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DEVELOPMENT OF FISHERIES AND AQUACULTURE IN THE CONTEXT OF UKRAINE'S EUROPEAN INTEGRATION COURSE

Abstract. *Aquatic bioresources are a valuable component of the population's nutrition and they play a significant role in ensuring global food security. Unlike global tendencies, Ukraine has experienced a persistent decline in fisheries and aquaculture production over the past decades (2000-2022).*

The purpose of this study is to determine the impact of European integration on the Ukrainian fisheries and aquaculture sector and to summarise the key measures for effective fishing management in Ukraine. The methodological basis of this study included such methods of scientific cognition: monographic, dialectical, tabular, graphical, abstract and logical. Legislative and regulatory acts of Ukraine and the EU, scientific works of domestic and foreign scientists, as well as statistical indicators served as the primary sources of information during the research. The author used the data of the State Statistics Service of Ukraine, Ministry of Agrarian Policy and Food of Ukraine, EUROSTAT.

The main factors that slow down the development of the Ukrainian fishing industry have been summarised: high level of moral and physical depreciation of fixed assets; sectoral shadowing due to the lack of proper control and accountability for not submitting reports; problems with the supply of fish planting materials; negative anthropogenic and climatic impacts on aquatic ecosystems etc. Including Ukraine's aspirations for European integration, it is essential to consider the potential consequences of EU accession for the Ukrainian fisheries and aquaculture. The primary expected advantages include: de-shadowing, improving the quality of fish products, increasing funding, expanding export potential, modernising of outdated equipment, and gaining access to innovative technologies and practices in fish extraction and processing. The dynamic of foreign trade of fish and crustaceans of Ukraine with EU countries shows that, despite the small share of fish and crustaceans in the overall commodity structure with EU countries, exports of these items had a positive growth trend before the full-scale war. However, in 2022 fish and crustaceans exports to EU countries have decreased by more than one and a half times,. To ensure effective management of the domestic fishing industry in the context of European integration, it is crucial to: bring the national legislation in line with the European one, including the implementation of more than 30 EU acts; digitalise and deregulate the industry, ensuring traceability of aquatic bioresources; implement sustainable fishing practices, including the development of organic aquaculture, etc.

Keywords*: fisheries; aquaculture; aquatic bioresources; food security; European integration.*

JEL Classification: Q01, Q22, F15.

Abstract. *A vízi biológiai erőforrások a lakosság táplálkozásának értékes összetevői, és jelentős szerepet játszanak a globális élelmezésbiztonság biztosításában. A globális tendenciákkal ellentétben Ukrajnában az elmúlt évtizedekben (2000-2022) a halászati és akvakultúra-termelés tartósan csökkent.*

E tanulmány célja, hogy meghatározza az európai integráció hatását az ukrán halászati és akvakultúra-ágazatra, és összefoglalja a hatékony halászati gazdálkodás kulcsfontosságú intézkedéseit Ukrajnában. A tanulmány módszertani alapját következő módszerek képezték: monografikus, dialektikus, táblázatos, grafikus, absztrakt és logikai. A kutatás során elsődleges információforrásként Ukrajna és az EU törvényi és rendeleti aktusai, hazai és külföldi tudósok tudományos munkái, valamint statisztikai mutatók szolgáltak. A szerző felhasználta az Ukrán Állami Statisztikai Szolgálat, Ukrajna Agrárpolitikai és Élelmezésügyi Minisztériuma, az EUROSTAT adatait.

Az ukrán halászati ágazat fejlődését lassító fő tényezők a következők: az tárgyi eszközök magas szintű erkölcsi és fizikai értékcsökkenése; a megfelelő ellenőrzés hiánya miatti ágazati árnyékolás és a jelentések benyújtásának elmulasztása miatti elszámoltathatóság; a haltelepítési anyagok ellátásával kapcsolatos problémák; a vízi ökoszisztémákra gyakorolt negatív antropogén és éghajlati hatások stb. Ukrajna európai integrációs törekvéseit is figyelembe véve alapvető fontosságú, hogy megvizsgáljuk az EU-csatlakozás lehetséges következményeit az ukrán halászatra és akvakultúrára nézve. Az elsődleges várható előnyök a következők: árnyékmentesítés, a haltermékek minőségének javítása, a finanszírozás növelése, az exportlehetőségek bővítése, az elavult berendezések korszerűsítése, valamint a halak kitermelésével és feldolgozásával kapcsolatos innovatív technológiákhoz és gyakorlatokhoz való hozzáférés. Ukrajna és az EU országai közötti hal- és rákfélék külkereskedelmének dinamikája azt mutatja, hogy annak ellenére, hogy a halak és rákfélék részesedése az EU országaival folytatott teljes áruszerkezetben csekély, e termékek kivitele a teljes körű háború előtt pozitív növekedési tendenciát mutatott. Azonban 2022-ben az uniós országokba irányuló hal- és rákfélék kivitele több mint másfélszeresére csökkent,. A hazai halászati ágazat hatékony irányításának biztosítása érdekében az európai integráció összefüggésében elengedhetetlenül fontos: a nemzeti jogszabályok összhangba hozása az európai jogszabályokkal, beleértve a több mint 30 uniós jogszabály végrehajtását; az ágazat digitalizálása és deregulációja, a vízi biológiai erőforrások nyomon követhetőségének biztosítása; fenntartható halászati gyakorlatok bevezetése, beleértve az ökológiai akvakultúra fejlesztését stb.

Kulcsszavak: *halászat, akvakultúra, vízi biológiai erőforrások, élelmezésbiztonság, európai integráció.*

Анотація. *Водні біоресурси є цінним компонентом харчування населення та відіграють значну роль у забезпеченні глобальної продовольчої безпеки. На відміну від світових тенденцій, в Україні протягом останніх десятиліть (2000-2022 рр.) спостерігалося стійке зниження обсягів добування (вилову) у рибогосподарському секторі.*

Метою дослідження є визначення впливу європейської інтеграції на український сектор рибальства та аквакультури, а також узагальнення ключових заходів для ефективного управління рибним господарством України. Методологічною основою дослідження стали такі методи наукового пізнання: монографічний, діалектичний, табличний, графічний та абстрактно-логічний. Основними джерелами інформації під час дослідження були законодавчі та нормативні акти України та ЄС, наукові праці вітчизняних і зарубіжних учених, а також статистичні показники. Зокрема, використано дані Державної служби статистики України, Міністерства аграрної політики та продовольства України, а також EUROSTAT.

У роботі узагальнено основні фактори, які гальмують розвиток української рибної галузі: високий рівень морального та фізичного зносу основних засобів; тінізація галузі через брак належного контролю та відповідальності за неподання звітності; проблеми з постачанням рибопосадкового матеріалу; негативний антропогенний та кліматичний вплив на водні екосистеми тощо. З огляду на прагнення України до європейської інтеграції, важливо враховувати потенційні наслідки вступу до ЄС для українського сектору рибальства та аквакультури. Зокрема, до основних очікуваних переваг слід віднести: детінізацію галузі, покращення якості рибної продукції, збільшення фінансування, розширення експортного потенціалу, модернізацію застарілого обладнання та доступ до інноваційних технологій і

практик у сфері вилову та переробки риби. Динаміка зовнішньої торгівлі рибою та ракоподібними України з країнами ЄС свідчить, що, незважаючи на невелику частку цієї продукції в загальній товарній структурі з ЄС, експорт риби та ракоподібних демонстрував позитивну динаміку до початку повномасштабної війни. Однак у 2022 році експорт риби та ракоподібних до країн ЄС знизився більш ніж у півтора раза. Для забезпечення ефективного управління вітчизняною рибною галуззю в умовах європейської інтеграції необхідно: гармонізувати національне законодавство з європейським, включаючи впровадження понад 30 актів ЄС; цифровізувати та дерегулювати галузь, забезпечивши простежуваність водних біоресурсів; впровадити сталі практики рибальства, включаючи розвиток органічної аквакультури, тощо.

Ключові слова: *рибальство, аквакультура, водні біоресурси; продовольча безпека; євроінтеграція.*

Problem description. The global tendency demonstrates an increasing overall fish production volume, which grew 1.6 times from 1990 to 2020, reaching 178 million tonnes [1]. Concurrently, there is an increase in the share of the powerful agricultural sector – aquaculture – to 52% in 2022 [2], with its projected further increase to 55% by 2032. This way, the global aquaculture production in 2032 is expected to reach 111 million tonnes. However, the mentioned production during 2023-2032 will no longer have the same growth rate as during the previous decade, due to climate factors and the enhancement of increased sustainability of the sector. Simultaneously, a moderate increase in global per capita fish consumption is expected by 2032, reaching 21.2 kg or 4% higher than the baseline indicator (2020-2022) [3]. Overall, the fishing industry produces 17% of the animal protein for human consumption [4]. Additionally, a gradual increase in fish trade is forecasted globally, with the largest importers remaining the EU, the USA and China [3]. It is noteworthy that the development of aquaculture in the EU is shaped with consideration of the goals of decarbonisation, biodiversity conservation and the transition to more sustainable food systems. Despite significant potential, Ukraine shows a trend of declining aquatic bioresource extraction volumes.

Literature review. According to forecasts, global aquaculture production will increase to 129 million tonnes by 2050 that will correspond to the food needs of the planet's growing population [5]. In Ukraine, the fishing industry is a vital component of the national economy, a source of food security and a supplier of raw materials for other economic sectors. Research on leveraging the potential of the aquaculture sector to ensure food security is relevant [6]. In the research of Ozhohanych, T. et al [7], a SWOT analysis of Ukraine's aquaculture sector was conducted, and the prospects for its development within the circular economy were examined. The research by Melnyshenko, S. and Bogadorova, L. [8] is dedicated to identifying the main trends in the extraction, import, and export of aquatic bioresources, as well as identifying key issues that hinder the development of the domestic fishing industry. Despite significant fishery potential, the sector has experienced a decline over recent decades, leading to a dependence on fish and fish product imports, underscoring the necessity for accelerated sector reforms. Choosing the European vector, Ukraine's fishing industry faces the challenge of harmonising its domestic regulatory framework with EU requirements and

fulfilling the conditions of Chapter 13 (Fisheries). In preparation for EU accession, the fisheries and aquaculture sector requires an assessment of potential negative consequences and advantages of European integration.

Goals of the article are: to outline the main tendencies in fishing industry management in Ukraine and the EU, to determine the impact of European integration on Ukraine's fisheries and aquaculture sector, and to generalise the key measures for effective fishing management, taking into account Ukraine's course toward European integration.

Results and discussions. Ukraine, despite having significant fisheries potential and favourable conditions (due to the extensive system of internal water bodies, the population of Ukraine can access the most valuable product – live fish, while the majority of fish imported into Ukraine is frozen), cannot boast of substantial achievements in this sector. There is a noted decrease in the catch of aquatic bioresources, with the volume declining tenfold from 2000 to 2023, reaching 35.5 thousand tonnes (Figure 1). It is worth noting that in 1990, the catch of fish and other aquatic living resources exceeded 1 million tonnes, which exceeded the 2023 indicator by 28 times.

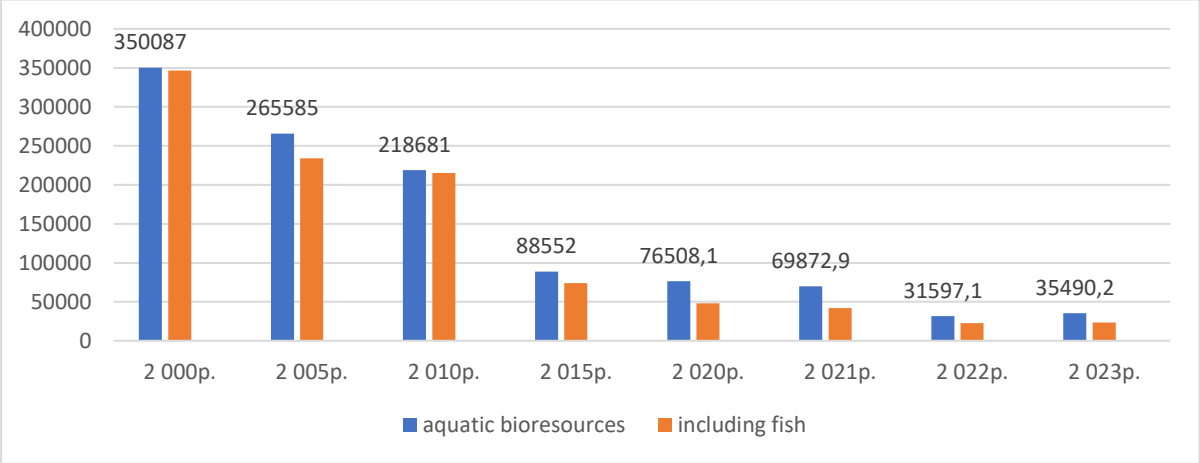

Figure 1. Extraction of aquatic bioresources in Ukraine, tonnes.
Source: created by the author based on the data [9].

It is noteworthy that the average price of extracted aquatic bioresources in 2023 increased to 32.7 thousand UAH (775 EUR) per tonne, which is 19% higher than in 2022 and two times more than the price in 2021. However, it is significantly lower than in the EU, where in 2022 the cost of a tonne of aquaculture products was 4.5 thousand EUR [10].

Additionally, the average annual consumption rate of aquatic bioresources and products derived from them globally is 1.5 times higher than the corresponding rate in Ukraine, which in 2023 was approximately 13 kg per person. At the same time, it is important to note the positive trend of moderate growth in fish consumption by Ukrainians from 2015 to 2023, during which the mentioned rate increased by one and a half times. It is worth noting that the physiologically justified norm for the consumption

of fish and seafood of animal origin is 20 kg per person per year [6]. However, due to low purchasing power, Ukrainians substitute this commodity position with cheaper products, including chicken. Considering the recommended fish consumption norms for a country with a population of 30 million, a demand for fish and other aquatic living resources should be 600 thousand tonnes.

Contrary to global trends, in Ukraine, the share of aquaculture in 2021 was only 27% [11], which is significantly less than the share of industrial fishing. According to data from the State Agency of Ukraine for the Development of Recreation, Fisheries and Food Programs (State Fisheries Agency), 15.3 thousand tons of aquaculture were produced in 2023, 71% of which are silver carp and common carp. The largest producers of aquaculture were Cherkasy (2.7 thousand tonnes), Khmelnitsky (1.5 thousand tonnes) and L'viv (1.2 thousand tonnes) regions. In 2023, approximately 3,5 thousand legal and physical entities of aquaculture were registered, among which only 53% reported their activities, making it impossible to conduct a comprehensive assessment of the aquaculture sector, including the impact of military actions.

Foreign trade relations of Ukraine with the EU

The reduction in the catching of aquatic bioresources complicates the supply of fish products to the domestic market and increases the country's import dependence. During recent years, the share of imported aquatic bioresources and products derived from them has been over 80%, and after the full-scale invasion, this figure approached 90%. So, in 2023, with an estimated fish and fish product consumption fund in Ukraine of 380 thousand tonnes [11], the share of national fish products was only 10%. At the same time, the export of aquatic bioresources and products derived from them in 2023 decreased by almost half compared to 2021, when the domestic industry exported 12.7 thousand tonnes[1]. In 2023, the export of fish, fish products and other aquatic bioresources in monetary terms decreased to 31 million USD. Ukraine exported the most to Moldova, Lithuania, Germany and Georgia. At the same time, fish, fish products and other aquatic bioresources were imported into Ukraine worth 932 million USD, with the main supplies traditionally coming from Norway, Iceland and Estonia. The current positions of commodity imports in the structure of satisfying consumer demand in the domestic fish and fish product market of Ukraine indicate a high level of import dependence (in 2023, the negative trade balance in fisheries exceeded more than 900 million USD), reflecting the low competitiveness of goods in the global market. This underscores the necessity of developing the industry and increasing the domestic export potential. It is worth noting that in the pre-war year of 2021, Ukraine's exports and imports of fish and crustaceans with EU countries amounted to 36 million USD and 107 million USD, respectively, forming 63.2% and 12.2% of the total structure of fish and crustacean exports and imports. Despite the small share of fish and crustaceans in the overall commodity structure of trade with EU countries, it should be noted that before the full-scale war, the export of this category showed a positive growth trend (Table 1).

[1] In 1992-1995 exports of fish products in Ukraine was on the same level as import, but since 1997 stated to rapidly decrease.

Table 1. Foreign trade of fish and crustacea of Ukraine with EU (thsd. USD)

	2019	2020	2021	2022	2023
Exports	23,709.9	25,894.7	35,547.0	21,988.7	15,421.2
Imports	117,425.6	115,035.0	107,218.2	84,229.2	99,682.3
Balance	-93,715.7	-89,140.3	-71,671.2	-62,240.4	-84,261.1

Source: *Own calculations based on [12].*

As we can see from the table, after beginning of the full-scale war in 2022, Ukrainian exports of fish and crustaceans to EU countries decreased by 1.6 times, which overall corresponds to the trends in foreign trade for the mentioned commodity category. Simultaneously, the import of fish and crustaceans from EU countries decreased by 21%, which is explained by logistical difficulties and the non-inclusion of fish in the list of critical import goods. In 2024, for the first time under the conditions of Russia's full-scale aggression on the territory of Ukraine, it was possible to ensure the growth of both exports and imports of fish products with EU countries, facilitated by the establishment of efficient logistics routes.

During the past decades, there has been a trend of increasing imports of aquatic bioresources and products derived from them in Europe – to 11 million tonnes. It is important for Ukraine to consider these trends and stimulate the export potential of the industry. Moreover, Ukrainian producers view the EU market as the most prioritised for fish product exports, as evidenced by a survey conducted by the State Fisheries Agency (Figure 2).

Figure 2. Survey Results on the Expectations of Ukrainian Fisheries for the Opening of International Markets, 2023

Source: *created by the author based on [13].*

So, to identify the benchmarks for future changes, let us summarise the main factors that slow down the development of the fishing industry in Ukraine: outdated methods and ineffective management and control; bureaucratisation and complexity in obtaining permits; illegal, unreported and unregulated fishing (IUU-fishing)[2]; corruption; monopolisation; tax evasion; limited sales markets both within Ukraine and abroad; high import dependency of the sector. It is important to note that more than half of the aquatic resources catch remains in the shadow, resulting in

[2] According to expert estimates, the budget losses from IUU fishing amount to 850 million UAH. Besides, the losses from shadowed aquaculture are 250 million UAH [11].

significant budget losses. The high level of sector shadowing is caused by the lack of proper control and accountability for non-reporting, business mistrust towards government authorities and significant production costs, including substantial tax burdens. Also, there are other several typical challenges of the sector, as a high level of moral and physical depreciation of fixed assets; low reproduction rates of most aquatic bioresource species[3] (quantity of fish planting materials produced in aquaculture in Ukraine decreased more than four times – to 76 million specimens, from 2017 to 2022)[4]; negative anthropogenic (hydro construction, pollution, coastal strips degradation) and climatic impacts on aquatic ecosystems; a lack of a full-cycle traceability system – from the extraction of aquatic bioresources to the sale of products derived from them; absence of a comprehensive statistical database and sector characteristics; complicated procedure for obtaining water bodies for lease and problems with leasing hydraulic structures and water bodies as integrated property complexes; lack of state support for the sector's breeding practices and issues with the supply of fish planting material[5] [14]; significant energy costs; the negative consequences of military activities. The last point significantly strengthens all previous issues, at the same time, adding new challenges. In particular, during the two years of full-scale war, the damages to aquaculture and fisheries are estimated at approximately 35 million USD [15]. The most severely affected is industrial fishing, due to mining, shelling, occupation of territories, prohibition of fishing in front-line zones, and the blockage of fisheries activities in the Black Sea and Sea of Azov.

Fishery activities in the EU

Sustainable management of fisheries and conservation of fish stocks in the EU is regulated by the Common Fisheries Policy (CFP), which, having separated from the Common Agricultural Policy (CAP) at one point, has established itself as a distinct framework. Responsible and sustainable fisheries management in the EU involves setting fishing quotas, control and inspecting fishing activities, implementing fisheries support programs, combating IUU fishing, by prohibiting access to the EU market for uncertified fishery products and publishing lists of IUU vessels. It is worth noting that the EU supports international cooperation with other countries to scale up efforts in combating IUU fishing.

Aquaculture is an important component of the Blue Economy Strategy and appropriate to the initiatives of the European Green Deal (EGD) due to its low carbon footprint. Considering the EU's small share in global aquaculture production, which was less than 2% in 2018 [16], and the necessity to implement sustainable practices, the EU

[3] At the end of 2024, the government made a decision to support freshwater fish producers in de-occupied and conflict-affected territories, providing for compensation of up to 30% of expenses for the purchase and cultivation of fish seed stock.

[4] It is important noting that every hryvnia invested in the reproduction of aquatic bioresources can yield a return of up to 9 UAH [14].

[5] Currently, Ukraine faces a significant challenge in the production of fish planting material. In the Odessa region, due to the absence of a complete aquaculture cycle, there are frequent instances where the obtained planting material is of low quality. Furthermore, there is a risk of spreading diseases, weeds, and undesirable invasive species with the fish stock [6].

Council approved conclusions and recommendations for new strategic guidelines for promoting more sustainable and competitive aquaculture for the period 2021-2030, that were developed with public engagement. The production dynamics of aquaculture in the EU from 2018 to 2023 demonstrated stability, except for 2020, when a significant decline was recorded in Spain due to the COVID-19 pandemic. In 2023, EU aquaculture production exceeded more than 1 million tonnes in live weight, or 4.6 billion EUR in value. It is noteworthy that approximately 70% of EU aquaculture production is provided by four countries: Spain, France, Italy, and Greece, with Spain traditionally leading (Table 2).

Table 2 - Aquaculture production in EU, (thsd. tonnes).

	2018	2019	2020	2021	2022	2023	2023/2022, %
EU – 27 countries	1133	1120	799	1124	1084	-	93.2
Greece	132	129	131	144	141	141	100.3
Spain	319	307	138	277	273	243	89.1
France	188	194	191	194	184	187	101.4
Italy	143	133	123	146	130	130	99.6

Source: *Own calculations based on the data [10].*

It indicates the possibility for expansion of the list of aquaculture-producing countries within the EU and corresponding prospects for Ukraine. It is worth looking into the rules for aquaculture producers in the EU, within which significant attention is given to sustainable management and proper conditions for animal care (Figure 3).

In 2023, within the framework of the CFP, the European Commission (EC) presented a series of measures aimed at enhancing the sustainability of fisheries and aquaculture, among which significant attention was given to addressing energy challenges and preserving marine ecosystems [18]. According to the EC's summaries, industry in the EU is showing improved sustainability indicators. However, in the near future, efforts should be focused on reducing the energy dependency of the fisheries and aquaculture sector on traditional fuel sources [19].

Such approach will contribute to achieving the goals of the EGD of climate neutrality and increasing resilience to fluctuations in energy commodity prices. Additionally, there is a focus on initiatives for reducing the EU's excessive dependence on imported fisheries and aquaculture products. At the same time, there is an established potential of developing organic aquaculture with appropriate labelling or certification for such products [20]. Furthermore, it is advised to promote innovative solutions in aquaculture, such as utilising aquaculture bio-waste for biogas production or as fertiliser, water recirculation or reuse; implementing integrated multi-trophic aquaculture (IMTA)[6] and aquaponics (symbiosis of aquaculture and hydroponics)[7] [21] etc.

[6] In IMTA residues of feeds and wastes from one species become food for others.

[7] It is important to note that the Ukrainian company "AQUAFARM" is already implementing innovative methods combining aquaculture and hydroponics, utilizing water enriched with organic fertilizers after fish cultivation for growing agricultural crops.

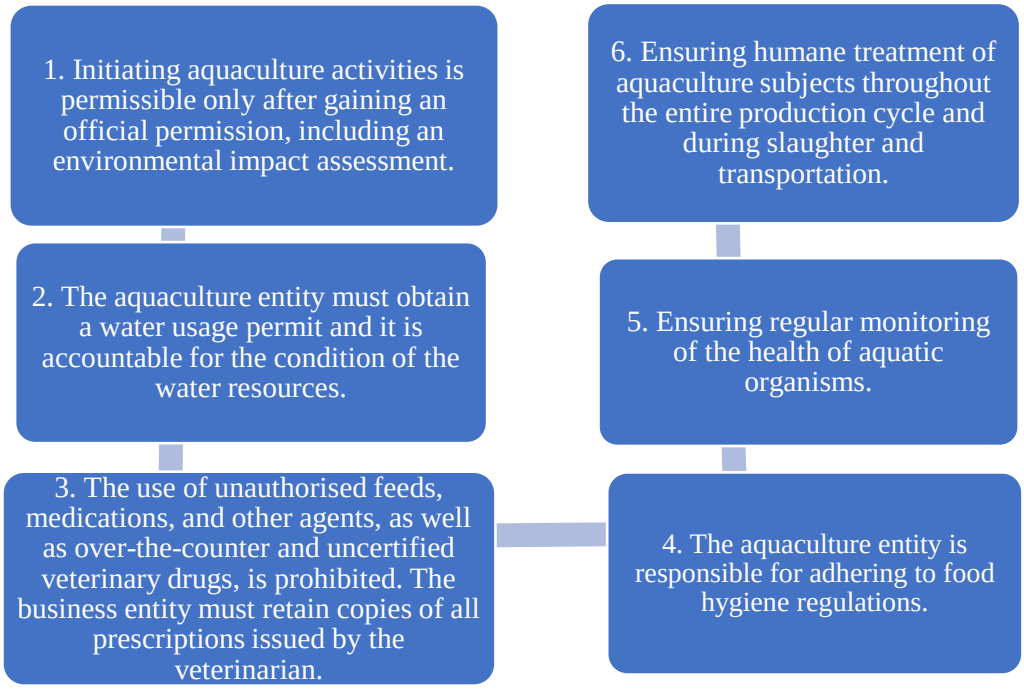

Figure 3. Rules for aquaculture entities in the EU.
Source: *created by the author based on [17].*

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It is worth noting the substantial financial support provided to the sector of fisheries and aquaculture in the EU. Particularly, the European Maritime, Fisheries and Aquaculture Fund (EMFAF) has been created, which, alongside the CFP, supports the EU's marine policy and international ocean governance. The budget of EMFAF for the period 2021-2027 exceeds 6 billion euros, nearly 90% of which is allocated through national programs. It is noteworthy that over the previous seven years (2014-2020), the European Maritime and Fisheries Fund (EMFF) operated with a budget of 5.6 billion euros, with over 46% directed towards sustainable fisheries and aquaculture [22]. Besides, EMFF supported initiatives aimed at restoring fish stocks, diversifying fisheries activities, and decarbonising the sector etc. It should be noted that according to

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the European Court of Auditors report, the EU's aquaculture sector, despite substantial funding (EMFF allocated 1.2 billion euros during 2014-2020 and EMFAF allocated 1 billion euros during 2021-2027), does not have expected results and requires improvement in monitoring and assessing the sustainability of the sector [23]. This underscores the importance of forming future payments relying on final outcomes.

Moreover, EU countries are developing and implementing local state support programs in aquaculture. Particularly, in Latvia, compensation is provided for losses due to predatory birds or animals and ecological payments to maintain specified fish productivity and reduce the contamination of water resources by fish feed [24].

Also, one of the directions for supporting the development of aquaculture could be the creation of a corresponding fund, similar to those that exist in the EU and other countries worldwide. For example, in Norway, 80% of the funds generated from auctions for aquaculture activities are accumulated in a development fund [25], with future redistribution of them for the replenishment of fish, procurement of modern refrigeration and other equipment, and the advancement of scientific activities etc.

Integration of the fishing industry of Ukraine into the EU legal framework

Despite the challenges posed by the ongoing war, Ukraine continues to move unhesitatingly towards EU membership. In June 2022, in particular, Ukraine was granted candidate status for EU accession and, by the end of June 2024, the first Intergovernmental Conference between Ukraine and the EU took place in Luxembourg, marking the official start of the negotiation process for Ukraine's membership in the European Union. By choosing the European direction, Ukraine's fisheries and aquaculture sector has primarily faced the challenge of harmonising its national sectoral regulatory framework with EU requirements and fulfilling the conditions of Chapter 13 (Fisheries). Currently, the reform of Ukraine's fishing industry is ongoing. This way, developed in line with European requirements and adopted in 2023, the Law of Ukraine No. 2989-IX "On amendments to certain legislative acts of Ukraine on improving state regulation in fisheries, conservation and rational use of aquatic bioresources and aquaculture", which involves the establishment and launch of the Unified State electronic management system (e-Fish), implementation of auction trading for industrial fishing rights within the "Prozorro.Sale" system, simplification of permit acquisition procedures, minimisation of corruption risks etc.

Auctions initiated in 2023 for the sale of rights to enter into agreements for special use of aquatic bioresources in fisheries water bodies have demonstrated effectiveness in a way that, in 2023, industrial catch made up 24.5 thousand tonnes, contributing over 100 million UAH to the budget [11], which is 7.6 times higher than in 2022. In 2023, the largest contributions to local budgets came from producers in Cherkasy, Kirovograd and Odessa regions, totalling 73.8 million UAH, unlike Kherson and Zaporizhzhia regions, where the revenue inflows decreased to record-low levels, due to the Kakhovka dam disaster.

In 2023, the EC rated Ukraine's compliance level with Chapter 13 (Fisheries) of EU standards at 2 out of 5 points, that indicate the need for further adaptation of national legislation to align with the European legal framework, including the principles of the CFP and the EGD. Currently, 705 EU legal acts have been analysed, with 662 not

requiring implementation and 34 needing implementation [11]. The screening of domestic legislation showed some progress that was reached in fisheries and aquaculture through the adoption of legislation aligned with the EU acquis[8] and the development and adoption of the Strategy for the Development of the Fisheries Sector of Ukraine for the period until 2030 (the Strategy) and the operational plan of measures for its implementation for 2023-2025 [14]. There is need to implement EU Regulations No 708/2007, 1026/2012, 2019/1241 etc.

According to the EC's conclusions, further reform of the sector in Ukraine should focus on such several areas as ensuring the implementation of measures outlined in the national sectoral Strategy; accelerating the harmonisation of legislation and focusing on combating IUU fishing; establishing a fisheries monitoring agency; accelerating fishing monitoring; improving the system for collecting and updating statistical data; minimising the environmental impact of fishing and aquaculture [26] etc.

According to the State Fisheries Agency's plans for 2024-2025, there are planned the implementation of e-contracts, e-permits, e-magazines, an inspectorate system (the system of GPS monitoring of inspectors' work and video recording of violations); a traceability system for aquatic bioresources and products derived from them [11], that aim to reduce IUU fishing and corruption risks significantly, and also simplify the process of obtaining permits. Currently, the e-contracts and e-permits systems are already operational, ensuring transparency at all stages of interaction and significantly simplifying the procedure for obtaining permit documents. In June 2024, the Verkhovna Rada of Ukraine passed in the first reading a draft law to ensure traceability of aquatic bioresources (No. 9545), the implementation of which will promote the establishment of an electronic traceability system. At the same time, new opportunities for exporting domestic fishery products will emerge.

According to the conclusions of EC published at the end of October 2024 [27], the fisheries and aquaculture sector demonstrates a certain level of preparedness. The EC highlighted the successful implementation of last year’s recommendations: an electronic management system has been established, and relevant legislation has been adopted in line with the EU acquis. It is expected that in 2025, modernization and harmonization of the e-Fish electronic system with similar European registers will continue, along with aligning national legislation on data collection, management, and utilization, monitoring of aquatic bioresources, and the inspection system with the EU acquis. At the same time, it is essential to facilitate the creation of a dedicated oversight body to combat IUU fishing. These conclusions should serve as a guide for Ukraine, and their implementation will facilitate adapting the management system of the fisheries sector to the EU acquis.

Consequences of European integration for Ukraine's fishing industry

Summarising the points above, it should be noted that the main *advantages* of European integration for Ukraine's sector of fisheries and aquaculture include: de-shadowing; implementation of traceability mechanisms for aquatic bioresources and products derived from them; improvement of fish product quality in accordance with

[8] In April 2023, Ukraine prepared a national plan for full alignment with the EU acquis in the fishing industry, with responsibility for implementation resting with the State Fisheries Agency of Ukraine.

European standards; possibility of gaining EU funding for modernising outdated equipment and developing the fisheries sector; enhancement of export potential; creation of a favourable investment climate; access to innovative technologies and practices in fish harvesting and processing (with a focus on energy conservation); improvement of maritime safety through increased control and supervision; formation of a climate-neutral fisheries and aquaculture sector; improvement of the ecological state of water bodies. *The challenges* of Ukraine's fishing industry facing the path to EU accession include: significant costs for adaptation, implementation of European norms and standards, and modernisation of production and product quality improvement; compliance with stricter EU norms and rules, including the CFP, which may complicate business operations, with small and medium-sized producers potentially being the most vulnerable; quota reductions[9] ; the need to establish collective responsibility among exporters; dependence of the domestic fisheries sector on the situation in the European market. Considering the current state of the sector, European integration can become a powerful driver for the development of Ukraine's national fishing industry.

Conclusions and prospects for further research. The current state of the fishing industry in Ukraine is characterised by disconsolate indicators, in particular, over recent decades, there has been a chronic decline in the catch of aquatic bioresources in natural water bodies and in the volume of fish farming in aquaculture, highlighting the necessity for accelerated industry reform. Particularly, over the past decades, the extraction of aquatic bioresources in Ukraine has decreased to 35.5 thousand tonnes, which is ten times lower than the figures from 2000 and 28 times lower than those from 1990. Considering global tendencies in fishing industry and Ukraine's significant potential, it is crucial, during extensive Russian invasion, not only to maintain the current productivity levels of fisheries and aquaculture but also to ensure effective management, diversify production structures, and create conditions for expanding industry capabilities in line with European integration requirements. Therefore, on the path to full membership in the European Union, synchronising domestic fisheries legislation with European standards should continue, including the principles of the CFP and the EGD, which require the implementation of more than 30 EU acts, and reforming national fisheries policies accordingly.

Considering the European integration benefits, it has been established that the primary advantages for the domestic sector include facilitating the acceleration of European initiatives, accessing special EU financial programs, modernising key fisheries assets, expanding export potential, and transitioning to sustainable management practices within the industry. Converting these benefits into practical achievements can serve as a powerful stimulus for the development of the fisheries sector and the adoption of ecologically-oriented and resource-efficient methods in aquaculture.

[9] Ukraine should consider the widespread practice, after the EU accession, of changing the quota system [28], where the quota for fishing rights belonging to a new member state becomes part of the EU's overall quota, subsequently redistributed among member states. It is possible that it could pose a challenge for Ukraine on its path towards European integration.

To ensure effective management of the domestic fishing industry in line with the European integration course, several measures should be implemented. These measures include improving documentation system through digitalisation, de-shadowing, combating IUU fishing through the identification and prohibition of IUU products, decarbonising, modernising monitoring and remote control systems for fishing activities, and conducting a comprehensive inventory of water bodies with subsequent creation of an open database for making effective management decisions, including those that are outlined in the sectoral Strategy. The development of the aquaculture sector in Ukraine requires the implementation of several measures such as: allocating funding for updating infrastructure and restoring property damaged due to Russian aggression; identifying and considering the potential use of water bodies suitable for aquaculture and mariculture purposes, particularly in southern regions following de-occupation and demining efforts; ensuring legislative regulation of integrated use of water bodies (land plots and water object) and hydraulic structures for aquaculture purposes; promoting the establishment and functioning of aquaculture producer associations and the fund of development of fisheries and aquaculture; promoting the growth of export potential for the most promising aquaculture products (such as zander, sturgeon and crustaceans); implementing innovative energy- and water-saving aquaculture technologies and developing organic aquaculture; popularising innovative aquaculture technologies and practices among agricultural producers etc. The prospects for further research involve a study of the European experience of effective fishing management.

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