



AQUACULTURE- AN EMERGING STARTUP SECTOR IN INDIA: OPPORTUNITIES AND CHALLENGES

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ABSTRACT:

In India, fishing is one of the oldest professions. The national economy may be proud of the fishing industry. Blue revolution has made aquaculture one of the fastest growing food production sectors. The, 'Blue food' and 'Blue economy' holds a great promise for the future by providing food and nutritional security to the ever-growing world population. Aquaculture production continued its upward trend, while capture fisheries recovered in 2024 after a marginal decline in 2023. Startups are a key driver of India's economic growth and innovation, contributing to employment creation, technology and development. The aquaculture industry has the potential to be extremely important in supplying the rising demand for protein across the world. With its significant contribution to the socioeconomic development of the nation, the fishing industry has grown to be a significant source of revenue and employment, and it also encourages the expansion of other related small, medium, and large-scale sectors. Indian government actively supports entrepreneurs and startups by launching many programs and initiatives. The government provides funding for startups through grants and loans. The government also offers tax incentives for startups. The aquaculture industry plays a vital role in addressing global food security and meeting the rising demand for fish and animal protein, yet its current practices face substantial challenges. This study aims to evaluate the current status of aquaculture in India and future scopes, opportunities and Challenges regarding to the startups in aquaculture sector with the help of existing government funding schemes.

Keywords: *Aquaculture, Startups, Economic Growth, Opportunities, Government Schemes, Challenges.*

INTRODUCTION :

Aquaculture, the cultivation of aquatic organisms for human consumption, has become an essential contributor to global food security. In India, fishing is one of the oldest professions. The national economy may be proud of the fishing industry. The importance of this industry is two-fold: it has the capacity to create jobs and export goods. Fisheries sector has been recognized the "Sunrise Sector", which has had excellent double-digit average annual growth of 175.45 lakh tonnes in 2022-23, marking an 81% increase compared to 95.79 lakh tonnes in 2013-14. This positions India as the third largest fish-producing nation globally, accounting for approximately 8% of the world's fish production. (Phand & Das 2025).

Fish is a super-food. It is one of the best sources of quality animal proteins besides the

polyunsaturated fatty acids (PUFAs), especially the omega-3 PUFAs EPA and DHA, and micronutrients. Blue revolution has made aquaculture one of the fastest growing food production sectors. The, 'Blue food' and 'Blue economy' holds a great promise for the future by providing food and nutritional security to the ever-growing world population. India being a highly populous country, there is a need for scaling-up of the fish production for ensuring food and nutrition security and livelihood. After formation of the Ministry of Fisheries, Animal Husbandry and Dairying (MoFAD), the Department of Fisheries (DoF), Government of India has taken several new initiatives for boosting up the fisheries and aquaculture sector. The Pradhan Mantri Matsya Sampada Yojana (PMMSY) is a big step in that direction. It

is now realized that entrepreneurial approach is needed for taking fisheries and aquaculture to 'industry scale'. Entrepreneurship is the ability and readiness to develop, organize and run a business enterprise, with all its uncertainties, to make it a profitable venture and the most prominent example of entrepreneurship is the starting of new businesses. It could be of any type; small business entrepreneurship, scalable start-up entrepreneurship, large company entrepreneurship, and social entrepreneurship (Mohanty, et. al, 2024).

METHODOLOGY:

For this research, secondary data is used. The secondary data are collected from different sources, including books on the subject, articles in reputable journals, newspaper articles, government publications, websites and Google to describe the need, scope and opportunity of Aquaculture startups in Indian economy. The present study is conducted to achieve the following specific objectives: · To study the role of Aquaculture startups in Indian economy; · To study the challenges and issues faced by Aquaculture startup sector; · To study the various initiatives & Policy Support announced by the government to enhance Aquaculture in India.

Aquaculture and Global Food demand

There is huge demand for fish food for human consumption and reduction in capture fishery resources has created a gap between the supply and demand of fish. Under such circumstances, increased aquaculture production can reduce the gap. Indian aquaculture sector comprises of large-scale culture of Indian major carp such as rohu, catla and mrigal with a combination of exotic carps, viz. grass carp, silver carp and common carp in fresh water sector. Carp which contribute about 87% in total aquaculture production in the country forms the mainstay of freshwater aquaculture activities. Beside this, catfish and prawn culture are also important

components (Paul and Giri 2015).

Indian aquaculture has demonstrated more than six-fold growth over the last two decades, with freshwater aquaculture contributing over 95% of the total aquaculture production. Over the years, culture practices have undergone considerable improvement and intensification and with the possibility of obtaining high productivity levels. The existing aquaculture system in the country comprises, commercial or corporate and small-scale household-based sustenance) aquaculture. In India, small scale aquaculture is prevalent in some areas of Andhra Pradesh, West Bengal and to a very limited extent in Haryana and Punjab. Fisheries could be one of the prospective sectors to play a vital role in upliftment of the socio- economic status of India in face of diversified challenges. To sustain fisheries in the new millennium, the quality, technical skills and management of fisheries manpower in the country will have to improve in consonance with the rapidly changing needs of our society, both nationally and internationally. (Das et al.2021)

Current market trends

Global fisheries and aquaculture production rose to about 193 Mt in 2024, driven by growth in both aquaculture and capture fisheries. Aquaculture production continued its upward trend, while capture fisheries recovered in 2024 after a marginal decline in 2023. In 2024, the FAO Fish Price Index declined by 3.0%, reaching its lowest point in September before rebounding towards the end of the year. This marked the second consecutive annual decrease since the record high reached in 2022. The volume of global trade in aquatic animal food products saw a slight increase in 2024, despite declines in imports from major markets such as the European Union and China. In China, increased aquaculture production was sufficient to reduce imports in spite of increased consumption. Fishmeal exports rebounded significantly in

2024, after a sharp decline in 2023 mainly due to lower production in Peru. (OECD /FAO 2025). Trends in the export of fishery products from India: The trends and pattern of export of agricultural commodities have shifted with the liberalization of the economy and India's accession to the World Trade Organization (WTO) with effect from 1995, and several other bilateral and multilateral agreements that the country has entered into thereafter. During 1995– 96 to 2019–20, marine products export from India grew from 0.3 to 1.29 million tonnes (mt), with a corresponding improvement in earnings from USD 1.1 million to 6.68 billion (Figure 1). The share of exported fish products was around 10–13% of the total production during the entire period (Suresh & Panda 2023).

Importance of Startups in Indian Economy

Startups are a key driver of India's economic growth and innovation, contributing to employment creation, technology and development. Despite slower growth than previous quarters, India's GDP increased by 6.7% in the first quarter of FY 2024–2025, making it one of the largest economies in the world with the greatest rate of growth. Startups ignited a passion for innovation and entrepreneurship across all age groups. The concept of startups fuelled people of all ages' drive to be creative and pursue their goals. (Pradhan et. al 2025) The ecosystem of start-ups has contributed significantly to economic growth in the country. Overall, this sector of start-ups was allowing job creation, innovative drive, and disruption in different conventional sectors, which in turn helped increase the GDP of the country (Kanodia, 2024)

Scope and Opportunities of Startups in Aquaculture sector

The world's population is expected to increase to 9.8 billion people in 2050, placing an even greater burden on the planet's food supply. India, blessed with a vast coastline of 7,516.6

km and extensive inland water resources, offers substantial scope for fisheries development. The aquaculture industry has the potential to be extremely important in supplying the rising demand for protein across the world. With its significant contribution to the socioeconomic development of the nation, the fishing industry has grown to be a significant source of revenue and employment, and it also encourages the expansion of other related small, medium, and large-scale sectors. Translating the findings of study in the fields of fisheries and other agricultural areas. With a focus on research and development activities towards improvement of current practises and development of new technology to ensure sustainable supply of high-quality products to meet growing demand from both national and international markets, both in terms of volumes and value addition, the industry has already significantly contributed to employment generation and exports. The sector includes:

- a) Marine Fisheries: Exploiting fishery resources in coastal and deep-sea waters.
- b) Inland Fisheries: Utilizing rivers, lakes, reservoirs, ponds, and wetlands for capture and culture fisheries.
- c) Aquaculture: The controlled breeding and rearing of aquatic species such as fish, shrimp, and molluscs in tanks, ponds, and cages.
 - Seaweed and Shellfish Culture: Growing seaweed, mussels, oysters, and other species with high nutritional and commercial value.
- d) Ornamental Fish Farming: Cultivation of decorative fish species for domestic and international markets. (Phand & Das 2025).
 - Aquaculture—particularly at small and medium scales—has demonstrated a stronger impact on rural income generation and job creation than traditional crop farming. Studies across developing countries show that fish farming is not just an alternative but a viable pathway to rural economic transformation (Das, et. al 2025)

Government Schemes and Fundings

Indian government actively supports entrepreneurs and startups by launching many programs and initiatives. They provide financial assistance, technical assistance, and subsidies, among other facilities, to startups through numerous schemes. The government provides funding for startups through grants and loans. The government also offers tax incentives for startups. The government also provides resources and support for startups through incubators and accelerators. The government also promotes entrepreneurship through education and training programs.

1. Pradhan Mantri Matsya Sampada Yojana (PMMSY)

The scheme provides credit-linked subsidies for a wide range of activities

The Union Cabinet approved the Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY), a Central Sector Sub-scheme under the Pradhan Mantri Matsya Sampada Yojana (PMMSY), on 8th February 2024 for a period of four years from FY 2023-24 to FY 2026-27.

2. Under the scheme Pradhan Mantri Matsya Samridhi Sah-Yojana (PM-MKSSY), the NFDP serves as a platform for creating digital work-identities for fishers, fish farmers, vendors, and processors, enabling their seamless integration into formal financial and welfare systems.

3. Fisheries and Aquaculture Infrastructure Development Fund (FIDF) Provides loans with an interest subvention of up to 3% annually for eligible projects,

4. NABARD's Agri-SURE Fund

NABARD and the Government of India have established the Agri-SURE fund to support technology-driven startups and rural enterprises, including those in the fisheries sector.

Challenges to Aquaculture Startups in India

The aquaculture industry plays a vital role in addressing global food security and meeting the

rising demand for fish and animal protein, yet its current practices face substantial challenges. The increasing human population, rising demand for animal protein, and consideration of fish as an inexpensive and rich source of animal protein and safe food have led to intensification of the aquaculture sector, resulting in the use of chemicals, steroids, antibiotics, etc., for raising fish.

In aquaculture, especially fish farming, wastewater is burdened with nutrients from fish feces and uneaten feed, and chemicals are the effluents that end up in the environment. Chemicals such as therapeutics, disinfectants, anaesthetics, and compounds used in water/fish treatment, especially in areas with poor water quality, when not treated before disposal, cause serious pollution of natural water bodies and soil, an example of which is the eutrophication of surface water bodies.

Eutrophication is the most significant cause of depletion of surface water quality and, in most cases, results in hypoxia.

Aquaculture wastewater has been documented to contaminate groundwater, altering water chemistry and making it unfit for drinking.

In addition, another harmful impact of aquaculture on the environment is the destruction of important ecosystems and habitats. The deforestation of mangrove forests for the farming of fish, especially shrimps, has been documented as a cause of significant habitat loss.

In order to increase productivity, several chemicals (including probiotics, antibiotics, disinfectants, herbicides, and pesticides) are used in aquaculture to cure and prevent diseases. Due to the use of these chemicals, contaminated farmed seafood items pose dangers to human health, possibly increasing the number of various NCDs like cancer. In aquaculture, antibiotics are used as preventative, therapeutic, or feed supplements.

Antibiotics can disperse into the water column through treated feed and spread to sediments and wildlife.

To sustain aquaculture's contribution to global protein needs, it is imperative to adopt environmentally friendly practices, regulate harmful chemical use, and ensure innovations align with ecological and public health priorities (Ruben, et. al 2025).

CONCLUSION:

The rise of startups in India has been a transformative force that has helped shape the economic contours of the country. Aquaculture is one of the fastest growing areas of Indian startups due to high demand of food for the ever-growing population all over the globe. Indian government supports the startups through various schemes and funds. Though there are many challenges to this sector aquaculture startups can be a promising area for job creation, Employment and overall economic growth of the country.

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