ЄРМАКОВА О.А.
доктор економічних наук, професор
ДУ «Інститут ринку і економіко-екологічних досліджень НАН України»
Французький б-р, 29 м. Одеса, Україна, 65044
E-mail: impeer@ukr.net
ORCID: 0000-0002-9815-3464

Б'ЄРНДАЛ Т.
PhD (економіка), професор
Центр прикладної економіки при Норвезькій школі економіці
Hellvn. 30, N-5045 Берген, Норвегія
Email: trond.bjorndal@snf.no

СТАН ТА ПЕРСПЕКТИВИ ЗАЛУЧЕННЯ ІНВЕСТИЦІЙ В СЕКТОР АКВАКУЛЬТУРИ В УКРАЇНІ

Актуальність. Попередньо проведені розрахунки підтверджують про значний потенціал для розвитку аквакультури як в Українському Причорномор’ї, так і в Україні в цілому. Збільшення питомої ваги аквакультури в загальному споживанні риби в Україні в умовах війни, яка спричинила значне скорочення промислового лову через фізичні втрати акваторій Азовського та Чорного морів, наслідки техногенного забруднення водойм через підрив Каховської ГЕС, також є підтвердженням важливості аквакультури для продовольчої безпеки країни та регіону.

Мета та завдання. Представлене дослідження ставить за мету аналіз існуючого стану залучення інвестицій в сектор аквакультури в Україні та світі, виявлення перешкод та перспектив у їх залученні.

Матеріали і методи. В дослідженні застосовані методи аналізу та синтезу, теоретичного узагальнення, статистичного аналізу, ретроспективного аналізу, системного аналізу, на основі чого визначено причинно-наслідкові зв’язки низької інвестиційної активності в секторі аквакультури в Україні, систематизовано пропозиції щодо організаційно-економічних механізмів залучення інвестицій в сектор аквакультури за ресурсно-процесним підходом - етапами створення вартості (підготовка, виробництво, переробка, реалізація) та вхідними компонентами (фактори виробництва), необхідними для функціонування сектору.

Результати. Аналіз інвестування сектору аквакультури в Україні та Українському Причорномор’ї виявив вкрай незадовільний його стан, який не відповідає інтересам розвитку сектору: незначний обсяг капітальних інвестицій в сектор аквакультури - 0,038% від загального обсягу капітальних інвестицій підприємств в Україні; незадовільне інвестиційне забезпечення інноваційної діяльності підприємств аквакультури - лише 0,5% від загального обсягу капітальних інвестицій спрямовується на нематеріальні активи; джерелами капітальних інвестицій виступають переважно власні кошти підприємств, зовсім не залучаються кошти місцевих бюджетів, інвестиційних компаній та фондів, кошти інвесторів-нерезидентів та інших джерел; незначний обсяг пряних іноземних інвестицій - 0,04% від загального обсягу пряних інвестицій в Україні, спостерігається відтік інвестицій, в регіонах Українського Причорномор’я останніми роками не здійснювалися; нерентабельність інвестованого капіталу.

Висновки. Для формування довгострокової візії розвитку сектору та визначення перспектив для потенційних інвесторів необхідною є розробка галузевої стратегії та програм, зокрема щодо залучення інвестицій в сектор аквакультури та розвиток інновацій. Цілеспрямованих дій потребує формування екосистеми супровідних послуг для інвесторів, зокрема, центрів залучення інвесторів, інвестиційних консалтингових агентств зі спеціалізацією в аквакультури, що особливо актуально для приморських регіонів. Пропонується застосування комплексного підходу до розвитку сектору аквакультури за ланцюгом створення вартості «підготовка-виробництво-переробка-реалізація», тобто формування регіонального інноваційно орієнтованого комплексу аквакультурного виробництва. Застосування мережевих інструментів створення доданої вартості у секторі, такі як кластери, акватехнопарки, еко-індустріальні парки, створить привабливі об’єкти для інвестування, зокрема із-за крізь кордону, враховуючи їх орієнтацію на принципи інноваційності, безвідходності, екологобезпеки, ресурсозбереження.

Ключові слова: блакитна економіка, аквакультура, інвестиції, інновації, кластери.
CURRENT STATE AND PROSPECTS OF INVESTMENT ATTRACTION INTO THE AQUACULTURE SECTOR IN UKRAINE

**Topicality.** Preliminary calculations confirm the significant potential for the development of aquaculture both in the Ukrainian Black Sea region and in Ukraine as a whole. The increase of aquaculture share in the total fish consumption in Ukraine in the conditions of the war, which caused a significant reduction in commercial fishing due to the physical loss of the water areas of the Azov and Black Seas, the consequences of technogenic pollution of water bodies due to the explosion of the Kakhovskaya Hydroelectric Power Station, is also a confirmation of the importance of aquaculture for the food security of the country and the region.

**Aim and tasks.** The presented study aims to analyze the current state of investment attraction in the aquaculture sector in Ukraine and the world, to identify obstacles and prospects for it increasing.

**Materials and Methods.** In the research the methods of analysis and synthesis, theoretical generalization, statistical analysis, retrospective analysis, system analysis have been used, on the basis of which the cause-and-effect relationships of low investment activity in the aquaculture sector in Ukraine are determined, proposals are systematized regarding the organizational and economic mechanisms of attracting investments to the aquaculture sector according to the resource-process approach - stages of value creation (preparation, production, processing, realization) and input components (factors of production) necessary for the functioning of the sector.

**Research results.** The analysis of investments in the aquaculture sector in Ukraine and the Ukrainian Black Sea region revealed its extremely unsatisfactory state, which does not correspond to the interests of the sector's development: a small volume of capital investments in the aquaculture sector - 0.038% of the total volume of capital investments of enterprises in Ukraine; unsatisfactory investment support for innovative activities of aquaculture enterprises - only 0.5% of the total volume of capital investments is directed to intangible assets; the sources of capital investments are mainly own funds of enterprises, funds from local budgets, investment companies and funds, funds from non-resident investors and other sources are not involved at all; a small amount of foreign direct investment - 0.04% of the total amount of direct investment in Ukraine, there is an outflow of investments, FDI in the aquaculture sector in the regions of the Ukrainian Black Sea region has not been carried out in recent years; non-profitability of invested capital.

**Conclusion.** In order to form a long-term vision of the development of the sector and determine the prospects for potential investors, it is necessary to develop an industry strategy and programs, in particular, regarding the attraction of investments in the aquaculture sector and the development of innovations. Targeted actions require the formation of an ecosystem of accompanying services for investors, in particular, centers for attracting investors, investment consulting agencies specializing in aquaculture, which is especially relevant for seaside regions. It is proposed to apply a comprehensive approach to the development of the aquaculture sector according to the value creation chain "preparation-production-processing-realization", that means the formation of a regional innovation-oriented complex of aquaculture production. The use of network tools for creating added value in the sector, such as clusters, water technology parks, eco-industrial parks, will create attractive objects for investment, in particular from abroad, taking into account their orientation to the principles of innovation, zero waste, environmental safety, resource conservation.

**Keywords:** blue economy, aquaculture, investments, innovations, clusters.

**Problem statement and its connection with important scientific and practical tasks.** Investment is a necessary resource for the development of the aquaculture sector, for the creation of new industries, and the implementation of innovations, both technological and managerial. In the world, there is a steady trend towards the growth of investments into the blue sectors of the economy, in particular, aquaculture (Stepanov V., Iermakova O., 2022). However, there is a lack of investments in the aquaculture sector in Ukraine, their small volumes do not allow to benefit from the effect of scale.

**Analysis of recent publications on the problem.** In the article it is analyzed the European analytical studies of the state of investment...
attraction in blue economy sectors (PwC for the European Commission, 2023), forecasts for the development of the blue economy until 2050 (High Level Panel for a Sustainable Ocean Economy, 2022), principles of sustainable financing of the UN blue economy (UN Environment Program Finance Initiative, 2018)), which indicate the prospects for the growth of the aquaculture sector and the need to attract investments in this sector and sectors of the blue economy as a whole. To assess the state of investment in the sector in Ukraine, it is analyzed the data of the National Bank of Ukraine (National Bank of Ukraine, 2023) and the State Statistics Committee of Ukraine (State Statistics Service of Ukraine, 2023a, 2023b), based on which unfavorable trends were revealed.

Allocation of previously unsolved parts of the general problem. The blue economy in the world and EU countries is growing rapidly and is promising for attracting investments and developing innovations. In 2019, the blue economy of the EU employed about 4.5 million people and generated 184 billion EUR of added value and about 667 billion EUR of turnover, which is 20% and 15% higher than the same figures for 2009. Over the past 5 years (2018-2022) business activity in the blue economy was on the rise - the number of financial transactions increased by 200% (PwC for the European Commission, 2023).

According to the World Resources Institute (High Level Panel for a Sustainable Ocean Economy, 2022), investing in the blue economy is profitable. Investment in the amount of 2.54 trillion EUR in 2020 in only four sectors of the blue economy - offshore wind energy, seafood production, decarbonization of international shipping, preservation and restoration of mangroves - by 2050 will bring a net benefit in the amount of 14.11 trillion EUR (benefit-cost ratio is 12:1, 10:1, 4:1 and 3:1 for each of the four sectors, respectively).

According to the OECD, the blue economy will grow twice as fast as the land economy by 2030.

According to estimates, the achievement of Sustainable Development Goal 14 "Conservation of marine resources" by 2030 globally requires 147 billion EUR per year. To date, only 21 billion EUR have been raised, of which 16.8 billion EUR come from state and international sources, 4.2 billion EUR from private investors. Therefore, the financing deficit of this direction is 126 billion EUR (PwC for the European Commission, 2023).

Formulation of research objectives (problem statement). Preliminary calculations indicate a significant potential for the development of aquaculture both in the Ukrainian Black Sea regions and in Ukraine as a whole. Thus, we calculated that the actual supply of fish and fish products in Ukraine in 2021 amounted to 454 thousand tons, in 2022 - 96 thousand tons - such a sharp reduction is due to the war in the country. The share of domestic aquaculture in the total consumption of fish and fish products in 2021 was 2.4%, in 2022 - 8.7%. In 2021, the potential normative demand on the market of fish and fish products amounted to 823 thousand tons, which is twice the actual volume in Ukraine.

In the world, the ratio between aquaculture and commercial fishing is 50:50, with a steady trend towards an increase in the share of aquaculture. In Ukraine, an increase in the percentage of domestic production in the domestic consumption of fish products to at least 50%, and at the same time an increase in the share of aquaculture in it to 30-50% will mean an increase in fish cultivation under aquaculture conditions to 68-113 thousand tons, i.e. 10 times from the existing volume.

Based on the global trends in the development of aquaculture as a sector of the blue economy, as well as the logic of the development of the domestic fishing sector and the potential of aquaculture, we can expect an increase in the demand for investments in the aquaculture sector. At the same time, the analysis of investments in the aquaculture sector in Ukraine and the Ukrainian Black Sea region revealed its extremely unsatisfactory state, which does not correspond to the interests of the sector's development.

The purpose of this research is to analyze the current state of investment attraction in the aquaculture sector in Ukraine and the world, to identify obstacles and prospects for it increasing.

Materials and Methods. In the research the methods of analysis and synthesis, theoretical generalization, statistical analysis, retrospective analysis, system analysis have been used, on the basis of which the cause-and-effect relationships of low investment activity in the aquaculture sector in Ukraine are determined, proposals are systematized regarding the organizational and economic mechanisms of attracting investments to the aquaculture sector according to the resource-process approach - stages of value creation (preparation, production, processing, realization) and input components (factors of production) necessary for the functioning of the sector.

An outline of the main results and their justification. Blue economy sectors such as blue technologies, blue renewable energy, aquaculture and fishing, shipbuilding, shipping, etc. are characterized by the greatest business activity in the EU countries (Fig. 1).
The European Union promotes not only the inflow of investments through incentive policies, but also through the EU funds for green and blue innovations. This capital is channeled through initiatives and programs under the Multiannual Financial Program or financial intermediaries - the European Investment Bank (EIB) and the European Investment Fund (EIF). Both of these financial institutions use a range of financial instruments, such as bonds, guarantees and quasi-equity, aimed at reducing the risks associated with investing and implementing technologies in blue economy sectors.

Below are the main EU funds currently allocated to promote new blue technologies, as well as green and digital technologies in the European Union:

- the European Maritime, Fisheries and Aquaculture Fund, with a budget of 6.11 billion EUR and aims to promote the sustainable use and management of marine resources and the development of a sustainable blue economy;
- the ETS Innovation Fund with a budget of 38 billion EUR (2020-2030) already finances large-scale demonstration projects related to innovative low-carbon technologies, including blue technologies;
- the European Innovation Council (EIC), created under the EU Horizon Europe Program, has a budget of 10 billion EUR to support innovation in areas that may be relevant to the blue economy, such as renewable energy and biotech;
- InvestEU, which aims to mobilize more than 372 billion EUR of public and private investment through guarantees of 26.2 billion EUR of EU budget funds, which supports investments by partners such as the European Investment Bank Group and other financial institutions providing guarantees to reduce investment risks, including in sectors of the blue economy.

The European Investment Bank implements the following programs focused on the blue economy:
- Blue Sustainable Ocean Strategy (Blue SOS);
- Clean Ocean Initiative.

Examples of two blue economy investment funds established by the European Commission in partnership with the European Investment Fund are listed below:
- BlueInvest Fund (2020) - the first ever special equity financing program for the EU blue economy sector. The Fund has successfully leveraged a 75 million EUR contribution from the European Fund for Strategic Investments and 15 million EUR from InnovFin Equity to several venture capital funds, which are now using these guarantees to invest up to 300 million EUR in the blue economy over the next 5 years, mainly in EU countries.
- InvestEU Blue Economy Fund (2022) – aims to mobilize an additional 500 million EUR of EU funds for financial intermediaries investing in the blue economy sector. This is expected to lead to 1.5 billion EUR of investment in innovative and green SMEs and start-ups in blue economy sectors (PwC for the European Commission, 2023).

With the aim of a systematic approach to the process of attracting investments in the blue economy sectors in the EU, the investment ecosystem was created - BlueInvest Community - a permanent platform for all interested parties in the field of investments in the blue economy sectors. It is a community where entrepreneurs, investors, corporations and innovators can engage in the blue economy. There are currently more than 1,550 community members. This platform helps SMEs and startups get access to financial and other tools for the development of their business. The platform helps establish connections between business and investors, provides knowledge exchange, introduces active accelerators, incubators, clusters and business networks in the field of the blue economy, offers online training and coaching within the BlueInvest Academy, provides information for investors about the market and industry trends for the formation of their successful investment strategies, organizes events such as BlueInvest Days, assists investors in finding

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![Agreements of European companies related to the blue economy for the period 2000-2023 (% of the total number of agreements)](image)

*Source: PwC for the European Commission, 2023*
promising companies for investment in the blue economy sectors through the BlueInvest Project Pipeline service.

Among the successful examples of attracting investments through this platform, it could be mentioned the Italian startup Ittinsect, which specializes in the production of feed for aquaculture based on innovative raw materials, which successfully attracted 750 thousand EUR. The platform turned out to be useful not only in the search for an investor, but also in the coaching support of a startup through the EU BlueInvest Readiness Assistance program, within the framework of which company representatives acquired skills in the preparation of investment proposals, their presentation, and interaction with investors.

Funds from the EU structural funds are provided for the implementation of projects that meet the priorities and requirements. For Ukraine on its path of European integration it is important to gain experience in the preparation and management of European projects in order to be able to attract funds from the European funds in the future.

The recent call of NEXT Black Sea Basin Program (Interreg VI-B) grant projects, in which Ukraine was able to participate, showed the priority of the development of sectors of the blue economy, where one of the two priorities was the development of blue and smart (innovation-oriented) regions.

At the global level in the interest of attracting investment into blue economy sectors the Sustainable Blue Economy Finance Initiative has been created. It is the platform that is created by the UN Environment Program Finance Initiative and brings together stakeholders internationally for implementation of Sustainable Blue Economy Finance Principles (UN Environment Program Finance Initiative, 2018).

In 2021, the volume of capital investments in the aquaculture sector in Ukraine amounted to 205.730 million UAH, that is 0.038% of the total volume of capital investments of enterprises in Ukraine.

The dynamics of capital investments in the aquaculture sector, and the types of economic activities related to it, such as fish processing and canning, wholesale and retail trade, are generally positive and will continue to follow the trend (Fig. 2).

![Fig. 2. Dynamics of capital investments in the field of aquaculture (production, processing, trade) of Ukraine in 2012-2021, thousand UAH](image)

*Source: compiled by the author on the basis of the data (State Statistics Service of Ukraine, 2023a)*

The structure of the use of capital investments is dominated by investments in tangible assets, which account for 99.5% of the total volume of capital investments, and intangible assets - only 0.5% (Table 1). This distribution indicates unsatisfactory investment support for innovative
activities of aquaculture enterprises. The largest volume of capital investments in material assets is related to aquaculture - processing and canning of fish, crustaceans and wholesale trade (Fig. 3). In the production of aquaculture, capital investments prevail in the field of marine fish farming, while the smallest amount of capital investments is directed to the field of freshwater fish farming. In 2021, no capital investments were made in the retail trade of fish, crustaceans and molluscs. According to the indicator of capital investment in intangible assets, among industries related to aquaculture, wholesale trade leads (Fig. 4).

Calculations of investments per enterprise reveal more acute disparities: in marine fish farming in Ukraine in 2021 (where are only 33 business entities) – 5,405 thousand UAH per enterprise, in freshwater fish farming - 20 thousand UAH per enterprise.

Capital investments in the aquaculture sector are carried out mainly at the expense of the own funds of enterprises and organizations, so in 2021 their share was 93% of the total volume of capital investments, the remaining 7% come from the state budget and bank loans. Funds from local budgets, investment companies and funds, funds from non-resident investors and other sources are not involved at all.

Table 1.

<table>
<thead>
<tr>
<th>Capital investments in aquaculture sectors of Ukraine by directions of their use in 2021, thousand UAH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capital investment of enterprises by type of economic activity</strong></td>
</tr>
<tr>
<td>03.21 Marine fish farming (aquaculture)</td>
</tr>
<tr>
<td>03.22 Freshwater fish farming (aquaculture)</td>
</tr>
<tr>
<td>10.20 Processing and canning of fish, crustaceans</td>
</tr>
<tr>
<td>46.38 Wholesale trade in other food products, including fish, crustaceans and molluscs</td>
</tr>
<tr>
<td>47.23 Retail trade of fish, crustaceans and molluscs in specialized stores</td>
</tr>
</tbody>
</table>

Source: calculated by the author on the basis of the data (State Statistics Service of Ukraine, 2023a)
Fig. 3. Capital investments in tangible assets in the field of aquaculture (production, processing, trade) of Ukraine in 2021

Source: compiled by the author on the basis of the data (State Statistics Service of Ukraine, 2023a)

Direct foreign investment in the aquaculture sector of Ukraine is quite insignificant. So, in 2018, the amount of attracted foreign direct investment in the aquaculture sector amounted to 1.7 million USD, that was 0.04% of the total volume of direct investments in Ukraine. Over the years, the situation steadily worsened - in 2020 and 2021 an outflow of investments from the aquaculture sector was observed. Direct foreign investments in the aquaculture sector of the Ukrainian Black Sea regions in 2018-2021 were absent.

Direct investments from Ukraine in the aquaculture and fishing sector around the world in 2018-2021 were absent.

The growth of direct foreign investments in the aquaculture sector of Ukraine took place in 2019 (mainly due to debt instruments), and after they sharply decreased to 0.2 million USD (Fig. 5).
Fig. 5. Remaining foreign direct investments in the aquaculture sector of Ukraine in 2018-2021, million USD
Source: compiled by the author on the basis of the data (National Bank of Ukraine, 2023)

In 2018-2021, investments in the sector were mainly made through equity instruments, reinvestment took place in 2018, debt instruments were used in 2019.

The ratio of net profit and capital investment of enterprises in the aquaculture sector indicates the unprofitability of invested capital (Table 2). Over the past ten years, companies in the industry have had more losses than profits. In terms of ROIC, wholesaling and retailing fish is much more attractive than growing and processing it.

Table 2.
The ratio of net profit and capital investment of aquaculture sector enterprises in comparison with key sectors of the economy of Ukraine

<table>
<thead>
<tr>
<th>Types of economic activity</th>
<th>Fish farming (aquaculture) (03.2)</th>
<th>Processing and canning of fish, crustaceans (10-20)</th>
<th>Wholesale trade in other food products, including fish, crustaceans, molluscs (46.38)</th>
<th>Retail trade of fish, crustaceans, molluscs in specialized stores (47.22)</th>
<th>Agriculture, forestry and fisheries (А)</th>
<th>Industry (B+C+D+E)</th>
<th>Totally in Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net profit of enterprises, thousand UAH (average value for 2012-2021)</td>
<td>-1071.7</td>
<td>2293.6</td>
<td>241331.4</td>
<td>16795.7</td>
<td>81025721.6</td>
<td>21970553.3</td>
<td>101251824.3</td>
</tr>
<tr>
<td>Capital investments of enterprises, thousand UAH (average value for 2012-2021)</td>
<td>42356.6</td>
<td>122501.2</td>
<td>117352.2</td>
<td>14536.6</td>
<td>44799639.8</td>
<td>152574817.5</td>
<td>340957142.9</td>
</tr>
<tr>
<td>ROIC – return on invested capital</td>
<td>-0.025</td>
<td>0.019</td>
<td>2.056</td>
<td>1.155</td>
<td>1.809</td>
<td>0.144</td>
<td>0.297</td>
</tr>
</tbody>
</table>

Source: calculated by the author on the basis of the data (State Statistics Service of Ukraine, 2023a, 2023b)
The unprofitability of enterprises in the industry is a factor of the investments outflow and an obstacle to attracting new investments.

Also, the small amount of investments in the industry does not allow to get benefits from the effect of scale.

The main reasons for low investment activity in the aquaculture sector in Ukraine include the following:

- complex procedure for registration of the right to carry out activities in the field of aquaculture. For foreign investors, the regulation of the permit system for starting a business in the aquaculture sector is a significant obstacle (BRDO, 2020);
- lack of information about water bodies that can be used for aquaculture purposes. Investment passports, which are developed in communities, do not contain information about water bodies and the possibilities of their use for aquaculture purposes;
- need for significant financial resources for start-up capital (the smallest start-up capital is required for the cultivation of herbivorous species of fish - approximately 1.2 million UAH, the largest start-up capital will be needed for the organization of the cultivation of valuable species of fish. For example, for the organization of an export-oriented sturgeon breeding complex, 10 million EUR will be needed). This limits the opportunities of small and medium-sized enterprises to start a business in aquaculture (EasyBusiness, 2017);
- long period of investment payback, because the average period of receiving marketable fish is 3 years;
- high risks of loss of cultivated hydrobionts due to diseases, adverse environmental conditions, theft;
- presence of poached fish on the market, spontaneous fish trade in non-specialized markets, which suppresses the rights of legal fish producers and end consumers in their right to quality and safe fish;
- underdevelopment of the innovation system in the field of aquaculture, which prevents the transfer of innovations between the generators and consumers of innovations;
- lack of information about the aquaculture sector for investors, lack of an investment portal, as well as a database of investment proposals, which creates an information vacuum for investors about the opportunities of the domestic aquaculture sector;
- lack of specialized operational services to support investors;
- underdeveloped market of investment instruments with a focus on the blue sectors of the economy (Laiko O., Kwiliński A., 2017);
- lack of a strategic and systematic approach to the development of the fishing industry and aquaculture, there are no national sectoral strategies and programs, in particular regarding the attraction of investments in the aquaculture sector, which would determine the long-term vision of the development of the sector for investors;
- lack of a comprehensive approach to the development of the industry "production-processing-realization", network tools for creating added value in the sector, such as clusters, aquatechnoparks, eco-industrial parks are not used.

Legislative initiatives to attract investments in the development of aquaculture and the fishing industry should be aimed at solving the problems outlined above.

Today, we can state the absence of a purposeful policy of attracting investments in the aquaculture sector in Ukraine and the regions of the Ukrainian Black Sea region. In order to form a long-term vision of the development of the sector and determine the prospects for potential investors, it is necessary to develop an industry strategy and programs, in particular, regarding the attraction of investments in the aquaculture sector. Targeted actions require the formation of an ecosystem of accompanying services for investors, in particular, centers for attracting investors, investment consulting agencies specializing in aquaculture, which is especially relevant for seaside regions.

Currently, there is no regional program for the development of fisheries and aquaculture in the Odessa region. The Regional Program for the Development of the Agro-Industrial Complex of the Odessa Region for 2019-2023 "Agrarian Odeschyna" was functioning, but the fishery complex was not represented in it. At the same time, the systematic development of fisheries and aquaculture, as well as the introduction of appropriate financial incentives, are possible within the regional program in the field.

As an example of providing financial support to aquaculture producers at the regional level, the Comprehensive Program for the Support and Development of Agriculture of the Lviv Region for 2021-2025 can be cited. Aquaculture producers who purchase in the current year breeding material of fish for the reproduction of brood stock and stocking of reservoirs are able to receive compensation from the regional budget in the amount of 50% of their value, within the limits of 40 UAH / kg - for herbivorous fish breeds and 50 UAH / kg - for carp and other species of fish, except for valuable species. The maximum amount of compensation is 200,000 UAH for one business
entity. The program also provided for a subsidy for the area of stocked water bodies in the amount of up to 5,000 UAH per hectare. The maximum area of stocked wetlands is limited to 10 hectares for one business entity.

Aquaculture producers can also:
- attract preferential loans at 5% per annum for the development of business projects;
- to reimburse in the amount of 1.5 of the accounting rate of the National Bank of Ukraine interest on loans raised in banking institutions and interest (commission) for accompanying financial leasing contracts (Lviv Regional State Administration, 2022).

Prospects for attracting investments in the aquaculture sector can be provided by the application of a comprehensive approach to its development along the value chain "preparation-production-processing-realization" that leads to the formation of a regional complex of aquaculture production, which also requires the development of an industry regional program. The use of network tools for creating added value in the sector, such as clusters, water technology parks, eco-industrial parks, will create attractive objects for investment, in particular from abroad, taking into account their orientation to the principles of zero waste, environmental safety, resource conservation.

Proposals for organizational and economic mechanisms for attracting investments into the aquaculture sector are systematized according to the resource-process approach - stages of value creation (preparation, production, processing, realization) and input components (factors of production) necessary for the functioning of the aquaculture sector (Table 3).

The implementation of innovations in the aquaculture sector is a promising direction for its development and investment attraction. The implementation of innovations will contribute to positive changes, such as:
- increasing the productivity of the production process through the introduction of modern automated methods at various stages of production;
- efficient use of resources, waste-free production - multi-product complexes of deep fish processing, including technologies for processing secondary raw materials (waste), recirculating aquaculture systems, aquaponic systems, combined intensive-extensive systems, complex multitrophic aquaculture;
- minimization of the negative impact of aquaculture production on the environment - wastewater treatment technologies after fish processing;
- ensuring the quality of commercial fish - organic production technologies;
- ensuring the traceability of the origin of aquatic biological resources, preventing IUU fishing - digital technologies, implementation of blockchain technology, online platforms for the sale of fish and fish products.

Table 3.

<table>
<thead>
<tr>
<th>Input components of ensuring business processes in the aquaculture sector</th>
<th>Description of the existing obstacles to attract investment</th>
<th>Organizational and economic solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Preparation</td>
<td>Ecosystem of accompanying services for investors</td>
<td>Lack of targeted support for investors in the aquaculture sector.</td>
</tr>
<tr>
<td>Permit system for activities in the field of aquaculture</td>
<td>A complex procedure for registration of the right to carry out activities in the field of aquaculture. For foreign investors, regulation of the permit system for starting a business in the aquaculture sector is a significant obstacle.</td>
<td>Introduction of a &quot;single window&quot;, including online, to simplify the obtaining by investors of the documents necessary for carrying out activities in the field of aquaculture (agreement for the lease of a water object, lease of hydrotechnical facilities, a permit for special water use, a conclusion on an assessment of the impact on the environment in case of intensive aquaculture).</td>
</tr>
</tbody>
</table>
Table 3 continued

<table>
<thead>
<tr>
<th></th>
<th>Water bodies</th>
<th>Finances</th>
<th>Production (growing, breeding of fish)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of information on water bodies that can be used for aquaculture purposes.</td>
<td>The need for significant financial resources for start-up capital (the smallest start-up capital is needed for the cultivation of herbivorous fish species - approximately 1.2 million UAH, the largest start-up capital will be needed for the organization of the cultivation of valuable fish species). The long period of obtaining marketable fish is 3 years on average.</td>
<td>Diversity or absence of value chain participants in aquaculture.</td>
</tr>
<tr>
<td>2</td>
<td>Carrying out an inventory of water bodies. Creation of a single open digital register of reservoirs that are used and can be used for aquaculture purposes, with an interactive opportunity to participate in the auction for the right of access to the lease of the reservoir. Inclusion of information on water bodies suitable for aquaculture in community investment passports.</td>
<td>Provision of investment lending at preferential interest. Attracting investments, including international investment funds. Introduction of innovative investment instruments (blue bonds, debt swaps, fundraising, etc.). Involvement of national credit agencies, for example, by analogy with the Norwegian export credit agency GIEK, as well as investment banks to finance the construction of fish farms and processing plants.</td>
<td>Formation of clusters that will unite producers of fish feed, producers of fish and related agricultural products, processors and distributors.</td>
</tr>
<tr>
<td>3</td>
<td>The division of a single production complex at the legislative level into components (land, water, and hydraulic structures) complicates the leasing of water facilities.</td>
<td>High risks for financial institutions.</td>
<td>Limitation of opportunities for SMEs to start a business in aquaculture.</td>
</tr>
<tr>
<td></td>
<td>Leasing of a water bodies through administrative services and as a complete complex &quot;land + water body + hydraulic structures&quot;.</td>
<td>Application of the investment insurance mechanism, including military risks, involvement of insurance agencies: - American MIGA and DFC, which have already agreed to provide insurance to investors in Ukraine; - European government insurance agencies, such as German Hermes, Polish KUKE, British UKEF; - Ukrainian Export Credit Agency EKA.</td>
<td>Provision of affordable credit lines for aquaculture entities. Development of road maps for starting aquabusiness. Creation of water technology parks with access to water and electricity.</td>
</tr>
<tr>
<td>Production risks</td>
<td>Moral and physical wear and tear of fixed assets of aquaculture enterprises.</td>
<td>Introduction of preferential lending/investment of fishing enterprises with the aim of updating the material and technical base. Creation of regional leasing funds for the purpose of concentration of financial resources for the technical re-equipping of fishing enterprises.</td>
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<tr>
<td>Insufficient quantity and quality of domestic equipment for aquaculture.</td>
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<td>Attracting investments for the production of equipment for aquaculture in the country.</td>
<td></td>
</tr>
</tbody>
</table>

### Innovations

- **Introduction of preferential lending/investment of fishing enterprises with the aim of updating the material and technical base.**
- **Creation of regional leasing funds for the purpose of concentration of financial resources for the technical re-equipment of fishing enterprises.**
- **Insufficient quantity and quality of domestic equipment for aquaculture.**
- **Attracting investments for the production of equipment for aquaculture in the country.**

#### Production

<table>
<thead>
<tr>
<th>Processing enterprises</th>
<th>The underdevelopment of the innovation system in the industry, which prevents the transfer of innovations between the entities of generation and consumption of innovations.</th>
<th>Development of the innovation system of the aquaculture sector. Implementation of mechanisms for the transfer of knowledge and innovations within the aquaculture sector, in particular, brokerage platforms for the innovations implementation and attraction of investments. Obtaining access to foreign technologies through the attraction of foreign investments.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient number of fish processing enterprises that leads to loss of added value.</td>
<td>Insufficient number of fish processing enterprises that leads to loss of added value.</td>
<td>Introduction of agricultural financing programs focused on the formation of chains of added value in aquaculture (UAFATA Technical Assistance Project, 2021).</td>
</tr>
</tbody>
</table>

#### Realization

<table>
<thead>
<tr>
<th>Sales infrastructure</th>
<th>The development of the sales infrastructure, aimed at the sale of products through a direct channel from the producer to the consumer, is necessary for a more significant influence of enterprises on the sale price, that will contribute to the reduction of consumer prices for fish for the population.</th>
<th>Attracting investments for the creation of specialized fish markets (live fish bases), wholesale markets, auctions, fish exchanges, on which the fish breeders-producers would have the opportunity to sell the grown fish, carry out the necessary analyzes in special laboratories.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A high percentage of IUU fishing, the presence of poached fish on the market, spontaneous trade of fish outside specialized markets, which suppresses the rights of legal fish producers and end consumers in their right to quality and safe fish.</td>
<td>A high percentage of IUU fishing, the presence of poached fish on the market, spontaneous trade of fish outside specialized markets, which suppresses the rights of legal fish producers and end consumers in their right to quality and safe fish.</td>
<td>Introduction of an electronic system of control over the origin of aquatic biological resources using the registration of commodity transactions (blockchain technology).</td>
</tr>
</tbody>
</table>

**Source: developed by the author**

The cluster approach to the development of the aquaculture sector has proven its effectiveness in many countries of the world in ensuring the multiplicity of investments. The formation of clusters with the involvement of foreign participants makes it possible to scale cluster effects.

The goals and objectives of the cluster may vary depending on the composition of its members:

- **Providing producers with the necessary resources:** The cluster combines production enterprises with suppliers of production resources (producers of fodder, equipment, leasing funds, financial, educational, research institutions), as well as providers of accompanying services (breeding and breeding support, fish farms, veterinary support for aquaculture) laboratories of hydrochemistry, hydrobiology, ichthyology, fishery reclamation). The formation of fishery-agricultural clusters is promising in the aspect of ensuring access of fish farms to relatively inexpensive waste products of enterprises in the fields of plant and animal husbandry, as well as grain processing, oil and fat, and meat processing industries, which can be used in feed for aquaculture;
- increase in added value: combination in a cluster of fish breeding enterprises with processing industries for the production of a wide range of food products from aquaculture facilities, as well as the processing of waste and the production of secondary products;
- increasing productivity due to the introduction of innovations: unification in a cluster of aquaculture enterprises for the purpose of developing and implementing innovations and new technologies, including energy saving, creating digital services for aquafarmers - specialized mobile applications, integration into the European research infrastructure, international scientific and technical cooperation;
- product implementation: companies unite to create a common brand for cluster companies to promote products in foreign markets, development and implementation of the cluster's marketing strategy, logistics of materials and finished products, popularization and promotion of cluster products, development of own sales infrastructure;
- scaling of production activities: uniting small and medium-sized aquafarmers in a cluster with the aim of increasing production, market share, creating aquahubs, which are centers for providing farmers with business services, in particular such as farm registration, logistical support of farms, financing, sales and storage of grown products, introduction of technologies, certification, etc.;
- development of accompanying activities (tourism, education, research, etc.) - multifunctional use of aquaculture water bodies.

Conclusions and perspectives of further research. The blue economy in the world and EU countries is growing rapidly and is promising for attracting investments and developing innovations. Blue economy sectors such as blue technologies, blue renewable energy, aquaculture and fishing, shipbuilding, shipping, etc. are characterized by the greatest business activity in the EU countries. The European Union promotes not only the inflow of investments through incentive policies, but also through the EU funds for green and blue innovations. With the aim of a systematic approach to the process of attracting investments in the blue economy sectors in the EU, the investment ecosystem was created - BlueInvest Community - a permanent platform for all interested parties in the field of investments in the blue economy sectors. At the global level, the Sustainable Blue Economy Finance Initiative has been created for attracting investments in blue economy sectors.

Based on the global trends in the development of aquaculture as a sector of the blue economy, as well as the logic of the development of the domestic fishing sector and the potential of aquaculture, we can expect an increase in the demand for investments in the aquaculture sector.

The analysis of investments in the aquaculture sector in Ukraine and the Ukrainian Black Sea region revealed its extremely unsatisfactory state, which does not correspond to the interests of the sector's development: a small volume of capital investments in the aquaculture sector - 0.038% of the total volume of capital investments of enterprises in Ukraine; unsatisfactory investment support for innovative activities of aquaculture enterprises - only 0.5% of the total volume of capital investments is directed to intangible assets; the sources of capital investments are mainly own funds of enterprises, funds from local budgets, investment companies and funds, funds from non-resident investors and other sources are not involved at all; a small amount of foreign direct investment - 0.04% of the total amount of direct investment in Ukraine, there is an outflow of investments, FDI in the aquaculture sector in the regions of the Ukrainian Black Sea region has not been carried out in recent years; non-profitability of invested capital.

In order to form a long-term vision of the development of the sector and determine the prospects for potential investors, it is necessary to develop an industry strategy and programs, in particular, regarding the attraction of investments in the aquaculture sector and the development of innovations. Targeted actions require the formation of an ecosystem of accompanying services for investors, in particular, centers for attracting investors, investment consulting agencies specializing in aquaculture, which is especially relevant for seaside regions.

It is proposed to apply a comprehensive approach to the development of the aquaculture sector according to the value creation chain "preparation-production-processing-realization", that means the formation of a regional innovation-oriented complex of aquaculture production. The use of network tools for creating added value in the sector, such as clusters, water technology parks, eco-industrial parks, will create attractive objects for investment, in particular from abroad, taking into account their orientation to the principles of innovation, zero waste, environmental safety, resource conservation.
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