the industry, as well as to acute social problems in coastal regions, where shipbuilding is to some extent city-forming. Establishment of a shipbuilding and ship repair cluster is primarily aimed at improving the competitiveness of coastal regions, development of their maritime and export-oriented industry, as well as improving coordination within the cluster.

For example, the maritime cluster of Hamburg, Germany, is one of the world's shipbuilding and ship repair centers. The German government has turned the port of Hamburg into a major transport and logistics center of Northeast Europe. A financial center was created within the cluster to support the shipbuilding industry.

Germany supports cluster initiatives at the federal and regional levels. At the federal level, a Maritime Coordinating Council was established under the Federal Ministry of Economics and Technology to promote cooperation among German maritime industry sectors. At the regional level, a number of studies have been carried out with the support of the Hamburg government to develop policies and frameworks for cluster initiatives. The first practical result was the establishment of the Hamburg School of Logistics in 2003.

Norway's maritime cluster is considered a cluster of global importance. It includes ship owners, shipbuilders, ship equipment manufacturers, brokers, financial experts, insurers and consultants. The

cluster specializes in shipping. The total number of members is 600 people. The member organizations include the Norwegian Shipowners' Association, the Federation of Norwegian Manufacturing Industry, the Metallurgical Industry Association and the Norwegian Maritime Officers' Association.

The general body of the Norwegian Maritime Cluster is the Maritime Forum, founded in 1990. It is open to Norwegian companies and organizations related to the maritime industry and includes both employers and employees. The Norwegian Maritime Forum brings together hundreds of participants and provides a framework for joint projects in the maritime sector and cooperation with the Norwegian Research Centre, which develops innovation as Norway's main competitive advantage and coordinates EU maritime research. The function of service and maintenance of maritime activities is performed by the maritime service cluster in Oslo (Development in the Norwegian maritime cluster, 2004).

Maritime transport and logistics cluster. At present there are enough prerequisites for the formation of maritime transport and logistics clusters (also called port clusters) in the Odessa, Mykolaiv and Kherson regions and on the Sea of Azov. They will increase the competitiveness of Ukrainian ports by attracting investment, building new terminals and providing port facilities to private enterprises on the right of concession.

By the way, Singapore's maritime cluster is based on port activities, shipping, shipbuilding and ship repair. As a port, it is on par with Rotterdam, handling about 300 million tons of cargo annually. The cluster is known as a ship registration center. Many shipping companies based in Singapore contribute to a higher concentration of service companies around them. Such companies provide agency, logistics, financial, marine insurance, legal and arbitration services. From the beginning, the government's goal has been to make Singapore the world's leading integrated logistics center with huge air and land transportation (The Maritime and Port Authority of Singapore, 2022).

Seaside cluster of fish and seafood. The formation of a cluster for the production of fish and seafood in coastal regions of Ukraine will enable the effective development of available resources. The potential of the Black Sea and Azov Sea gives an opportunity to involve in the economic turnover additional 300-400 thousand tons of undeveloped marine biological resources. This will allow:

– loading up the capacities of coastal fish-processing enterprises;
– increasing the volume of production of deep-processed products (fillets, klipfish) upon enterprise modernization;
– expanding the product range on the basis of innovative technologies.

An active increase in the volume of deep processing products from marine biological resources will become the dominant contributor to the gross domestic product of the fishing industry (The Maritime and Port Authority of Singapore, 2022). The publication considers the fish cluster as the integration of the basic production corporation engaged in the catching and processing of marine biological resources with the corporate entities of related industries. Such a meso-economic cluster system of the fishery complex includes three main subsystems:

– mechanisms for interaction of state and regional authorities, local government, public and professional organizations;
– a complex of basic elements, including shipbuilding and ship repair, fishing and seafood production, seafood processing, storage, packaging and sale, as well as innovation infrastructure;
– a complex of uninterrupted supply and sale of fish products (The Maritime and Port Authority of Singapore, 2022).

A similar structure of the fish cluster is presented in (Markova, 2017). It includes the same three main subsystems: 1) a set of basic elements, including production and experimental fish farms, mariculture enterprises (marine farms), integrated industrial processing of aquatic biological resources, storage, packaging and sale of seafood, shipbuilding and ship repair, and innovative infrastructure; 2) mechanism of interaction between national and regional authorities, local government, public and professional organizations; 3) complex uninterrupted supply and sale of fish products.

Regional clusters based on fishing and seafood complexes of the Black Sea and Azov Sea regions of Ukraine have the following distinctive features:

– they are based on the region-specific branch, the share of which exceeds the average share of the region's economy (GRP) on appropriate national and world markets;
– the growth rate of the cluster's product output exceeds the average growth rate of the GRP;
– taking into account specific costs and quality of products, the clusters are as competitive as appropriate economic sectors of other countries and regions; there are scientific and educational foundations, transport and energy infrastructure for its development;
– there is sustainable cooperation of cluster industries, which serves as a basis for the formation of network organizations utilizing cutting-edge information technologies, value chains, common production, supply and management standards, and cluster brands;
– it is possible to establish state and/or public cluster management bodies comprising the middle level of economy (The Maritime and Port Authority of Singapore, 2022).

Sea Tourism Cluster. Among European states, the cluster model of tourism organization is already being implemented by Italy, France and Norway. For example, Norway has tourism clusters developing in the maritime industry. In France, the Nice tourist cluster is annually visited by several million tourists, which corresponds to almost 1% of the world tourist turnover. Similar high-efficiency models operate in Belgium, Greece, Ireland, Spain, Scotland and Sweden. The cluster organization of tourism in Italy has a high level of scientific justification. For example, some regions of the country have special conditions, such as prerequisites for the development of several types of tourism, significant tourist resources, the value of the tourist area, etc. Examples of the Italian clusters include tourist systems Lake Trasimeno in Umbria, Salina Hot Springs in Sicily, Adriatic Sea and Coast, and Cities of Arts, Culture and Business both in Emilia-Romagna (Kovalva & Alysheva, 2014).

Considering the sphere of development of marine recreation in coastal regions of Ukraine, we can note the great prospects of the Kinburn Spit cluster in the Mykolaiv region. Other tourist clusters can also be created with the help of public-private partnership. Scientific and educational institutions, private enterprises and government agencies should cooperate to promote sustainable tourism development, provide high-quality tourist services, stimulate and retain demand, as well as promote employment of local people in this area.

Cluster of maritime research and education. This cluster cannot do without qualified personnel and the accumulation of a critical mass of unique maritime knowledge. For example, the government of Singapore is taking steps to strengthen the competitiveness of this maritime center by supporting the training of relevant professions, the introduction of advanced information technology and e-commerce, and significant investments in scientific research. In 2003, 100 million Singapore dollars were allocated to develop a maritime technology cluster strategy; a fund of another 80 million was established to promote the cluster. Four specialized training courses have been established at universities in Singapore: maritime law, maritime economics, shipping, shipping management and maritime business (The Maritime and Port Authority of Singapore, 2022).

The educational system of Mykolaiv also provides training for the professions required in maritime clusters. For half a century, the Faculty of Maritime Economy (known as the Faculty of Engineering and Economics until 2013) of the Admiral Makarov National University of Shipbuilding (NUOS) has been providing students with appropriate knowledge and practical skills. Currently, the faculty offers higher education in the following specialties: business economics, international economics, management and administration of enterprises, logistics and supply chain management, management of hotel and tourist business, finance, banking and insurance, accounting and auditing in accordance with international standards.

As the maritime education cluster is formed and developed, the Faculty's seminars, conferences and workshops at the NUOS may touch on further cluster development of the maritime complex, quality management, strategic planning, introduction of latest technologies, legislative and regulatory support, financial activities, etc. Systematic information and methodological support for cluster participants, whose activities are related to the regional maritime complex, will greatly contribute to their professional development. As Professor V.N. Parsyak (Parsyak, 2014) notes, the maritime economy of the country is unthinkable without higher education institutions with the research and educational services they provide. In turn, universities must make changes in response to the needs of the business environment, not just adapting to its current state, but anticipating its progress (Parsyak, 2014). This scheme is usually used by countries that are heavily dependent on the development of the maritime complex.

Multibranch maritime cluster. Ukrainian scientists advocate an approach to creating cluster systems that involves enterprises from various sectors of the economy, social sphere, and research organizations. A similar approach is noted in the creation of the Maritime Cluster of Bulgaria (Marine Cluster Bulgaria, 2022) (areas of activity of the companies involved: transport and logistics, navigation and embedded systems, shipbuilding, coastal and maritime tourism) and the Cluster Delta Danube (Clusterul Delta Dunarii, 2022) (areas of activity of the companies involved: hospitality and tourism, food additives, ingredients, functional food, food processing, ecotourism, accommodation (hotels, campsites)), which include universities, governmental and local business support organizations, shipping, tourism and recreation, and food companies.

The goals of such a cluster can be the following: achieving sustainable development of the coastal region through cooperation of enterprises, organizations, educational and research institutions, regional and national authorities for economic growth using specific regional resources and opportunities, technological modernization, innovation and integration of the cluster into the global economy.

Indeed, coastal regions are complex systems that include geographical, economic, ecological and social subsystems. Their attractiveness is associated with the intensification of their economic development and requires a comprehensive study of the possibilities of their sustainable development. Thus, the maritime

potential of a coastal region is the most accurate characteristic of its economic significance. By maritime potential we mean the aggregate ability of economic sectors and industries that make up the maritime complex of the coastal region to carry out production and economic activities, meet the needs of the population and ensure the sustainable development of the country's maritime activities – and all this with the help of the principle of cluster organization.

The basic principles of warehouse logistics are presented. These include: consistency, coordination and integration, optimization, sustainability and adaptability, cost reduction, TQM, use of modeling and automation. It is proved that these principles of warehouse logistics allow to provide timely and quality services for storage, processing and shipment of inventory, provide interconnection of the warehouse with the services of supply, storage, transportation and shipment of inventory. It has been proved that the decisive role in the management of warehouse logistics belongs to planning. The main objectives of integrated logistics planning include: the allocation of work areas and equipment on them, minimizing costs, increasing the level of cargo handling and warehouse capacity, increasing throughput capacity. Organizational and functional model of innovative transformation of regional transport and logistics systems, which together will contribute to the intensification of innovative development, engineering and re-engineering of warehouses and transport and logistics entities in general and the construction of modern logistics centers that provide high quality services using the latest technology, was substantiated (Irtyshcheva, Voit, & Nosar, 2021).

Until recently, most Ukrainian reformers paid little attention to the coastal regions of Ukraine. However, modern conditions make these regions a subject of sustainable development of the country within the framework of a completely new national economic space, which has been formed over the past two years. Sustainable development of coastal regions depends on effective state management of regional development and realization of the economic potential of these territories.

5. Conclusions

The analysis showed that the dynamics of profitability indicators against the background of a gradual increase in gross profit of enterprises in 2010–2013, 2016–2018 and 2019–2020. It should be noted that in 2014, 2015, 2017 and 2018 the enterprises of transport and logistics industry of Ukraine were unprofitable, which indicates an increase in the growth rate of costs over profits. However, Russia's war against Ukraine has made significant adjustments to the efficiency of transport and logistics companies. Due to the blockade of ports, the economy loses about $170 million every day. Ukraine has currently lost control of four ports: Mariupol, Berdyansk, Skadovsk and Kherson (concessionaire – Risoil and Georgian Industrial Group).

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