India Exim Bank

Export Potential of India's Shrimps and Prawns

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EXPORT POTENTIAL OF INDIA'S SHRIMPS AND PRAWNS

EXIM Bank's Occasional Paper Series is an attempt to disseminate the findings of research studies carried out in the Bank. The results of research studies can interest exporters, policy makers, industrialists, export promotion agencies as well as researchers. However, views expressed do not necessarily reflect those of the Bank. While reasonable care has been taken to ensure authenticity of information and data, EXIM Bank accepts no responsibility for authenticity, accuracy or completeness of such items.

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Introduction

The global farmed shrimp market continues to grow faster than other aquaculture species with most shrimp being produced in Asia. The main market outside Asia is Latin America, with Ecuador recently overtaking Thailand to become the world's fifth largest shrimp producer. Global production of shrimps and prawns reached 5.5 MT in 2019, growing at an average annual growth rate (AAGR) of 6.1% during 2011-19. Accounting for nearly 39% of the global production of Shrimps and Prawns in 2019, China remained the top producer, followed by Indonesia, Vietnam, Thailand, and India.

Global shrimp and prawn production[1] remained concentrated amongst the top five producing countries during 2012 and 2019, with the collective share increasing from 90% to 92%. During this time while China's share in global shrimp and prawn production marginally declined from 43% to 39%, that of India nearly doubled from 7% to 14%. An uptick in global share of shrimp and prawn production was also noted for Indonesia and Vietnam while the share of Thailand share has declined.

Farmed shrimp accounts for 55% of the shrimp produced globally. Most shrimp aquaculture occurs in China, followed by Thailand, Indonesia, India, Vietnam, Brazil, Ecuador, and Bangladesh.

India's Shrimp and Prawn Industry

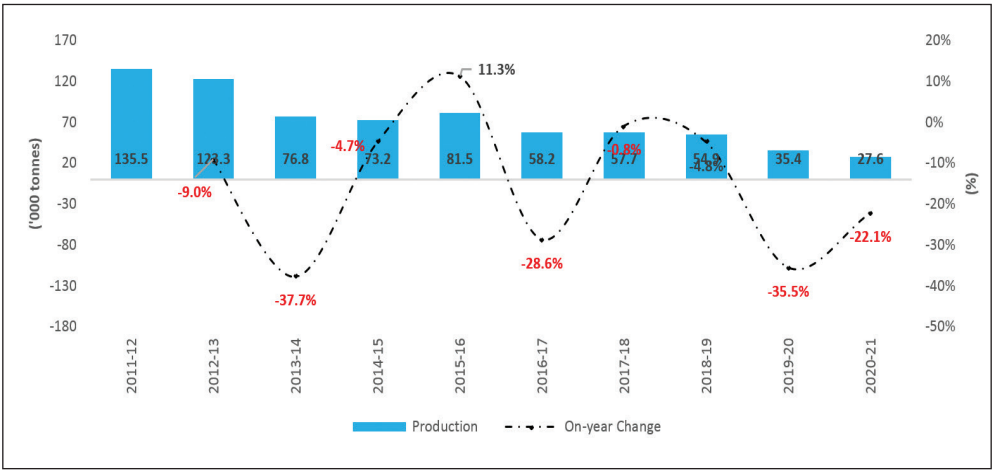
Modern shrimp farming commenced in India in the late 1980s, driven by a growing global appetite for shrimp, government policies to promote seafood exports and several corporate entities providing capital to build hatcheries, farms, and processing plants. It was based predominantly on the black tiger shrimp (Penaeus monodon) and to a lesser degree the Indian white shrimp (Fenneropenaeus indicus).

India's shrimp farming growth after the introduction of SPF L. vannamei has been phenomenal. Farms previously culturing the black tiger shrimp experienced a

[1]FAO Yearbook 2021: Fishery and Aquaculture Statistics 2019 (https://www.fao.org/3/cb7874t/cb7874t.pdf)

boost in productivity due to higher stocking densities, lower incidence of diseases and animal growth rates that were comparable to those of black tiger shrimp up to 20 grams or even beyond. Farmers switched to SPF L. vannamei swiftly and today more than 90% of Indian shrimp production is for this species.

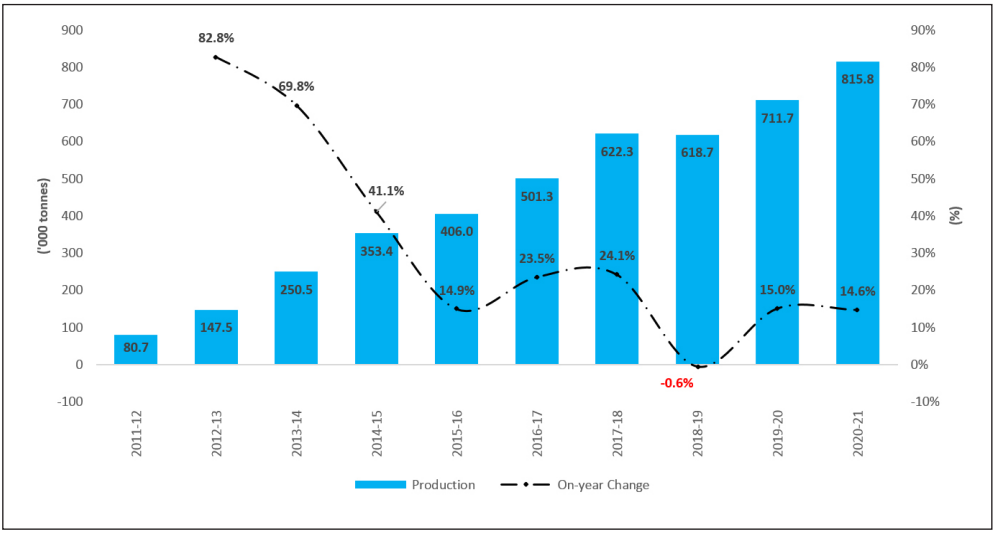
Production of Tiger Shrimp in India at a Glance

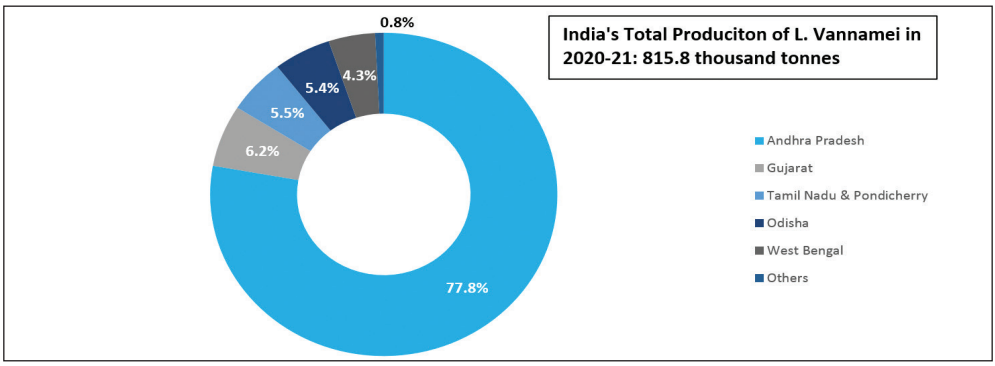


Source: Data accessed from MPEDA; India Exim Bank Research

India's production of Shrimps and Prawns reached an all-time high of 759.9 thousand tonnes in 2019, growing at a reasonably high AAGR of 15.1% during 2011-19. The State of Andhra Pradesh has been on the forefront of shrimp and prawn production in India, accounting for nearly 70% of the country's production.

Production of L. Vannamei Shrimp in India at a Glance





Source: Data accessed from MPEDA; India Exim Bank Research

Foreign Trade Scenario

India was the leading exporter of Shrimps and Prawns in 2020 accounting for 17.5% of total exports, followed by Ecuador (15.7%), Vietnam (14.4%), Indonesia (8.3%), and China (6.8%). India's exports of Shrimps and Prawns were recorded at US$ 4.31 billion in 2020, growing at an AAGR of 13.6% during 2011-20. India has been a net exporter of Shrimps and Prawns with trade surplus nearly quadrupling from US$ 1.6 billion in 2011 to US$ 4.2 billion in 2020. The USA has remained the top export destination for India's exports of Shrimps and Prawns, accounting for a share of nearly 52% of India's total Shrimps and Prawns exports in 2020.

It may be noted that India's exports of Shrimps and Prawns reached an all-time high of US$ 4.9 billion in 2017 and have remained above the US$ 4 billion mark ever since. The export growth of Shrimps and Prawns has primarily been a result of increased production of L. Vannamei, diversification of aquaculture species, sustained measures to ensure quality, and increase in infrastructure facilities for production of value-added products. Additionally, the Government of India's interest in positioning India as a market leader with regards shrimp exports is evident with the reduction in custom duty on key inputs required for shrimp aquaculture in the Union Budget 2022-23 announcement. Apart from increasing shrimp exports from the country, this move is likely to result in greater value-addition in exports and enable market penetration in the underserved regions.

Impact of COVID-19 Outbreak on the Industry

As per the estimates of India's Central Institute of Brackishwater Aquaculture (CIBA), the economic losses caused by the COVID-19 outbreak on India's farmed shrimp sector have been to the tune of US$ 1.5 billion in 2020-21. This was primarily due to three reasons.

- One, decline in prices on account of halted import demand amid the pandemic.
- Two, shortage of skilled technicians: Shrimp production cycles are inflexible and time dependent. A sudden dearth of skilled labour meant that hatcheries struggled to fulfil their contracts.
- Third, record high prices of shrimp feed ingredient soyabean further manifested the losses for small and medium players in the industry.

A study by CIBA reports that the COVID-19 outbreak, and restrictions to curtail the spread of virus negatively impacted each link of the industry's supply chain. Shrimp hatcheries, farms, processors, retailers and exporters lost an estimated 30-40% of their business in the wake of India's lockdown.

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

Launched in September 2020, the Pradhan Mantri Matsya Sampada Yojana (PMMSY) is a centrally sponsored flagship scheme for focused and sustainable development of fisheries sector in the country with an estimated investment of ₹ 20,050 crores for its implementation during a period of five years from 2020-21 to 2024-25, as a part of Aatmanirbhar Bharat Package.

Out of the total estimated investment of ₹ 20,050 crores under the Scheme, about ₹ 12,340 crores is proposed for beneficiary - oriented activities[2] in marine, inland fisheries and aquaculture and about ₹ 7,710 crores investment for Fisheries Infrastructure[3].

Brackish water aquaculture offers huge potential as the country has around 1.42 million Ha of brackish/saline area, of which only 13% is utilized. With the aim to harness its potential, PMMSY aims at enhancing fish production by an additional 70 lakh tonne by 2024-25, increasing fisheries export earnings to ₹ 1,00,000 crore by 2024-25 from ₹ 43,627 crore in 2019-20. As on, doubling of incomes of fishers and fish farmers, reducing post-harvest losses from 20-25% to about 10% and generation of additional 55 lakhs direct and indirect gainful employment opportunities in fisheries sector and allied activities.

Shrimps and Prawns Industry in India: Challenges and Strategies

An attempt is made to look at key areas that could drive and support the sustainable export growth of shrimps and prawns India in a near-term. Broadly, following are the key recommendations of the Study.

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[2] Enhancement of Production and Productivity, Infrastructure and Post-harvest Management

[3] Establishment of Fishing Harbours, Construction of Ice Plants, Construction of Ice Plants, Fish Transport Facilities, Modernization State Fish Seed Farms, Fish Processing Units, Fish Feed Mills/Plants, Setting up of Brood Banks

Key Recommendations

Focusing on Sustainable Growth of the Shrimps and Prawns Industry in India

- The typical shrimp production cycles last between 100 and 120 days. After each cycle, the wastewater is discharged into the surroundings. Afterwards, clean water is used to flush the pond sediment. Each ton of produced shrimp generates between 5345 m^3 and 7157 m^3 brackish waste effluent. To make the Indian shrimp industry sustainable, it is suggested that the businesses should look at developing **Zero Water Discharge (ZWD) Systems for Shrimp and Prawn Farming.**
- Additionally, to make the domestic shrimp and prawn industry more sustainable, **uptake of indoor shrimp farming through investment in closed-containment indoor facilities** could be a gamechanger. This could enable upscaling production by reducing contamination and even minimizing the environmental footprint.

Devising and Implementing State-level Export Promotion Policies for Shrimps and Prawns

- Given the heterogeneity in endowment of resources for shrimp farming, a tailor-made policy for the respective states can suitably incentivize both the shrimp farmers as well as the players from the shrimp processing industry. The States of Gujarat, Andhra Pradesh and West Bengal are noteworthy cases in this regard.
- In addition to devising dedicated fisheries policy, States could also look at **entering into Memorandum of Understanding (MOU)** with nodal agencies like MPEDA and SEAI to boost export-oriented aquaculture.

Redirecting Exports to meet the Import Demand of Growing and Underserved Markets

- The Study classifies India's export destinatiom for Shrimps and Prawns into three categories (A, B and C) to assess the potential gains to exporters that may arise on redirecting exports away from saturated markets to underserved markets.
- Importing countries in the Category A represent a stronghold for India's exports of Shrimps and Prawns, providing avenues for sustained export growth in the near-term. The importing countries in the Category B, on the other hand, represent the relatively underserved market for India's Shrimps and Prawns exports. Lastly, Category C represents the markets from where Indian exporters could exit and shift supply to countries in Category A and B. India could explore the route of Comprehensive Economic Partnership Agreements (CEPAs) and Free Trade Agreements (FTAs) to cater to the growing import demands in Category B countries.

Addressing the Costs of Shrimp feed and switching to Functional Feed

- The growing import demand for the L. Vannamei shrimp from India has led to a rise in demand for shrimp feed. It may be noted that the cost of feed constitutes nearly 50% to 70% of the total variable cost incurred in shrimp production.
- India's dependence on imported shrimp feed has grown over the years. It has been noted that record high prices of shrimp feed ingredient soyabean manifested the losses for small and medium players in the industry amid the COVID-19 outbreak. Keeping a check on the prices of shrimp feed, therefore, becomes an important determinant of overall prices of shrimps.
- It is suggested that domestic shrimp businesses should expand their portfolios to include funcitonal feed (Growth Enhancement Functional Feed and Health Enhancement Functional Feed) to not only insulate against international feed price volatility but also to reduce the Feed Conversion Ratio.

Vertical Development of India's Shrimps and Prawns Industry

- It is suggested that diversification of India's shrimp and prawn exports from primarily frozen shrimps to value-added shrimp products could further improve the overall export potential in the near-term and reduce India's dependence on Vietnam's shrimp-processing industry. Value added shrimps would include products like shrimps of varied cuts and coated shrimps for ready-to-eat meals.

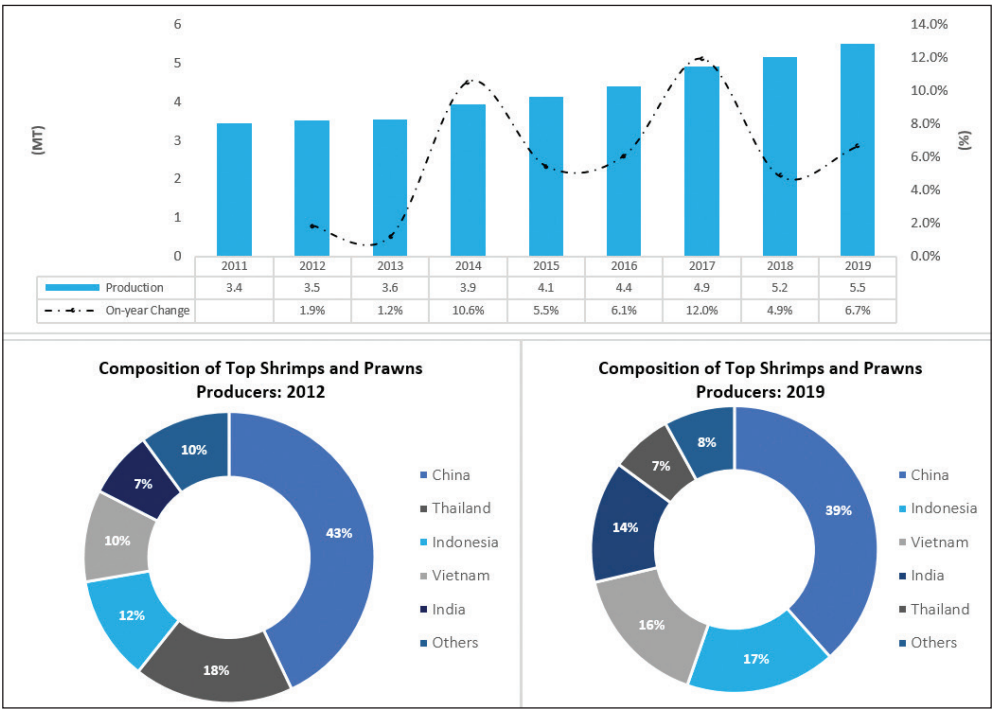
Chapter 1: INTRODUCTION

Global Markets

The global farmed shrimp market continues to grow faster than other aquaculture species, with most shrimp being produced in Asia. The main market outside Asia is Latin America, with Ecuador recently overtaking Thailand to become the world's fifth largest shrimp producer.

Global production of shrimps and prawns reached 5.5 MT in 2019, growing at an AAGR of 6.1% during 2011-19. Accounting for nearly 39% of the global production of Shrimps and Prawns in 2019, China remained the top producer, followed by Indonesia, Vietnam, Thailand and India.

Chart 1: Global Production of Shrimps and Prawns



Source: Data accessed from OECD Stat; India Exim Bank Research

As can be seen, global shrimp and prawn production remained concentrated amongst the top five producing countries during 2012 and 2019, with the collective share increasing from 90% to 92%. During this time while China's share in global shrimp and prawn production marginally declined from 43% to 39%, that of India nearly doubled from 7% to 14%. An uptick in global share of shrimp and prawn production was also noted for Indonesia and Vietnam while the share of Thailand has declined.

According to FAO, farmed shrimp supply worldwide remained stable during the first half of 2021 while the demand slowed down in China but remained strong in the western markets.

It may be noted that shrimp trade plays an important role in international fish trade, representing about 18% of total world fish trade in value terms.

In the overall fish trade (HS 03), the top export items include Crustaceans (HS 0306), Fish Fillets (HS 0304) and Frozen Fish meat (0303) with shares in world exports (2020) recorded at 24%, 20% and 20%, respectively.

Shrimp species, such as white leg shrimp, giant tiger shrimps, gulf shrimps, blue shrimps, and royal red shrimps, are the most popular varieties that are consumed all over the world.

Indian Markets

India's combined production of Tiger Shrimp and the L. Vannamein reached 843.4 thousand tonnes in 2020-21, growing at an AAGR of 16.7% during 2011-12 and 2020-21. Better yields per-hectare, increased hatchery output, and expansion of culture areas were factors contributing to this growth in production. However, it may be noted that during this period, while the production of L. Vannamei registered an AAGR of 31.7%, that of Tiger Shrimp production registered a negative AAGR of (-) 14.7%, indicating a production shift towards L. Vannamein.

Litopenaeus vannamei, the white-leg prawn originally a native of the Americas, is helping script a blue revolution in India. According to fisheries scientists it can be one of the biggest success stories of Make-in-India if the concept can be stretched to apply to aquaculture.

A pilot certification programme to produce antibiotic-free shrimp seed is due to be launched soon. Leading shrimp producing states like Andhra Pradesh, Tamil Nadu and West Bengal could be the pioneers in designing and roll-out of such certification programs, which may later be extended at the pan-economy level.

The shrimps and prawns' industry in India has long been characterized with

high export-led growth. Andhra Pradesh is the leading shrimp producer, accounting for more than 50% of the total output. India rose to prominence as a shrimp exporter in the past decade owing to sharp focus on quality and disease control, and by shifting to the more resilient, specific pathogen free (SPF),brood stock imports from the US[4]. Producers in Andhra Pradesh, Tamil Nadu, Odisha, and West Bengal also benefited from aquaculture zones built by state governments, and subsidies offered for electricity and capital[5].

During 2011-19, India's exports of shrimps and prawns registered an AAGR of 16.9% as against the world export AAGR of 4.2%. During 2020, however, lockdowns and supply-chain disruptions resulted in a marginal decline in exports to US$ 4.3 billion from US$ 4.9 billion in 2019. Ecuador emerged as a close competitor to India's exports with US$ 3.9 billion exports because of fewer logistical hinderances and focused on catering to the steady rise in the demand for raw shrimps[6] in China.

Additionally, among the major challenges faced by the Indian exporters are the international trade barriers such as anti-dumping and countervailing duties imposed by the USA on Indian shrimp exports[7].

It is expected that the simultaneous imposition of similar duties on Chinese exports will leave the Indian share of the market unaffected since the US market is not seasonal but is a year-round one, and volumes are important to service the demand, and India is perhaps the only country that can meet the US market demand for shrimps.

More recently, the COVID-19 outbreak reduced overall global demand for shrimps in 2020. While international and domestic shrimp markets were characterized by strong retail trade, the foodservice sector incurred huge losses. In the latter half of 2021, however, there has been a boom in China's catering industry associated

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[4]Broodstock, or broodfish, are a group of mature individuals used in aquaculture for breeding purposes. Broodstock can be a population of animals maintained in captivity as a source of replacement for, or enhancement of, seed and fry numbers. Such populations often undergo conditioning to ensure maximum fry output. Bulk of shrimp brood stock is imported from Hawaii by Indian shrimp farmers.

[5] The West Bengal Fisheries Investment Policy, 2015 for the MSMEs offered the firms a capital investment subsidy ranging from 15% to 40%, up to ₹ 20 lakhs. Further, the Policy offered a power subsidy ranging from ₹ 1.00-1.50/ KwH for units across various zones, in addition to the waiver on electricity duty. (https://bengalglobalsummit.com/pdf/policies/West-Bengal-Fisheries-Investment-Policy-2015.pdf)

[6]India has been the second largest exporter of Shrimps and Prawns to China over the last decade, after Ecuador.

[7]The USDOC in November 2021 increased the anti-dumping duty on shrimp exports from India by more than 100% from 3.06% to 7.15%, in its 14th Administrative Review of the anti-dumping duty order on frozen warm-water shrimp.

with the mid-autumn festival in October. This is likely to lead to the further opening of China's restaurant industry in the coming months.

At a broader level, it may be interesting to note that there are only five listed aquaculture companies[8] in the Indian stock exchanges, indicating untapped fundraising avenues for businesses to scale growth.

Further, 90% of shrimp farms in India are cultivated by marginal farmers. The advent of e-commerce[9] and direct procurement of produce from the farmers have changed the stakes a little. Technology driven corporates have also entered the shrimp sector recently enabling seamless procurement, price discovery and efficient marketing.

Summary

Global production of farmed shrimp is estimated to be growing at a rate of 6% annually, while shrimp is consistently one of the top protein choices for consumers. However, shrimp market trends are influenced by evolving consumer demand, particularly with regard to proof of sustainability in the global value chain. Moreover, the concept of sustainability has evolved to encompass social and human rights issues, as well as decent working conditions in the industry.

Further, high shipping prices, transportation disruptions (bottlenecks at seaports, shortages of lorry drivers in some countries of Europe and the USA) are likely to cause steady rise in shrimp prices at the wholesale level in the near-term as the sector revives from the pandemic-induced economic shocks.

This Study seeks to analyse the trends in global and domestic production of shrimps and prawns, emerging areas for diversification where India may stand to benefit from increased global import demand. Whilst drawing a competitive landscape and capacity of the global shrimp industry, an attempt is made to outline the challenges and actionable areas to further improve India's exports.

[8] Avanti Feeds Ltd, Apex Frozen Foods Ltd, Coastal Corporation Ltd, Waterbase Ltd, Zeal Aqua Ltd

[9] Platforms like e-Santa have been designed to connect aqua farmers and buyers across the country, to avoid middlemen. It can be used by producers and exporters who are registered with MPEDA, thereby directly benefitting farmers in terms of better price realization.

CHAPTER 2: INDIA's SHRIMPS AND PRAWNS INDUSTRY

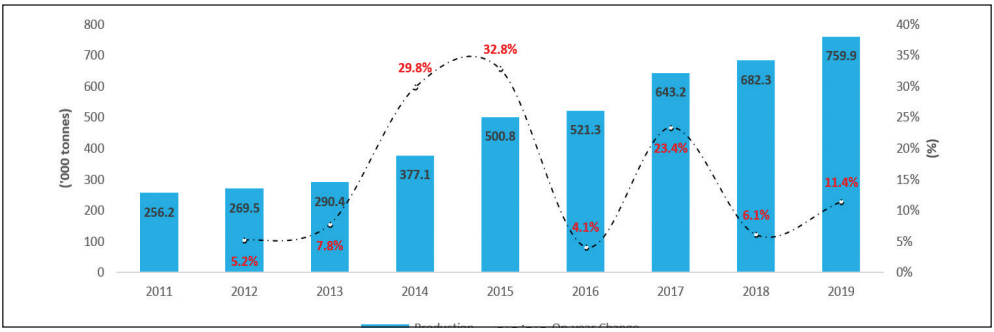
Shrimp and Prawn Aquaculture in India at a Glance

In the recent past, Indian fisheries has witnessed a paradigm shift from marine dominated fisheries to inland fisheries, with the latter emerging as a major contributor of fish production from 36% in the mid-1980 to 70% in the recent past. Within inland fisheries, a shift from capture to culture-based fisheries has paved the way for sustained blue economy.

While inland fisheries and aquaculture have grown in absolute terms, the development in terms of its potential is yet to be realized. The unutilized and underutilized vast and varied resources, in the form of 191,024 km of rivers and canals, 1.2 million Ha of floodplain lakes, 2.36 million Ha of ponds and tanks, 3.54 million Ha of reservoirs and 1.24 million Ha of brackish water resources offer great opportunities for enhanced production along with livelihood development and ushering economic prosperity[10].

Shrimp and prawn aquaculture has emerged as a vibrant agri-business sector in India in the last ten years. In the Union Budget 2021-22 announcement, fisheries sector was recognized as a 'Sunrise Sector', given the outstanding double-digit average annual growth.

Chart 2: India's Production of Shrimps and Prawns



Source: Data accessed from OECD Stat; India Exim Bank Research

[10] Department of Fisheries

India's production of Shrimps and Prawns reached an all-time high of 759.9 thousand tonnes in 2019, growing at a reasonably high AAGR of 15.1% during 2011-19. It is noted that substantial growth in India's shrimp and prawn production has been noted after the introduction of specific pathogen free brood stock or the SPF Litopenaeus Vannamei, in 2010.

Farms previously culturing the black tiger shrimp experienced a boost in productivity due to higher stocking densities, lower incidence of diseases and animal growth rates that were comparable to those of black tiger shrimp up to 20 grams or even beyond.

Farmers switched to SPF L. Vannamei swiftly and today more than 90% of Indian shrimp production is for this species.

The State of Andhra Pradesh has been on the forefront of shrimp and prawn production in India, accounting for nearly 70% of the country's production. In this regard, it is imperative to highlight the role played by the enabling environment for the sector's growth in Andhra Pradesh, led by the implementation of Fisheries Policy of Andhra Pradesh 2015-20, which identifies fisheries as a growth engine for the State's socio-economic development.

Box 1: Fisheries Policy of Andhra Pradesh 2015-20

Under the Fisheries Policy 2015-2020, the Government approved the fiscal benefits covering the categories of Processing Units; Aquaculture Pond/Farm; Feed Manufacturing Units/Fishery related Equipment Manufacturing; and Aqua Labs/Disease Diagnostic Labs Promotion.

Processing Units	The Aquaculture Pond/Farm	Feed Manufacturing Units/Fishery related Equipment Manufacturing	Aqua Labs/Disease Diagnos Labs Promotion
• For shrimp processing units including cold chain maintenance, capital subsidy of 50% inclusive of land cost with upper ceiling limit of ₹ 5 crores, will be provided. The cost of land should not exceed 15% of the total project cost on sub–registrar value. • For fish processing / filleting units including cold chain, land cost etc., subsidy of 50% with upper ceiling limit of ₹ 7 crores will be provided. • Interest subvention of 6% provided on bank loan subject to maximum of ₹ 2.5 Crores for 5-year period to aqua processing units, ice plants and cold storages. • Reefer vans: For purchase of Reefer vans, a subsidy of 50% with maximum of ₹ 10 lakhs per vehicle will be provided from 2016-17 onwards. • Cold storage at ports/ Fishing harbours with subsidy will be permitted on par with industrial policy. • Aquaculture processing units incentivized by providing 100% stamp duty exemption in land registration/lease of land/, mortgage deed/Bank documentation/ Hypothecation etc. • Power subsidy permitted to fish/prawn/shrimp processing unit and ice plants from the date of commencement of commercial production and will be on par with industrial policy from 2016-17.	• Financial assistance extended for farm mechanization like pumps and aerators with 50% subsidy. • Solar pumps, solar lights and solar based aerators given on 60% subsidy to the prawn and shrimp farms up to maximum of 2 ha per farmer per annum. • Scale of finance by banks to be as per reasonable requirement for pond culture. • Power to be supplied to Shrimp and Prawn culture farms at ₹ 3.75 ps/ unit for a maximum of 2 hectares per aqua-farmers/ shrimp farmers from the year 2016-17.	• Incentives provided to feed manufacturing units, aerator manufacturing, fish processing equipment on par with industrial policy. • Interest subvention of 6% per annum up to a maximum of ₹ 2 crores provided to the Fish Feed Manufacturing units for five years. This policy will be reviewed after one year.	• All private labs in the State graded under technical supervision of State Institute Fisheries technology (SIFT), Kakinada. SIFT will act as Sta referral lab for all private lab The technicians of these lab will be continuously monito to upgrade their skills as per technical requirements of Aquaculture sector. • Water and soil analysis labs promoted in all major aquaculture districts for conducive water manageme One lab for every 500 ha are proposed with a unit cost of maximum of ₹ 10 lakhs. The financial assistance of 50 % the unit cost will be extende by Government and the bala of 50% to be borne by the concerned entrepreneur/ stakeholder. • Quality control / Antibiotic residue testing labs promote through private sector in the districts of East Godavari, Krishna and Prakasam to overcome the problem of rejection of exported shrimp due to presence of antibiotic residues. The unit cost of th lab will be ₹ 2 crores of whic the Government assistance be 40%.

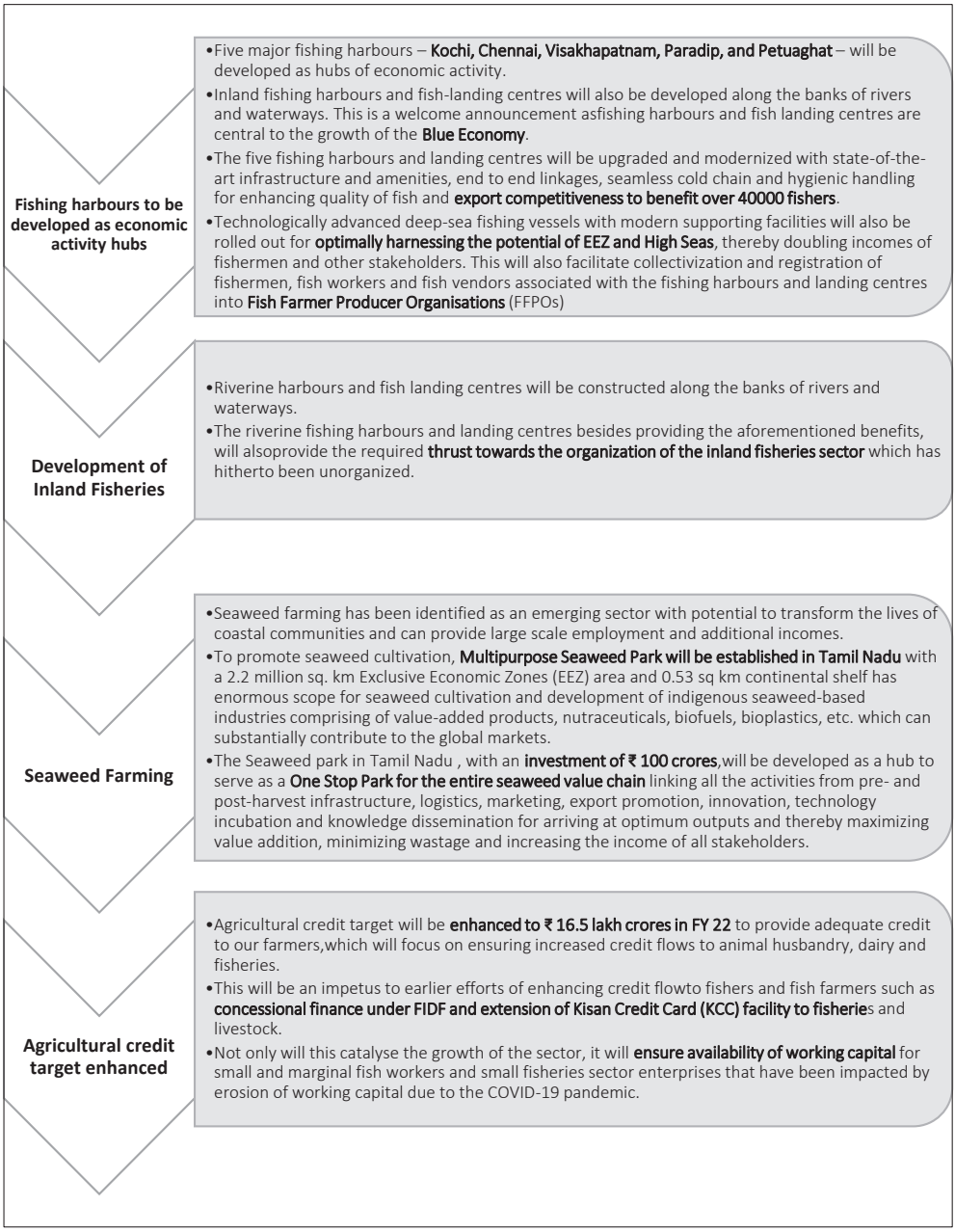
Export Promotion Focus

- Linkage with MPEDA will be developed for storage/ refrigeration/Harbour Facilities/ Fiscal Incentives.
- Mega Food Parks will be established in suitable places by tapping the incentive from the Government of India.
- Effort will be made to develop fisheries infrastructure for promotion of fish and fish products exports in Bhimavaram and Visakhapanam which are recognized as the towns of export excellence (marine Sector) in trade policy of Government of India 2015-20.

R&D Focus:

- A special fund of ₹ 5 crore will be created (subsidy up to 60 % will be provided for sponsored research by reputed research institutions in Private sector and PPP mode, 100% funding to govt. institutions) for research & development in aquaculture.

Box 2: Policy Push to India's Fishery Sector: Union Budget 2021-22



Source: PIB; India Exim Bank Research

India's Foreign Trade of Shrimps and Prawns

With a share of 17.5% in world exports, India was the leading exporter of Shrimps and Prawns in 2020, followed by Ecuador (15.7%), Vietnam (14.4%), Indonesia (8.3%), and China (6.8%). India's exports of Shrimps and Prawns were recorded at US$ 4.31 billion in 2020, growing at an AAGR of 13.6% during 2011-20. At the HS 6-digit level, India's exports of Shrimps and Prawns primarily comprised of Frozen Shrimps and Prawns cooked by steaming or boiling in water[11] (88%) and Shrimps and Prawns preserved in airtight containers[12] (9%).

India has been a net exporter of Shrimps and Prawns[13] with trade surplus nearly quadrupling from US$ 1.6 billion in 2011 to US$ 4.2 billion in 2020.

The USA has remained the top export destination for India's exports of Shrimps and Prawns, accounting for a share of nearly 52% of India's total Shrimps and Prawns exports in 2020.

It may be noted that India's exports of Shrimps and Prawns reached an all-time high of US$ 4.9 billion in 2017 and have remained above the US$ 4 billion mark ever since. The export growth of Shrimps and Prawns has primarily been a result of increased production of L. Vannamei, diversification of aquaculture species, sustained measures to ensure quality, and increase in infrastructure facilities for production of value-added products[14].

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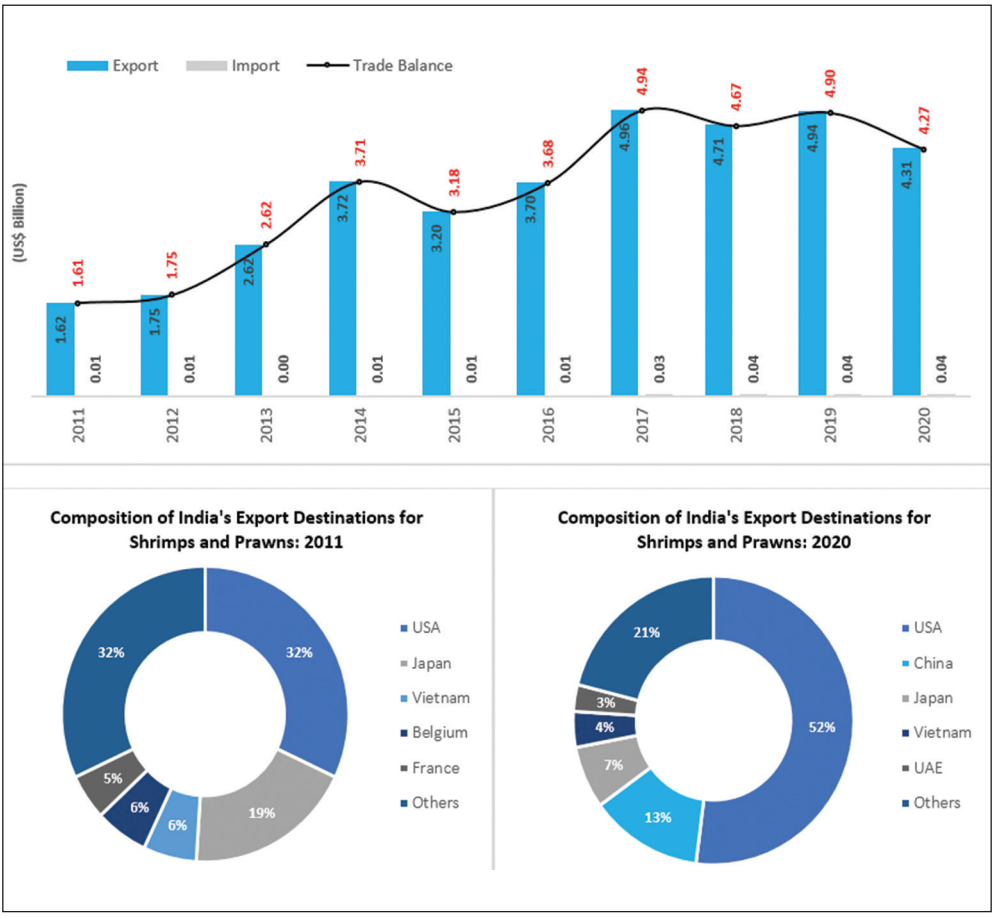
[11]**HS 030617**: Frozen shrimps and prawns, even smoked, whether in shell or not, incl. shrimps and prawns in shell, cooked by steaming or by boiling in water (excluding cold-water shrimps and prawns)

[12]**HS 160529**: Shrimps and prawns, prepared or preserved, in airtight containers (excluding smoked)

[13]HS Codes for Shrimps and Prawns given in the Annexure

[14]PIB (https://pib.gov.in/newsite/PrintRelease.aspx?relid=164454)

Chart 3: India's Foreign Trade in Shrimps and Prawns



Source: Data accessed from ITC Trade Map, India Exim Bank Research

During 2011-19, while the USA's share in India's exports of Shrimps and Prawns increased from 31.5% to 51.9%, the share of Japan and Vietnam in the same nearly halved from 19.2% to 7.2%. Other export destinations whose share in India's Shrimps and Prawn exports witnessed a decline during the same time include Vietnam, France, Belgium, the UK, South Africa, and Germany.

Table 1: India's Top Export Destinations for Shrimps and Prawns (2011 and 2020)

Importer	Share in India's Export of Shrimps and Prawns (2011)	Share in India's Export of Shrimps and Prawns (2020)	AAGR in Imports of Shrimps and Prawns from India (2011-20)	AAGR in Total Imports of Shrimps and Prawns (2011-20)
USA	31.5%	51.9%	20.4%	%3.4
China	0.7%	13.3%	84.2%	%41.0
Japan	19.2%	7.2%	1.1%	(-) %3.6
Vietnam	6.3%	4.3%	33.5%	%14.9
France	4.9%	1.3%	(-) 3.0%	(-) %0.1
Belgium	6.3%	2.6%	4.6%	(-) 2.6%
UK	4.9%	2.5%	6.3%	(-) %1.2
South Africa	2.5%	0.3%	0.0%	(-) %6.7
Germany	1.8%	0.5%	0.3%	%2.4

Source: Data accessed from ITC Trade Map; India Exim Bank Research

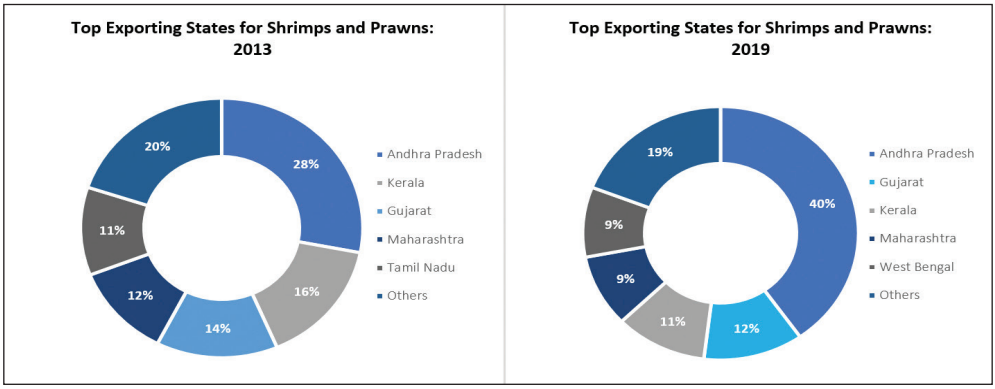
Trend in the overall import demand for Shrimps and Prawns by India's top export destinations during 2011-20 reveals that while the import demand saw a decline in Japan, France, Belgium, the UK and South Africa, the import demand remained positive in Vietnam and Germany. However, except for France, India's exports of Shrimps and Prawns to the importing countries whose average import demand saw an average increase during 2011-20.

While Japan's (India's second largest market for black tiger shrimps after the US) share in India's exports of shrimps and prawns saw a decline during 2011 and 2020, it is likely to bounce back with the former's exemption of import inspection for the Indian black tiger shrimps in 2020.

Further, an attempt is made to analyze the change in composition of top marine products[15] exporting states of India. While Andhra Pradesh's share in India's total marine product exports has risen from 28% in 2013 to 40% in 2019, that of Kerala and Tamil Nadu has decreased.

[15] Principal Commodity classification E7: Marine Products

Chart 4: State-wise Export of Shrimps and Prawns (2013 and 2019)



Source: Data accessed from ITC Trade Map; India Exim Bank Research

Impact of COVID-19 outbreak on India's Farmed Shrimp Sector

As per the estimates of India's Central Institute of Brackishwater Aquaculture (CIBA), the economic losses caused by the COVID-19 outbreak on India's farmed shrimp sector have been to the tune of US$ 1.5 billion in 2020-21. This was primarily due to three reasons.

- One, decline in prices on account of halted import demand amid the pandemic.
- Two, shortage of skilled technicians: Shrimp production cycles are inflexible and time dependent. A sudden dearth of skilled labour meant that hatcheries struggled to fulfil their contracts.
- Third, record high prices of shrimp feed ingredient soyabean further manifested the losses for small and medium players in the industry.

A study by CIBA[16] reports that the COVID-19 outbreak, and restrictions to curtail the spread of virus negatively impacted each link of the industry's supply chain. Shrimp hatcheries, farms, processors, retailers and exporters lost an estimated 30-40% of their business in the wake of India's lockdown.

Pradhan Mantri Matsya Sampada Yojana

Launched in September 2020, the Pradhan Mantri Matsya Sampada Yojana (PMMSY) is a centrally sponsored flagship scheme for focused and sustainable development of fisheries sector in the country with an estimated investment of ₹ 20,050 crores for its implementation during a period of five years from 2020-21 to 2024-25, as a part of Aatmanirbhar Bharat Package.

[16]Prospective impact of COVID-19 related lockdown on shrimp aquaculture sector in India – A sectoral assessment (https://www.sciencedirect.com/science/article/pii/S0044848620315891)

Out of the total estimated investment of ₹ 20,050 crores under the Scheme, about ₹ 12,340 crores is proposed for beneficiary-oriented activities in Marine, Inland fisheries and Aquaculture and about ₹ 7,710 crores investment for Fisheries Infrastructure.

Brackish water aquaculture offers huge potential as the country has around 1.42 million Ha of brackish/saline area, of which only 13% is utilized. With the aim to harness its potential, PMMSY aims at enhancing fish production by an additional 70 lakh tonne by 2024-25, increasing fisheries export earnings to ₹ 1,00,000 crore by 2024-25, doubling of incomes of fishers and fish farmers, reducing post-harvest losses from 20-25% to about 10% and generation of additional 55 lakhs direct and indirect gainful employment opportunities in fisheries sector and allied activities.

CHAPTER 3: SHRIMPS AND PRAWNS INDUSTRY IN INDIA: CHALLENGES AND STRATEGIES

With a coastline spanning over 8000 square kilometres and the abundant inland water resources, India stands at a distinct natural advantage in marine exports. The freshwater culture resources in the country comprise 2.43 million hectares of ponds and tanks. The other resources readily available for the seafood industry players are natural lakes, reservoirs, irrigation canals and paddy fields and it boasts of 1.19 million hectares area under brackish water.

The Government of India allows 100% foreign direct investment in aquaculture through automatic route but under controlled conditions. The government has been working towards ushering in new projects like the Blue Revolution with the objective of developing wetland fisheries, to empower communities and stakeholders through improved livelihood, and to refine region specific fisheries enhancements. An attempt is made to look at key areas that could drive and support the sustainable export growth of shrimps and prawns in India, in a near-term.

Focusing on Sustainable Growth of the Shrimps and Prawns Industry in India

Usually, coastal shrimp culture involves clearing an extensive amount of mangrove forests, which provide a necessary habitat for marine and terrestrial species, protect coastal human populations from erosion and tropical storms, and maintain the balance of nutrients and sediments in coral reefs and seagrass beds. Loss of mangrove forests along coastlines has had significant effects on coastal communities, along with a loss of wildlife species that rely on mangrove forests to shelter them. In addition, environmental degradation also arises from nutrient- and sludge-enriched aquaculture effluents.

Typical shrimp production cycles last between 100 and 120 days. After each cycle, the wastewater is discharged into the surroundings. Afterwards, clean water is used to flush the pond sediment.

Each ton of produced shrimp generates between 5345 and 7157 m^3 brackish waste effluent.

It is estimated that 3.74×1010 m^3 effluent discharge results from worldwide

crustacean aquaculture industry. Shrimps assimilate only between %23 and %31 nitrogen and between %10 and %13 phosphorus of the total feed input, while the greatest proportion remains as waste[17].

The natural habitat is degraded not only around the shrimp farms but also within the production ponds. It is estimated that 245 kg-N/ha/cycle and 243 kg-P/ha/cycle accumulate in the sludge sediments (Anh et al., 2010). These nutrients, along with suspended solids, fertilizers, liming materials, antibiotics, and other chemicals and inorganic materials, form sludge layers at the bottom of the ponds. The sludge volume accumulated within the ponds varies between 139 and 629 m^3/ha. Due to the high salt content, it is not meant for agricultural use.

To make the domestic shrimp and prawn industry more sustainable, uptake of indoor shrimp farming through investment in closed-containment indoor facilities could be a gamechanger.

This could enable upscaling production by reducing contamination and even minimizing the environmental footprint.

From the point of view of exports, indoor shrimp farming is likely to result in twin benefits: One, endowing designated areas in landlocked states and interiors of coastal states as hubs for shrimp and prawns' production and export. Two, given the nature of indoor tanks and the measures to contain contamination, the risk of disease is also lowered. With the growing demand for sustainable foods globally, indoor shrimp culture could further boost India's exports.

Box 3: Closed Aquaculture System: Zero Water Discharge (ZWD) for Shrimp and Prawn Farming

Development of zero water discharge (ZWD) system for shrimp and prawn farming, has become an alternative solution to conventional methods of aquaculture production. The System is focussed on addressing key issues like environmental damage, disease outbreak, and land-use change, while creating a sustainable aquaculture cultivation system.

The term of zero water discharge has many versions; it can be zero water exchange, limited water discharge, minimal discharge system, minimal effluent discharge, minimal exchange system, etc. All such systems have the same principle that is minimizing water use and re-recycling water used by involving the role of microbes. ZWD system is an improvement from batch system with

[17] Perspectives for improving circular economy in brackish shrimp aquaculture (https://onlinelibrary.wiley.com/doi/full/10.1111/are.15685)

an emphasis on microbial manipulation in rearing tanks. ZWD system can be interpreted as no water discharge during culture period, additional water that put into the system is to balance water level due to water losses caused siphoning and evaporation. It is approximately 2% of culture volume in every 6 weeks.

The principle of microbial selection is based on the role of each microbial component in nutrient cycle in the rearing tank. The performance of the system was tested in crustacean culture such as white shrimp and giant freshwater prawns, and it showed that the system can increase the average survival rate of 10–20%. In addition, the technical and economic feasibility of this system was evaluated to illustrate the production efficiency upon the application of this system in the industry.

This system uses the principle of microbial loops adapted from natural ecosystems. Toxic nitrogen substances present in ammonium and nitrite form can be converted into nitrate which is less toxic substance through consecutive nitrification microbial process. ZWD system aims to improve water quality through recycling chemical waste. While conventional system (e.g., flow-through) requires a continuous new water supply to avoid waste accumulation in the culture, ZWD recycles ammonium, nitrite, and nitrate using microorganism consortia, and therefore, it reduces water usage significantly. Ammonium, nitrite, and nitrate level can be maintained using addition of heterotrophic bacteria, nitrifying bacteria, and microalgae, regularly.

When managed correctly, a diverse healthy microbial community contributes directly and indirectly to shrimp nutrition and growth while processing excess nitrogen waste in the system. Once established, the community becomes stable, competitively excluding harmful opportunistic pathogen and therefore improving health and immune competence of shrimps.

Source: Closed Aquaculture System: Zero Water Discharge for Shrimp and Prawn Farming in Indonesia (https://www.intechopen.com/chapters/57327)

Devising and Implementing State-level Export Promotion Policies for Shrimps and Prawns

At the state-level, Andhra Pradesh, closely followed by Gujarat and Odisha have, so far, led the way in positioning India as an export hub of shrimps and prawns. While the growth in shrimp farming across states like West Bengal, Tamil Nadu, Uttar Pradesh, and Punjab has been substantial, along the lines of Andhra Pradesh, a dedicated policy (or an extension to the State Fisheries

policy) for the shrimp and prawn industry at the state-level can play a critical role in steering the growth in exports from the sector in the near-term. Given the heterogeneity in endowment of resources for shrimp farming, a tailor-made policy for the respective states can suitably incentivize both the shrimp farmers as well as the players from the shrimp processing industry.

Box 4. Shrimp Culture in Punjab

During 2019-20, 750 MT of shrimp was produced from 164 hectares of ponds in Punjab. The State's Department of Fisheries accorded financial assistance to the farmers along with technical hand-holding support, which is facilitating farmers to generate income form unutilized saline affected areas. Farmers were reported to have been harvesting 2 crops/year of shrimp between March-November 2019, which can be scaled up with further refinement of technology.

The department of fisheries has established well-equipped demonstration farm cum training centre (DFTC) for shrimp culture at Sri Muktsar in 6 hectares of land. DFTC has 4.8 hectares of shrimp farm supported by facilities like office, lab, feed mill, storeroom, training hall, toilet & staff quarters. State Fisheries Department has constituted a society with a vision of promotion of Shrimp culture in Punjab along with addressing and mitigating challenges related to forward and backward linkages.

Development of shrimp culture in Punjab publicized growth of cluster-based culture system which is alleviating farming related issues starting from input supply to marketing, thus showing the probability of development of postharvest facilities in future. Shrimp culture has proved to be a game changer in Punjab. Many of the farmers have come out of debt trap and shrimp culture has provided them surplus income and farmers income has doubled through adoption of shrimp culture technology. Being in premature stage, shrimp culture holds a great potential in the state and can address the employment concerns along with socioeconomic upliftment of the underprivileged families.

Source: National Fisheries Development Board (https://nfdb.gov.in/PDF/Shrimp%20Culture_Success%20story.pdf)

In addition to devising dedicated fisheries policy, States could also look at entering into Memorandum of Understanding (MOU) with nodal agencies like MPEDA and SEAI. The MOU entered between the State of Telangana and MPEDA is a case-in-point in this regard, with the objective to boost the export-oriented aquaculture. The MOU involves setting up a multi-species aquaculture

center with the state government's funding. The facility will consist of hatcheries, nurseries and training centers for export-oriented aquaculture species. MPEDA will also assist the Telangana government in formulating a cage culture policy for promoting export-oriented aquaculture in the water bodies of the state. To build the capacity of farmers in adopting better management practices, MPEDA will organize the farmers into clusters under the National Centre for Sustainable Aquaculture (NaCSA).While such MOUs are in place between MPEDA and other shrimp exporting states like Kerala and Tamil Nadu, shrimp exporters from non-coastal States like Uttar Pradesh and Punjab, exploring the viability of inland shrimp farming may stand to benefit from similar collaborations.

Redirecting Exports to meet the Import Demand of Growing and Underserved Markets

During 2014-19, India's exports of Shrimps and Prawns grew at an AAGR of 12.8% as against the AAGR of 3.8% in world imports of the same. An analysis of importing countries that steered the world import demand for Shrimps and Prawns, mapped against India's exports of Shrimps and Prawns to these countries offers valuable insights into how the direction of trade could be altered to boost exports in the near term. Broadly, India's export destinations for Shrimps and Prawns can be categorized into the following three categories:

- **Category A:** AAGR of Total Imports of Shrimps and Prawns > AAGR of Imports of Shrimps and Prawns from India
- **Category B:** Positive AAGR of Total Imports of Shrimps and Prawns; Negative AAGR of Imports of Shrimps and Prawns from India
- **Category C:** Negative AAGR of Total Imports of Shrimps and Prawns; Positive AAGR of Imports of Shrimps and Prawns from India

Table 2: Country-wise Trend in Shrimps and Prawns Imports – From India and ROW

Country	AAGR in World Imports of Shrimps and Prawns (2014-19)	AAGR in Imports of Shrimps and Prawns from India (2014-19)
Category A: Stronghold for India's Shrimps and Prawns exports		
Ukraine	62.6%	140.2%
China	49.7%	138.6%
Bahrain	18.5%	50.7%
Russia	17.5%	43.6%
Lithuania	10.6%	112.2%
Turkey	7.2%	24.1%

South Korea	5.2%	9.7%
Poland	4.8%	10.4%
Greece	4.7%	15.3%
United Arab Emirates	3.9%	12.4%
Ireland	3.8%	9.4%
USA	3.7%	19.0%
New Zealand	3.1%	43.5%
Dominican Republic	1.3%	12.0%
Hong Kong	1.1%	1.9%
Mauritius	0.7%	8.4%
Canada	0.0%	5.6%
Category B: Underserved Markets for India's Shrimps and Prawns exports		
Netherlands	6.1%	-6.3%
Israel	4.8%	-1.0%
Germany	3.7%	-2.1%
Thailand	2.1%	-6.2%
Portugal	1.0%	-1.8%
France	0.6%	-8.1%
Category C: Markets from where Indian exporters could exit and shift supply to countries in Category A and B		
Denmark	-0.5%	2.2%
Japan	-1.3%	2.5%
Oman	-2.0%	20.5%
Vietnam	-3.1%	0.2%
UK	-3.1%	5.7%
Sweden	-3.5%	2.2%
South Africa	-6.3%	7.2%
Lebanon	-17.3%	16.0%
Mexico	-29.9%	37.5%

Source: Data accessed from ITC TradeMap; India Exim Bank Research

Importing countries in the Category A represent a stronghold for India's exports of Shrimps and Prawns, providing avenues for sustained export growth in the near-term. The importing countries in the Category B, on the other hand, represent the relatively underserved market for India's Shrimps and Prawns exports. Lastly, Category C represents the markets from where Indian exporters could exit and shift supply to countries in Category A and B. India could explore the route of Comprehensive Economic Partnership Agreements (CEPAs) and Free Trade Agreements (FTAs) to cater to the growing import demands in Category B countries.

Addressing the Costs of Shrimp feed and switching to Functional Feed

The growing import demand for the L. Vannamei shrimp from India has in turn led to a rise in demand for shrimp feed. It may be noted that the cost of feed constitutes nearly 50% to 70% of the total variable cost incurred in shrimp production. The availability of nutrients from feeds depends on the type and quality of the raw material used, the formulation, the feed processing, feed storage conditions and the feeding management. The use of good quality feed helps in improving the shrimp production, profits, and minimizing the environmental pollution generated from shrimp farming.

There are 38 feed plants in India that can manufacture shrimp feeds, with a total capacity of 3.5 million MT. In 2019, the volume of shrimp feed deals was assessed at 1.3 million MT.

Andhra Pradesh represents the largest market for shrimp feed and is expected to account for 53.9% of the total shrimp feed market by 2022-23 followed by West Bengal (13.2%), Gujarat (11.0%), Tamil Nadu & Puducherry (10.5%), Odisha (7.4%) and Maharashtra (2.0%)[18].

However, India's dependence on imported shrimp feed has grown over the years. As has been noted in Chapter 2, record high prices of shrimp feed ingredient soyabean manifested the losses for small and medium players in the industry amid the COVID-19 outbreak. Keeping a check on the prices of shrimp feed, therefore, becomes an important determinant of overall prices of shrimps.

As India strives to boost its exports of Shrimps and Prawns in the near-term, improving the attractiveness of the shrimp feed businesses will also play a critical role, serving the following twin objectives:

- As ancillaries, domestic shrimp feed businesses are well-positioned to benefit from the growing demand for shrimps and prawns by expanding their portfolios to include functional feed[19]—basic feed that has been enhanced with additives, such as proteins, vitamins, or probiotics, to achieve a specific outcome.
- Well-structured fiscal and monetary incentives that lead to capacity addition for the domestic shrimp feed businesses, can prove to be gamechangers by enabling import substitution and by extension, making Indian shrimp farmers less vulnerable to price volatility of shrimp feed ingredients.

Among the key functional feed segments that need to be looked to achieve the said purpose include:

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[18] Outlook of the Indian Shrimp Feed Industry and Manufacturers

[19] Functional feed is slightly different from improved basic feed: it is used in specific circumstances to achieve a specific outcome, usually includes more additives

- Growth Enhancement Functional Feed: Growth enhancement functional feed is a complete feed (rather than an isolated compound) that is designed to promote specific physiological effects that allow farmers to grow larger shrimp faster and more efficiently. Specifically, growth enhancement functional feed has the potential to accelerate shrimp growth rates or to produce larger shrimp. Farmers are likely to opt for growth enhancement functional feed when global shrimp prices rise, and they want to take advantage of the opportunity.
- Health Enhancement Functional Feed: This aims to improve shrimp survival and to increase productivity by optimizing the shrimp's digestive efficiency. This type of feed is especially useful for mitigating risk when the threat of disease is high.

Switching to functional feed also benefits the environment by decreasing land use – due to reduced FCR—by up to 15% per kilogram of shrimp produced, improving water quality by reducing feed waste, decreasing the use of antibiotics, and requiring less fish meal and fish oil.

The sectoral R&D efforts must be focused on optimizing the feed conversion ratio (FCR), which indicates the amount of feed required to grow a kilogram of shrimp.

It may be noted that every 0.1 improvement in FCR can increase the crop profitability by US$ 100/tonne of shrimp harvested and that every 0.1 increase in FCR will produce 90 kg more organic waste/tonne of shrimp production.

Vertical Development of India's Shrimps and Prawns Industry

While the international market for India's shrimp and prawns has grown steadily over the last decade, the need for product profile to develop vertically has been noted.

Diversification of India's shrimp and prawn exports from primarily frozen shrimps to value-added shrimp products could further improve the overall export potential in the near-term and reduce India's dependence on Vietnam's shrimp-processing industry.

The processing of value-added products in the industry would require improved harvest and post-harvest technology. In addition, other key measures for vertical development of India's shrimp and prawns' industry to boost exports include:

- Shrimps of varied cuts: India's shrimp processing industry could focus on diversifying to shrimps with varying depths of cuts. This may include the Easy-

Peel Shrimp, Peeled and deveined (P&D) Shrimps and Peeled undeveined (PUD) Shrimps.

- Coated shrimps for ready-to-eat meals: Given the growing markets for ready-to-eat meals, India's exporters could focus on pre-battered or coated shrimps as value-added exports. Among the key drivers for India's export of ready-to-eat shrimp exports may be attributed to rising urbanization and the growing demand for quick food and presence of freshness and high nutritional value in these foods.
    - Additionally, longer shelf life and easy availability of ready-to-eat food products is further pushing their demand globally. Innovation in products offerings, sustainable packaging and preference of single serving frozen products are likely to further propel the market growth.

Annexure

Shrimps and Prawns: HS Codes and Description

HS Code	Description
030613	Frozen shrimps and prawns, whether in shell or not, incl. shrimps and prawns in shell, cooked by steaming or by boiling in water
030616	Frozen cold-water shrimps and prawns “Pandalus spp., Crangon crangon”, even smoked, whether in shell or not, incl. shrimps and prawns in shell, cooked by steaming or by boiling in water
030617	Frozen shrimps and prawns, even smoked, whether in shell or not, incl. shrimps and prawns in shell, cooked by steaming or by boiling in (water (excluding cold-water shrimps and prawns
030623	Shrimps and prawns, whether in shell or not, live, dried, salted or in brine, incl. shrimps and prawns in shell, cooked by steaming or by boiling in water
030626	Cold-water shrimps and prawns “Pandalus spp., Crangon crangon”, even smoked, whether in shell or not, live, fresh, chilled, dried, salted or in brine, incl. shrimps and prawns in shell, cooked by steaming or by boiling in water
030627	Shrimps and prawns, even smoked, whether in shell or not, live, fresh, chilled, dried, salted or in brine, incl. shrimps and prawns in shell, cooked by steaming or by boiling in water (excluding cold-water (shrimps and prawns
030635	Cold-water shrimps and prawns “Pandalus spp., Crangon crangon”, whether in shell or not, live, fresh or chilled
030636	Shrimps and prawns, whether in shell or not, live, fresh or chilled (excl. cold-water shrimps and prawns “Pandalus spp., Crangon cran- (“gon
030695	Shrimps and prawns, whether in shell or not, dried, salted, smoked or in brine, incl. ones in shell, cooked by steaming or by boiling in water
160520	Shrimps and prawns, prepared or preserved
160521	Shrimps and prawns, prepared or preserved, not in airtight containers ((excluding smoked
160529	Shrimps and prawns, prepared or preserved, in airtight containers ((excluding smoked

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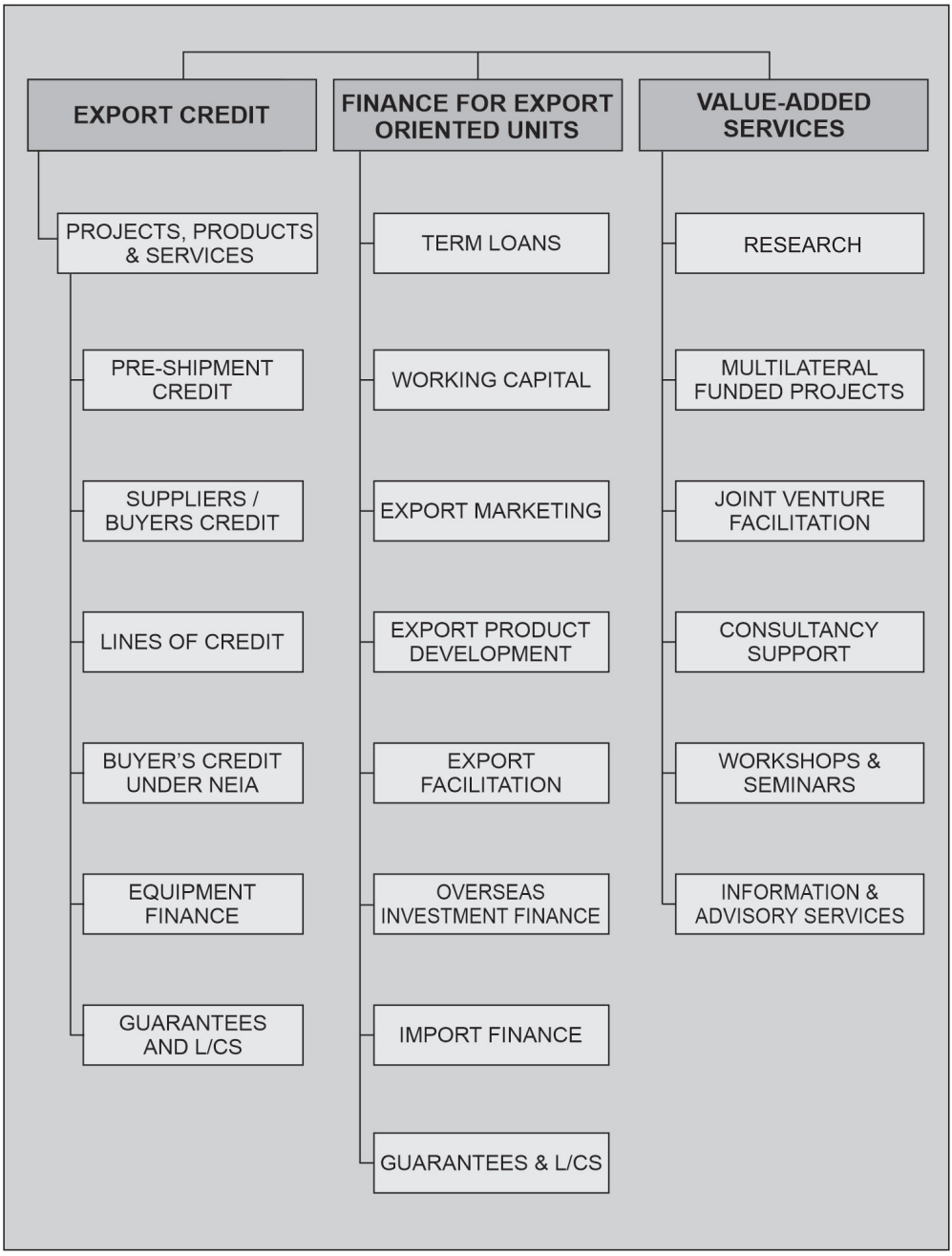

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