



Development of Intensive Fish Farming: Theory, Methodology and Practices

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Abstract

The article substantiates the objective need for the development of the intensive fish farming, summarizes its features into a single system, develops recommendations for improving the system of indicators of the economic efficiency of intensive fish farming, reveals the relationship of factors affecting the development of the industry, reveals significant aspects of foreign experience in the development of the industry. In particular, the ongoing reforms in the fish farming industry and trends in change, the state were analyzed, recommendations were developed on the basis of norms that provide for saving resources, reducing the cost of material, technical and labor resources necessary for growing fish.

Keywords: intensive fish farming, aquaculture, efficiency of fisheries enterprises, production of fish products, state support for fisheries.

Introduction

The dynamic development of the system of production of biological resources is the most important function of the state policy in the field of rational nature management. The transition to market relations in Uzbekistan predetermined the need to create a new economic mechanism for resource use, the development of new approaches to state regulation of the production of fish products.

The fish industry of the Republic of Uzbekistan is the most important component of the food security system of the republic.

Of particular importance is the dynamic development of aquaculture as a sustainable source of providing the population with fish products. In the conditions of increasing anthropogenic impact on the environment, production is the main direction of preserving and increasing the commercial value of freshwater reservoirs.

The current practice of financing work on the production of fish products does not activate the dynamic development of the industry. Modern practice requires the search and development of new scientific approaches to the development of the industry, theoretical and methodological justifications for the specialization of fisheries, the development of practical recommendations for the development of the industry, and the identification of ways to increase the economic efficiency of fish production. The lack of systematic research in this area and the importance of the production of fish products for the dynamic and efficient development of aquaculture determine the relevance of this problem.

The development of fish farming in conditions of food security is an objective necessity, and the economic reforms associated with the development of the industry serve to meet the demand of the population for fish and fish products and improve their health.

In order to further increase the objective necessity and socio-economic significance of the development of the fish farming industry, we consider it expedient to carry out the following measures:

– improving the efficiency of fish farming and fish products;

- improving the material and technical supply of the fish farming and processing system, attracting investments in the industry;
- efficient use of natural and artificial reservoirs;
- widespread introduction of scientifically based resource-saving methods and intensive fish farming technologies;
- broad establishment of the cultivation of marketable fish products, as well as paying attention to the optimal territorial distribution of the fish farming industry;
- systematization of organizational and economic relations in the value chain of fish products;
- stimulating the system of re-reproduction of fish fry and providing fish farms with feed;
- development of mechanisms for state support for the development and improvement of the efficiency of the fishery industry;
- based on the analysis of foreign experience, the development of proposals on the possibilities of introducing its significant aspects.

Level of study of the problem. Theoretical and practical aspects of the development of the fishing industry and issues of improving organizational and economic mechanisms, the importance of cage aquaculture in the development of intensive fisheries, modeling of fish production, areas for improving the efficiency of the fishing industry, fish species and A.R. Kurbonov from Uzbekistan, R. Kurbonov, B.G. Kamilov, U.T. Mirzaev, D. Kholmiraev, D. Shokhimardonov, F.K. Mamatov, B. Elmurodova, A. Mukhtorov [12, 13, 14, 15, 16, 17, 18, 19] and foreigners I. Okumus, A.B. Patel, A. Yakupitiyage, D. Research was conducted by such economists and biologists as Ts. Dorzhiev, E.V. Levkina, O.N. Ponomareva, I.A. Chernyavsky, G.E. Servetnik, I.P. Novozhenin [20, 21, 22, 23, 24, 25]. However, their works do not sufficiently study theoretical and practical issues, methodological aspects of intensification of the fishing industry at the present stage. Therefore, it is advisable to further improve the scientific and practical foundations of intensive development of the fishing industry, taking into account the conditions of the regions of our republic and the fact that the population's demand for fish products is not satisfied sufficiently. This served as the basis for choosing the topic of this research work.

Materials and methods. The fish farming industry has several specific features, given them, it is possible to determine the direction of the industry development (Figure 1).

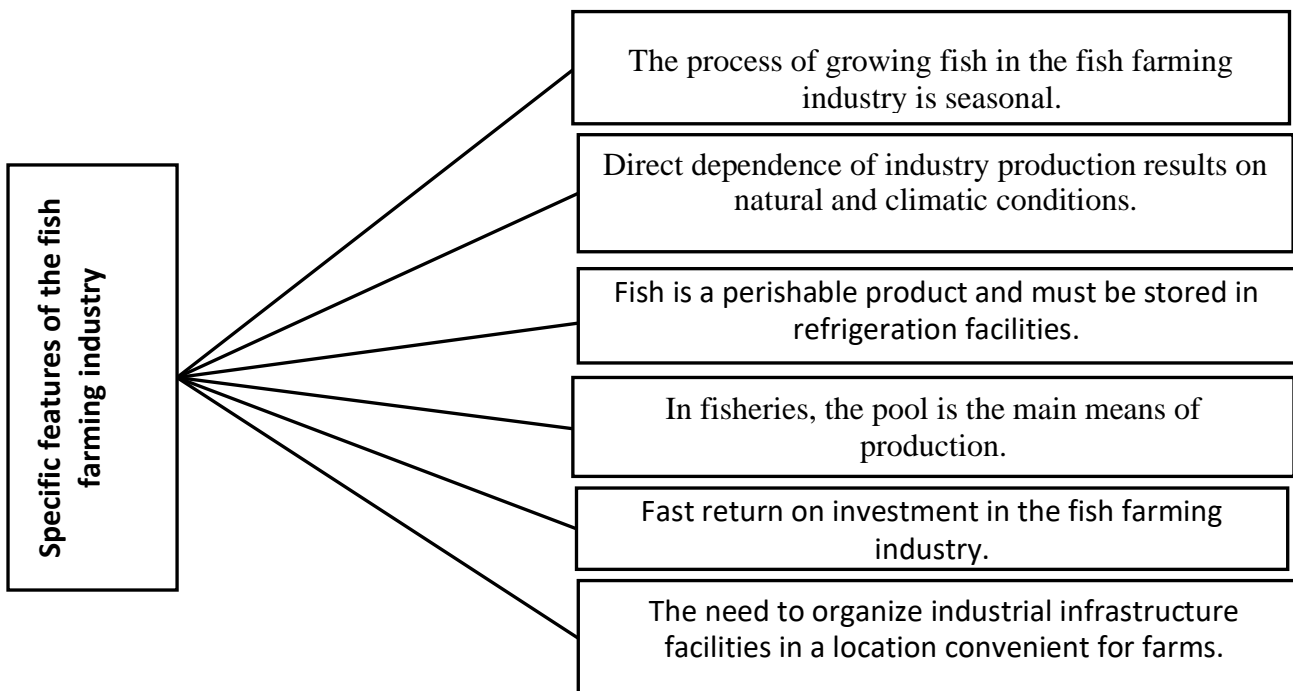


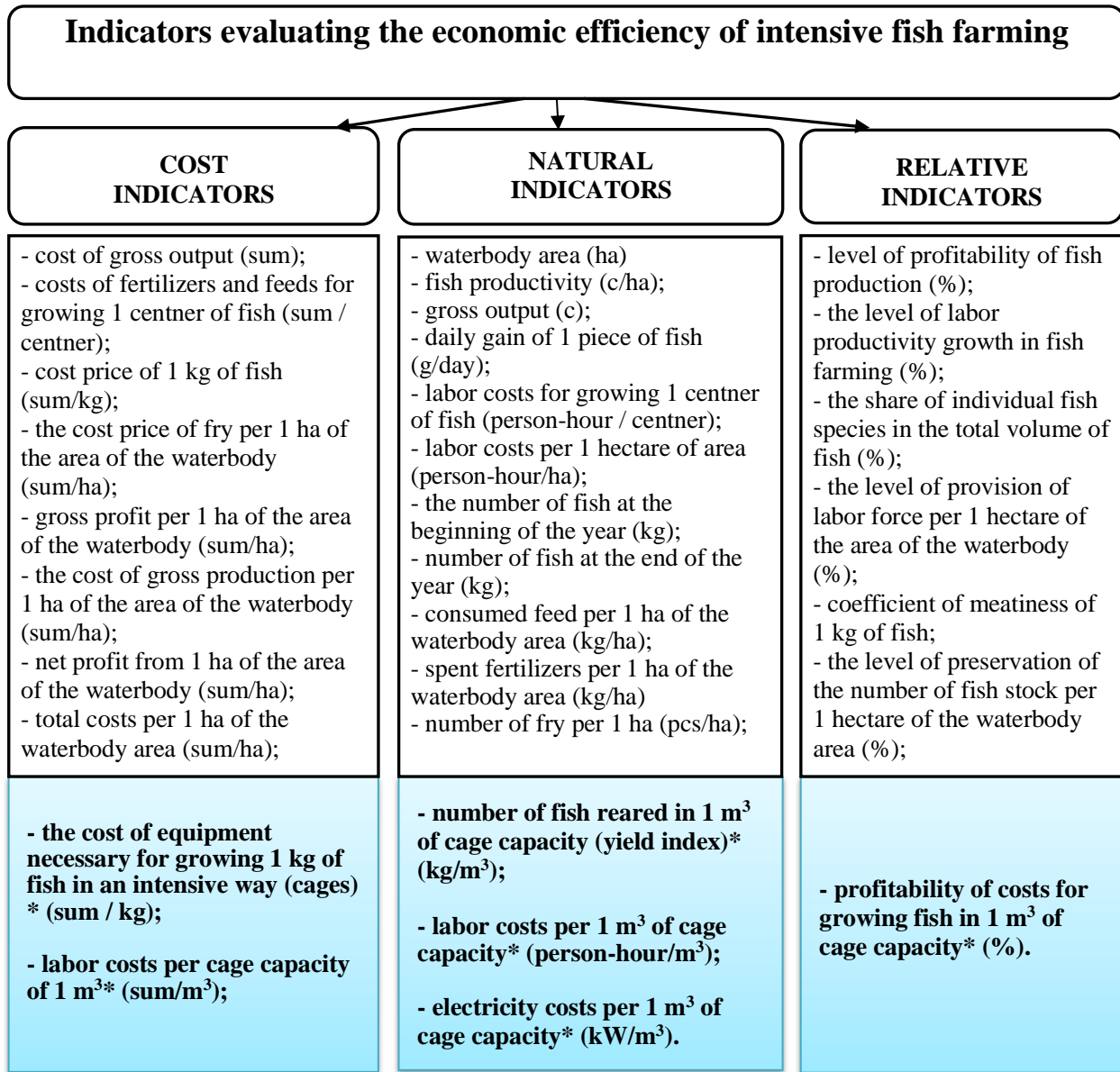
Figure 1. Specific features of the fish farming industry

(Compiled on the basis of scientific research of the author).

Features of the fish farming industry are similar to the general properties of agricultural production. By increasing economic efficiency, it is possible to adjust these properties, or rather, to transfer industries from a seasonal cycle to a year-round cycle, which will make it possible to find sources of additional capital and bring them into the production process.

These characteristics require attention when evaluating the efficiency of fish farming, including indicators that determine economic performance and improve the methods of their accounting.

The system of indicators was developed by dividing the economic efficiency of fish farming into three: cost, natural, relative indicators (Figure 2).



Note: * indicators recommended by the author.

Figure 2. Indicators evaluating the economic efficiency of intensive fish farming

(Compiled on the basis of scientific research of the author.)

Indicators such as the cost of electricity consumption per cage capacity of 1 m³, the cost of equipment needed to grow 1 kg of fish in a cage method, the number of fish grown in a cage capacity of 1 m³ (productivity indicator), labor costs corresponding to a cage capacity of 1 m³, the profitability of growing fish in a cage capacity of 1 m³ makes it possible to determine the economic efficiency.

Several factors influence the development of fish farming. They are studied by dividing into the following 4 groups: organizational and legal factors, economic factors, natural and geographical factors, socio-demographic factors, and having studied the influence of factors on the development of the fish farming industry, an econometric assessment of their relationship is given.

Comprehensive measures are being taken in our country to modernize agriculture and accelerate the development of the fish farming industry. An integrated approach to solving issues related to the development of fisheries, the conservation of biological diversity and the reproduction of fish by intensive methods (cages, a closed water circulation system, small intensive pools) can be considered one of the main tasks of economic reforms carried out in the agricultural sector.

Also, according to the trend of structural and quantitative changes in the industry with the emergence of various forms of ownership as a result of the formation of market relations in the volume of fish farming and in terms of population consumption of fish products, growth has been achieved over the years. Of course, this helps to improve the provision of the ever-increasing needs of the population for food.

Data analysis and results

Our country is implementing comprehensive measures to modernize agriculture and accelerate the development of the fishing industry. A comprehensive approach to solving the issues of fisheries development, preserving biological diversity, intensive fish farming (in cages, closed water circulation systems, small intensive ponds) can be considered one of the main tasks of the economic reforms being carried out. in the agricultural sector.

Also, according to the trend of structural and quantitative changes in the industry, as a result of the formation of market relations after the emergence of various forms of ownership, over these years, the volume of fish production and fish consumption by the population have increased. This will certainly contribute to further improvement of the food supply of the growing population.

According to the analysis, the highest figures for the total volume of fish caught in 2023 will be recorded in Khorezm (15.6%), Tashkent (13.6%), Andijan (10.9%), Samarkand (9.0%) regions, Namangan region (7.8%), Jizzakh region (7.6%), Navoi region (6.9%) and Fergana region (6.7%) (see Table 1).

Also, according to the analysis, in 2023, compared to 2015, the volume of fish catch in the republic increased by 3.3 times. During this period, a significant growth trend of this indicator was observed in all regions. Compared to 2021, the volume of fish catch in 2023 increased by 14.4%. However, in some regions, including the Republic of Karakalpakstan (80.2%), Bukhara (96.3%), Kashkadarya (77.3%), Samarkand (81.7%), Khorezm (99.%) regions, the volume of fish catch is clearly that compared to 2021 it has decreased. In addition, during the analyzed periods, high fish production rates were achieved in Samarkand (9.8 times), Andijan (8.5 times), Namangan (5.6 times), Bukhara (5.6 times) and Syrdarya (5 times) regions.

Of course, the reason for this today is, firstly, the increased attention to the development of the fishing industry, and secondly, the development of intensive aquaculture in this industry, the effective use of natural and artificial reservoirs, an increase in the volume of fish farming using intensive pools and the creation of fish farms in households.

Before analyzing the activities of fish farms and comparing their technical and economic indicators, it is advisable to study the existing main problems in the industry. According to research based on a survey conducted in the Republic of Karakalpakstan, Surkhandarya and Namangan regions, respectively, 96%, 98% and 90% of respondents had problems with water, 80%, 90% and 78% with maintenance, 94%, 96% and 92% with nutrition problems, 84%, 92% and 94% with a lack of qualified specialists in the field, 56%, 64% and 86% with a low level of veterinary services, 88%, 68% and 92% with a shortage medicines, 86%, 94% and 90% - with problems in the supply of mineral fertilizers.

Table 1.

Indicators of changes in the volume of fish catch in the country [26, 27]

№	Name of regions	2015	2017	2019	2021	2023	In 2023 compared to 2015 (%)
1.	Republic of Karakalpakstan	3 410	6 157	12847	14454	11597	3.4 times
2.	Andijan region	2 535	4 081	11048,6	17663	21672	8.5 times
3.	Bukhara region	1 951	3 400	5798,3	11421	11004	5.6 times
4.	Jizzakh region	10 850	13 838	10314,9	13139	15098	139.1
5.	Kashkadarya region	3 151	4 770	5714,4	6505	5026	159.5
6.	Navoi region	5 610	12 566	11997,6	13503	13743	2.4 times
7.	Namangan region	2 733	5 218	6931,6	11187	15434	5.6 times
8.	Samarkand region	1 839	3 435	8974,1	21982	17961	9.8 times
9.	Surkhandarya region	1 911	3 876	3610,8	4977	6882	3.6 times
10.	Syrdarya region	1 822	2 222	9994,1	5933	9058	5.0 times
11.	Tashkent region	11 557	8 155	7896,6	10222	27125	2.4 times
12.	Fergana region	4 025	6 782	10567,6	11763	13341	3.3 times
13.	Khorezm region	8 457	9 401	16021,4	31117	30933	3.7 times
	TOTAL	59 852	83 900	121717	173866	198874	3.3 times

Such problems were identified as the most important ones influencing the development of the industry. To eliminate them, it is necessary to improve the organizational and economic mechanism and further improve the legal framework.

In recent years, our government has been implementing a number of measures to develop the agricultural market, improve its material and technical base, create favorable conditions for sellers and buyers, and modernize the market infrastructure in technological terms.

As a result, favorable conditions have been created for farmers in various regions of our republic to sell agricultural products, in particular fish products.

Today, important factors in providing the industry with food are economic incentives for the credit and financing system, insurance, personnel training, advanced training and education, selection and development of the gene pool.

This is, firstly, partial and full coverage by the interest rate of bank loans, and, secondly, the increase in the level of water salinity as a result of an increase in the surface of groundwater is not included in the current procedure, it is necessary to enter these indicators as insurance and set the maximum amount of insurance money in the amount of 30 percent and an insurance premium of 5 percent, and thirdly, providing the industry with qualified specialists armed with modern knowledge will serve as the basis for further strengthening the food base.

Conclusions and recommendations. The solution of existing problems, taking into account the specifics of fish farming and the production infrastructures serving it, as well as the organization and planning of production based on the study of individual features of the industry.

Such indicators of economic efficiency as the cost of equipment required for rearing 1 kg of fish using the intensive method, the volume of fish grown in a cage capacity of 1 m³, the profitability of production, labor costs per cage capacity of 1 m³, electricity consumption per cage capacity of 1 m³, allow you to optimally locate fish farming, draw up and implement a business plan, as well as correctly analyze the results obtained.

Organizational and economic incentives to strengthen the food base in the fish farms themselves and supply them with feed from external sources, as well as in order to improve the food supply of the farms, the allocation of land area based on the area of the reservoir, the productivity of fish per 1 m³ of the reservoir and the level of groundwater will give good results. Therefore, it is advisable to provide economic incentives for the food supply of fish farms on the part of the state by guaranteeing partial coverage of bank loans and covering their full interest rates, applying insurance for damage caused by water salinity at a 30 percent rate and establishing a 5 percent level of insurance premium, issuing customs and tax benefits for feed processing and pellet manufacturing enterprises, fish farms and organizations.

We also consider it appropriate to present the following important aspects of the analyzed foreign experience in the development of fisheries in the republic:

- Considering the specifics of the fishing industry, it may be useful to introduce subsidies to cover a certain part of production costs (experience of Russia);
- Expand the involvement of foreign specialists and organize training seminars on the treatment and prevention of fish diseases (experiences of Russia, Germany, Croatia);
- Increase in the volume of fish farming due to the introduction of intensive technologies (cage, closed water circulation) (experiences of Vietnam, China, Turkey, Russia);
- Economic incentives for the production of highly nutritious granulated feed (experiences of Turkey, Germany, Russia);
- Organization and development of consulting services in the industry (experiences of Germany, Croatia).

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