Market Intelligence
& Analytics

CRISIL
An S&P Global Company

Assessment of the fish meal and fish oil processing industry in India

March 2023 (Macro-economic update – May 2023)

Addendum December 2023

Consulting

Contents

1. Macroeconomic assessment

1.1. India's macroeconomic assessment

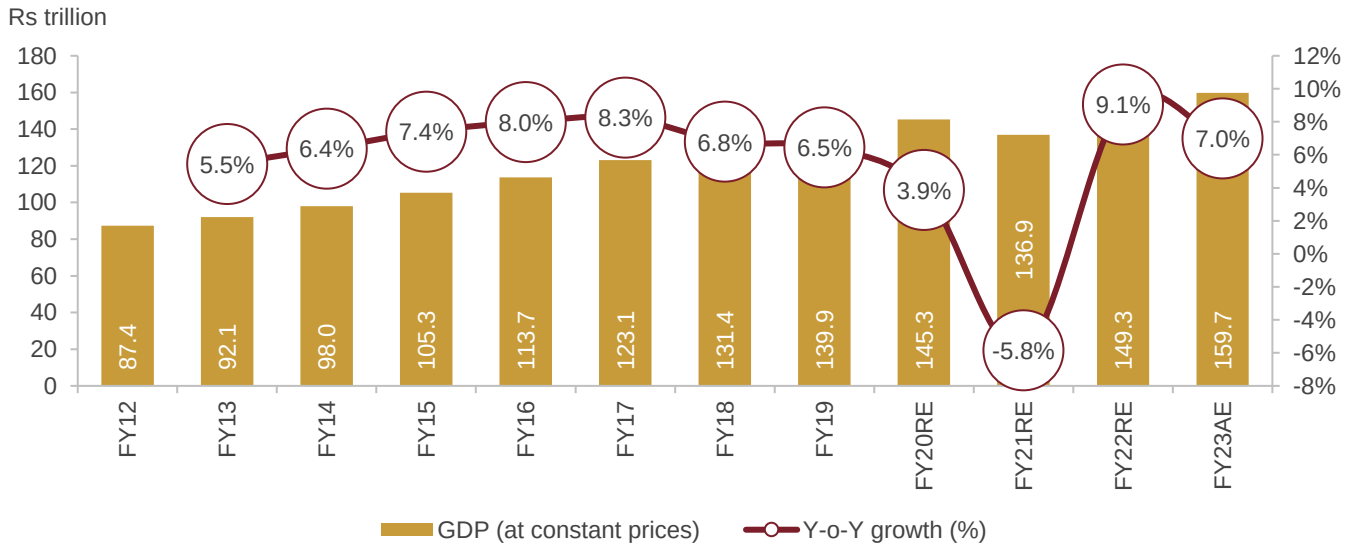
India's GDP logged 5.6% CAGR over fiscals 2012-2023

In 2015, the Ministry of Statistics and Programme Implementation (MoSPI) changed the base year for calculating India's GDP from fiscal 2005 to fiscal 2012. Based on this, the country's GDP logged an 11-year CAGR of 5.6%, reaching ~Rs 160 trillion in fiscal 2023 from ~Rs 87 trillion in fiscal 2012.

In fiscal 2023, the Indian GDP has seen a year-on-year growth of 7.0%. Though the GDP has seen a rise above the pre-pandemic levels, the growth is constrained by the global economic slowdown, tight monetary policies, and elevated oil prices.

In fiscal 2022, the economy faced challenges in the last quarter owing to geopolitical pressures, resulting in higher inflation levels. With the resumption of economic activities and healthy trade flow, GDP growth was at a healthy 9.1%, albeit on a low base.

Real GDP growth in India (new series)



Note:
1. *PE: Provisional estimates; RE: Revised estimates; AE: Advance estimates*
2. *The above-mentioned values are reported by Government under various stage of estimates*

Source: Second Advance Estimates of National Income 2022-23, Central Statistics Office (CSO), MoSPI, CRISIL MI&A Research

India's GDP to grow 7.0% in fiscal 2023

While recovery continues to gather pace, the economy is facing multiple risks. Global growth is projected to slow as central banks in major economies withdraw easy monetary policies to tackle high inflation. This would imply lower demand for our exports. Together with high commodity prices, especially oil, this may deal a trade shock for the country. High commodity prices, along with depreciating rupee, indicate higher imported inflation.

The second quarter fiscal 2023 data reflected how global slowdown had begun to spill over to the Indian economy. Long-term growth movements suggest that despite diverging now, India's growth cycles have been remarkably synchronised with that of advanced economies since the 2000s. Major developed economies are expected to fall

into a shallow recession by next year. S&P Global expects the US GDP to swerve from a growth of 1.8% in 2022 to negative 0.1% in 2023, and the European Union from 3.3% to 0% driven by tight financial conditions induced by rate hikes of US Federal Reserve, and the European energy crisis. This will weaken the export prospects for India, thereby weighing on domestic industrial activity.

India's GDP saw a year-on-year growth of 9.1% in fiscal 2022

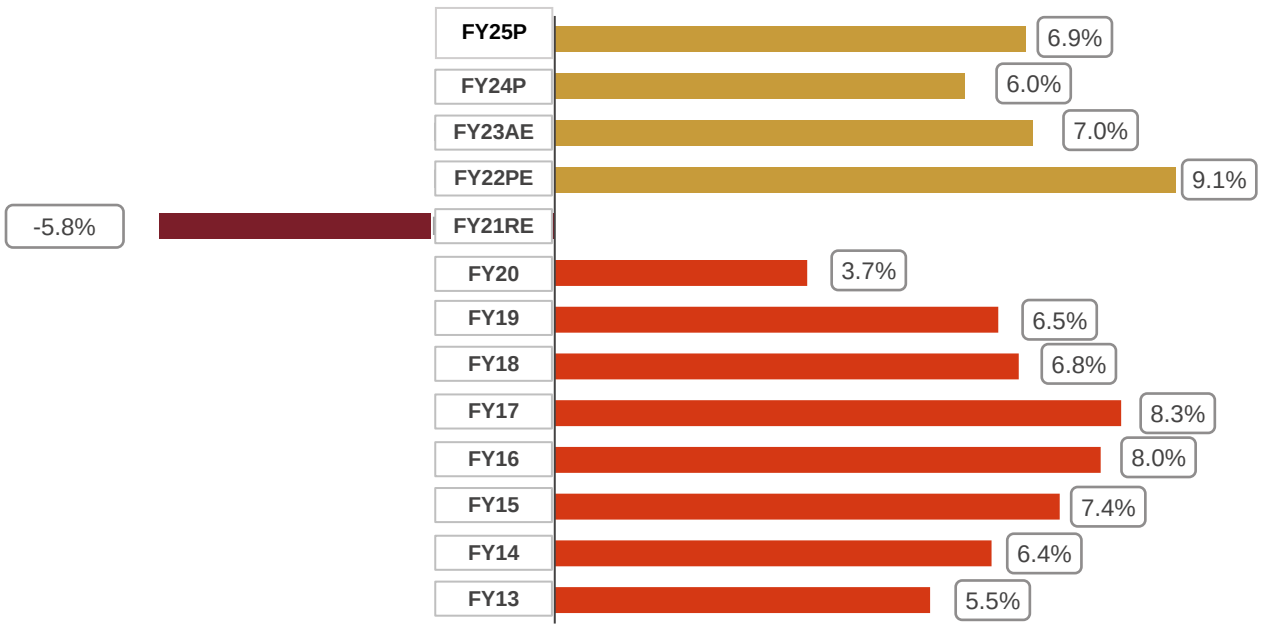
As per the first revised estimates released by the National Statistical Office, India's real GDP grew 9.1% in fiscal 2022, higher than 8.9% it had estimated in January 2023. This suggests that the impact of Covid-19 waves (in fiscals 2021 and 2022) was not as severe as thought previously. It is noteworthy that given the large output loss in the past fiscal, GDP is 2.7% above the pre-pandemic (fiscal 2020) level. Over fiscals 2012-2022, GDP clocked 5.5% CAGR.

CRISIL forecasts India's GDP to grow at 6.0% in fiscal 2024

The quarterly growth trends indicate that the slowdown is intensifying and becoming more widespread in the economy. India's export and industrial growth was hit in the second quarter this fiscal by a global demand slowdown (particularly for goods), and this continued into the third quarter. The third quarter reflected waning momentum in domestic consumption. In addition, demand momentum is also expected to slow further, both at the domestic and global levels. Domestically, the transmission of the Reserve Bank of India's rate hikes has picked up since December, and key rates have either surpassed or reached close to the pre-pandemic 5-year average. The transmission is yet to be completed, which is likely to lead to a further rise in borrowing costs.

Further, the advanced economies will inevitably face slower growth in 2023 as their interest rates are already at decadal highs. They account for 45% of India's exports, which will bear the brunt of weaker demand. Besides the global slowdown, a forecast of El Nino, which disturbs Indian monsoons, is another risk to monitor. The above-mentioned factors are expected to slow India's GDP growth to 6.0% in fiscal 2024 from 7.0% in fiscal 2023. However, it is projected to improve to 6.9% in fiscal 2025.

Real GDP growth (% on-year)

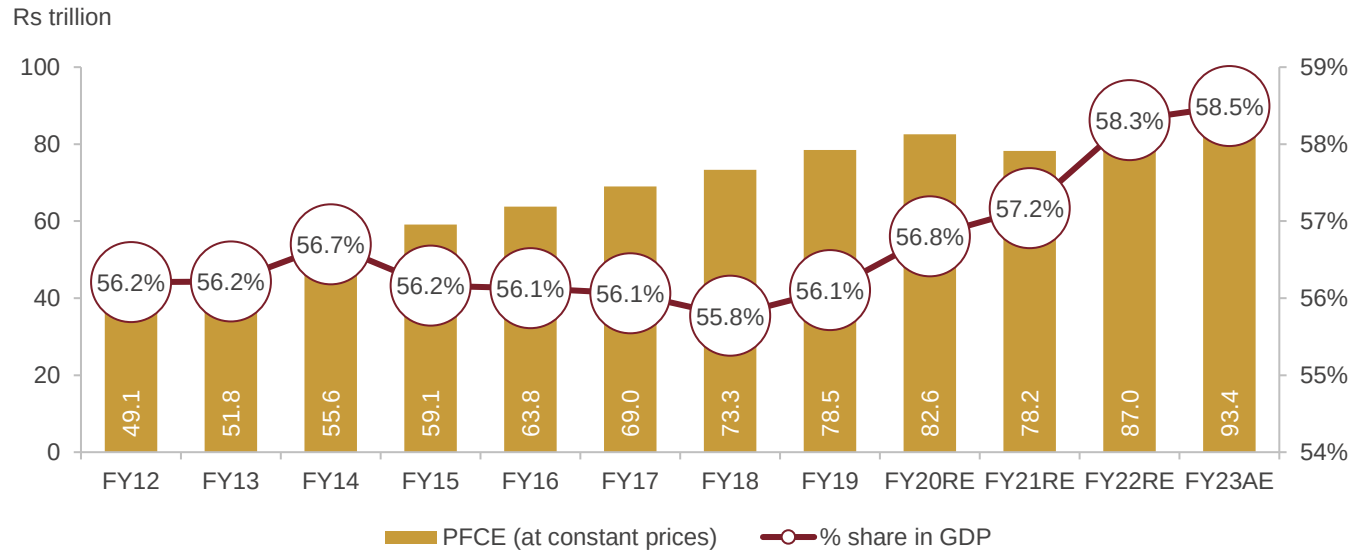


Note:
PE: Provisional estimates; RE: Revised estimates; AE: Advance estimates
Source: Second Advanced of national income 2022-23, Central Statistics Office (CSO), MoSPI, CRISIL MI&A

PFCE to maintain dominant share in India's GDP

PFCE at constant prices clocked 5.9% CAGR between fiscals 2012 and 2022, maintaining its dominant share in the GDP pie at ~58% or Rs 87,035 billion. Factors contributing to growth included good monsoons, wage revisions due to the implementation of the Pay Commission's recommendations, benign interest rates and low inflation. However, it declined in fiscal 2021 to Rs 78,245 billion on account of the pandemic, when consumption demand was impacted on account of strict lockdowns, employment loss, limited discretionary spending and disruption in demand-supply dynamics. In fiscal 2023, it increased 5.4% to Rs 93,421.3 billion, forming 58.5% of GDP.

PFCE (at constant prices)



Note: RE: revised estimates, AE: advance estimates
Source: Second Advance Estimates of National Income 2022-23, CSO, MoSPI, CRISIL MI&A Research

India's per-capita income jumped over fiscals 2012-2023

India's per capita net national income (NNI), a broad indicator of living standards, rose from Rs 63,462 in fiscal 2012 to Rs 98,118 in fiscal 2023 logging 4.0% CAGR. Growth was led by better job opportunities, propped up by overall GDP growth. Moreover, population growth remained stable at ~1% CAGR. However, in fiscal 2021, the indicator declined 8.9% on-year owing to the impact of Covid-19. With a 6.0% on-year growth seen in fiscal 2023, in absolute terms, it is has surpassed pre-pandemic levels.

Per-capita net national income at constant prices

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21RE	FY22RE	FY23AE
Per-capita net national income (Rs.)	63,462	65,538	68,572	72,805	77,659	83,003	87,586	92,133	94,420	86,054	92,583	98,118
On-year growth (%)		3.3%	4.6%	6.2%	6.7%	6.9%	5.5%	5.2%	2.5%	-8.9%	7.6%	6.0%

Note: RE: revised estimates, AE: advance estimates
Source: Second Advance Estimates of National Income 2022-23, CSO, MoSPI, CRISIL MI&A Research

India's per-capita GDP grows faster than global average

Global per-capita GDP clocked a CAGR of 1.5% between 2012 and 2021, as per the World Bank data. Meanwhile, India's corresponding figure registered a CAGR of 4.3%.

Per-capita GDP at constant prices

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	CAGR 2012-2021
India per-capita GDP at constant prices ($)	1,347	1,416	1,503	1,606	1,719	1,817	1,914	1,966	1,818	1,961	4.3%
World per-capita GDP at constant prices ($)	9,709	9.863	10,043	10,232	10,396	10,625	10,853	11,019	10,549	11,057	1.5%

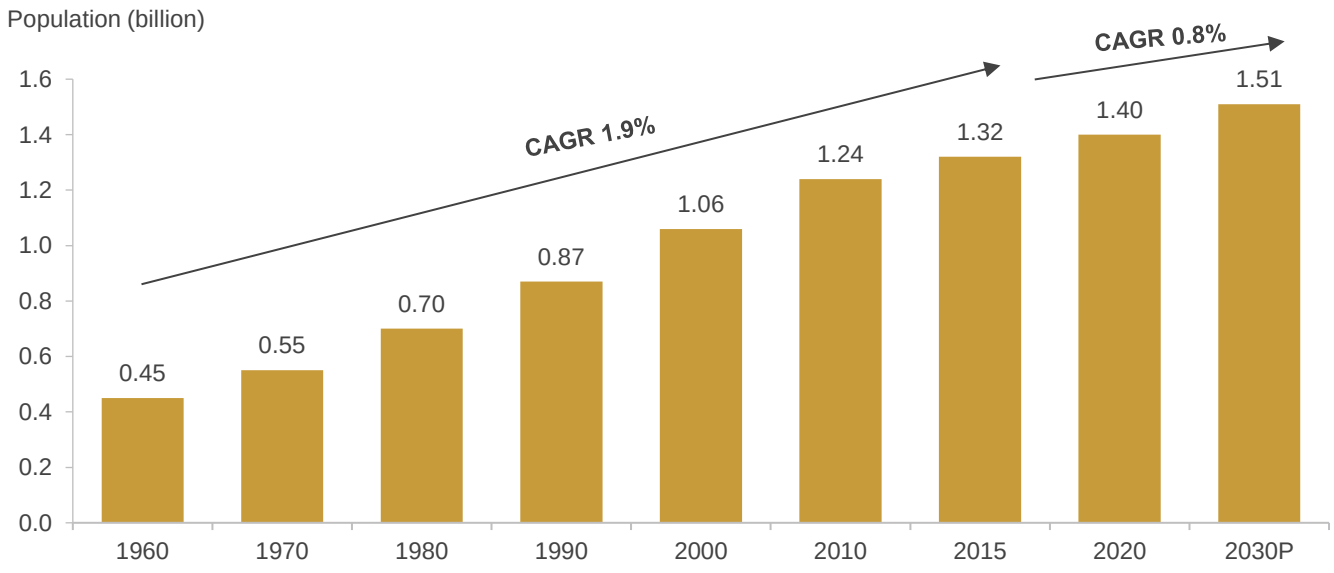
Source: World Bank data, CRISIL MI&A Research

India's population is projected to log 0.8% CAGR between 2020 and 2030

India's population grew to ~1.2 billion according to Census 2011, at a CAGR of 1.9% between 2001 and 2011. As of 2010 census, the country had ~246 million households.

According to the United Nation's (UN) World Urbanization Prospects, 2022 revision, India and China, two of the most populous countries, accounted for nearly 36% of the world's population in 2021. As per United Nations Population Fund's (UNFPA), "State of World Population Report" of 2023, India's population by mid-year of 2023 is estimated to surpass China by around ~2.9 million.

India's population growth

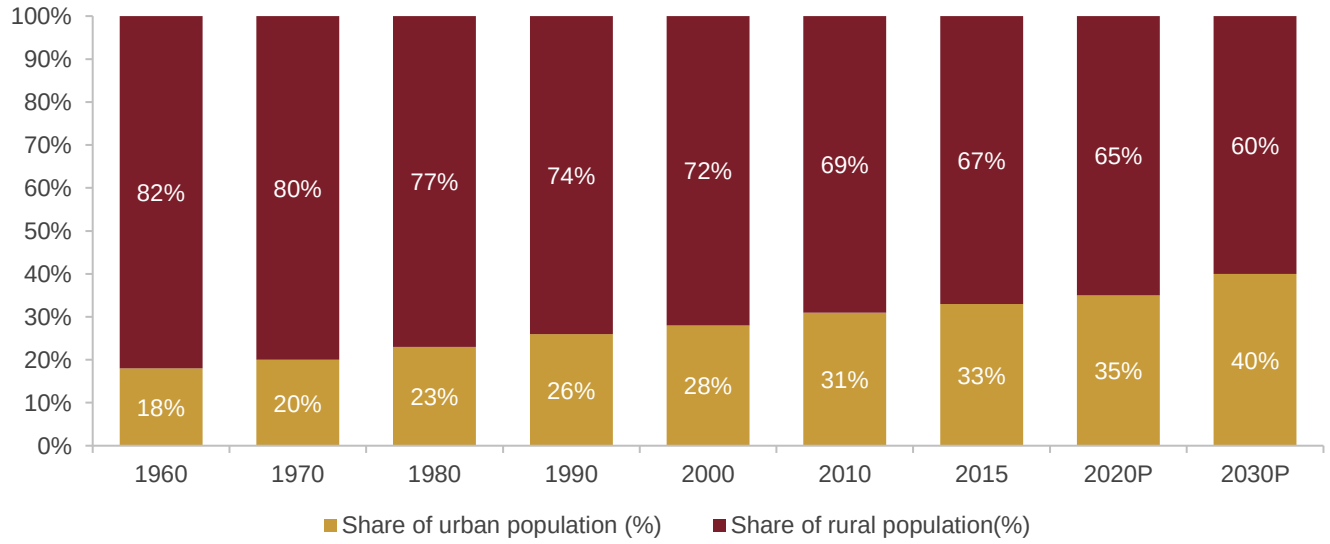


Note: P: projected
Source: UN Department of Economic and Social Affairs, World Population Prospects 2022, CRISIL MI&A Research

Urbanisation in India likely to reach 40% by 2030

India's urban population has been rising over the years and is expected to continue with rise in economic growth. From ~31% of the total population in 2010, it is projected to rise to nearly 40% by 2030, according to a UN report on urbanisation.

India's urban vs rural population



P: projected
Source: World Urbanization Prospects: The 2018 Revision, UN, CRISIL MI&A Research

People from rural areas move to cities for better job opportunities, education, and quality of life. The entire family or only a few individuals (generally an earning member or students) may migrate, while the other members continue to live in their rural home.

India's youth to account for ~39% of its population by 2030

As per the UN's 2022 Revision of World Population Prospects, India's youth (0-24 years) accounted for nearly half its population in 2010, significantly higher than that for some of its peers (Brazil at 42.5%, China at 35.1%, and the Russian Federation at 29.7%). The fact that ~31% of the population is aged below 15 indicates that a high proportion of the country's young population is expected to remain so in the coming years.

This share is, in fact, expected to reach ~39% by 2030, and remain significantly higher than that of its peers (Brazil at 31.5%, China at 25.4%, and the Russian Federation at 27.7%). This also indicates higher proportion of population entering the workforce.

Age-wise population break-up for key countries

Country	0-14 years	15-24 years	25-49 years	50-69 years	70+	Total
Brazil						
2010	24.8%	17.7%	37.6%	15.6%	4.4%	100%
2020	20.8%	15.6%	38.3%	19.5%	5.8%	100%
2030P	18.2%	13.3%	37.4%	22.6%	8.4%	100%
China						
2010	18.5%	16.6%	40.3%	19.0%	5.7%	100%

Country	0-14 years	15-24 years	25-49 years	50-69 years	70+	Total
2020	18.0%	11.4%	37.6%	25.5%	7.5%	100%
2030P	13.1%	12.3%	34.0%	28.6%	12.0%	100%
India						
2010	31.0%	19.1%	33.9%	12.9%	3.1%	100%
2020	26.1%	18.2%	36.2%	15.5%	3.9%	100%
2030P	22.3%	16.2%	38.0%	17.9%	5.5%	100%
Russian Federation						
2010	15.2%	14.6%	37.2%	23.2%	9.8%	100%
2020	17.7%	9.8%	37.4%	25.5%	9.7%	100%
2030P	15.4%	12.4%	33.8%	25.2%	13.3%	100%
UK						
2010	17.6%	13.1%	34.8%	22.9%	11.6%	100%
2020	17.8%	11.6%	32.5%	24.4%	13.7%	100%
2030P	15.4%	12.2%	31.9%	24.5%	15.9%	100%
US						
2010	19.9%	14.1%	34.1%	22.8%	9.1%	100%
2020	18.5%	13.1%	33.0%	24.7%	10.7%	100%
2030P	16.4%	12.5%	33.2%	23.0%	14.8%	100%

P: projected
Source: United Nations, Department of Economic and Social Affairs, Population Division (2022); World Population Prospects 2022, CRISIL MI&A Research

Indian population's median age to be 30.9 years by 2030

According to the UN, the global median age rose to ~30 years in 2020 from ~20 years in 1970. This is lower than the median age in developed countries such as the US (37.5 years) and the UK (39.5 years). Interestingly, India's median age is 27.3 years, indicating a favourable demographic dividend. Furthermore, it is the lowest among its BRIC peers: Brazil (32.4 years), Russia (37.4 years), and China 38.6 years.

This trend is expected to continue up to 2030, implying strong potential for an increase in income, and basic and healthcare spending, with a large proportion of the population being employed.

Median age trend across key countries

Country	1970	1990	2010	2015	2020	2030P
Brazil	17.3	21.5	28.2	30.3	32.4	36.5
China	18.0	23.7	34.1	35.6	37.4	42.7
India	18.3	20.0	24.0	25.5	27.3	30.9
Russian Federation	29.7	32.2	36.9	37.6	38.6	42.1
UK	33.2	34.8	38.5	39.0	39.5	41.6
US	27.2	31.8	36.1	36.6	37.5	39.7
World	20.3	23.0	27.3	28.5	29.7	32.1

Source: United Nations, Department of Economic and Social Affairs, Population Division (2022); World Population Prospects 2022, CRISIL MI&A Research

Review of CPI Inflation in India

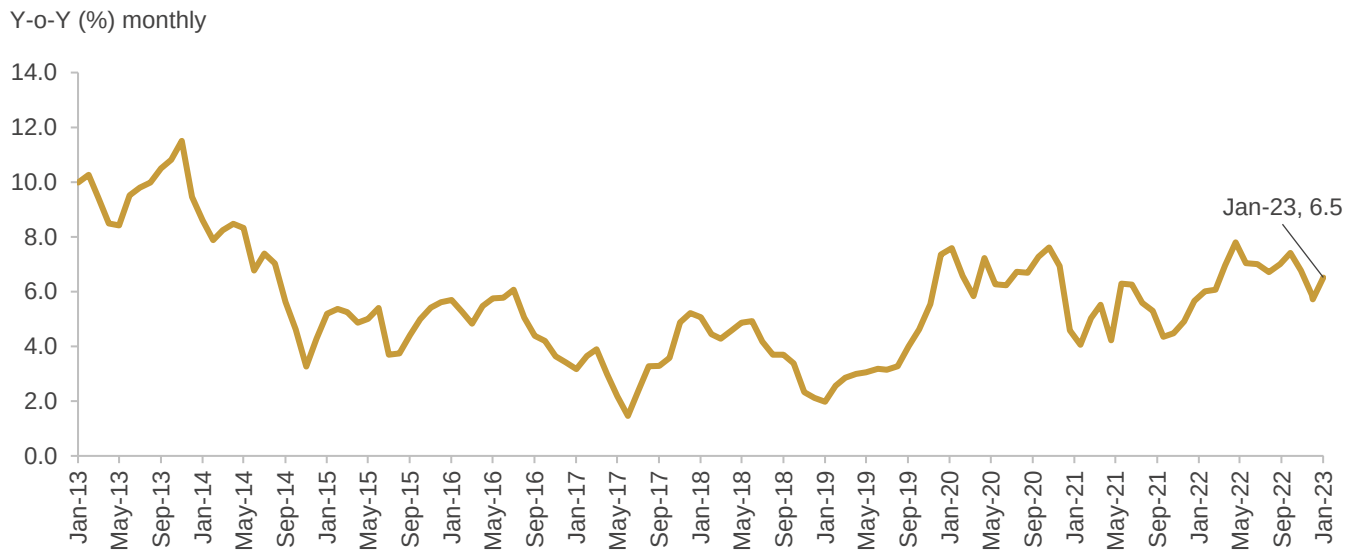
Consumer Price Index (CPI) inflation jumped sharply in January to 6.52% on-year (from 5.72% in December), driven by a rise in food (cereals, protein-based items) and core (personal care and effects) prices.

Headline inflation is now at the upper limit of Reserve Bank of India's (RBI) target range of 2-6%. Both momentum (from on-month price increases) and some low-base effect contributed to pulling up the headline inflation, overwhelming the effect of deflation in vegetables.

Food inflation continues to drive swings in headline inflation: in November and December, sharp seasonal correction in vegetable prices lowered inflation below 6% (the RBI's upper tolerance band). However, in January, acceleration in price rise in cereals, milk, pulses, eggs, meat and fish countered the deflation in vegetable prices. Fuel inflation saw a slight moderation (10.8% on-year in January vs 10.9% in December) arising from sequential decline in PDS kerosene prices and high base effect in coal prices.

Based on an assessment of the current and evolving macroeconomic situation, the Monetary Policy Committee (MPC) at its meeting on February 8, 2023, decided to increase the policy repo rate by 25 basis points (bps) to 6.50%. It also decided to remain focused on withdrawal of accommodation to ensure that inflation remains within the target going forward.

CPI in India



Source: MoSPI, CRISIL MI&A Research

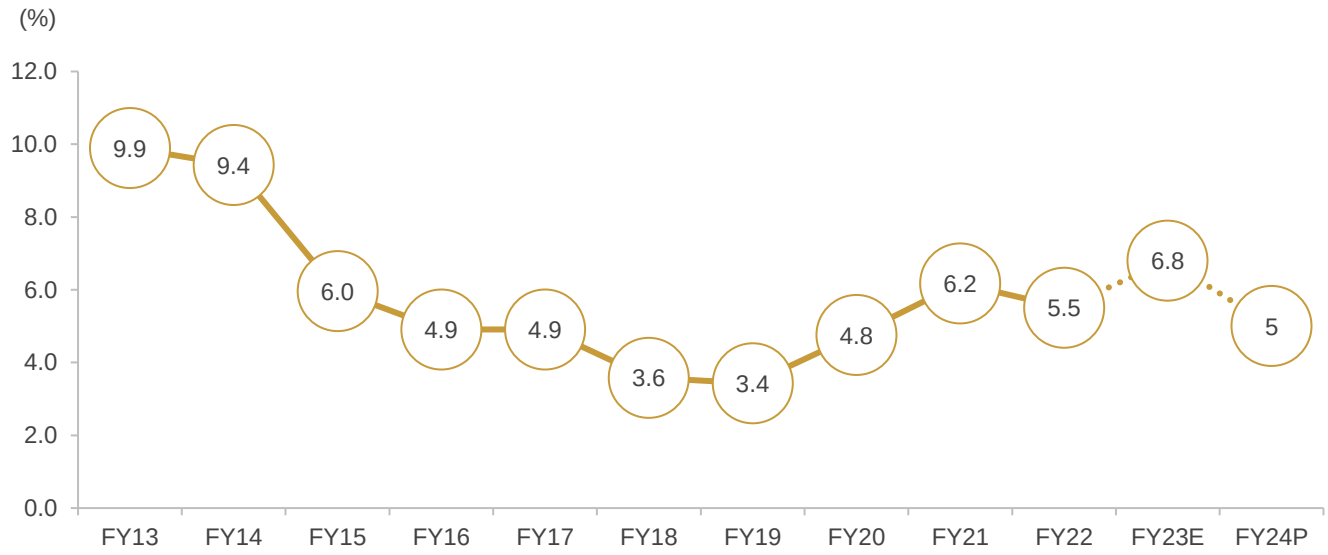
CPI inflation to average around 6.8% in fiscal 2023 and 5% in fiscal 2024

The January CPI print highlights that pressures on headline inflation from food and core items continue, warranting caution. If the CPI print for the remaining months of the last quarter remains as high as in January, average annual CPI inflation could print at 6.7% in fiscal 2023 (above the RBI's revised forecast of 6.5%). That said, going ahead, food inflation outlook is expected to improve: from both a robust rabi harvest (providing relief for wheat and pulses prices) and improved procurement. Fuel inflation inching down (albeit, only gradually) provides some comfort, though the trajectory of international crude oil prices remains a monitorable amid persistent geopolitical tensions and reopening effect from China.

Core inflation remains the biggest concern with continued passthrough of input costs and domestic demand proving to be resilient.

Taking all factors into account, we maintain our fiscal 2023 CPI inflation forecast of 6.8%. Next fiscal, inflation is expected to trend down to 5%, led by a combination of factors: base effect, lower food inflation as the supply of cereals shores up, lower international commodity prices, and the impact of monetary policy actions (rate hikes and liquidity withdrawal) on core inflation.

Outlook for CPI in India



Source: MoSPI, CRISIL MI&A Research

India's GVA continues to record healthy growth

On the supply side, gross value added (GVA), a much better measure of the economic performance, grew 8.8% (compared with 4.2% de-growth in fiscal 2021). In absolute terms, real GVA was Rs. 138 trillion in fiscal 2022, up from Rs. 126.8 trillion in fiscal 2021, and is expected to reach Rs. 147.1 trillion in fiscal 2023, as per the advance estimates.

GVA at constant fiscal 2012 prices

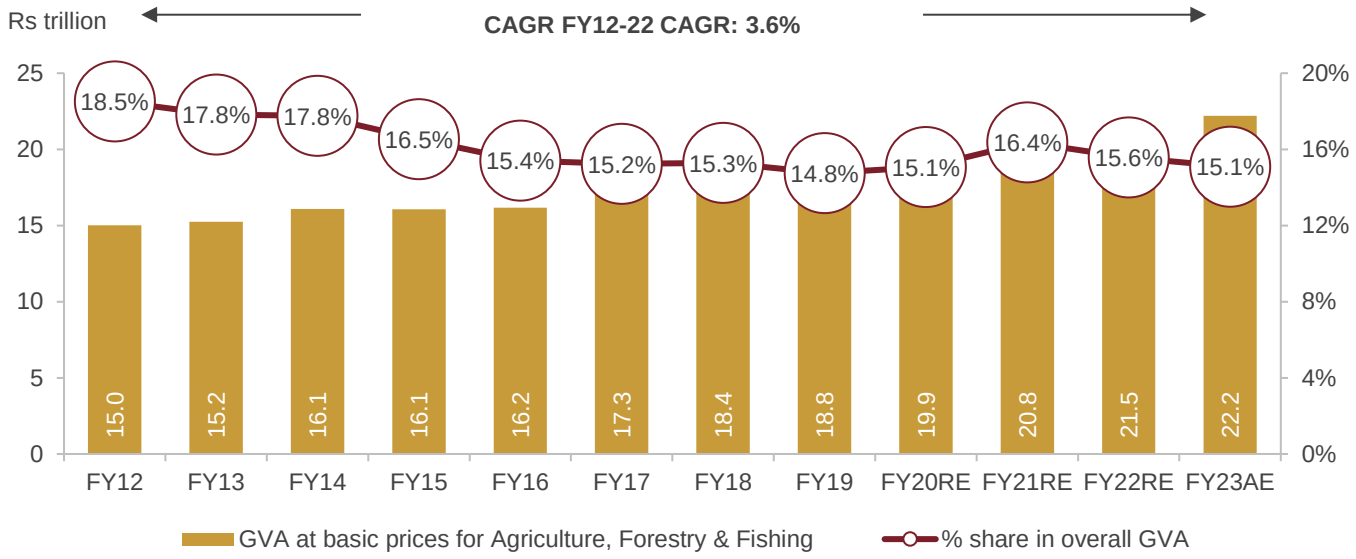
Rs. trillion	FY21RE	FY22PE	FY23AE	Share in GVA FY23	Annual growth in FY23
Agriculture, forestry and fishing	20.8	21.5	22.2	15.1%	3.3%
Mining and quarrying	2.9	3.1	3.2	2.2%	3.4%
Manufacturing	23.3	25.8	26.0	17.7%	0.6%
Utility services	2.9	3.2	3.5	2.3%	9.2%
Construction	9.8	11.3	12.3	8.4%	9.1%
Trade, hotels, transport, communication and services related to broadcasting	21.6	24.6	28.0	19.1%	14.2%
Financial, real estate and professional services	29.6	31.0	33.1	22.5%	6.9%
Public administration, defence and other services	16.0	17.6	18.8	12.8%	7.1%
GVA at basic prices	126.8	138.0	147.1		6.6%

RE: revised estimate, AE: advanced estimate
Source: Second Advance Estimates of National Income 2022-23, CSO, MoSPI, CRISIL MI&A Research

Agriculture, Forestry and Fishing (AFF) contributed to 15.1% of the total GVA in fiscal 2023

The agriculture, forestry and fishing segment has been a key contributor to the total GVA. The segment's GVA has grown 3.5% from fiscals 2012-22. The segment contributed 15.6% of the total GVA in fiscal 2022.

GVA of AFF segment in total GVA (constant fiscal 2012 prices)

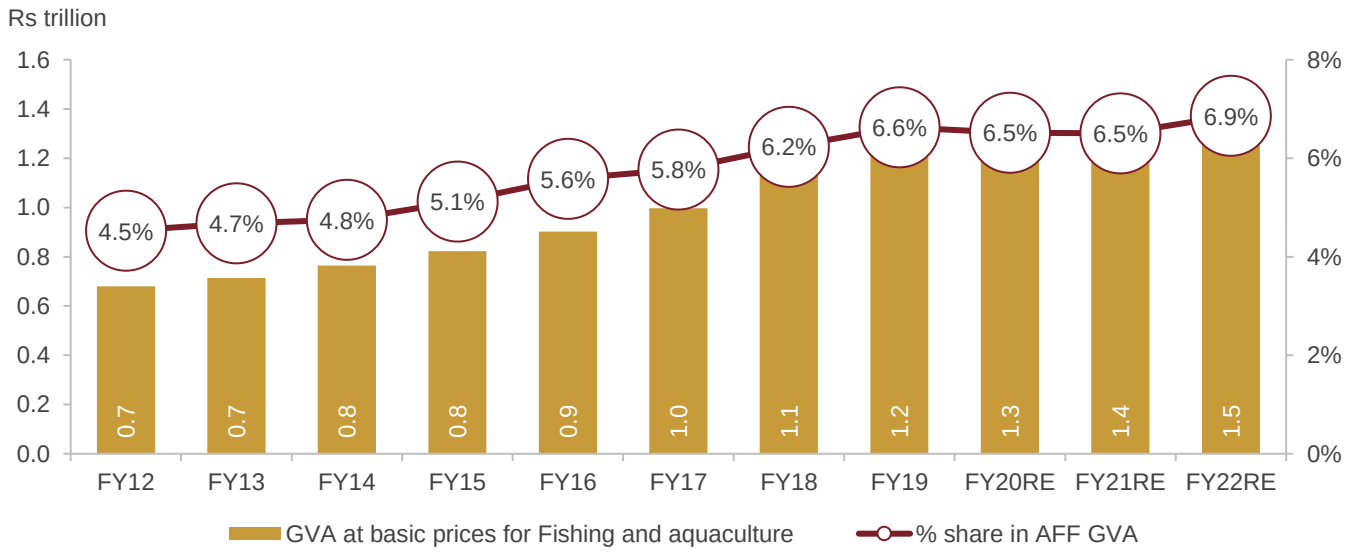


RE: revised estimate, PE: Provisional Estimates, AE: advanced estimate
Source: Second Advance Estimates of National Income 2022-23, CSO, MoSPI, CRISIL MI&A Research

Share of fisheries sector in AFF has grown from 4.5% to 6.9% from fiscals 2017-22

In terms of GVA, fisheries has been fastest growing segment in AFF. Its GVA grew ~8.0% during fiscal 2012 to 2022. This segment contributed 6.9% share in the AFF sectoral GVA as of fiscal 2022, and ~1% to overall GVA.

Share of fisheries and aquaculture in AFF GVA (constant fiscal 2012 prices)

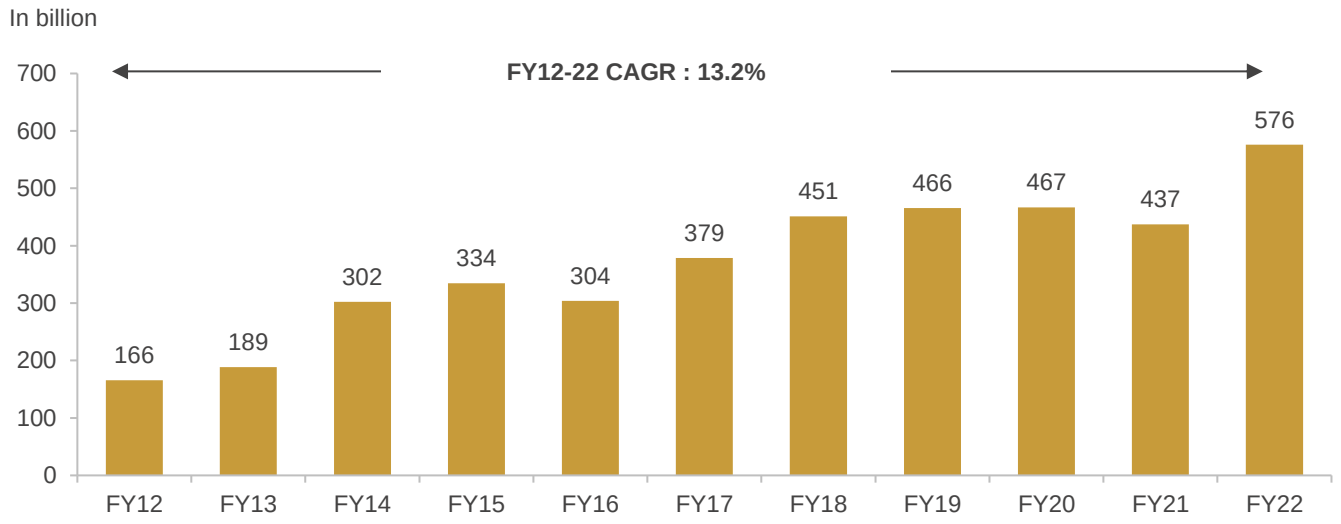


Source: Second Advance Estimates of National Income 2022-23, CSO, MoSPI, CRISIL MI&A Research

India's export of fish and fish products has grown at 13% CAGR from fiscals 2012 to 2022

India has a coastline of 7,516.6 km (including mainland, Lakshadweep and Andaman & Nicobar), which helps India's fishing population. Export of fish and fish products from India has grown at 13% CAGR from Rs. 166 billion in fiscal 2012 to Rs. 576 billion in fiscal 2022. Of the total exports in fiscal 2022, frozen shrimp occupied the highest share at 74%, followed by frozen fish at 6%.

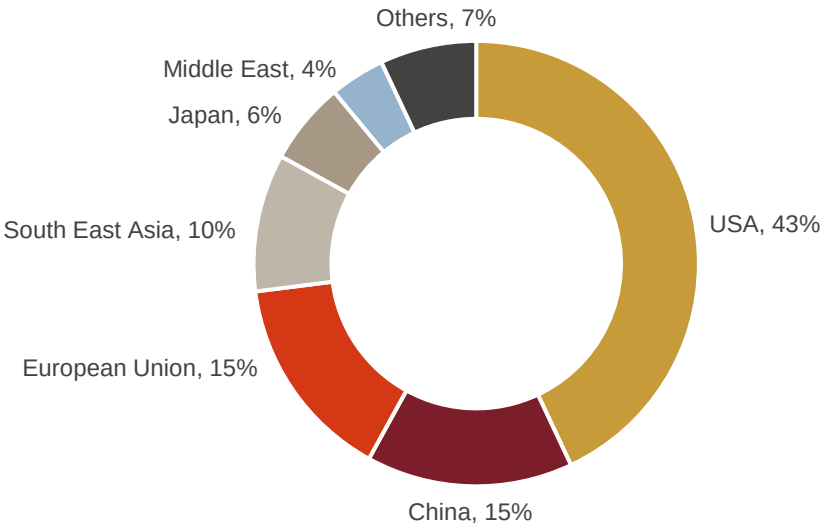
India fish and fish products exports



Note: Fish and Fish products include Frozen Shrimp, Frozen Fish, Frozen Cuttle Fish, Frozen Squid, Dried items, Chilled items, and others
Source: MPEDA, CRISIL MI&A Research

In value terms in fiscal 2022, the USA occupies the largest share of the total exports from India, at 43%, followed by China at 15% and the European Union at 15%.

Region-wise share of fish and fish-product exports (fiscal 2022)

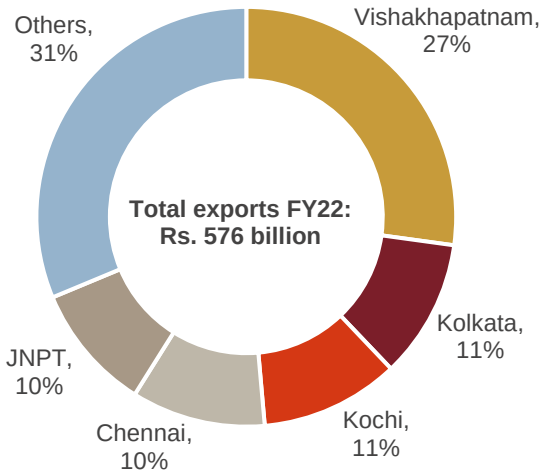


Source: MPEDA, CRISIL MI&A Research

Vishakhapatnam port contributed to highest exports of fish and fish products (value terms)

In fiscal 2022, exports of fish and fish products were highest from Vishakhapatnam port, at Rs. 156.5 million by value and 27% by share of fish and fish products. Kochi and Kolkata ports followed closely, with a share of 11%, each.

Port-wise share in exports (FY22)



Port-wise export of fish and fish products

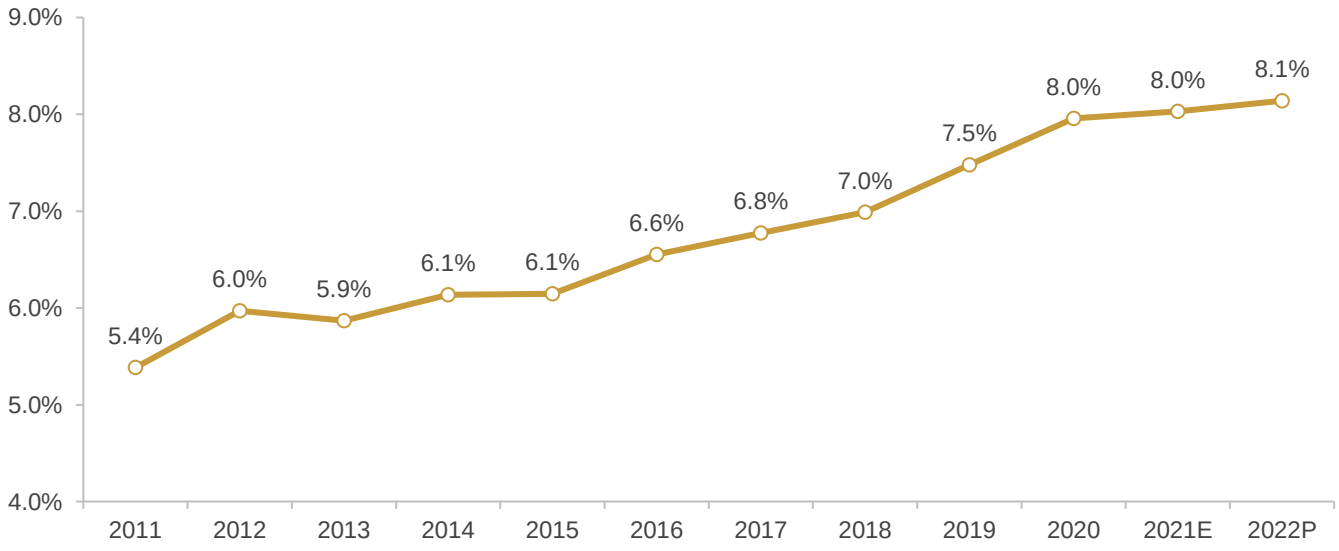
Rs. Billion	FY20	FY21	FY22
Vishakhapatnam	131	124	156
Kolkata	53	51	62
Kochi	49	50	62
Chennai	20	31	59
JNPT	44	36	56
Others	169	145	180
Total	**467**	**437**	**576**

Source: MPEDA, CRISIL MI&A Research

India occupied 8% share of the global fish production in CY 2021

As per OECD-FAO data, India occupied 8% share of global fish production in CY 2021. The share has grown from 5.4% in CY 2011. As per OECD-FAO data, fish production in India has grown at 6.2% CAGR from CY 2011 to CY 2021 while the global fish production has grown at 2.1%.

India's growing share in global fish production



Source: OECD-FAO Agricultural Outlook 2022-31, CRISIL MI&A Research

Government providing support for the fisheries sector in India

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

As a part of the Aatmanirbhar Bharat Abhiyan, the government approved PMMSY in fiscal 2021 to enhance the country's Blue Revolution by focusing on sustainable and responsible development of the fisheries sector. The major objectives and aims of this scheme include:

- Harnessing of fisheries potential in a sustainable, responsible, inclusive, and equitable manner
- Enhancing fish production and productivity through expansion, intensification, diversification, and productive utilisation of land and water
- Modernising and strengthening of the value chain - post-harvest management and quality improvement
- Doubling fishers and fish farmers' incomes and generation of employment
- Enhancing contribution to agriculture GVA and exports
- Social, physical and economic security for fishers and fish farmers
- Robust fisheries management and regulatory framework

In line with the above-mentioned aims and objectives, the scheme has envisaged achieving the following targets during the period catering to various segments such as productivity, employment generation and value addition in the fisheries sector.

Fish production and productivity	Economic value addition	Enhancing income and employment generation
• Increasing fish production to 22 million metric tonne by fiscal 2025 • Improving aquaculture productivity to 5 tonne per hectare • Increasing fish consumption in the country to 12kg per capita	• Increasing contribution of the fisheries sector GVA in agriculture GVA to 9% by fiscal 2025 • Increasing earnings from exports to Rs 1 trillion by fiscal 2025 • Reduction in post-harvest losses from 20-25% to 10% • Encouraging private investments and entrepreneurship in the fisheries sector	• Doubling the incomes of fishers and fish farmers • Generation of employment opportunities directly and indirectly along the value chain

This scheme, with an overall investment of Rs. 2,005 billion, will be implemented over five years from fiscal 2021 to fiscal 2025 as an umbrella scheme with two components:

- Central sector scheme, wherein the project cost is borne by the central government
- Centrally sponsored scheme, wherein the cost will be shared between states and central government and all the sub-components/ activities will be carried forward by state/ Union territories

Fisheries and Aquaculture Infrastructure Development Fund (FIDF)

The FIDF has been envisaged under Union Budget 2018. With a fund size of Rs. 75.2 billion, this scheme tries to improve the fisheries infrastructure, both marine and inland, and also achieve the target of 15 million tonne of fish production by 2020, set under the Blue Revolution. In addition, FIDF also tries to achieve sustainable growth of 8-9% to achieve fish production of 20 million tonne by fiscal 2023.

The National Fisheries Development Board (NFDB), Hyderabad, acts as the nodal implementing agency. FIDF provides concessional finance to the eligible entities (EEs), which include state governments/Union territories and state entities to develop identified fisheries infrastructure facilities. This concessional finance is provided through nodal loaning entities (NLEs) such as:

- National Bank for Agriculture and Rural Development (NABARD),
- National Cooperatives Development Corporation (NCDC) and
- All scheduled banks

Activity-wise key proposals received

S no	Name of activity	Proposals	Project cost (Rs. billion)
1	Establishment of fishing harbours	36	52.6
2	Development of aquaculture	34	1.1
3	Any other innovative projects/activities designed to enhance fish production/productivity/value	32	18,187.0
4	Modernisation of state fish seed farms	30	1.4
5	Establishment of fish landing centres	26	2.0
6	Fish processing units	10	1.4
7	Fish transport facilities (marine and inland fisheries sector)	9	0.02
8	Establishment of cage culture in reservoir	9	2.3
9	Introduction of deep sea fishing vessels	6	0.1
10	Establishment of state of art of fisheries training centres	6	3.2

Note: data is as of February 24, 2022
Source: FIDF Dashboard, CRISIL MI&A Research

Blue Revolution

The Blue Revolution, which focuses mainly on increasing fisheries production and productivity from aquaculture and fisheries resources, both inland and marine, was launched in December 2015 as a centrally sponsored scheme. The scheme was launched for 5 years from fiscal 2016 to 2020 with an outlay of Rs. 300 billion with the following objectives:

- Increase overall fish production in a responsible and sustainable manner for economic prosperity
- Modernise fisheries with special focus on new technologies
- Ensure food and nutritional security
- Generate employment and export earnings
- Ensure inclusive development and empower fishers and aquaculture farmers

Major targets achieved by the scheme include

Fish production

- Increase in fish production from 10.26 million MT in fiscal 2015 to 13.75 million MT in fiscal 2019

Productivity

- Enhancement in productiivty from 2.3 tonne per hectare to 3.3 tonne per hectare

Exports

- Exports increased from Rs 334.4 billion to Rs 465.9 billion in fiscal 2019

Source: Department of Fisheries, CRISIL MI&A Research

Kisan Credit Card (KCC)

During the budget announcement for fiscal 2019, the government extended the Kisan Credit Card (KCC) facility to fish and animal husbandry farmers in India. This scheme was introduced to meet the working capital requirement of fish farmers. The major aim of this scheme is to provide adequate and timely credit to farmers.

KCC facilities can be availed by fishers, fish farmers, self-help groups, women groups, and joint liability groups. Currently, a credit limit of Rs. 0.3 million is provided to already existing KCC farmers while a credit limit of Rs. 0.2 million is provided for new KCC farmers for activities related to fisheries and animal husbandry.

For fisheries, the working capital costs that are included under KCC include recurring costs such as:

- Seed
- Feed
- Organic and inorganic fertilisers
- Lime/ other soil conditioners
- Harvesting and marketing charges
- Fuel/electricity charges
- Labour
- Lease rent (if leased water area)

For capture fisheries, these working capital costs may include:

- Fuel charges
- Ice
- Labouring charges
- Mooring/ landing charges, etc.

Till December 9, 2022, 121,450 KCCs had been issued to fishers and fish farmers.

Fisheries sector attracts 38% on-year growth in fiscal 2024 budget allocation

The budgetary allocation for the department of fisheries for fiscal 2024 rose 38%, from Rs. 16.2 billion (revised estimates) in fiscal 2023 to Rs. 22.5 billion in fiscal 2024. In addition, allocation for the PMMSY was enhanced 42% to Rs. 20 billion for fiscal 2024 from Rs. 14.2 billion (revised estimates) during fiscal 2023.

Parameter	Actuals FY22	RE FY23	BE FY24
	Rs. Billion	Rs. Billion	Rs. Billion
FIDF	0.1	0.1	0.3
PMMSY	11.7	14.1	20.0

BE: budget estimates, RE: Revised estimates
Source: Budget document, CRISIL MI&A Research

Key budget proposals for fiscal 2024 for the fisheries sector

In Union Budget 2023-24,

- The government has announced a new sub-scheme, Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY) – under PMMSY. It has a targeted investment of Rs. 60 billion with the objective to enhance further the earnings and incomes of fishermen, fish vendors and micro and small enterprises engaged in the fisheries sector. It also envisages focussed intervention to bring about formalisation of the fisheries sector. This includes digital inclusion; facilitating access to institutional finance for capital investment and working capital; incentives to bring about system and institutions to reduce risk in aquaculture and fisheries; incentivising microenterprises operating in fisheries and aquaculture sector to work on value-chain efficiencies; incentivising micro and small enterprises to establish supply chains for delivery of safe fish products to consumers, thereby expanding the domestic market; and incentives for creation and maintenance of jobs for women in the sector.
- Further, the government also stressed upon creation of primary cooperative societies, including fisheries cooperatives at the panchayat level, to formalise the sector and empower fishers and fish farmers to carry out fish production and post-harvest activities in an organised manner. Rs. 9 billion was allocated under Ministry of Cooperation to develop the co-operatives.
- To promote exports, lower the cost of imports and cost of production, the government has announced reduction in import duty on certain products required for shrimp feed - basic customs duty on fish meal from 15% to 5%, on krill meal from 15% to 5%, on algal prime (flour) from 30% to 15%, on fish lipid oil from 30% to 15% and on mineral and vitamin premixes from 15% to 5%.
- The government has increased the credit target for agriculture and allied sector to Rs. 20 trillion with a focus on animal husbandry, dairy and fisheries. This would further improve inflow of institutional finance for the fisheries sector.
- Digital public infrastructure and the Agricultural Accelerator Fund is expected to further nurture innovations in the fisheries value chain. In addition, the announcement of three Centres of Excellence in India for artificial intelligence is expected to galvanise the AI ecosystem in India and offer great scope for improvement in fish marketing systems and create increased value realisation through accelerated implementation of block-chain-based solution for traceability and quality.

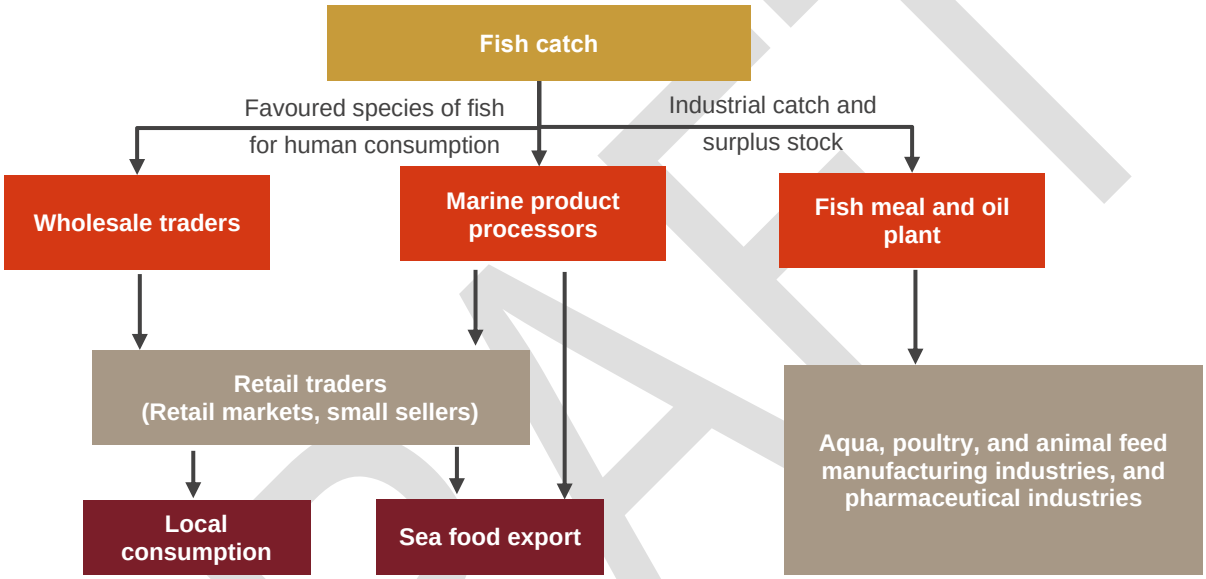
With lowering down of import duty on fish meal in union budget of 2023-24, CRISIL MI&A Research, expects the competition in the fish meal industry to intensify as a result of consolidation of existing players.

2. Overview of fish meal and fish oil industry in India

2.1. Introduction

Established at the beginning of the 19th century, the fish meal and fish oil industry mainly met the oil requirements of sectors such as leather tanning, production of soap and glycerol, paints, and other non-food products. The dry residue left after extracting the oil – fish meal – was used as fertiliser. By the 21st century, fish meal started finding usage as animal feed such as diets for fish, pigs and poultry which need higher quality protein than other farm stock such as cattle and sheep. Fish oil finds application in pharmaceutical industries and in some dietary supplements due to its high content of omega-3 fatty acids.

Typical consumption pattern of fishery catch



Source: Industry, CRISIL MI&A Research
Note: Animal feed includes feed to animal husbandry industries and pet food industries

Fish meal and fish oil are produced from i) fish considered as industrial catch (those caught specifically for making fish meal and fish oil) and ii) surplus stock from by-catch of fisheries for human consumption. Sometimes offal and trimmings from sea-food processing industries are used along with whole fish, to produce fish meal - the proportion of this mixture varies between large players and small players with large players using smaller proportion of offal and trimmings to produce fish meal when compared to that of small players. Industrial catch are high protein edible species of fish such as sardines, which are the major source of protein in the aqua feed protein chain. While industrial catch comprises edible species of fish, they are not majorly favoured for direct human consumption. On account of the economical price of the raw material (fish), wild species from sea are generally used in the fish meal and fish oil industry rather than aquaculture species. According to the International Fish meal and Fish Oil Organisation (IFFO), now known as IFFO - The Marine Ingredients Organisation, 30-35% of the wild catch goes into the production of fish meal and fish oil.

2.2. Value chain of the industry

The fish meal and fish oil industry relies on fishing in oceanic waters for procurement of raw materials. Typically, the larger raw material vendors (fishermen) use mechanised and motorised boats while the smaller fishermen use non-motorised boats, along with gears such are seines, trawls, gillnets and bagnet for fishing. According to Central

Marine Fisheries Research Institute (CMFRI) data, mechanised and motorised boats accounted for ~98.8% of the total marine landings while non-motorised boats comprised the rest 1.8%, as of 2021.

In India, the peak season for fishing is August-December and the slack season is January-May. Fishing is not allowed in Indian waters during June-July, as it is the monsoon season. Fish meal and fish oil production follows the same season as fishing. The output is stocked to cater to the demand of domestic and exports market.

Availability of raw materials, a key monitorable

In the entire process of production of fish meal and fish oil, availability of raw material is a key monitorable. The industry procures raw material from fishing in the oceans, and thus, is dependent on fish landings in the Indian coastal waters. Large players have diversified their procurement across the Indian coastline so as to minimise their dependence on one particular coastal landing and fish catchments.

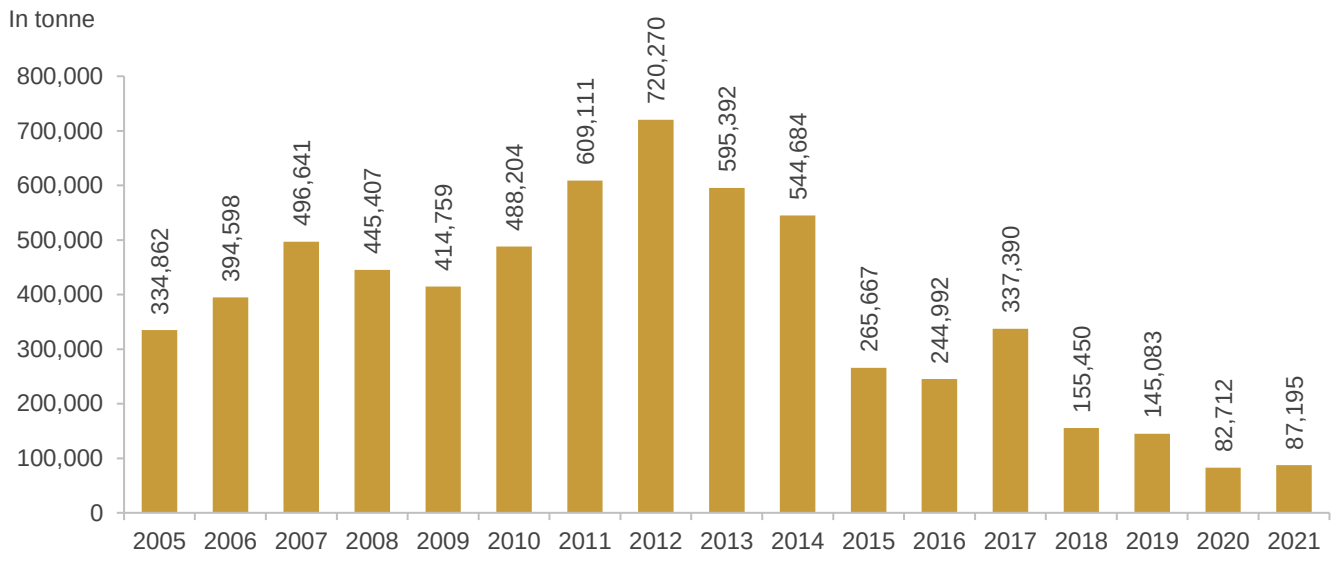
Fish landings is an important factor that determines the total quantity available for fishing and further use. Any drop in the fish landings hugely affects the entire sea-food and fish processing industry, which is dependent on wild catch. Also, the quality of fish in terms of nutrient content and growth of adult population determines the yield and output quality of fish meal and fish oil. Thus, even the prices of the end product are dependent on the quality of fish caught. The dependency of multiple stakeholders (fishers, fish processors, consumers, industrialists and exporters) on fish landings makes it necessary to initiate appropriate management measures for judicious harvesting of the resource.

According to the Indian Council of Agricultural Research (ICAR)-CMFRI report on Indian oil sardine (IOS), availability of the fish in the ocean water is affected by factors that could be classified as: i) environmental, such as El Niño and erratic rainfall; ii) biological, such as spawning failure, competition from other species of fish, and lack of food; and iii) anthropogenic, such as overfishing. A living natural resource such as fish has limitations in replenishment and is severely affected by climatic and environmental changes. Any change in climatic conditions affects the growth and breeding of fish and thus impacts the adult population during a particular season in the coastal waters. Overfishing and fishing of juvenile species also affect the fish population over the long run.

IOS is a key raw material used by Indian fish meal and fish oil industry. The landings of IOS have declines drastically from 0.5 Mn tonnes in 2014 to below 0.15 Mn tonnes in 2019 and further down to 0.08 Mn tonnes in 2021. However, in 2022 the landings of IOS have seen a drastic increase from the levels of 2021 - which is further reflected in exports during the period.

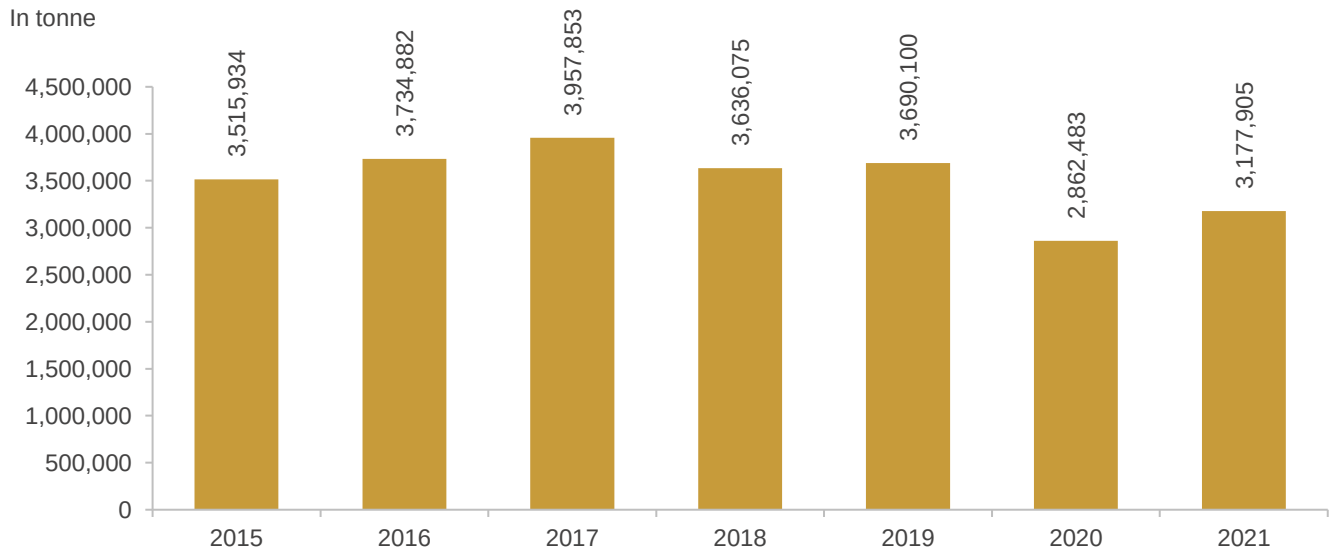
According to CMFRI, IOS is known for its capricious nature, with seasonal, annual, inter-annual and decadal peaks and slumps in availability. The resilience of a fish population to exploitation is largely dependent on the reproductive traits. Thus, while IOS species is volatile in availability, is also known to replenish fast after a decline, on account of its natural characteristics of rapid growth, early maturity, high fertility, and protracted spawning period. According to the ICAR-CMFRI report, the species have medium to high resilience due to which, along the southwest coast of India, the species is expected to revive in a span of 2-3 years post any decline, as supported by historical fishery trends. Decline in fish landings due to unsustainable fishing and changing climatic conditions is a key risk factor for the fish meal and fish oil industry.

Trend in IOS landings in the Indian Ocean (2005-21)



Note: 1. Latest data available is as of 2021
2. As per Industry interactions the landings of oil sardines have seen a rise post August 2022 compared to 2021, which further reflects in rise in exports. From January to July of 2022 an average of ~6,688 tonnes of fish meal has been exported while during July to December an average of ~22,000 tonnes of fish meal has been exported indicating a rise of ~3.3 times.
Source: Central Marine Fisheries Research Institute (CMFRI), CRISIL MI&A Research

Trend in total marine landings



Note: Latest data available is as of 2021
Source: CMFRI, CRISIL MI&A Research

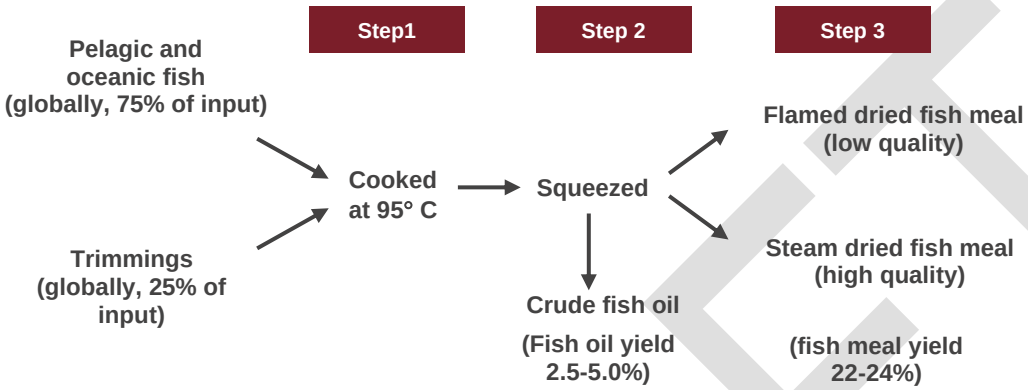
Fish meal, fish oil are products of cooked fish

Fish meal and fish oil, which have a huge demand in aquaculture and animal feed industries, are the most important products made from processing of cooked fish. Fish meal is the solid matter of fish and fish oil the liquid-oil matter. A liquid water-based by-product called fish-soluble, which is high in water content and contains soluble proteins, is obtained during the production of fish meal and fish oil. Various species can be used for fish meal and fish oil production, but oily fish are the main groups of species utilised.

Fish meal is a concentrated source of protein. It is in a powdered form and appears brownish in colour. Fish species with high protein content such as sardines, are cooked and pressed to remove liquid matter. The solid matter is further dried and ground to form crude flour or powdered fish meal.

Fish oil is a clear brownish yellow liquid obtained by pressing the cooked fish. It is generally made from oily species such as sardine, mackerel and tuna. The oil is derived from fish tissues. Oil sardine is the preferred source of fish oil due to its high contents of nutrients and omega-3 fatty acids.

Production of fish meal and fish oil



Source: www.thefishsite.com, CRISIL MI&A Research

Manufacturing process of fish meal and fish oil

There are several ways of making fish meal from raw fish. The easiest is to let the fish dry in the sun and then grind it. This is the traditional method used in some parts of the world where processing plants are not available. The quality of the product, however, is poor compared with the ones made using modern methods such as steam sterilised plants. Almost all fish meal is made by cooking, pressing, drying and grinding the fish in the machinery designed for the purpose. Although the process is simple in principle, it requires considerable skill and experience, quality control, sustainable technology and R&D to produce high yield, and high quality product and to ensure that plants operates with high efficiency.

Procurement of Raw material: The raw fish viz. Sardine, Mackerel, Anchovy etc. are brought in refrigerated insulated trucks with clearly stacking of fish in crates with sufficient ice and appropriate temperature. The trucks are checked by our staff for temperature, freshness, foreign matter, iced, any other fish mix etc. and thereafter used for processing. The raw fish is also tested for microbiology parameters by our in-house laboratory and is even tested with EIC/EIA approved laboratory where the test reports are maintained.

Cooking: Once the raw fish is checked for quality purpose, it is passed through conveyor for the cooking process. The fish is cooked at 90^0-95^0 C in the cooker using steam generated from the boiler. However, the time of cooking is based on the size of the fish. The cooking validation chart is displayed and is recorded frequently. The purpose of cooking is to denature or coagulate the proteins and to rupture the cell walls of tissues of fish so that oil and water present in the fish is separated. The cooking process is fully automated, and the cooker is regularly cleaned.

Pressing: The cooked fish passes through the screw press. The process of pressing separates the cooked material into solid phase (press cake) and liquid phase (press liquor). During the pressing process, the water content may be reduced to about 50% from about 70% and the oil content to about 4% in the press cake.

Drying: The pressed cake from the pressing process is passed through a automated conveyor to the dryer. In the drying process, fluffed press cake is dried at a temperature of 90^0-95^0 C along with necessary pressure to achieve

the desired moisture content. The dried press cake is then passed through a magnetic separator to remove any steel contaminants. This generates dried fish meal.

Pulveriser: The dried fish meal is then passed through an automated conveyor to the Pulveriser, where it is grinded into powder form. The powdered fish meal will be added with antioxidant to meet customers specification and the details of antioxidant are recorded.

Cooling: The powdered fish meal is passed through the cooler where the water temperature is maintained between 26^0-30^0 C.

Sieving: After cooling, the powdered fish meal is passed through the automated conveyor to the siever where extraneous material is separated, if any.

Quality Control: We adhere to the quality control process by conducting sample check from the batches of the finished products. This involves sample check at our in-house labs.

Packing (Fish meal): After the quality analysis report, the fish meal from the sieving process are packed in HDPE, which are pre-printed for batch number, expiry date and the date of manufacturing. The finished product is then weighed and stacked in pellets.

Decanter: The liquid phase (press liquor) from the pressing stage is passed through the decanter wherein the suspended solids are separated and added back to the dryer for further converting into fish meal. The press liquor is passed through a preheated tank to centrifuge.

Centrifuge: In the centrifuge, the oil gets separated from the press liquor. The oil is then stored after checking for moisture and FFA at regular interval.

Evaporator: The remaining protein water after the separation of fish oil in the centrifuge is passed through the process of evaporation with the help of sealing water pump, cooling water supply pump, cooling tower fan, air compressor, drier and vacuum pump. After the evaporation process, the soluble paste which is a brown semi-viscous liquid is produced which is commonly known as fish soluble paste.

Packing and Storage: The finished fish oil and fish soluble paste is then packed in the plastic airtight HDPE barrels or flexi bags, tankers or flex tankers and are dispatched to our storage facilities.

Dispatch: The stored fish meal, fish oil and fish soluble paste is further dispatched as per orders received from our customers.

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Fish meal and fish oil value chain

Raw material

Processing

Cooking, pressing, drying and grinding

Separating and purifying oil

Products

Fish meal (protein)

Fish oil

By-product: Fish-soluble

Markets/ Industry

- Non-human consumption
- Animal feed
- Poultry feed
- Aquaculture feed
- Pharmaceutical
- Supplements and functional food
- Organic fertiliser

Manufacturing process

Raw fish: Oil sardines, other fish such as mackerel, leather-jackets

→ Removal of foreign material - metal

→ Cooking

→ Pressing

→ Squeezed liquid

→ Separation of water and oil

→ Purification of oil: multiple processing

→ **Fish oil**

Pressing → By-product: Fish soluble

→ Pressed matter

→ Drying

→ Cooling equipment

→ Grinder

→ **Fish meal**

→ Packaging/dispatch

Fish meal is rich source of protein and essential amino acids

Fish meal is predominantly used as a rich source of protein in compound feeds. Compound feed is animal feed made from a combination and mixture of various raw materials and additives. Non-compound feed has a single source ingredient.

Fish meal carries large quantities of energy per unit weight and is an excellent source of proteins, lipids, minerals and vitamins and contains very less carbohydrates. It is easily digestible and considered a high-quality ingredient in aquaculture, poultry and animal feed industry. Fish meal and fish oil is usually deemed unsuitable for direct human consumption, but fish protein concentrate (FPC), which is same as fish meal but produced with high-quality inspection, is considered edible.

The protein content of fish meal varies from 50% to 65%, even reaching 70% when prepared from protein rich species. The table below depicts a comparison of protein content of various raw materials used to make animal feeds. Fish meal also provides a balanced composition of essential amino acid, phospholipids and fatty acids, which help optimum development, growth, and reproduction in animals. Fish meal is largely used in aquaculture feeds, followed by pig and poultry sector. Compared with other protein feeds, fish meal has the higher content of easily digestible proteins, minerals, vitamins, and essential amino acids. This makes it an essential ingredient in aqua, poultry and animal feed.

Protein content of fish meal vs other animal feed compounds

Feed raw material	Protein content (% of dry weight of produce)
Roughage	10-15%
Grains & seeds	8-12%
Grain distilling by-products	15-20%
Other oilseed meal	25-35%
Groundnut meal	40-50%
Soybean meal	45-55%
Corn glut meal	55-60%
Fish meal	**65-70%**
Fish meal and offal	50-65%
Fish soluble	35-45%

Source: CRISIL MI&A Research

Based on protein content, fish meal is classified into various grades. Final fish meal product is rich in protein with 65-70% protein and contains 8-10% of fat, 8-10% of moisture, and traces of ash, salt and sand. The acid value of fish meal and total volatile base nitrogen (TVBN/TVN) are other parameters monitored for grade quality. The lower the TVBN the better, as it is used as a fish spoilage indicator.

Grades of fish meal and protein content

Grade	Protein content
Grade I	60-61%
Grade II	62-63%
Grade III	64-66%
Super prime grade	>67%

Source: CRISIL MI&A Research

Fish meal's nutrient content and, resultantly, its grade, depends on the species used and their nutrient content. Grade is dependent on the raw material; better the species of fish, higher the quality of meal. The same holds true for fish oil.

Oily fish and fish oil are the richest source of two groups of omega-3 acids

Fish oil is the fat or oil that is extracted from fish tissue. It is rich in two specific groups of omega-3 fatty acids: docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). Omega-3 fatty acids are known to have various health benefits: they support healthy cardio-vascular function and development of the nervous system/the brain, and boost the immune system.

The World Health Organization (WHO) recommends eating 1-2 portions of fish per week to meet the dietary requirement of fish oil. In the absence of fish intake, a fish oil supplement is recommended. Fish oil contains 30% omega-3 fatty acids as well as vitamins A and D.

Plant sources of omega-3 acids, such as flaxseed and chia seeds, contain another group known as alpha-linolenic acid (ALA).

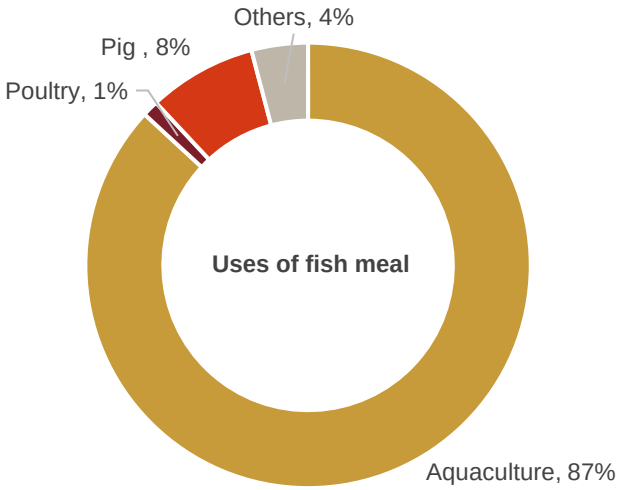
Aquaculture feed represents the dominant usage of fish meal and fish oil at 87% and 75%, respectively, for calendar year 2022

According to the International Fish meal and Fish Oil Organisation (IFFO) 2022 report and CRISIL MI&A Research estimates, aquaculture feed represents the dominant use of fish meal globally at ~87% for calendar year 2022. Fish meal is transported from the factory to the compound animal feed manufacturers, where it is mixed with other ingredients to make ideal aquaculture or animal feed. Some of the key players operating in the Indian aquaculture feed manufacturing industry include Avanti Feeds, Godrej Agrovet, Anmol Feeds, CP Foods, Devi Sea Foods, and Grobest Foods.

Fish meal is also used to fortify feed for animals and poultry. According to industry interactions, incorporating less than 5-10% in the feed for farm animals achieves positive effects. Fish meal has served as a protein source for livestock for decades because in addition to the beneficial protein and amino acid composition, it has high digestibility of over 90%.

Fish meal and fish oil contribute indirectly to human consumption as they are used as feed in aquaculture and livestock raising. Application in aquaculture which has been recording high growth rates worldwide due to the limited catch of wild fish, is especially important for fish meal and fish oil as it forms an important diet constituent.

Uses of fish meal (in CY 2022)

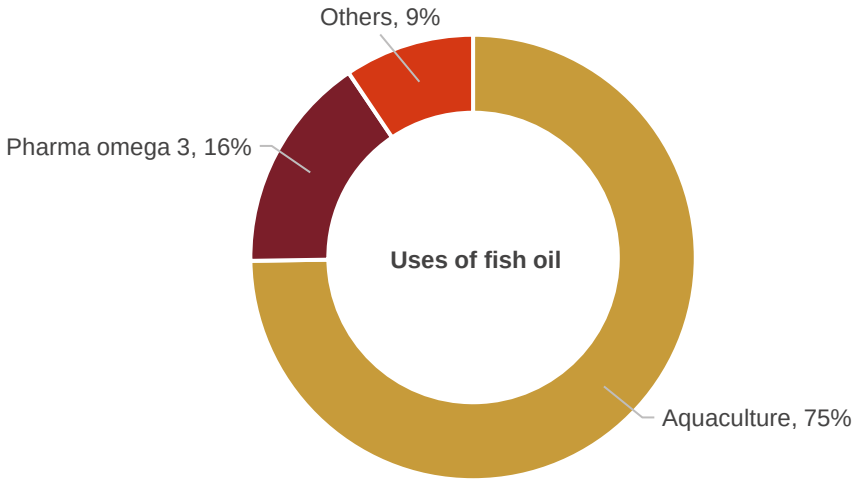


Note: Others include other animal husbandry industries such as cattle, pet feed and agriculture fertiliser
Source: IFFO, CRISIL MI&A Research

Fish oil is largely used for aquaculture feed to maintain omega-3 diet nutrient

As per the IFFO 2022 report and CRISIL MI&A Research estimates , aquaculture feed sector dominates fish oil consumption with ~75% share worldwide, as of 2022. Aquaculture feed requires fish oil as specific species such as oily or carnivorous fish (salmonids and shrimps), chiefly consumed by humans, need to be fed with feed containing fish oil in order to ensure natural diet and achieve the natural nutrient make-up of fish.

Uses of fish oil (in CY 2022)



Note: Others include cosmetics, animal feed industry, and industrial applications such as paints, leather processing, inks, and lubricants
Source: IFFO, CRISIL MI&A Research

Use of fish oil directly in human foods and capsules is on the rise. The use in nutraceuticals — nutrients plus pharmaceuticals — had been increasing even more rapidly than in aquaculture. Fish oil is also used in traces in some cosmetic products.

Other uses include as a carrier for pesticides, in paints and in the leather industry. Fish oil is refined to reduce free fatty acid content and bleached to reduce the colour to be used for different industrial applications, including resins for paints and polymer, ceramic deflocculates and release agents, rust inhibitors and water repellent. Fish oil oxidises rather quickly and turns rancid and, hence, is avoided in packaged food.

2.3. Indian fish meal and fish oil industry size

In India, Karnataka, Kerala, Maharashtra, Gujarat and Tamil Nadu are home to key fish meal plants. Karnataka has the maximum number of plants, mostly in and around Mangaluru.

Indian fish meal and fish oil industry is estimated to reach Rs. 16-20 billion by fiscal 2026

CRISIL MI&A Research estimates, the Indian fish meal and fish oil industry de-grew at a CAGR of (4)-(5)% from Rs. 18.0 – 24.0 billion in fiscal 2018 to Rs. 13.0 – 17.0 billion in fiscal 2022. While in volume terms, it is estimated to have de-grown at a CAGR of (9)-(13)% from 180,000 – 220,000 tonnes in fiscal 2018 to 100,000-140,000 tonnes in fiscal 2022. This decline can be attributed to the decrease in fish landing (specifically of oil sardine fish) over the years due to change in climatic and natural conditions. In addition, as per our industry interactions, implementation of GST on fish oil (at 12%) and fish meal (at 5%), since 2019, has led to increase in prices, causing end consumers to favour cheaper imports as compared to domestic produce.

However, in fiscal 2023, the industry is estimated to see a huge jump in value as well as volume. It is likely to see an on-year growth of 130-150% in value terms and 90-110% in volume terms. This sudden rise can be majorly attributed to the increase in oil sardine landings (major raw material for fish meal and fish oil) coupled with increased traction in exports led by production shortage in Peru region and higher exchange rates in the global markets.

The fish meal and fish oil industry is seasonal in nature as the production during a period is majorly dependent upon the fish landings (fish availability) during that period. The landings of Indian oil sardines - the major raw material used in production of fish meal and fish oil - has seen a fluctuation over the years. These fluctuations in landings that bring in seasonality in the industry is majorly influenced by various factors which include environmental factors such as sea surface temperature, salinity, rainfall, upwelling, food availability; environmental events such as El Nino with a reduced rainfall and high temperature along with excessive fishing on the stock beyond the maximum sustainable yield, and excessive capture of juveniles.

In addition, the industry is broadly divided into established players or large players and seasonal players or small players. In case of a period where there are lower landings the established players get access to larger share of landings while the seasonal players get limited access to the landings. However, during the period of high landings both seasonal players and established players get access to fish (raw material) on account of surplus availability.

During fiscal 2023, when the Indian oil sardine landings have seen a sudden rise, both established and seasonal players got access to raw material and contributed to the supply / production. Prior to fiscal 2023, where the industry has seen lower landings, majorly established players contributed to the supply / production while small players operated at lower or zero utilization levels contributing negligibly to the supply / production.

Also, as per industry interactions and from past data on landings it is to be understood that volume of fish landings tend to exhibit moderation post a high landing period. Further, over long term, CRISIL also estimates the landings to moderate because of weather conditions such as El Nino and also due excessive catch of juvenile fish. With such scenario, the small players seize to operate or operate at lower utilization levels causing the overall industry capacities to be lower over the longer term. Hence, going forward, CRISIL estimates the overall industry volume to

grow at a CAGR of 3-7% from the base of fiscal 2022 reaching an overall volume of 130,000 – 170,000 tonnes by fiscal 2026.

In value terms the industry is expected to grow at of 5-9% between fiscal 2022 and 2026 reaching Rs 16-20 billion. In fiscal 2023, the value growth is supported by both price and volume. The production shortage in Peru has supported the growth in exports leading to rise in prices for the fiscal which CRISIL expects to see a moderate growth over the longer term.

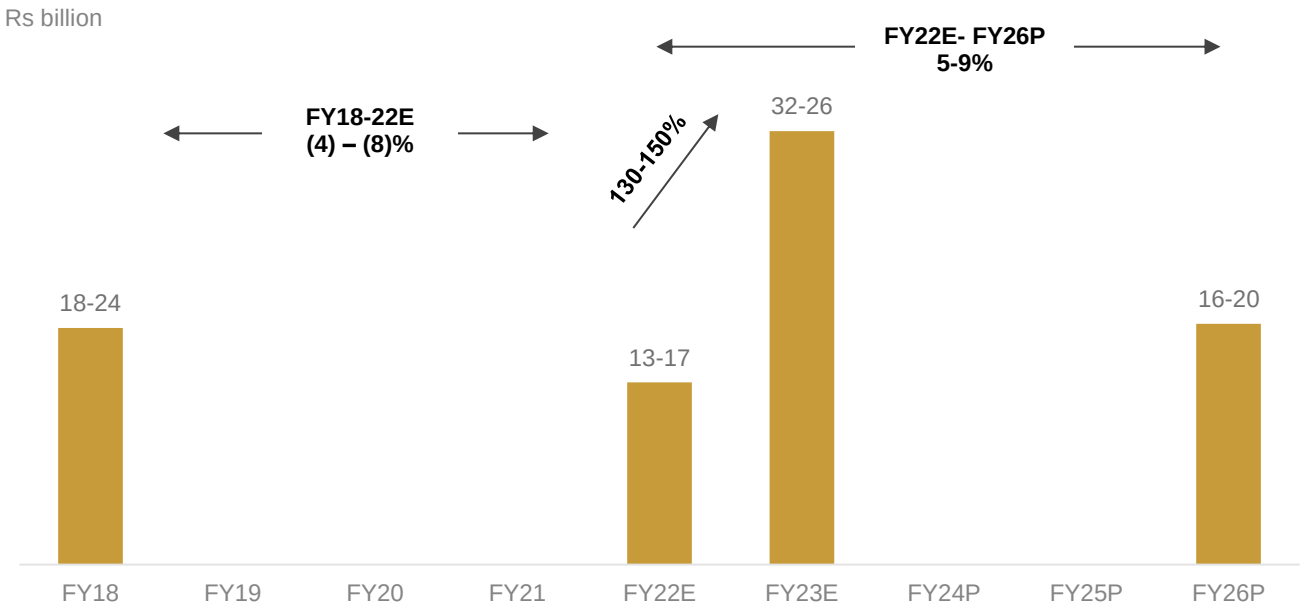
It is to be noted that, this future growth is majorly dependent on the improvement of fish landings. Alternatively, if the fish landings tend to decline further from the levels of 2022, CRISIL expects the industry remain stagnant or show moderate signs of decline during the aforementioned period when compared to fiscal 2022.

It is also important to note that early weather forecasts for calendar year 2023 suggest return of El Nino. However, the degree or grade of El Nino is yet to be determined.

According to IFFO, aquaculture growth is not limited by availability of fish meal, though it remains an essential feed constituent which is not easy to substitute. Growth of the aquaculture industry will thus provide an opportunity for fish meal and fish oil players.

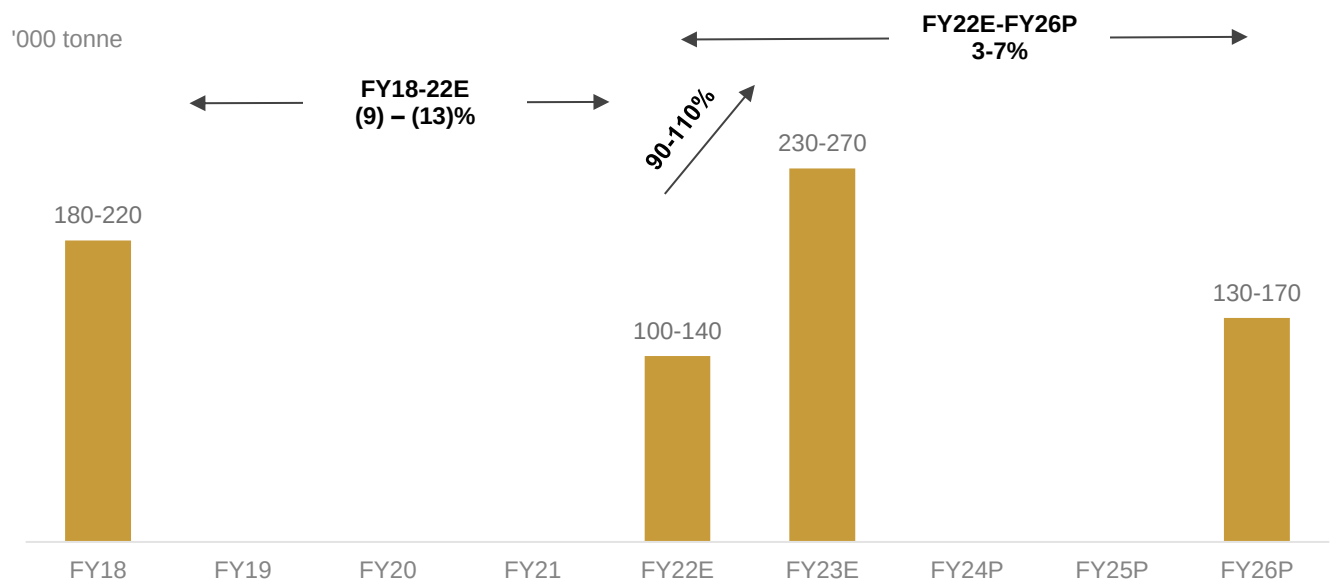
Though there exists an adequate demand for fish meal and fish oil in India driven by the aquaculture industry, the production of fish meal and oil depends on the natural availability of fishes and prevailing climatic conditions during the period in turn creating a supply constraint. In addition to that, the fish availability also depends on the reduction in unsustainable fishing practices wherein juvenile fishes are being caught and processed resulting in overexploitation of resources leading to reduction in fish stock.

Industry size of Indian fish meal and fish oil (value terms)



Note: E: Estimates, P - projected
Source: CRISIL MI&A Research

Industry size of Indian fish meal and fish oil (volume terms)



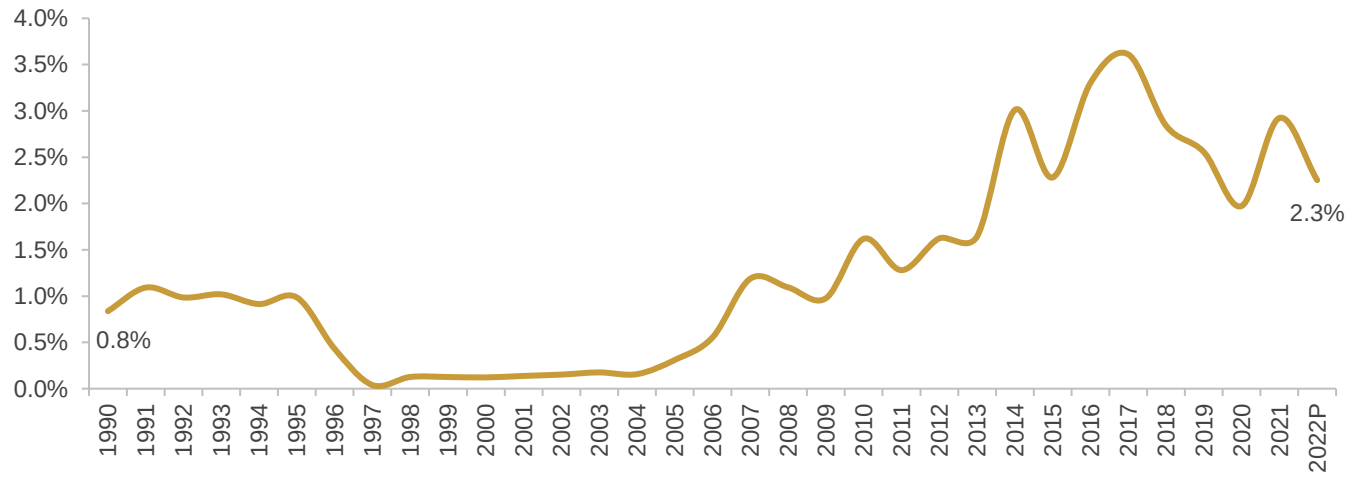
Note: E: Estimates, P - projected
Source: CRISIL MI&A Research

Share of Indian fish meal and fish oil in global production stands at 2.9% in CY 2021

The Indian fish meal and fish oil industry began to flourish and develop only in the past 15-20 years on account of export demand following a reduction in global production of fish meal and fish oil.

India accounts for a very low share in global fish meal and fish oil production but its share has seen a rapid rise over the past two decades. After rising from 0.8% in CY 1990 to 1.6% in CY 2013, the share is estimated to reach 2.9% in CY 2021.

India's fish meal and fish oil production as a percentage of global production

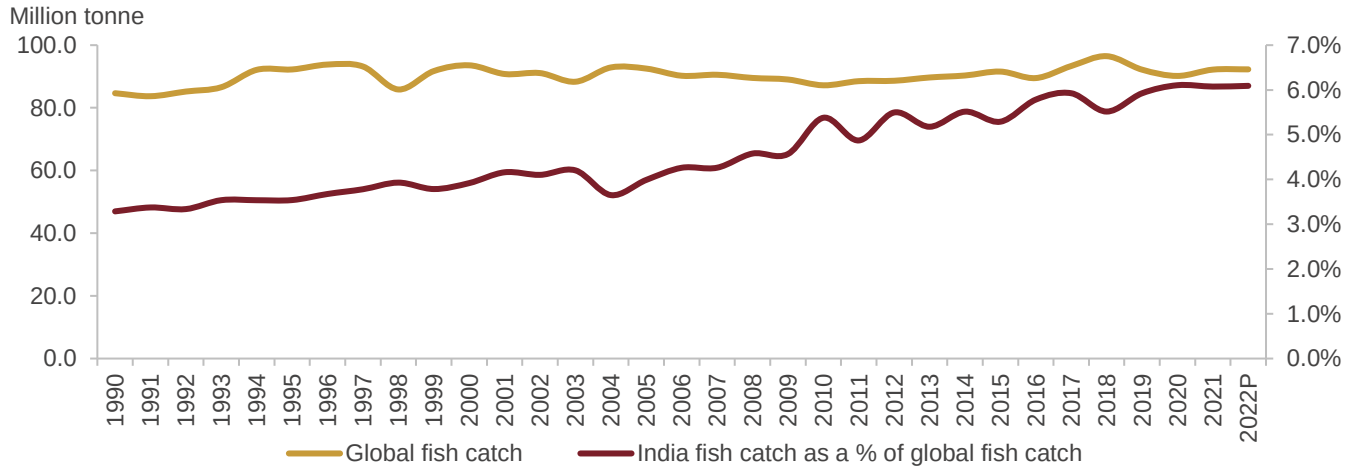


P: Projected
Source: OECD-FAO Agricultural Outlook 2022-31 and CRISIL MI&A Research

India's share in global capture of fish has increased steadily over the years due to various factors such as development of relevant industries, an increase in the use of modern techniques for fishing, etc. According to OECD-FAO 2022 data, India ranks fourth, after China, Indonesia, and Peru, in terms of country-wise wild fish

capture as of 2022. Global capture of fish has been stagnant since the 1990s and the trend is likely to continue or decline slightly due to the emphasis on sustainable fishing and constraints in replenishment of fish population.

India's wild fish catch versus global wild fish catch



Source: OECD-FAO Agricultural Outlook 2022-31 and CRISIL MI&A Research

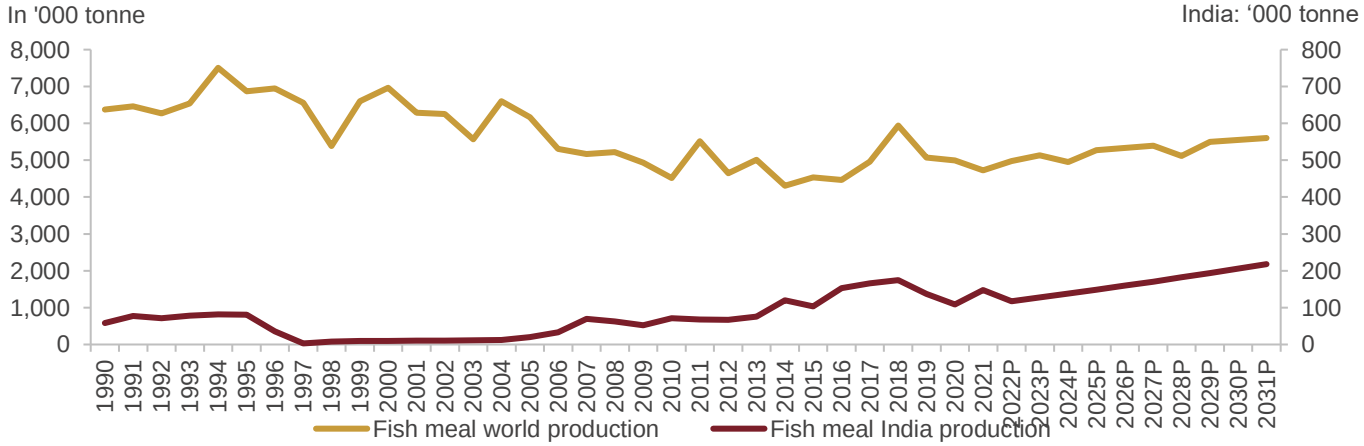
India's production rose 7% in the past decade, faster than global production

Indian fish meal and fish oil production has trended upwards over the past decade or so. As per OECD-FAO data, while global production of fish meal and fish oil de-grew at a CAGR of 1.4% between CY 2011 and CY 2021, India's production grew at a CAGR of 7.1%. OECD-FAO expects global fish meal and fish oil production to grow at a moderate pace in the mid-term and long-term on account of limitations in the availability of fish.

Global production of fish meal and fish oil has been volatile

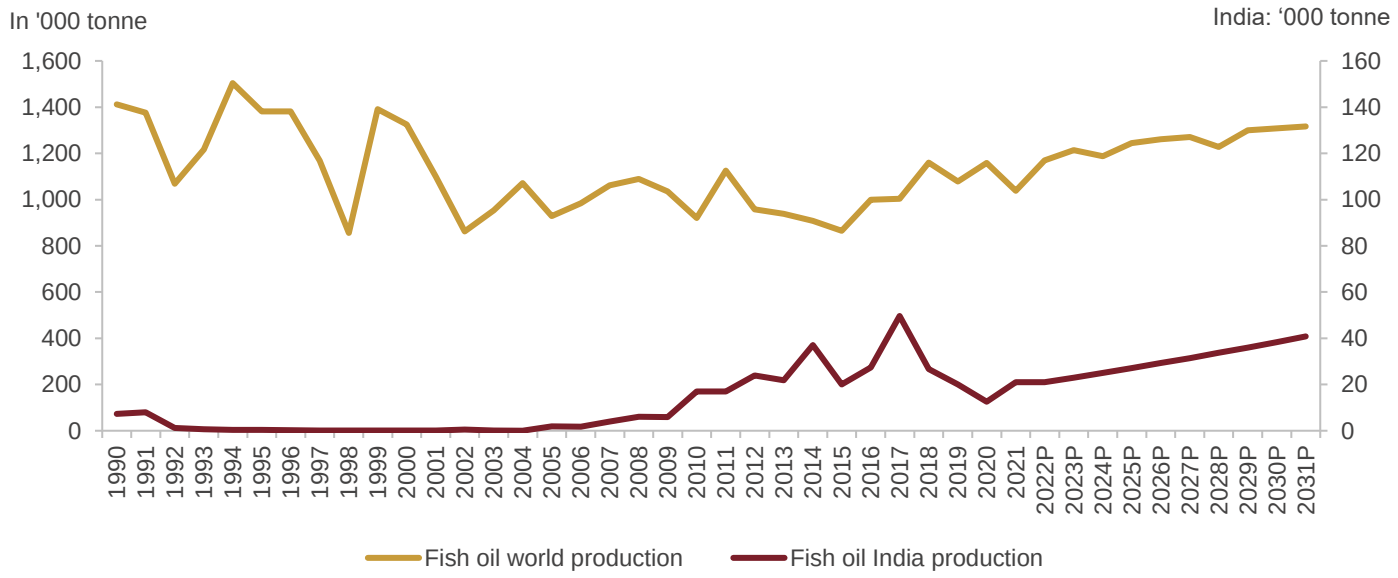
Fish meal and fish oil production is volatile in nature due to variability in raw material availability. According to OECD-FAO Agricultural Outlook 2022-31, global fish meal and fish oil production has been volatile during the past two decades as seen in the production charts below from CY 1990 to CY 2021. It has been declining slowly due to limited supply of fish and concerns over sustainability. According to OECD-FAO, global fish meal supply is likely to remain tight but stable in the future, except during El Niño years.

Fish meal production



Note: India's production is plotted on secondary axis with scale of 1:10; P – Projected by FAO-OECD
Source: OECD-FAO Agricultural Outlook 2022-31 and CRISIL MI&A Research

Fish oil production



Note: India's production is plotted on secondary axis with scale of 1:10; P – Projected by FAO-OECD
Source: OECD-FAO Agricultural Outlook 2022-31 and CRISIL MI&A Research

2.4. India's fish meal and fish oil (FMFO) export trend

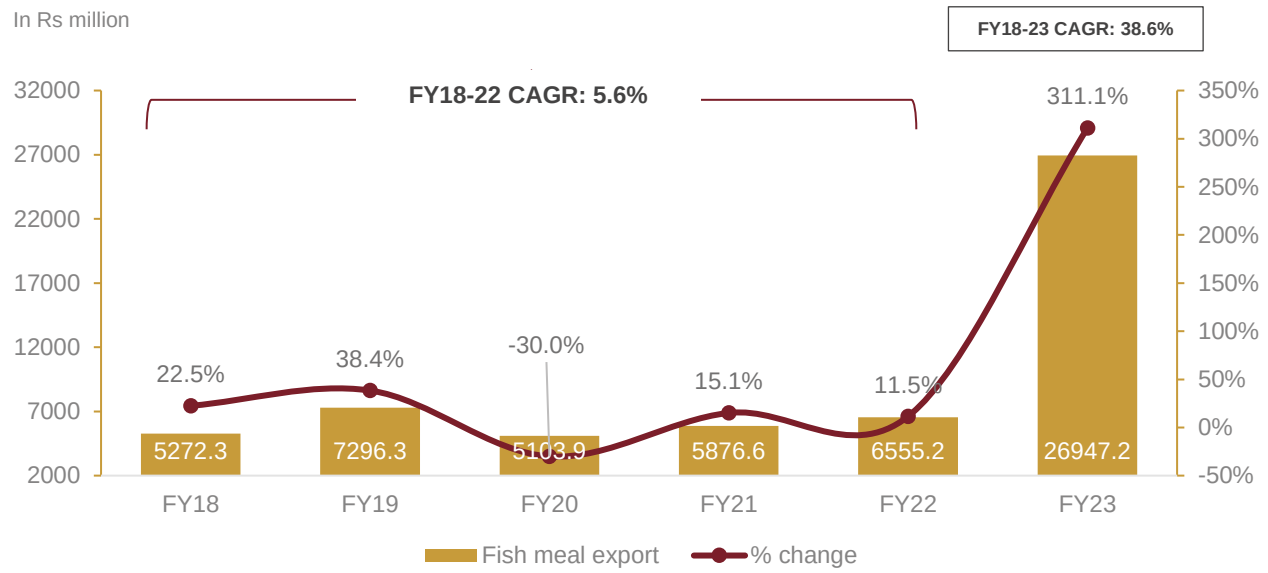
The Indian fish meal and fish oil industry caters to both export and domestic markets. It is marked by seasonality. According to industry sources, the peak season for exports is from August to December/January. Export demand is dependent on production from the top 10 producing countries and inventory levels.

Post sluggish growth between fiscal 2018-22, fish meal exports saw a rise in fiscal 2023 supported higher landings

In value terms, fish meal exports increased at ~5.6% CAGR from Rs. 5,272.3 million in fiscal 2018 to Rs. 6,555.2 million in fiscal 2022. Fish meal exports have stagnated with fiscal 2022 volumes at ~70 thousand tonne, registering mild growth of 0.1% from fiscal 2018. Growth has not been uniform across years, as exports are dependent on factors such as: i) the catch during a year, which is affected by climate changes, and ii) demand from the domestic compound feed industry.

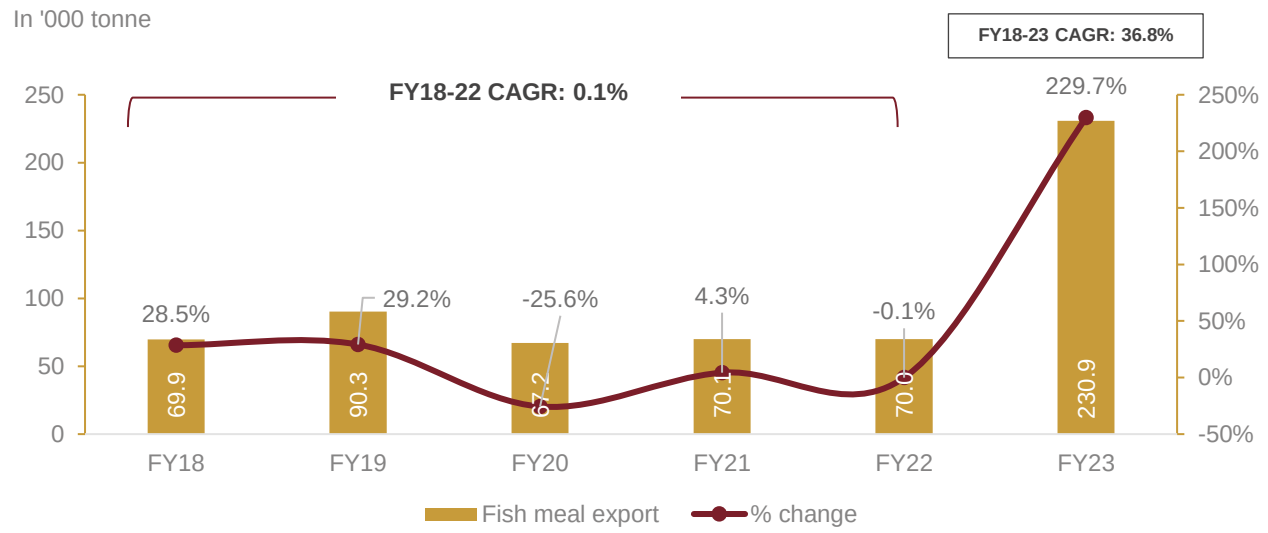
In fiscal 2023, the fish meal exports saw huge jump reaching Rs. 26,947.2 million. This rise in exports of fish meal during fiscal 2023 can be majorly attributed to the rise in raw material resources – oil sardine landings, coupled with shortage of fish meal production in Peru (a leading manufacturing country). This, coupled with depreciation of India rupee against the US dollar, has provided a further push for exports during the fiscal 2023 period.

India's exports of fish meal in value terms (FY18-FY23)



Source: DGCI&S, CRISIL MI&A Research

Exports of fish meal in volume terms (FY18-FY23)

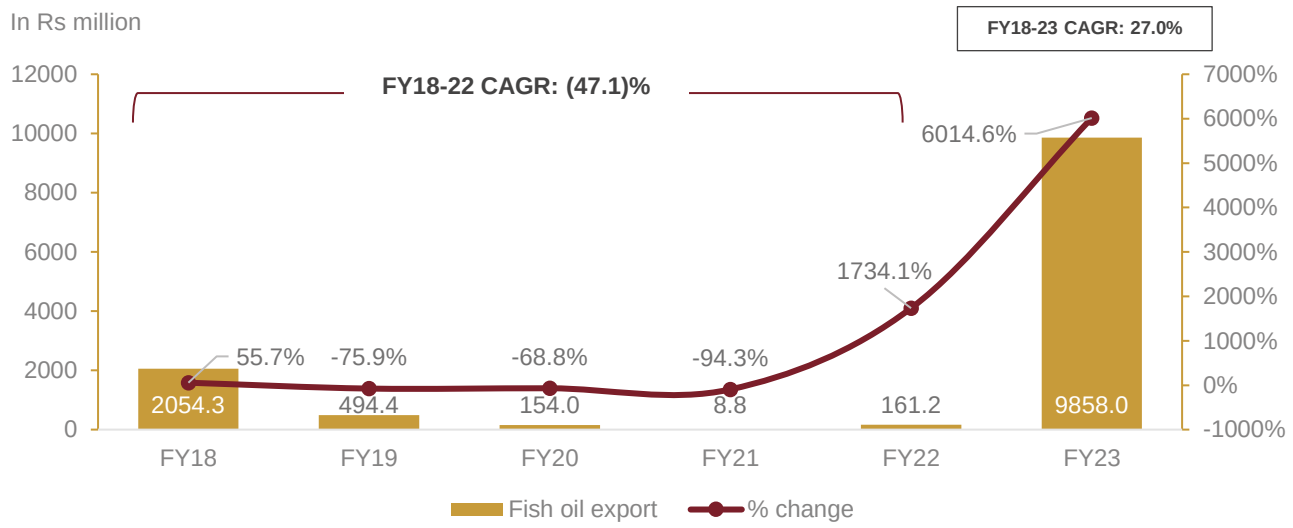


Source: DGCI&S, CRISIL MI&A Research

Led by rise in fish landings fish oil exports saw a huge jump in fiscal 2023

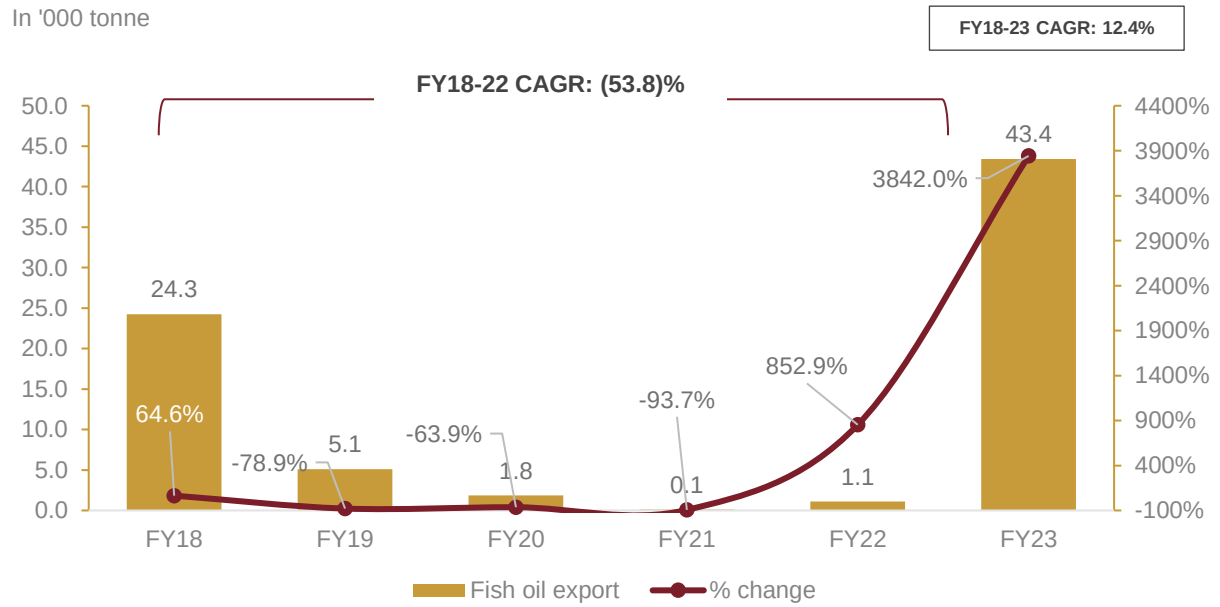
Fish oil exports in value terms declined from Rs. 2,054.3 million in fiscal 2018 to Rs. 161.2 million in fiscal 2022 at a CAGR of ~47%. The volume of fish oil exports also saw a dip at a similar rate as value. In volume terms, fish oil exports dropped from 24.3 thousand tonne in fiscal 2018 to 1.1 thousand tonne in fiscal 2022 at a CAGR of 54%. Growth in fish oil exports was affected by species and quality of fish landings.

Exports of fish oil in value terms (FY18-FY23)



Source: DGCI&S, CRISIL MI&A Research

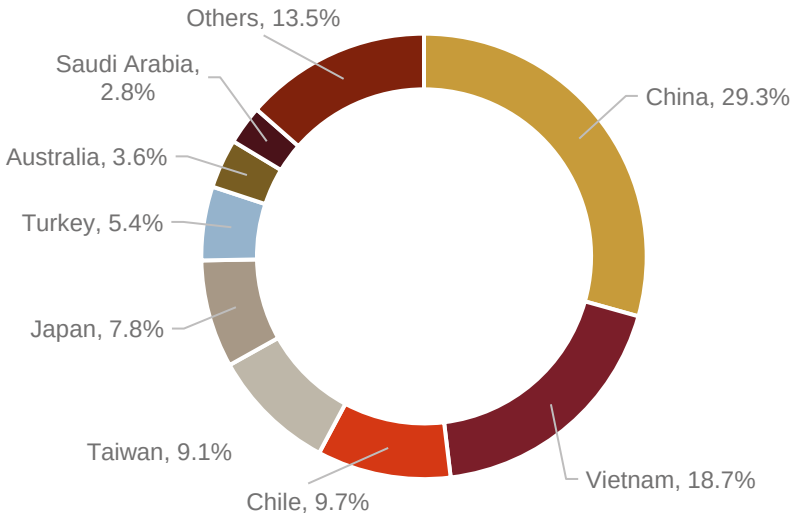
Exports of fish oil in volume terms (FY18-FY23)



Source: DGCI&S, CRISIL MI&A Research

As mentioned earlier in the case of fish meal, exports of fish oil also saw a rise during fiscal 2023 due to higher landings of oil sardines, production shortage in the Peru region and a higher exchange rate scenario in the global markets.

Share of countries in Indian fish meal and fish oil exports: as of fiscal 2023 (In value terms)



Source: DGCI&S, CRISIL MI&A Research

In value terms, during fiscal 2023, China, Vietnam, China and Japan became top 4 exporting nations for India in terms of fish meal and fish oil.

Since the end of 2018, Indian players could cater to Chinese demand for fish meal and fish oil

In November 2018, a protocol on hygiene and inspection requirements for the exports of fish meal and fish oil from India to China was signed by the two countries during the visit of Hu Wei, Vice Minister of General Administration of Customs of China (GACC). This will enable India to commence exports of fish meal and fish oil to China. According to an Indian Press Information Bureau (PIB) notice dated November 28, 2018, India received clearance to export fish meal and fish oil to China. A protocol on hygiene and inspection requirements for the export of fish meal and fish oil from India to China was signed on the day. As per International Trade Centre data for the period 2018, China imported fish oil to the tune of $183 million and fish meal and allied products to the tune of $2,228 million.

2.5. Growth drivers for the industry

Fish meal and fish oil are not only a rich source of protein and essential fatty acids (EPA and DHA), respectively, but also contain an optimal mix of vital nutrients and are easily digestible. Fish meal and fish oil are valuable and essential ingredients in the feed industry. Fish meal and fish oil have been increasingly used in the aquaculture industry and the industry's growth is driving prices of fish meal and fish oil higher. Growth drivers for the industry are detailed below:

Growth in the compound animal feed market, especially aqua feed

India is one of the largest global producers of animal feed and the Indian compound animal feed market is growing at a fast clip and expected to record a 3.5-4.0% CAGR, in value terms, between fiscals 2022 and 2026. Fish meal is an essential element for the compound feed industry and, thus demand for fish meal is expected to be strong going forward.

Within the animal feed market, during the same period, aqua feed is expected to grow the fastest at a 9-10% CAGR (value terms) driving higher growth for protein-rich feed such as fish meal and fish oil. About 70-75% of fish meal and fish oil demand is from the aquaculture industry, which is expected to grow strongly on rising per capita fish consumption.

Government initiatives to support growth of aquaculture and fisheries industries in India

India is the second-largest fish producer in the world and the central government has recognised the fisheries sector as the 'sunrise sector'. In addition, this sector provides livelihood to 28 million people at the primary level and twice the number across the value chain. To support the fisheries and aquaculture sectors in India, the government has introduced various schemes such as PMMSY, FIDF and Kisan Credit Card. These schemes cumulatively aim at increasing fish production and aquaculture exports from India, and decreasing post-harvest losses. The PMMSY aims to achieve an annual production of 22 million tonne by 2025 and increase the per capita consumption to 12 kg.

Further in Union Budget 2023-24, the government has taken various initiatives to support the Indian fisheries sector. PM-MKSSY, a sub-scheme under PMMSY was introduced with an investment of Rs. 60 billion to increase earnings of various stakeholders in the sector, along with ushering in formalisation in the sector. Reduction in custom duty of various products required for the manufacturing of shrimp feed was also announced. In addition, new reforms such as introduction of fishery co-operative societies, an increase in the credit target for agriculture and allied sectors and enhancement of digital infrastructure through the Digital Public Infrastructure and Agriculture Accelerator Fund were also introduced.

The above-mentioned initiatives by the government would bolster growth in the aquaculture and fisheries industry, in turn, leading to growth of the FMFO industry - as it acts a major raw material for the production of fish feed which is used in the aquaculture industry.

Increase in demand for nutraceuticals – nutrients plus pharmaceuticals

Increasing health disorders due to a sedentary lifestyle and poor habits have encouraged the use of nutraceuticals, which provide adequate supply of essential nutrients that help lower the risk of diseases. Awareness and access to information and rising risk of health disorders have increased awareness about nutrition and healthy diet, which has led to an increase in demand for health supplements and nutraceuticals.

Omega-3 pills and related products derived from fish oil are gaining importance as high nutrient and healthy dietary supplements. As already mentioned, omega-3 fatty acids have various health benefits and support healthy functioning of the heart, brain, nervous system, eyes, bones and joints. Along with supporting various body functions, they provide protection from numerous diseases. Dietary supplements and foods fortified with essential nutrients such as vitamins, iron and omega-3 acids are more in demand now.

2.6. Growth challenges for the industry

In spite of growing demand and importance of fish meal and fish oil, the industry faces various challenges to cater to rising demand. The foremost challenge is the volatile nature of raw materials (fish) and adherence to sustainable fishing practices.

Limited and volatile supply of raw materials

The Indian fish meal and fish oil industry's annual turnover is dependent on the availability of fish. Indian oil sardine is a key species used for production of superior grade of fish meal and fish oil. By nature, the Indian oil sardine is prone to wide fluctuations in availability due to environmental factors. The environment has a direct impact on growth and reproduction of Indian oil sardine. Central Marine Fisheries Research Institute (CMFRI) in its study report on Indian oil sardine (IOS) remarks that various environmental factors affect biological functioning (which include growth rate, food availability, spawning failure, etc) of fishes that impact fish landing in coastal areas, both in terms of quality and quantity.

The impact of El Niño also cannot be ruled out. According to CMFRI, the IOS landing is impacted by the occurrence of El Nino effect. Though IOS decline is associated with onset and retreat of El Nino, the species recovers quickly on account of its medium to high resilience to exploitation on account of its inherent qualities such as high fecundity (fertility), rapid growth, short generation turnover time and protracted spawning period. Over the previous years, IOS landing peaked in fiscal 2013 post which it declined due to onset of El Nino. With the weakening of El Niño since fiscal 2017, normal spawning activity resumed and a marginal improvement in IOS landings was recorded in fiscal 2018.

The CMFRI study also notes that fisheries management is important for ensuring sustainable exploitation of various fishery resources and even more for Indian oil sardine, which not only is an important food fish but also forms a forage fish in the marine food chain and is also a key raw material for the fish meal and fish oil industry. Overall fish landings have increased in the last decade due an improvement in fishing gears and mechanisation of boats. Further analysis by CMFRI on IOS landings indicate that as of 2018, the stock level of IOS is almost fully exploited and there is little scope to increase the landing significantly by further increasing the effort. Efforts have to be in place to ensure sustainable exploitation of the stock without impacting the natural replenishment cycle.

Unsustainable fishing practices

Many companies have mushroomed in the past decade seeing a growth opportunity with the rise in aquaculture and export markets. Due to envisioned growth in aquaculture and a simple in-principle manufacturing process, many coast-specific small players have entered the fish meal industry. This has led to a rise in demand for fish at certain coasts, where supply is already limited by nature. Due to increased competition, unsustainable fishing practices have become rampant, leading to overfishing and depletion of fish population. Prices of raw material have been volatile, adversely impacting players' revenue and margins, especially for smaller coast-specific players.

Working capital management is key, especially for smaller players

In India, fishing is generally carried out by the unorganised segment and small fishermen. Procurement of fish has to be on a low credit basis with an immediate payment cycle. Also, fishing peaks during 3-4 months post monsoon season. Thus, procurement largely takes place for 3-4 months only. This raises inventory and the working capital requirement. Moreover, in the fish meal and fish oil industry, smaller local players have low bargaining power when it comes to large compound feed industry players, who are their chief customers. To retain customers, local players need to provide additional facilities such as a high credit period apart from a good quality product. Additionally smaller coast-specific players, on account of their scale of operation, have low bargaining power in terms of access to raw material (marine fish) compared with large established players. All these factors necessitate proper working capital management. As per industry interactions, due to the abovementioned factors, many smaller coast-specific players have had to stall or scale down production. Though schemes such as Kisan Credit Card (KCC) have been brought by the government under Union Budget fiscal 2018-19 to meet the working capital requirements of farmers, their penetration remains a key monitorable.

Development of alternative feed sources, in nascent stage

Fish meal and fish oil production cannot sustain the growing aquaculture industry as the supply of fish for fish meal is limited, being a natural resource. Consequently, feed formulators are looking to reduce their reliance on fish meal. Alternative feeds, which can substitute fish meal as a protein source, are being developed. As per IFFO data, the share of marine ingredients in fish feed formula has declined moderately since the 1990s to include more of plant source proteins. Developments in plant-based and insect-based products are in nascent stages. However, their availability on a larger scale will remain a key monitorable.

Insect feed as meals consists of a high amount of protein content and presence of essential amino acids and other lipids. It is blended with respect to the targeted animal. Being a rich source of nutrients, insect feed is used in

various segments, such as poultry, pet food and aquaculture. Currently, insect feed is majorly used in pet food. Thus, growth of insect feed depends on its adaptability in the pet food segment and other animal feeds, where insect feed usage is currently limited.

2.7. Government regulations impacting the industry

Important for the industry to comply with regulations on fishing activities

The Marine Fishing Regulation Act (MFRA) has been in place since the 1980s, and all the maritime states have several management/regulation measures for marine fisheries. Relevant regulations on the zonation/demarcation of fishing areas for different categories of gear types, closed fishing season, restrictions on the use of destructive fishing gears, etc. are clearly indicated in the MFRA. Mesh size regulations are stipulated in this act and under state fisheries acts. Juvenile fishing was banned in August 2015, and the CMFRI recommended a minimum size of 10 cm of Indian oil sardines and 14 cm for Indian mackerel.

Apart from direct regulations on fishing, various environment laws are applicable to fishing activities. The Environment (Protection) Act (1986), being an umbrella act containing provisions for all environment-related issues, includes the Water (Prevention and Control of Pollution) Act (1974) and the Wild Life Protection Act (1972), which are applicable to the fisheries industry.

Export regulations

The Marine Products Export Development Authority (MPEDA) necessities registration of exporters, fishing vessels and other processing entities under Section 9(2) (b) and (h) of the MPEDA Act, 1972, for exporters of marine products.

There are no direct and separate regulations pertaining to the fish meal and fish oil industry, but the industry has to comply with standards and regulations required by export and domestic customers. For instance, Europe has its own set of regulations and standards for exports; Indian plants have to be approved by European agencies before exporting. In November 2018, India received clearance to export fish meal and fish oil to the Chinese market. Accordingly, players need to have certification and accreditation from the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ) in order to conduct any export trade with China.

Compliance with sustainable procurement practices to gain importance

Apart from approvals and certification by export regulating authorities, industry players also need to comply with sustainable and responsible fishing activities. Due to growing importance of sustainable procurement of raw materials, many organisations (both feed and fish meal and fish oil producers) are keen on procuring goods only from suppliers that comply with certified sustainable supply practices. One such initiative is the IFFO Global Standard for Responsible Supply (IFFO RS), which is a business-to-business third-party audited certification programme that ensures stakeholders (including the animal feed, food and nutraceuticals value chains) responsibly source raw materials and manufacture fish meal and fish oil products. With growing importance of sustainability, especially in the developed markets, Indian exporters may have to comply with such sustainable practices to cater to the developed markets. Industry interactions indicate that some players have already initiated the process to gain requisite compliance certification, in order to remain competitive in the global scenario.

Limited supply of raw material necessitates regulations on fish meal and fish oil

Production of fish meal and fish oil is highly dependent on the fish landing quantity and quality in a particular season. It is nature-dependent. To ensure an ecological balance, measures are being taken to ensure sustainable

fishing and avoid over-fishing. Over-fishing may increase the output for one season, but it may affect the availability of fish in the long run.

Measures such as a quota system for fish meal and fish oil producers on the quantity of fish catch utilised for production in a particular season have helped keep a check on over-fishing. In Peru and Chile, quotas are provided according to the approved capacity of fish meal and fish oil plants, which ensures sustainable fish catch and protects the industry from uncontrolled competition. Such a quota system is currently not implemented in India.

In Kerala, minimum fishing size has been implemented since 2015 by agencies so that juvenile fish are not caught, and breeding is not disrupted by over-fishing. Only adult fish can be caught.

CMFRI and MPEDA recommend a precautionary approach to fishing along with adherence to regulations on avoiding fishing of juveniles, using the stipulated mesh size in the nets and recommended engine horsepower of crafts that can lower fishing mortality rates. According to industry interactions, quota on catches per trawler, quota on capacity-wise procurement of fish and production of fish meal and fish oil, sustainable practices for fishing activity, and prevention of indiscriminate dumping of toxic materials, industrial effluents and sewage should be taken up by India to promote and conserve fisheries and the related industries.

3. Overview of the global animal feed industry

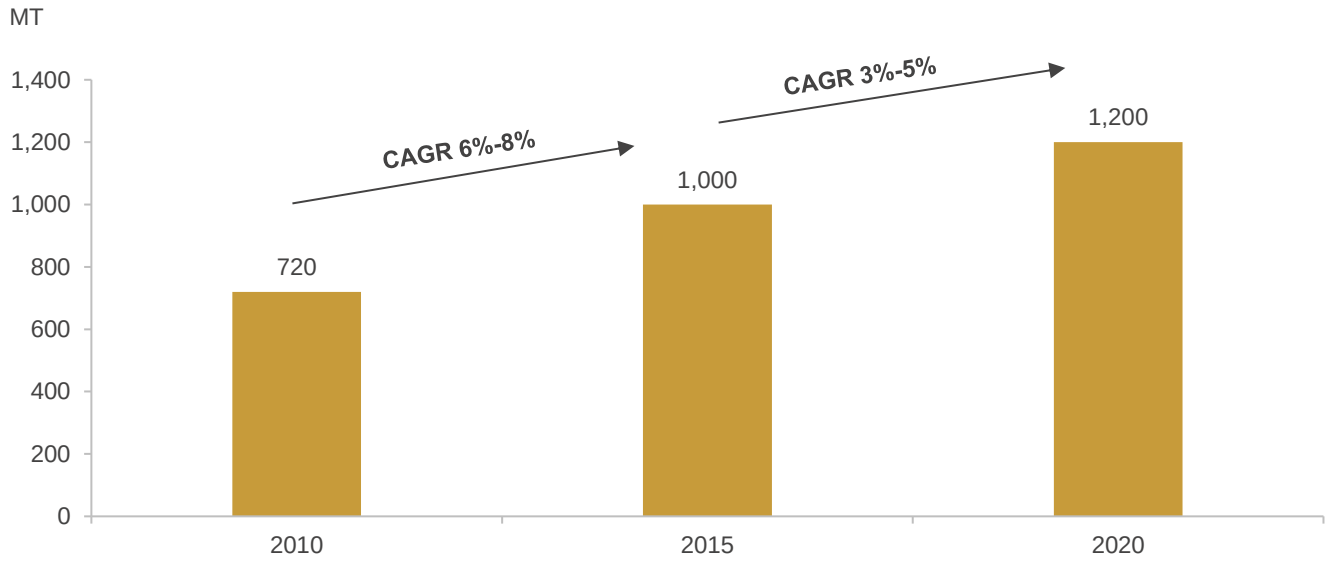
3.1. Global animal feed industry generated over $400 billion revenue in CY 2020

The animal feed industry enables economic production of livestock animals throughout the world, and thus plays a prominent role in the global food industry. The animal feed industry supports generation of animal food and protein products. According to the International Feed Industry Federation (IFIF), the global commercial feed manufacturing industry or the compound animal feed industry generated estimated revenue in excess of $400 billion in CY 2020.

3.2. Global animal feed industry produced ~1.2 billion tonne of feed in CY 2020

As per IFIF, global compound animal feed production grew at 5-6% CAGR between CY 2010 and CY 2020, to 1.2 billion tonne.

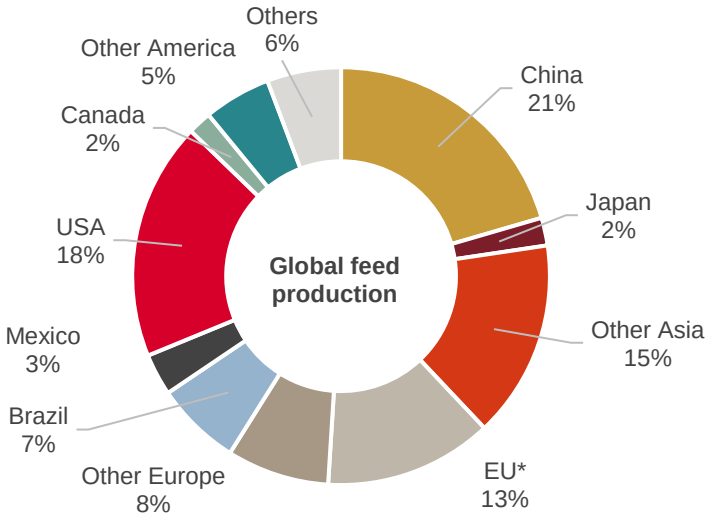
Industry size of global animal feed (in volume terms)



Source: IFIF, CRISIL MI&A Research

In volume terms, China was the largest producer of animal feed (21% share) in CY 2020, followed by the US (18%) and the EU (13%). Other Asian countries, including Japan, together accounted for 17% share.

Global feed production (CY 2020)



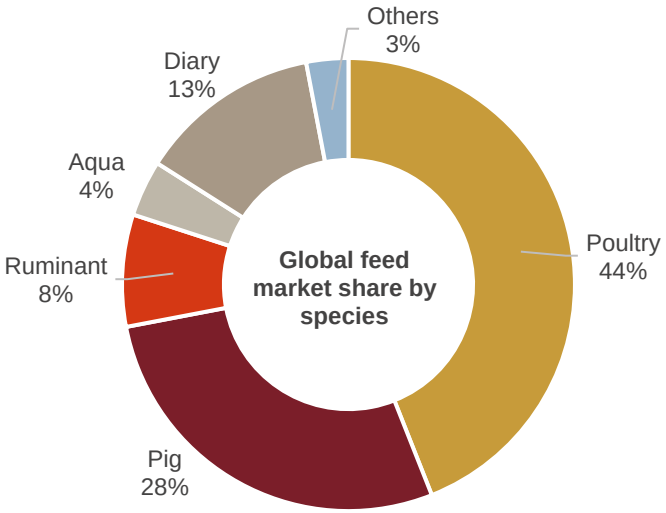
*Note: *UK is not a part of EU*
Source: The European Feed Manufacturers' Federation (FEFAC), IFIF, CRISIL MI&A Research

3.3. Growth of global animal feed industry driven by developing nations

IFIF has observed that growth of the global animal feed industry is largely from developing countries, with production in developed countries relatively stable. IFIF expects the trend to continue, with growth coming from developing countries such as Brazil, China, India, and those in the Latin American and Caribbean regions.

Growth of the animal feed industry will be fuelled by rising global demand for animal protein food. Over the past decade, there has been an increase in global demand for animal protein, including livestock, dairy and fish, as more people are opting for animal nutrient diet. As seen from the chart below, poultry and pig feed held the dominant shares in the global animal feed industry as of CY 2020. However, by CY 2050, while poultry will still be the highest-growth category on account of higher production volume, aquaculture feed is expected to gain share and be the next fastest-growth category as global demand for fish protein rises.

Poultry contributes to nearly half of global compound animal feed (as of CY 2021)

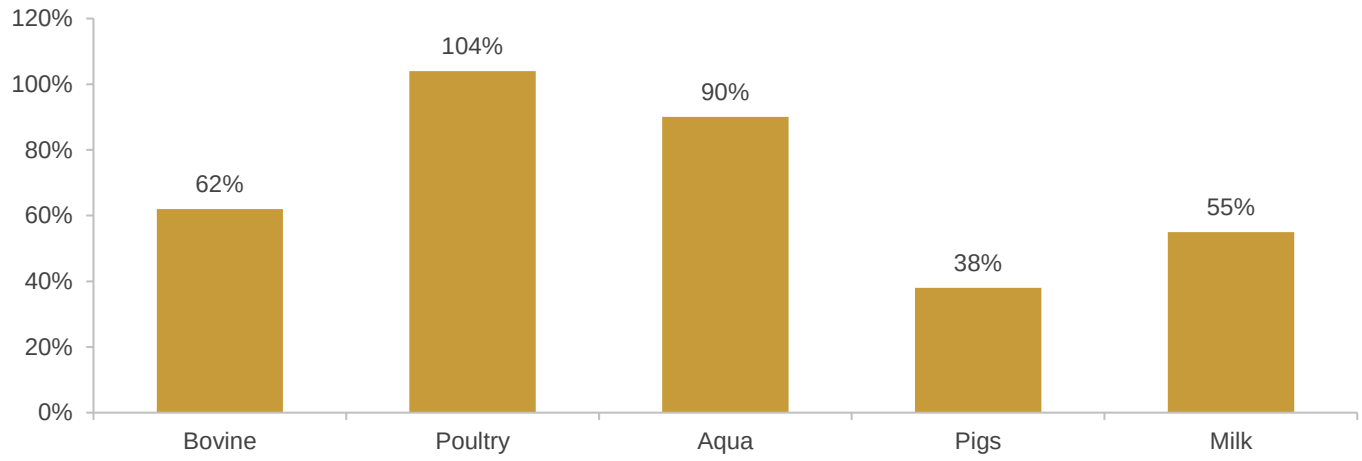


Source: IFIF estimates, CRISIL MI&A Research

3.4. Poultry and aquaculture to drive growth for animal feed

The United Nations Food and Agriculture Organization (FAO) estimates global food demand to grow 60% by CY 2050. Accordingly, between CY 2010 and CY 2050, production of animal proteins is expected to grow ~1.7% per annum, with poultry projected to rise ~104%, aquaculture by 90% and dairy by 55%.

Projected absolute growth in animal protein source from 2010 to 2050



Source: FAO global food outlook, CRISIL MI&A Research

3.5. Demand from aquaculture farms to boost fish feed and allied industries

The anticipated growth of the aquaculture industry is expected to drive growth of the fish feed and allied industries, which can be seen from the growth rate in exports.

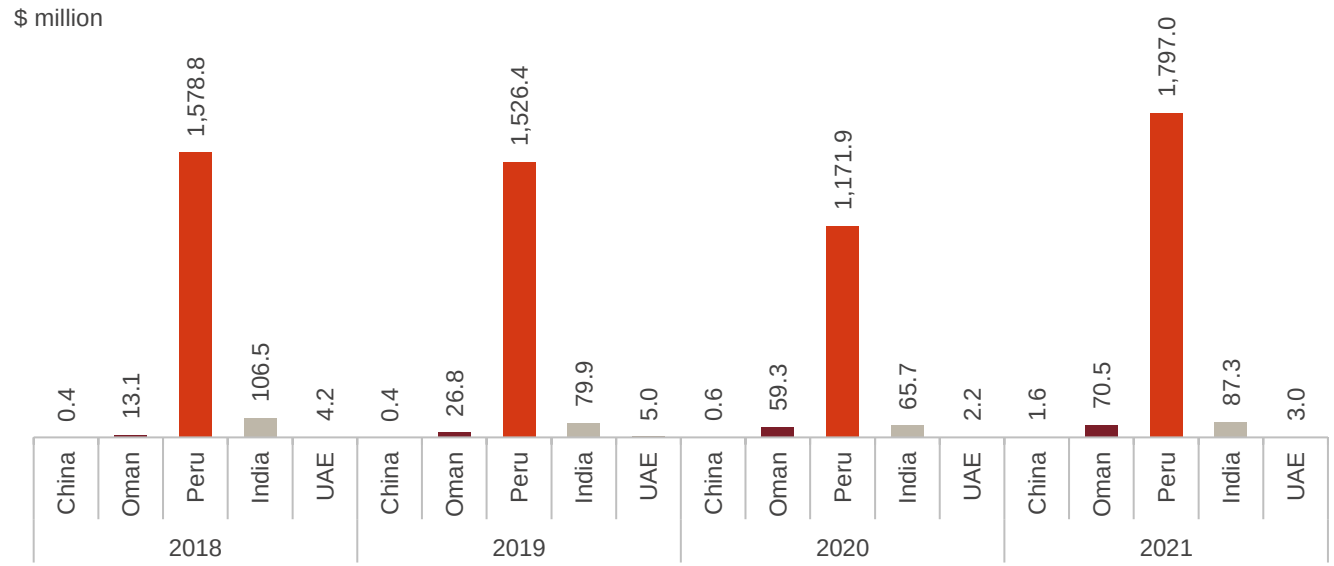
China, Chile, Denmark, Iceland, India, Japan, Norway, Peru, Thailand, the US and Vietnam are the key producers of fish meal and fish oil. China utilises fish meal primarily for the domestic industry. In fact, China is a net importer of fish meal, largely for its aquaculture farm and feed industries.

As per IFFO data, Peru is the leader in fish meal and fish oil production, as it has the largest and superior-quality oily fish along its coast. Due to low domestic consumption, the produced fish meal and fish oil are sold in global markets.

In the European Union, Norway and Denmark are the major producers of fish meal and fish oil. Norway is the largest consumer of fish meal and fish oil globally, due to its aquaculture production.

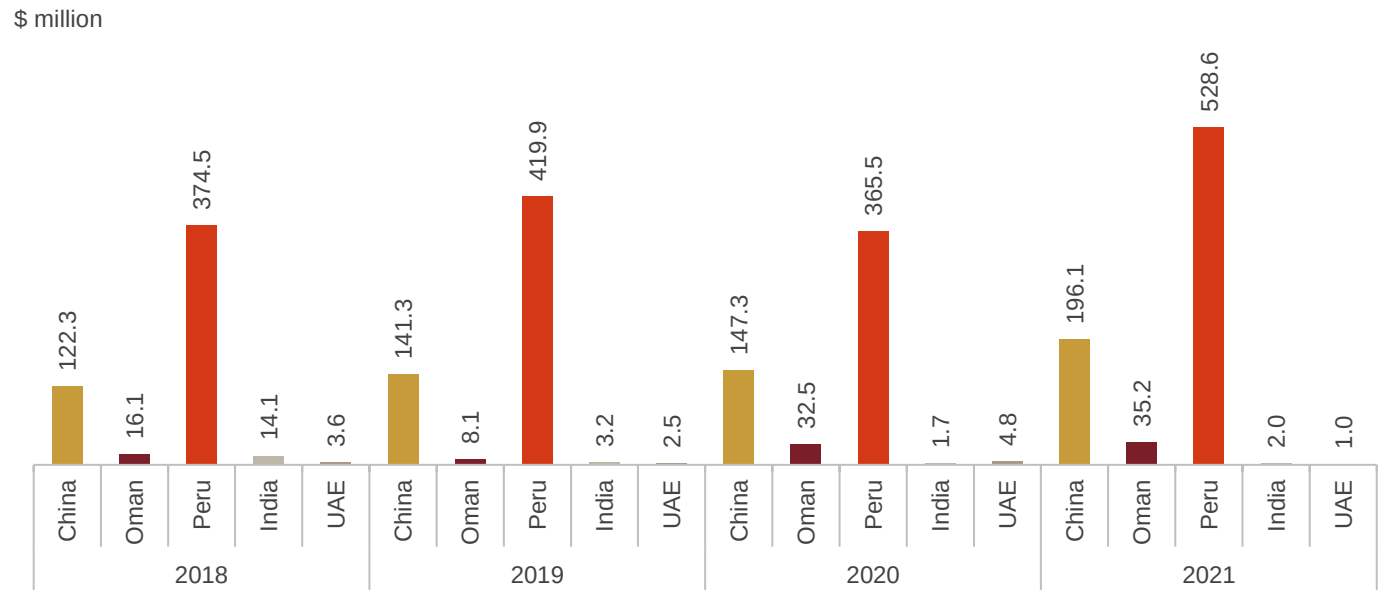
As per industry interactions, India is not a major exporter of fish meal and fish oil when compared with the top 10 countries. On average, the Indian fish meal and fish oil grade contains lower protein than the Peruvian grade, owing to limited availability of high-quality oily fish along its shores. The country's main export markets for fish meal and fish oil are Australia, Bangladesh, Japan, Malaysia, Saudi Arabia, Taiwan, Thailand and Vietnam.

Export of fish meal from select countries



Note: Six-digit HS code from UN Comtrade is considered to arrive at the export figures; HS code used is 230120.
Source: UN Comtrade, CRISIL MI&A Research

Export of fish oil from select countries



Note: Six-digit HS code from UN Comtrade is considered to arrive at the export figures; HS code used is 150420.
Source: UN Comtrade, CRISIL MI&A Research

3.6. Insect feed emerging as an alternative source in animal feed industry

With increasing demand driven by more population opting for animal-based nutrition coupled with limitation of fish meal due to its environmental impact has raised the requirement for new source of protein in the animal feed industry. Insect based nutrition is emerging as a new source of protein in the global animal feed industry. The emergence is majorly led by the following factors.

- Insects have high protein content (50-80% on a dry matter basis)
- Insects are natural diet for most animals
- Insect farming requires less water, less land, less production and has small environmental footprint when compared with other species.
- Use of insect feed also contributes to circular economy upcycling of low agriculture food materials into high value protein

Aquaculture industry plays a vital role in adoption of insect feed. In the current scenario, globally the usage of insect feed in the aquaculture industry is at nascent stage.

The initial usage in the industry is limited to insect feed being a niche ingredient. Going forward, usage ingredients such as fish meal being limited by sustainability provides an opportunity for the insect feed industry to grow.

Further growth in the segment is led by functional properties of insects. Insects are natural source of food for fishes and shrimps. Insect feed having similar smell and taste as that of insects would aid in its adoption and can also increase appetite.

4. Competitive assessment of key players

Data in this section is obtained from publicly available sources, including annual reports of players, regulatory filings, and/or company websites. The financials used in the competitive section are re-classified by CRISIL based on the annual report and financial fillings by the players.

CRISIL has considered the following companies as competitors for Mukka Proteins Limited. These lists of companies either operate in same line of business or offer same product portfolio as that of Mukka Proteins Limited and available in public domain. Please note the peers set considered below is an indicative list and not an exhaustive list of players present in the fish meal and fish oil industry

4.1. Operating parameters

Brief information about key players in the industry

Company name	Established in	Registered as company in	Production capacity (in metric tonne per day)	Plant locations	Corporate office
Mukka Proteins Ltd	2003	2010	167	Mangalore, Karnataka	Mangalore, Karnataka
TJ Marine Products Pvt Ltd	2004	2014	240	MIDC Ratnagiri, Maharashtra	Udupi, Karnataka
Arbee Aquatic Proteins Pvt Ltd	1978	2013	82	Alleppey, Kerala	Kottayam, Kerala
Akash Fishmeal and Fish Oil Pvt Ltd	-	2015	160	Vengurla, Maharashtra	Sindhudurg, Maharashtra
Omega Fishmeal and Oil Pvt Ltd	2011	2011	200	Ratnagiri, Maharashtra	Mumbai, Maharashtra

Note:

- *Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players*
- *Other than mentioned above, plants of subsidiaries for Mukka Proteins Ltd are located at Ullal (Karnataka), Jafarabad (Gujarat), and at Asrar and Shinas in the Sultanate of Oman.*
- *Data on production capacity for all players is sourced from MPEDA and reflects the export-approved standalone capacity*
- *Capacity mentioned above is output capacity for respective players*

Source: MPEDA, CRISIL MI&A Research

Product offerings of key players

Company name	Fishmeal	Fish oil	Fish soluble	Other
Mukka Proteins Ltd	✓	✓	✓	✓
TJ Marine Products Pvt Ltd	✓	✓	✓	-
Arbee Aquatic Proteins Pvt Ltd	✓	✓	✓	-
Akash Fishmeal and Fish Oil Pvt Ltd	✓	✓	-	-
Omega Fishmeal and Oil Pvt Ltd	✓	✓	✓	✓

Note:

- *Other includes product offerings unrelated to fish meal and fish oil processing*
- *Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players*

Source: CRISIL MI&A Research

Exports of fish meal and fish oil

Financial year	FY18	FY19	FY20	FY21	FY22	FY23*
Fish meal exports ('000 kg)						
Mukka Proteins Ltd	21,460	28,412	37,596	34,320	15,200	20,570
Total India exports	69,875	90,296	67,180	70,089	70,032	147,125
Share in (%)	31%	31%	56%	49%	22%	14%
Fish oil exports ('000 kg)						
Mukka Proteins Ltd	2,823	1,038	962	113	0	2550
Total India exports	24,252	5,107	1,846	116	1,102	26,842
Share in (%)	12%	20%	52%	98%	0%	9%

*Note: * Data is from Apr'22 to Dec'22*
Standalone Mukka Proteins Ltd is considered for above analysis
Source: Company interactions, DGCIS, CRISIL MI&A Research

Market share (fiscal 2022)

Company name	Total operating revenue (Rs. billion)	Market share (%)	Indian fishmeal and fish oil industry (Rs. billion)
Mukka Proteins Ltd	6.9	45-50%	13-17

Note: Market share is based on standalone financials
Source: CRISIL MI&A Research

Market share (fiscal 2023E)

Company name	Total operating revenue (Rs. billion)	Market share (%)	Indian fishmeal and fish oil industry (Rs. billion)
Mukka Proteins Ltd	10	25-30%	32-36

Note: Market share is based on standalone financials
Source: CRISIL MI&A Research

Capacity share of fish meal and fish oil

Overall capacity estimated (MT per day)	Mukka Proteins Ltd (MT per day)	Share (%)
4,600 – 5,200	416	8-9%

Note:
- *Overall capacity is as per MPEDA database as of Mar 2023*
- *Capacity for Mukka Proteins Ltd is as of February 2023*
- *To arrive at the MPEDA capacity for fish meal and fish oil CRISIL has considered*
  - *Capacity of players who manufacture items of type Dried & Other Non-edible, Others-Non-Edible & Others-Edible, Others-Non-Edible, Frozen & Others-Non-Edible as per MPEDA database.*
  - *Capacity of fish meal and fish oil given out in MPEDA newsletter of January 2020.*
- *Capacity additions in fish meal and fish oil industry is limited by the low-capacity utilization and scarcity of resources*
- *Above-mentioned capacity for Mukka Proteins Ltd includes fish meal, fish oil and fish soluble*

Source: MPEDA, CRISIL MI&A Research

Financial parameters

Key financials for fiscal 2022

Company name	Standalone/ consolidated	Operating revenue	CAGR (FY19-22)	Operating profit	Operating profit margin	Net profit	CAGR (FY19-22)	Net profit margin
		Rs. million	%	Rs. million	%	Rs. million	%	%
Mukka Proteins Ltd	Standalone	6,928.9	19.1%	342.1	4.9%	198.2	8.8%	2.9%
TJ Marine Products Pvt Ltd	Standalone	2,208.0	14.2%	110.0	5.0%	30.6	28.6%	1.4%
Arbee Aquatic Proteins Pvt Ltd	Standalone	752.6	17.5%	75.1	10.0%	33.5	14.4%	4.4%
Akash Fishmeal and Fish Oil Pvt Ltd #	Standalone	392.6	N.Ap	1.6	(0.4)%	(35.1)	N.Ap	(8.9)%
Omega Fishmeal and Oil Pvt. Ltd #	Standalone	28.8	N.Ap	(32.5)	NM	(89.5)	N.Ap	NM

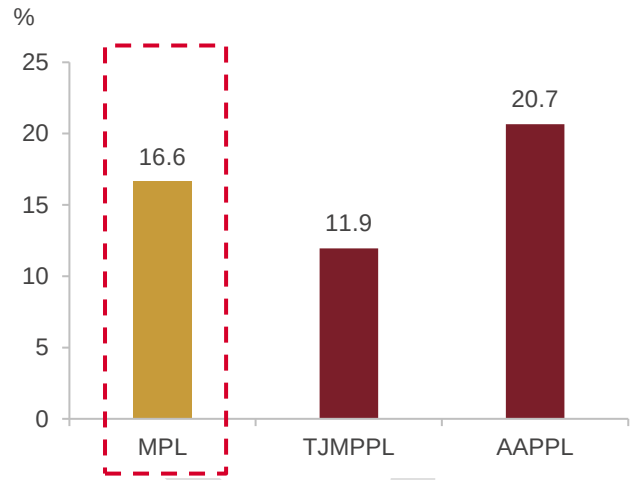
Note:

- *Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players*
- *#: Values are as of fiscal 2021 as fiscal 2022 data for respective companies is not available on Ministry of Corporate Affairs (MCA)*
- *NM: Not meaningful due to high negative values; N.Ap: Not applicable*

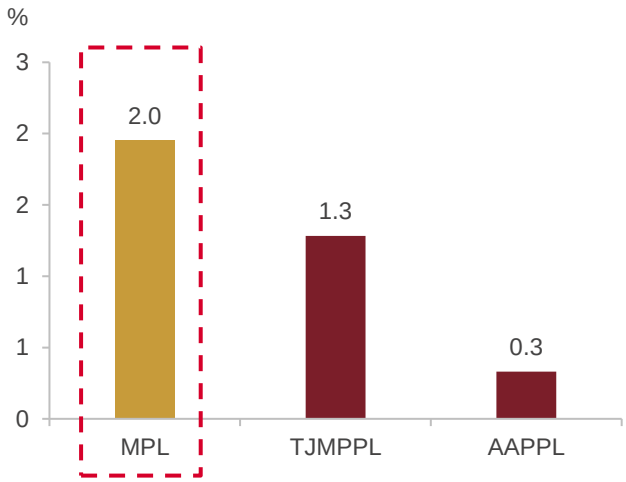
Source: Company annual reports, CRISIL MI&A Research

Other key financial ratios for fiscal 2022

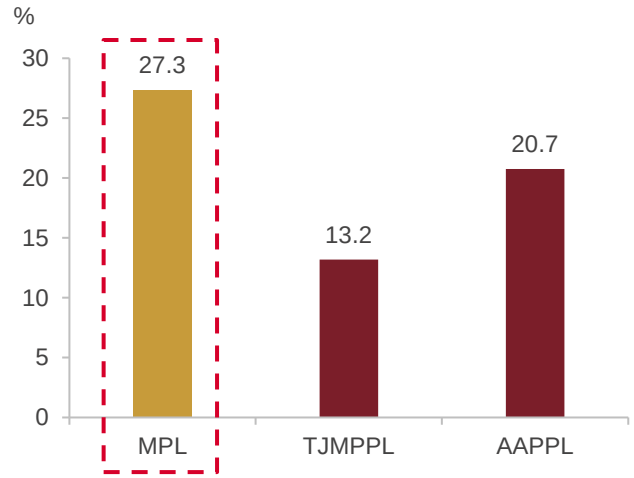
ROCE (%)



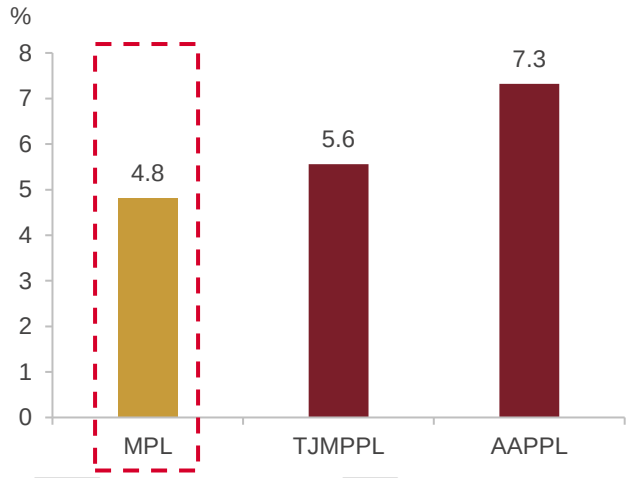
Gearing (times)



ROE (%)



Interest coverage (times)



Note:

- *MPL: Mukka Proteins Ltd; AAPPL: Arbee Aquatic Proteins Pvt Ltd; TJMPPL: TJ Marine Products Pvt Ltd*
- *For Akash Fishmeal and Fish Oil Pvt Ltd and Omega Fishmeal and Oil Pvt Ltd, the latest available data is as of fiscal 2021; hence they are not mentioned above*

Source: Company annual reports, CRISIL MI&A Research

Key observations

- Mukka proteins limited through its promoters has presence in the fish meal and fish oil industry since 1975. Among the other players listed above, Arbee Aquatic Proteins Pvt Ltd has presence in the fish meal and fish oil industry since 1978.
- Over the past 5 years, fiscal 2018 to 2022, share of Mukka Proteins limited in fish meal exports from India has ranged from 30-60% in volume terms. It is to be noted that the share of Mukka Proteins Limited varies acutely on a year-on-year basis.
- Between fiscal 2018 to 2022, share of Mukka Proteins limited in fish oil exports from India has ranged from 20-50% in volume terms. It is to be noted that the share of Mukka Proteins Limited varies acutely on a year-on-year basis.
- As per CRISIL estimates, Mukka proteins limited with total operating revenue of Rs. 6.9 billion, has a market share of 45-50% in the fish meal and fish oil industry for fiscal 2022 which is estimated to be around Rs..13-17 billion for the corresponding period.
- In terms of operating revenues, among the players compared above Mukka Proteins limited is the largest player with operating revenue of Rs. 6.9 billion for fiscal 2022. TJ Marine Products Private Limited is the second largest player with revenue of Rs. 2.2 billion for fiscal 2022. Similar data on operating revenue is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered.
- Operating revenue for Mukka Proteins limited has grown at a faster pace when compared to its peers mentioned above at a CAGR of ~19% from fiscal 2019 to 2022. Similar data is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered.
- Net profit for Mukka Proteins limited has degrown at CAGR of ~9% from fiscal 2019 to 2022. Meanwhile, TJ Marine Products Pvt Ltd grew at the fastest pace, at ~29% CAGR, among the peers mentioned above. Similar data is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered

- In terms of profitability, Arbee Aquatic Proteins Pvt ltd. ranks higher among the players listed above, with net profit margin of ~4% for fiscal 2022. It is followed by Mukka Proteins limited and TJ Marine Products Private Limited. Similar data is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered
- As per CRISIL estimates and MPEDA database, Mukka Proteins Limited (at consolidated level) occupies a share of 8-9% in the overall fish meal and fish oil capacity in India. The low share in capacity can be attributed to non-operation of few units and limited utilization rates of plants in fish meal and fish oil industry, as CRISIL has considered capacities registered with MPEDA for fish meal and fish oil industry.
- It is vital to note that, unavailability of raw materials i.e, fish species required to produce fish meal and fish oil acts as the major constraints in the fish meal and fish oil industry rather the production capacities available.

Addendum I to the report "Assessment of the fish meal and fish oil processing industry in India"

The following section is an addendum I to the report, 'Assessment of the fish meal and fish oil processing industry in India' dated March 2023 (Macro-economic update – May 2023) . CRISIL MI&A has provided this addendum to sections which are as below. Rest of the original report remain unchanged.

5. Macroeconomic assessment

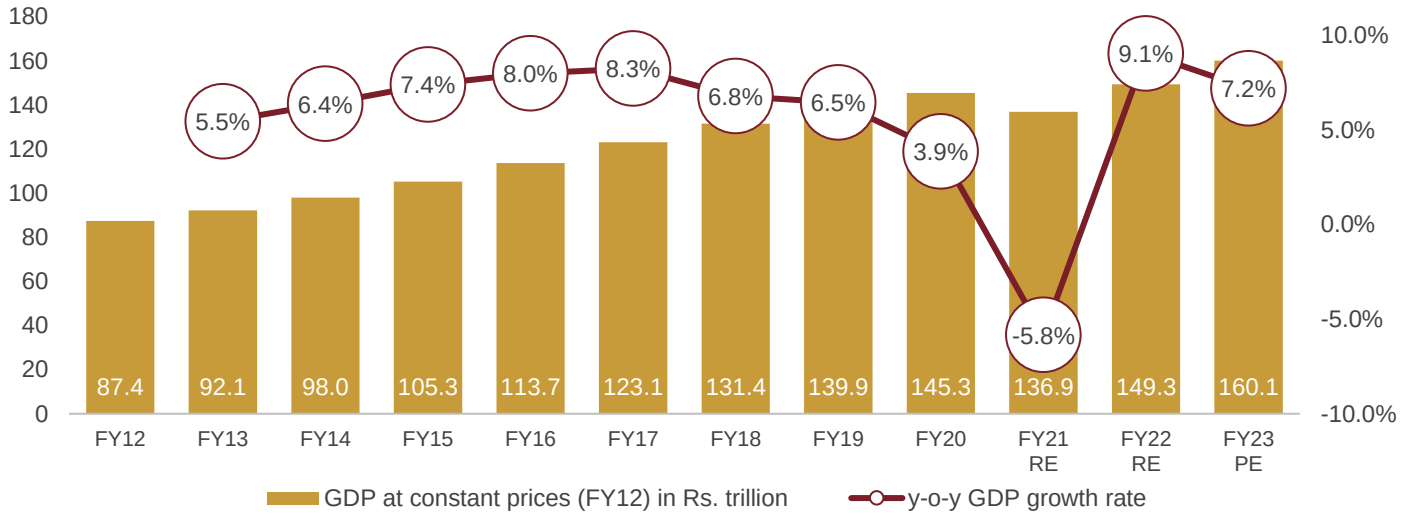
5.1. India's macroeconomic assessment

GDP grew at a 5.7% CAGR between fiscals 2012 and 2023

India's GDP logged a compound annual growth rate (CAGR) of 5.7% over the past 11 years to Rs 160 trillion in fiscal 2023 from Rs 87 trillion in fiscal 2012.

In fiscal 2022, India recovered from pandemic-related stress following the resumption of economic activity and easing of restrictions, although geopolitical pressures in the last quarter resulted in higher inflation. However, resumption of economic activity and healthy trade flows led to robust GDP growth of 9.1% in fiscal 2022 after declining 5.8% in fiscal 2021. In FY23, the GDP rose 7.2% on strong growth momentum propelled by domestic demand from investment and private consumption through the year.

Real GDP growth in India (new series)



Note: PE: provisional estimates; RE: revised estimates
Source: Provisional estimates of national income 2022-23, Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation (MoSPI), CRISIL MI&A Research

GDP grew at a robust rate of 7.2% in fiscal 2023

While the Indian economic recovery continues to gather pace after the pandemic, there are several risks. Global growth is projected to slow as central banks in major economies withdraw easy monetary policies to tackle high inflation, leading to lower demand for Indian exports. Together with high commodity prices, especially oil, this may lead to a trade shock for the country. High commodity prices, along with depreciating rupee, indicate higher imported inflation.

Data for the second and third quarters of fiscal 2023 reflect how the global slowdown had begun to spill over into the Indian economy. The first three quarter of fiscal 2023 saw a decline in the contribution of net exports to GDP growth, but the fourth quarter saw a recovery and positive growth. S&P Global expects US GDP to slow to 0.7% in CY2023 from 2.1% in CY2022 and eurozone GDP to decline to 0.3% from 3.5%. Major developed economies are expected to fall into a shallow recession in CY2023. S&P Global expects US GDP growth to swerve from 1.8% in CY2022 to negative 0.1% in CY2023, and European Union GDP growth to plunge from 3.3% to 0%. This will

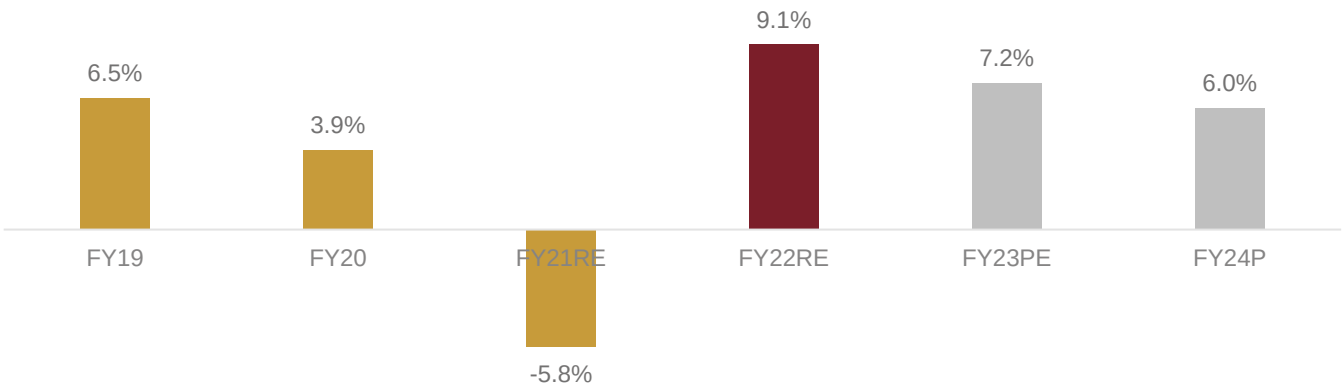
weaken the export prospects for India, thereby weighing on domestic industrial activity but strong domestic consumption will sustain growth in a reasonable range.

CRISIL forecasts India's GDP to grow 6.0% in FY24

After the robust growth in FY2023, a slowdown seems inevitable in FY2024, driven by rising borrowing costs and global slowdown. Rate hikes are getting transmitted to broader lending rates with a lag and expected to peak in FY2024, hitting both global and domestic demand. S&P Global expects GDP growth for the United States and euro zone to slow in 2023. As these economies account for 33% of India's goods exports, the country is likely to see slower growth. Overall, real GDP of India is expected to grow 6.0% in FY2024 compared with 7.2% in FY2023.

While outlook for the external environment seems grim, India is positioned better with lower inflation rates and higher government capex. Government capex is expected to offer key support to the investment cycle this year. Private sector capex is also showing signs of a pick-up, because of the rising capacity utilisation. However, it will take time for the pick-up to be broad-based and for the segment to take the baton from the government. Overall, we expect India's real GDP to grow 6% this fiscal, compared with 7.2% in fiscal 2023.

Real GDP growth

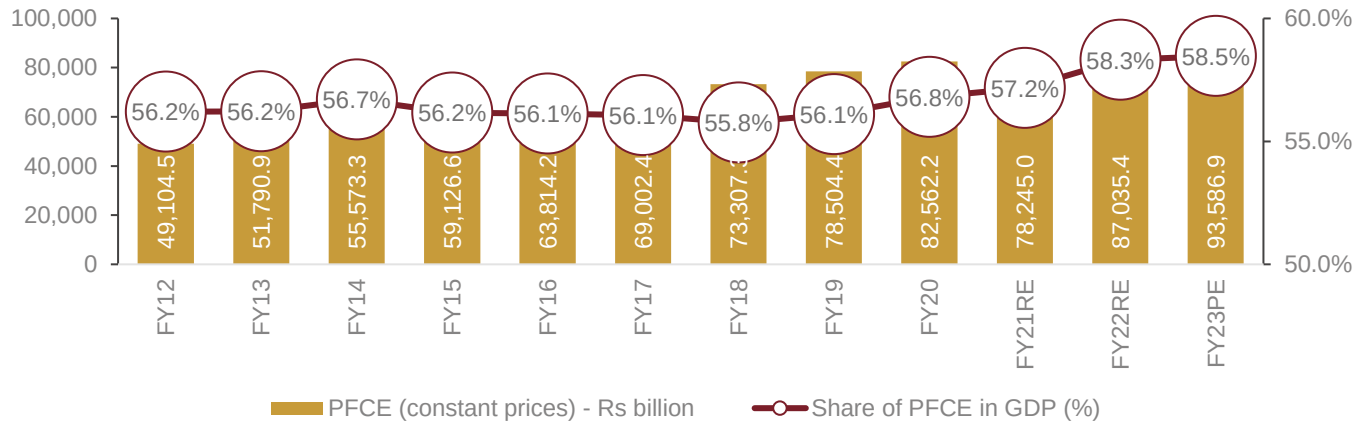


Note: RE: revised estimates, PE: provisional estimates, P: projected
Source: Provisional Estimates of National Income, 2022-23, CSO, MoSPI, CRISIL MI&A Research

PFCE to maintain dominant share in India's GDP

Private final consumption expenditure (PFCE) at constant prices clocked a 6% CAGR between fiscals 2012 and 2023, maintaining its dominant share ever in the GDP pie at 58.5%, or ~Rs 93,587 billion in fiscal 2023, registering 7.5% y-o-y growth. Factors contributing to growth included good monsoons, wage revisions due to the implementation of the Seventh Central Pay Commission's recommendations, benign interest rates, and low inflation.

PFCE (at constant prices)



Note: PE: provisional estimates; RE: revised estimates
Source: MoSPI, CRISIL MI&A Research

India has seen robust growth in per capita income in recent times

India's per capita income, a broad indicator of living standards, rose from Rs 63,462 in fiscal 2012 to Rs 98,374 in fiscal 2023, at a 4.1% CAGR. Per capita income recovered 7.6% and 6.3% in fiscal 2023 and 2022, respectively, after declining 8.7% in fiscal 2021. Growth was led by better job opportunities, propped up by overall GDP growth. Moreover, population growth remained stable at ~1% CAGR.

Per capita net national income at constant prices

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21RE	FY22RE	FY23PE	CAGR FY12-23
Per capita net national income (Rs)	63,462	65,538	68,572	72,805	77,659	83,003	87,586	92,133	94,270	86,054	92,583	98,374	4.1%
On-year growth (%)		3.3	4.6	6.2	6.7	6.9	5.5	5.2	2.3	(8.7)	7.6	6.3	-

Note: RE: revised estimates, PE: provisional estimates
Source: Provisional Estimates of Annual National Income, 2022-23, CSO, MoSPI, CRISIL MI&A Research

India's per capita GDP grows faster than global average

Global GDP per capita clocked a CAGR of 3.4% between 2017 and 2022, as per the International Monetary Fund (IMF) data. Meanwhile, India's corresponding figure registered a CAGR of 4.1%.

Per capita GDP at current prices

	2017	2018	2019	2020	2021	2022	2023P	2024P
India per capita GDP at current prices ($)	1,958	1,974	2,050	1,913	2,238	2,392	2,612	2,848
World per capita GDP at current prices ($)	10,906	11,457	11,500	11,077	12,468	12,895	13,333	13,872

Note: P-Projected
Source: IMF, CRISIL MI&A Research

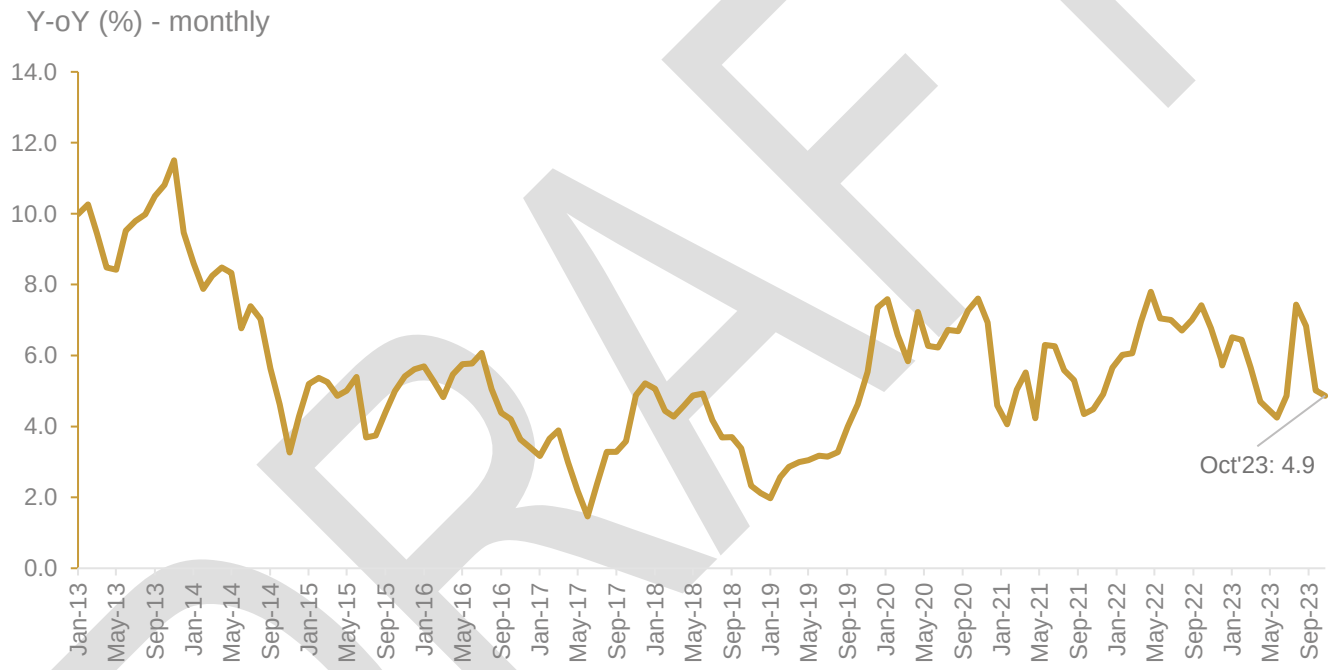
Review of CPI Inflation in India

Inflation based on the consumer price index (CPI) dropped a mild 15 basis points (bps) to 4.87% in October from 5.02% in September 2023, led by a broad-based decline in core and fuel inflation.

Food inflation remains steady, as the underlying components show mixed trends with categories like vegetables, cereals, milk have eased during the period while categories like fruits, pulses and sugar have seen a uptick in inflation. Furthermore, fuel inflation has turned mildly negative with declining of inflation across categories. This coupled with easing of core inflation supported by inflation in categories such as education, housing, personal care and effects, transportation and communication have aided the over inflation to come down during the October period when compared to previous month.

However, CRISIL MI&A expected the Reserve Bank of India (RBI) to remain vigilant, as the headline inflation remains above the Monetary Policy Committee's (MPC) 4% target and risks to food and fuel inflation persist.

CPI in India



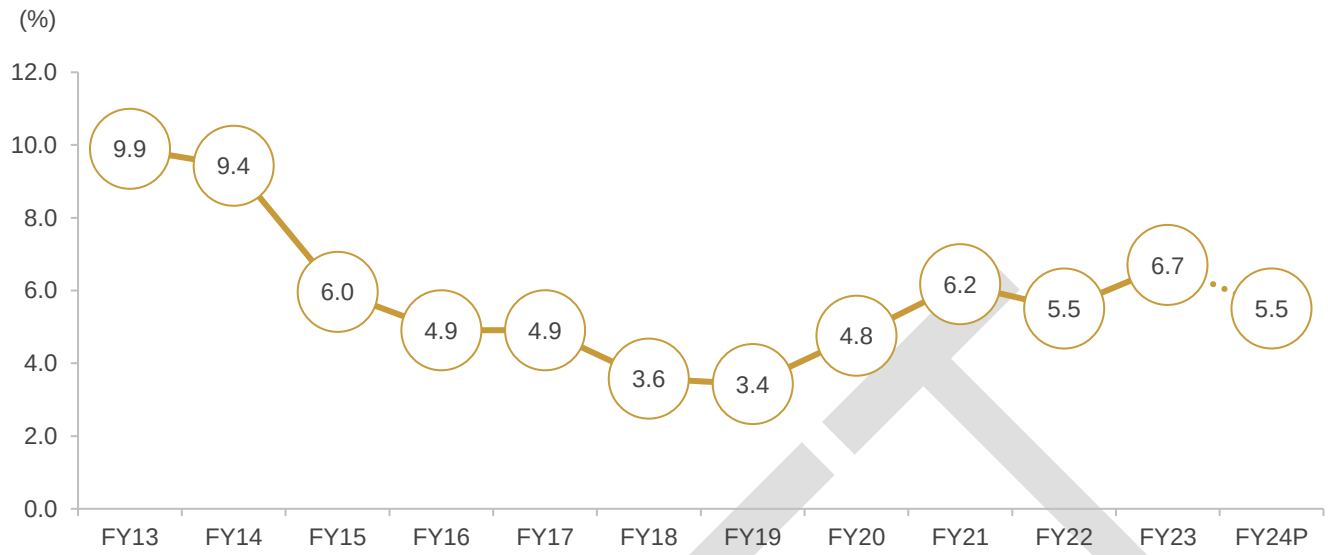
Source: MoSPI, CRISIL MI&A Research

CPI inflation to average 5.5% in fiscal 2024

Easing input cost pressures on manufacturers and moderating domestic demand are expected to ease core inflation. That said, several risks to the forecast remain. Tight global food supplies threaten food inflation. So does the flare up in onion prices which continued in October. For the December quarter, CRISIL MI&A expects food inflation to soften, because of the government intervention and as the kharif harvest enters the market. Oil prices remain an unknown and could potentially play a spoilsport if the Middle East conflict escalates. An adverse index base (inflation had seen a drop in the year-ago period) will somewhat restrict the downside in inflation for two months.

We expect the Reserve Bank of India (RBI) to remain vigilant, as the headline inflation remains above the Monetary Policy Committee's (MPC) 4% target and risks to food and fuel inflation persist. Our base case for this fiscal is an average inflation of 5.5% and the MPC maintaining its policy rate and stance.

Outlook for CPI in India



Source: MoSPI, CRISIL MI&A Research

India's GVA continues to record healthy growth

On the supply side, gross value added (GVA) grew 7.0% last fiscal, as per provisional estimates (compared with 8.8% in fiscal 2022). In absolute terms, real GVA rose to Rs 147.6 trillion last fiscal from Rs 138.0 trillion in fiscal 2022.

GVA at constant fiscal 2012 prices

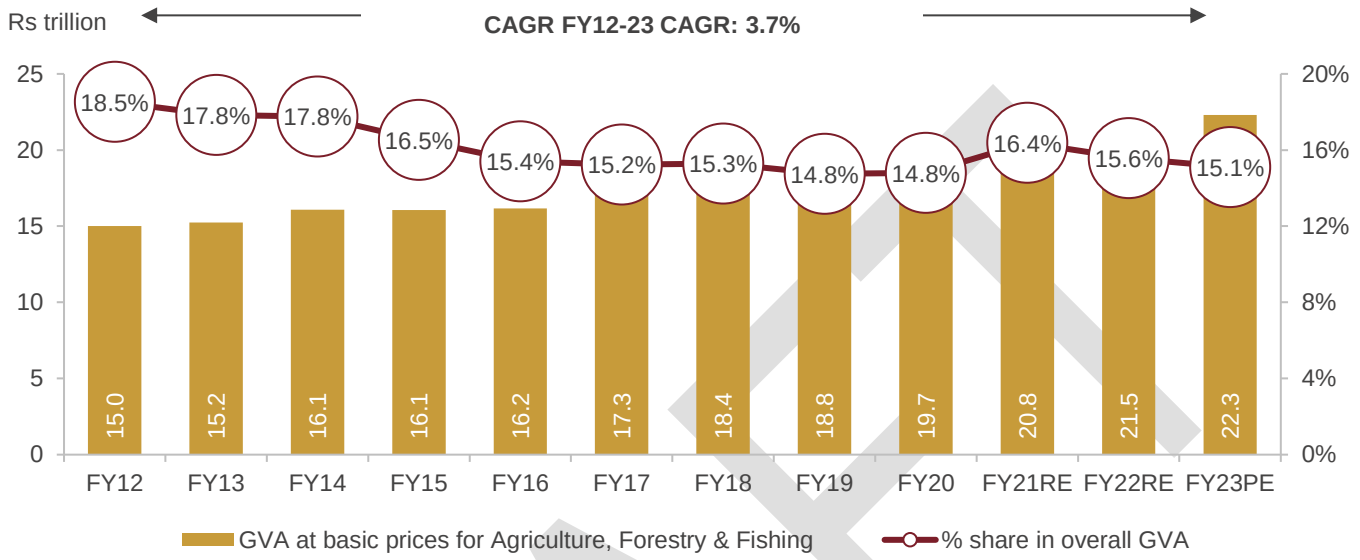
Segment	FY21RE Rs trillion	FY22RE Rs trillion	FY23PE Rs trillion	Share in GVA FY23	Annual growth in FY23
Agriculture, forestry and fishing	20.8	21.5	22.3	15%	4.0%
Mining and quarrying	2.9	3.1	3.2	2%	4.6%
Manufacturing	23.3	25.8	26.2	18%	1.3%
Utility services	2.9	3.2	3.4	2%	9.0%
Construction	9.8	11.3	12.4	8.4%	10.0%
Trade, hotels, transport, communication and services related to broadcasting	21.6	24.6	28.0	19.0%	14.0%
Financial, real estate and professional services	29.6	31.0	33.2	22.5%	7.1%
Public administration, defence and other services	16.0	17.6	18.8	12.7%	7.2%
GVA at basic prices	126.8	138.0	147.6	-	7.0%

RE: revised estimate, PE: provisional estimate
Source: MoSPI, CRISIL MI&A Research

Agriculture, Forestry and Fishing (AFF) contributed to 15.1% of the total GVA in fiscal 2023

The agriculture, forestry and fishing segment has been a key contributor to the total GVA. The segment's GVA has grown 3.7% from fiscals 2012-23. The segment contributed 15.1% of the total GVA in fiscal 2023.

GVA of AFF segment in total GVA (constant fiscal 2012 prices)

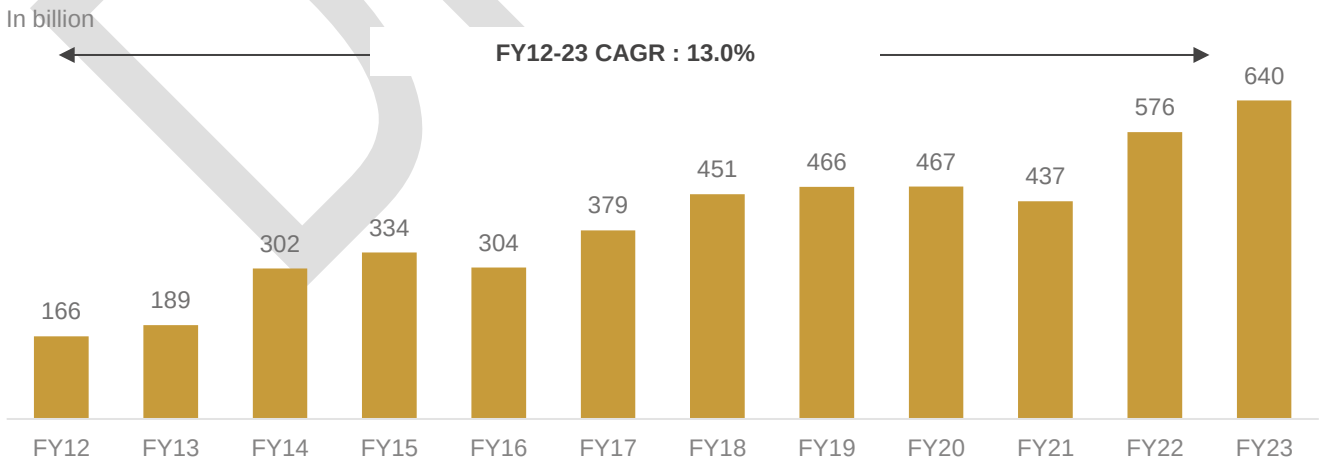


RE: revised estimate, PE: Provisional Estimates, AE: advanced estimate
Source: Provisional Estimates Of National Income 2022-23 And Quarterly Estimates Of Gross Domestic Product For The Fourth Quarter (Q4) Of 2022-23, CSO, MoSPI, CRISIL MI&A Research

India's export of fish and fish products has grown at 13% CAGR from fiscals 2012 to 2023

India has a coastline of 7,516.6 km (including mainland, Lakshadweep and Andaman & Nicobar), which helps India's fishing population. Export of fish and fish products from India has grown at 13% CAGR from Rs. 166 billion in fiscal 2012 to Rs. 640 billion in fiscal 2023. Of the total exports in fiscal 2023, frozen shrimp occupied the highest share at 67%, followed by frozen fish at 9%.

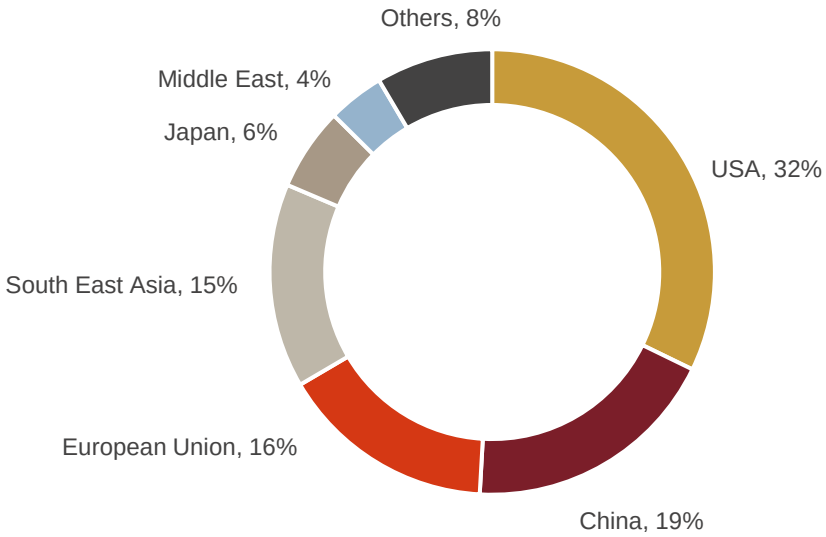
India fish and fish products exports



Note: Fish and Fish products include Frozen Shrimp, Frozen Fish, Frozen Cuttle Fish, Frozen Squid, Dried items, Chilled items, and others
Source: MPEDA, CRISIL MI&A Research

In value terms in fiscal 2023, the USA occupies the largest share of the total exports from India, at 32%, followed by China at 19% and the European Union at 16%.

Region-wise share of fish and fish-product exports (fiscal 2023)

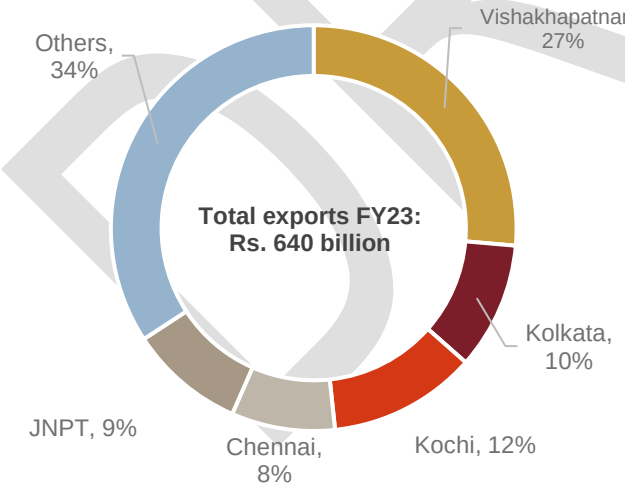


Source: MPEDA, CRISIL MI&A Research

Vishakhapatnam port contributed to highest exports of fish and fish products (value terms)

In fiscal 2023, exports of fish and fish products were highest from Vishakhapatnam port, at ~Rs. 169 million by value and 27% by share of fish and fish products. Kochi and Kolkata ports followed closely, with a share of 12% and 10% respectively.

Port-wise share in exports (FY23)



Port-wise export of fish and fish products

Rs. Billion	FY22	FY23
Vishakhapatnam	156	169
Kolkata	62	65
Kochi	62	76
Chennai	59	53
JNPT	56	59
Others	180	219
Total	**576**	**640**

Source: MPEDA, CRISIL MI&A Research

Government providing support for the fisheries sector in India

In recent times, Indian government is providing support to fisheries sector in India through various schemes mentioned below, contributing to India's efforts towards enhancing its presence in global sea food industry. This in turn would also aid the growth for Indian fish oil and fish meal industry.

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

As a part of the Aatmanirbhar Bharat Abhiyan, the government approved PMMSY in fiscal 2021 to enhance the country's Blue Revolution by focusing on sustainable and responsible development of the fisheries sector. The major objectives and aims of this scheme include:

- Harnessing of fisheries potential in a sustainable, responsible, inclusive, and equitable manner
- Enhancing fish production and productivity through expansion, intensification, diversification, and productive utilisation of land and water
- Modernising and strengthening of the value chain - post-harvest management and quality improvement
- Doubling fishers and fish farmers' incomes and generation of employment
- Enhancing contribution to agriculture GVA and exports
- Social, physical and economic security for fishers and fish farmers
- Robust fisheries management and regulatory framework

In line with the above-mentioned aims and objectives, the scheme has envisaged achieving the following targets during the period catering to various segments such as productivity, employment generation and value addition in the fisheries sector.

Fish production and productivity	Economic value addition	Enhancing income and employment generation
• Increasing fish production to 22 million metric tonne by fiscal 2025 • Improving aquaculture productivity to 5 tonne per hectare • Increasing fish consumption in the country to 12kg per capita	• Increasing contribution of the fisheries sector GVA in agriculture GVA to 9% by fiscal 2025 • Increasing earnings from exports to Rs 1 trillion by fiscal 2025 • Reduction in post-harvest losses from 20-25% to 10% • Encouraging private investments and entrepreneurship in the fisheries sector	• Doubling the incomes of fishers and fish farmers • Generation of employment opportunities directly and indirectly along the value chain

This scheme, with an overall investment of Rs. 2,005 billion, will be implemented over five years from fiscal 2021 to fiscal 2025 as an umbrella scheme with two components:

- Central sector scheme, wherein the project cost is borne by the central government
- Centrally sponsored scheme, wherein the cost will be shared between states and central government and all the sub-components/ activities will be carried forward by state/ Union territories

Fisheries and Aquaculture Infrastructure Development Fund (FIDF)

The FIDF has been envisaged under Union Budget 2018. With a fund size of Rs. 75.2 billion, this scheme tries to improve the fisheries infrastructure, both marine and inland.

The National Fisheries Development Board (NFDB), Hyderabad, acts as the nodal implementing agency. FIDF provides concessional finance to the eligible entities (EEs), which include state governments/Union territories and state entities to develop identified fisheries infrastructure facilities. This concessional finance is provided through nodal loaning entities (NLEs) such as:

- National Bank for Agriculture and Rural Development (NABARD),
- National Cooperatives Development Corporation (NCDC) and
- All scheduled banks

Cumulatively, 31st December 2022, NFDB received 236 proposals from 25 states and UTs for the total project cost of Rs. 78.8 billion. NFDB recommended 121 proposals out of which 110 proposals were recommended by CAMC and in-principal approval was accorded by Department of Fisheries (DoF) for the project cost of Rs. 52.5 billion.

Activity-wise key proposals received

S no	Name of activity	Proposals	Project cost (Rs. billion)
1	Establishment of fishing harbours	36	52.6
2	Development of aquaculture	33	1.1
3	Any other innovative projects/activities designed to enhance fish production/productivity/value	30	5.8
4	Modernisation of state fish seed farms	30	1.4
5	Establishment of fish landing centres	26	2.0
6	Fish processing units	14	1.8
7	Fish transport facilities (marine and inland fisheries sector)	10	150.0
8	Establishment of cage culture in reservoir	9	2.3
9	Introduction of deep sea fishing vessels	6	0.1
10	Construction of Ice Plants (both Marine and Inland Fisheries Sectors)	8	0.2

Note: data is as of 8th December 2023
Source: FIDF Dashboard, CRISIL MI&A Research

Blue Revolution

The Blue Revolution, which focuses mainly on increasing fisheries production and productivity from aquaculture and fisheries resources, both inland and marine, was launched in December 2015 as a centrally sponsored scheme. The scheme was launched for 5 years from fiscal 2016 to 2020 with an outlay of Rs. 300 billion with the following objectives:

- Increase overall fish production in a responsible and sustainable manner for economic prosperity
- Modernise fisheries with special focus on new technologies
- Ensure food and nutritional security
- Generate employment and export earnings
- Ensure inclusive development and empower fishers and aquaculture farmers

Major targets achieved by the scheme include

Fish production
•Increase in fish production from 10.26 million MT in fiscal 2015 to 13.75 million MT in fiscal 2019
Productivity
•Enhancement in productiivty from 2.3 tonne per hectare to 3.3 tonne per hectare
Exports
•Exports increased from Rs 334.4 billion to Rs 465.9 billion in fiscal 2019

Source: Department of Fisheries, CRISIL MI&A Research

Kisan Credit Card (KCC)

During the budget announcement for fiscal 2019, the government extended the Kisan Credit Card (KCC) facility to fish and animal husbandry farmers in India. This scheme was introduced to meet the working capital requirement of fish farmers. The major aim of this scheme is to provide adequate and timely credit to farmers.

KCC facilities can be availed by fishers, fish farmers, self-help groups, women groups, and joint liability groups. Currently, a credit limit of Rs. 0.3 million is provided to already existing KCC farmers while a credit limit of Rs. 0.2 million is provided for new KCC farmers for activities related to fisheries and animal husbandry.

For fisheries, the working capital costs that are included under KCC include recurring costs such as:

- Seed
- Feed
- Organic and inorganic fertilisers
- Lime/ other soil conditioners
- Harvesting and marketing charges
- Fuel/electricity charges
- Labour
- Lease rent (if leased water area)

For capture fisheries, these working capital costs may include:

- Fuel charges
- Ice
- Labouring charges
- Mooring/ landing charges, etc.

Till March 2023, 130,931 KCCs had been issued to fishers and fish farmers.

6. Overview of fish meal and fish oil industry in India

6.1. Value chain of the industry

The fish meal and fish oil industry relies on fishing in oceanic waters for procurement of raw materials. Typically, the larger raw material vendors (fishermen) use mechanised and motorised boats while the smaller fishermen use non-motorised boats, along with gears such are seines, trawls, gillnets and bagnet for fishing. According to Central Marine Fisheries Research Institute (CMFRI) data, mechanised and motorised boats accounted for ~98.8% of the total marine landings while non-motorised boats comprised the rest 1.8%, as of 2021.

In India, the peak season for fishing is August-December and the slack season is January-May. Fishing is not allowed in Indian waters during June-July, as it is the monsoon season. Fish meal and fish oil production follows the same season as fishing. The output is stocked to cater to the demand of domestic and exports market.

Availability of raw materials, a key monitorable

In the entire process of production of fish meal and fish oil, availability of raw material is a key monitorable. The industry procures raw material from fishing in the oceans, and thus, is dependent on fish landings in the Indian coastal waters. Large players have diversified their procurement across the Indian coastline so as to minimise their dependence on one particular coastal landing and fish catchments.

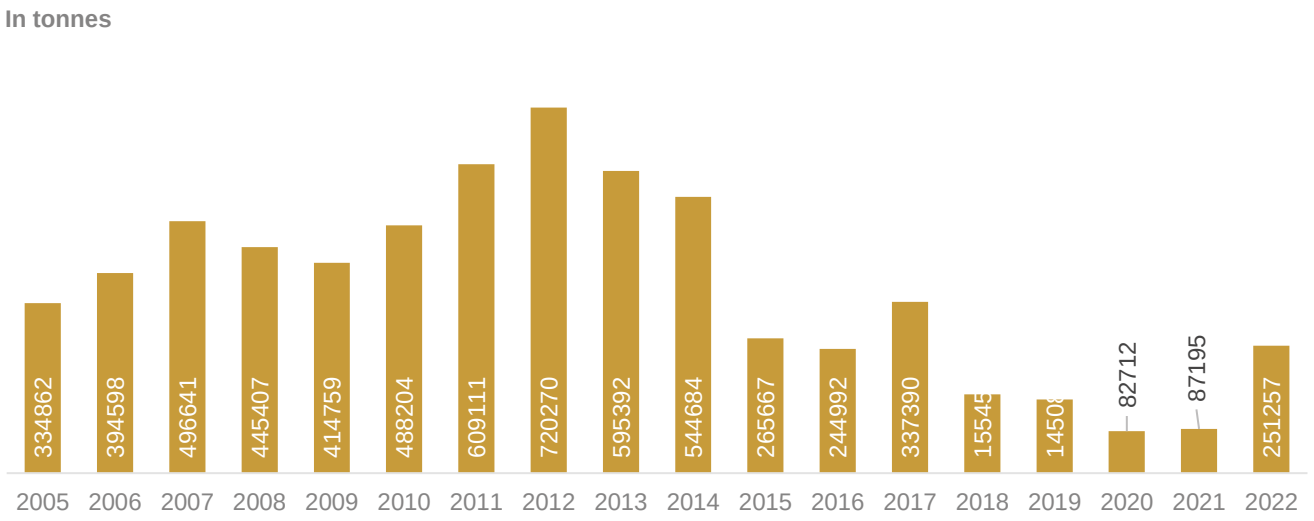
Fish landings is an important factor that determines the total quantity available for fishing and further use. Any drop in the fish landings hugely affects the entire sea-food and fish processing industry, which is dependent on wild catch. Also, the quality of fish in terms of nutrient content and growth of adult population determines the yield and output quality of fish meal and fish oil. Thus, even the prices of the end product are dependent on the quality of fish caught. The dependency of multiple stakeholders (fishers, fish processors, consumers, industrialists and exporters) on fish landings makes it necessary to initiate appropriate management measures for judicious harvesting of the resource.

According to the Indian Council of Agricultural Research (ICAR)-CMFRI report on Indian oil sardine (IOS), availability of the fish in the ocean water is affected by factors that could be classified as: i) environmental, such as El Niño and erratic rainfall; ii) biological, such as spawning failure, competition from other species of fish, and lack of food; and iii) anthropogenic, such as overfishing. A living natural resource such as fish has limitations in replenishment and is severely affected by climatic and environmental changes. Any change in climatic conditions affects the growth and breeding of fish and thus impacts the adult population during a particular season in the coastal waters. Overfishing and fishing of juvenile species also affect the fish population over the long run.

IOS is a key raw material used by Indian fish meal and fish oil industry. The landings of IOS have declines drastically from 0.5 Mn tonnes in 2014 to below 0.15 Mn tonnes in 2019 and further down to 0.08 Mn tonnes in 2021. However, in 2022 the landings of IOS have seen a drastic increase from the levels of 2021 – reaching to the levels of 0.3 Mn - which is further reflected in exports during the period.

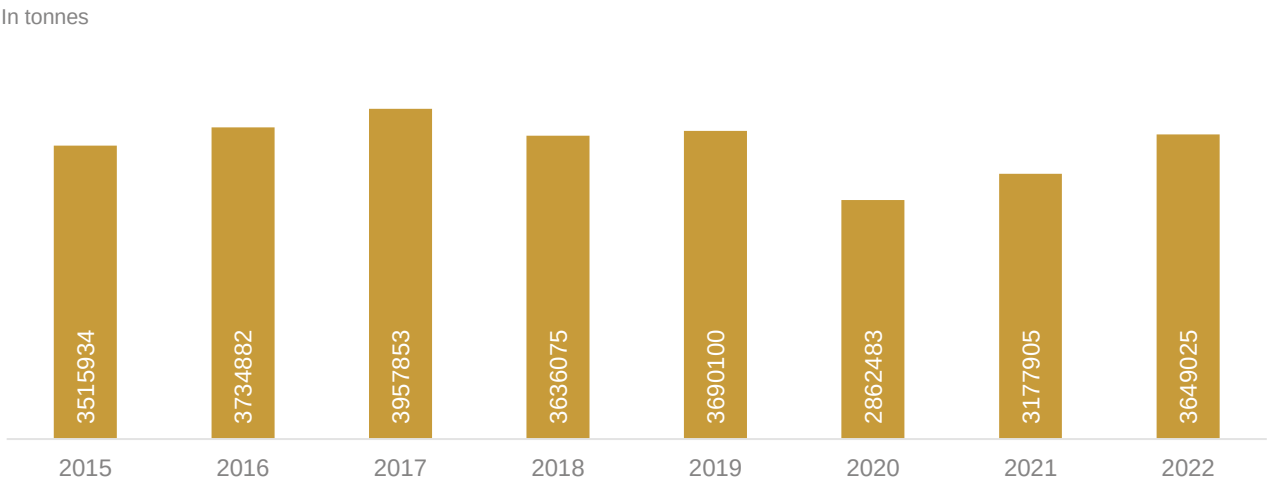
According to CMFRI, IOS is known for its capricious nature, with seasonal, annual, inter-annual and decadal peaks and slumps in availability. The resilience of a fish population to exploitation is largely dependent on the reproductive traits. Thus, while IOS species is volatile in availability, is also known to replenish fast after a decline, on account of its natural characteristics of rapid growth, early maturity, high fertility, and protracted spawning period. According to the ICAR-CMFRI report, the species have medium to high resilience due to which, along the southwest coast of India, the species is expected to revive in a span of 2-3 years post any decline, as supported by historical fishery trends. Decline in fish landings due to unsustainable fishing and changing climatic conditions is a key risk factor for the fish meal and fish oil industry.

Trend in IOS landings in the Indian Ocean (2005-22)



Note: 1. Latest data available is as of 2022
Source: Central Marine Fisheries Research Institute (CMFRI), CRISIL MI&A Research

Trend in total marine landings



Note: Latest data available is as of 2022
Source: CMFRI, CRISIL MI&A Research

Aquaculture feed represents the dominant usage of fish meal and fish oil at 88% and 74%, respectively, for calendar year 2022

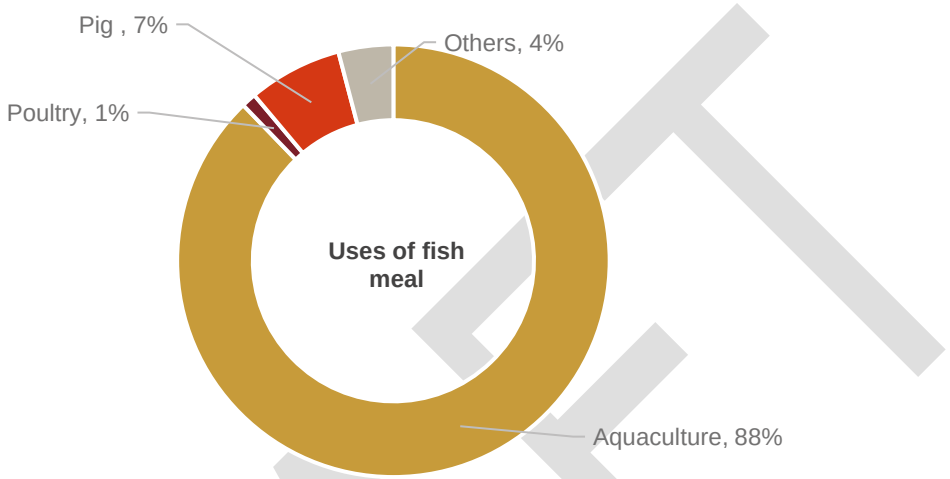
According to the International Fish meal and Fish Oil Organisation (IFFO) 2023 report and CRISIL MI&A Research estimates, aquaculture feed represents the dominant use of fish meal globally at ~88% for calendar year 2022. Fish meal is transported from the factory to the compound animal feed manufacturers, where it is mixed with other ingredients to make ideal aquaculture or animal feed. Some of the key players operating in the Indian aquaculture feed manufacturing industry include Avanti Feeds, Godrej Agrovet, Anmol Feeds, CP Foods, Devi Sea Foods, and Grobest Foods.

Fish meal is also used to fortify feed for animals and poultry. According to industry interactions, incorporating less than 5-10% in the feed for farm animals achieves positive effects. Fish meal has served as a protein source for

livestock for decades because in addition to the beneficial protein and amino acid composition, it has high digestibility of over 90%.

Fish meal and fish oil contribute indirectly to human consumption as they are used as feed in aquaculture and livestock raising. Application in aquaculture which has been recording high growth rates worldwide due to the limited catch of wild fish, is especially important for fish meal and fish oil as it forms an important diet constituent.

Uses of fish meal (in CY 2022)

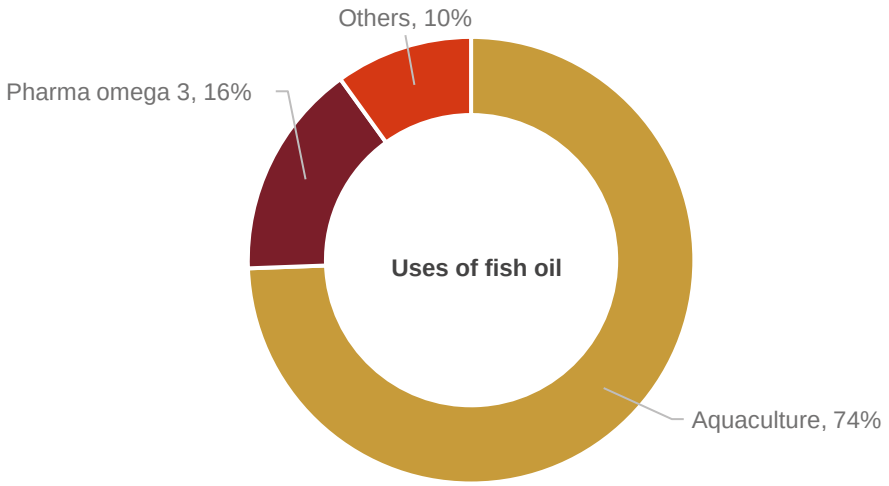


Note: Others include other animal husbandry industries such as cattle, pet feed and agriculture fertiliser
Source: IFFO, CRISIL MI&A Research

Fish oil is largely used for aquaculture feed to maintain omega-3 diet nutrient

As per the IFFO 2022 report and CRISIL MI&A Research estimates , aquaculture feed sector dominates fish oil consumption with ~74% share worldwide, as of 2022. Aquaculture feed requires fish oil as specific species such as oily or carnivorous fish (salmonids and shrimps), chiefly consumed by humans, need to be fed with feed containing fish oil in order to ensure natural diet and achieve the natural nutrient make-up of fish.

Uses of fish oil (in CY 2022)



Note: Others include cosmetics, animal feed industry, and industrial applications such as paints, leather processing, inks, and lubricants
Source: IFFO, CRISIL MI&A Research

6.2. Indian fish meal and fish oil industry size

In India, Karnataka, Kerala, Maharashtra, Gujarat and Tamil Nadu are home to key fish meal plants. Karnataka has the maximum number of plants, mostly in and around Mangaluru.

Indian fish meal and fish oil industry is estimated to reach Rs. 16-20 billion by fiscal 2026

CRISIL MI&A Research estimates, the Indian fish meal and fish oil industry de-grew at a CAGR of (4)-(5)% from Rs. 18.0 – 24.0 billion in fiscal 2018 to Rs. 13.0 – 17.0 billion in fiscal 2022. While in volume terms, it is estimated to have de-grown at a CAGR of (9)-(13)% from 180,000 – 220,000 tonnes in fiscal 2018 to 100,000-140,000 tonnes in fiscal 2022. This decline can be attributed to the decrease in fish landing (specifically of oil sardine fish) over the years due to change in climatic and natural conditions. In addition, as per our industry interactions, implementation of GST on fish oil (at 12%) and fish meal (at 5%), since 2019, has led to increase in prices, causing end consumers to favour cheaper imports as compared to domestic produce.

However, in fiscal 2023, the industry is estimated to see a huge jump in value as well as volume. It is likely to see an on-year growth of 130-170% in value terms and 90-130% in volume terms. This sudden rise can be majorly attributed to the increase in oil sardine landings (major raw material for fish meal and fish oil) coupled with increased traction in exports led by production shortage in Peru region and higher exchange rates in the global markets.

The fish meal and fish oil industry is seasonal in nature as the production during a period is majorly dependent upon the fish landings (fish availability) during that period. The landings of Indian oil sardines - the major raw material used in production of fish meal and fish oil - has seen a fluctuation over the years. These fluctuations in landings that bring in seasonality in the industry is majorly influenced by various factors which include environmental factors such as sea surface temperature, salinity, rainfall, upwelling, food availability; environmental events such as El Nino with a reduced rainfall and high temperature along with excessive fishing on the stock beyond the maximum sustainable yield, and excessive capture of juveniles.

In addition, the industry is broadly divided into established players or large players and seasonal players or small players. In case of a period where there are lower landings the established players get access to larger share of landings while the seasonal players get limited access to the landings. However, during the period of high landings both seasonal players and established players get access to fish (raw material) on account of surplus availability.

During fiscal 2023, when the Indian oil sardine landings have seen a sudden rise, both established and seasonal players got access to raw material and contributed to the supply / production. Prior to fiscal 2023, where the industry has seen lower landings, majorly established players contributed to the supply / production while small players operated at lower or zero utilization levels contributing negligibly to the supply / production.

Also, as per industry interactions and from past data on landings it is to be understood that volume of fish landings tend to exhibit moderation post a high landing period. Further, over long term, CRISIL also estimates the landings to moderate because of weather conditions such as El Nino and also due excessive catch of juvenile fish. With such scenario, the small players seize to operate or operate at lower utilization levels causing the overall industry capacities to be lower over the longer term. Hence, going forward, CRISIL estimates the overall industry volume to grow at a CAGR of 3-7% from the base of fiscal 2022 reaching an overall volume of 130,000 – 170,000 tonnes by fiscal 2026.

In value terms the industry is expected to grow at of 5-9% between fiscal 2022 and 2026 reaching Rs 16-20 billion. In fiscal 2023, the value growth is supported by both price and volume. The production shortage in Peru has

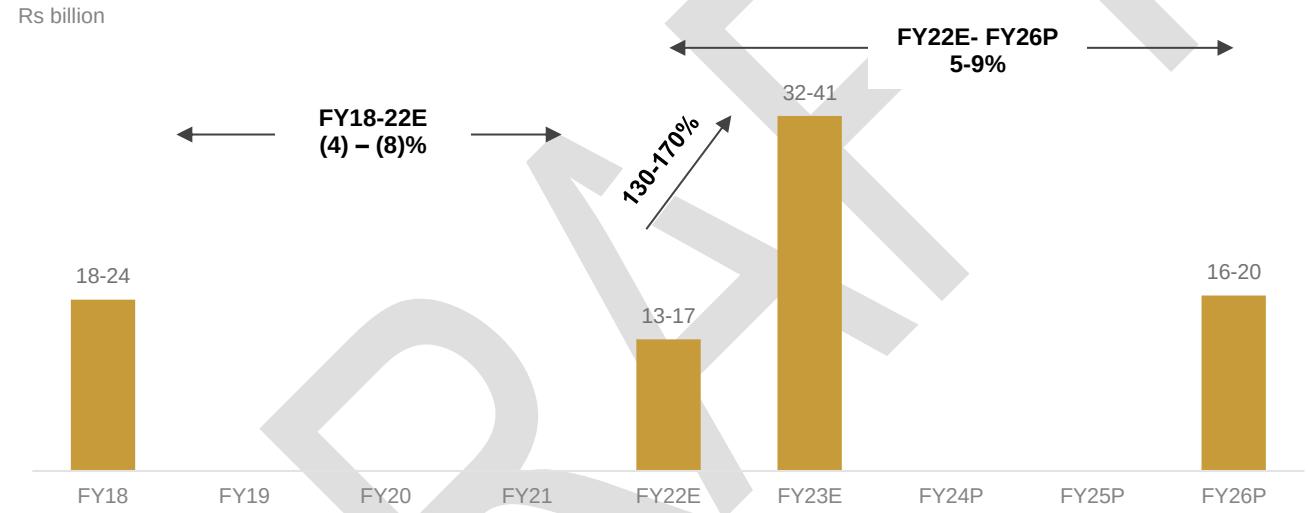
supported the growth in exports leading to rise in prices for the fiscal which CRISIL expects to see a moderate growth over the longer term.

It is to be noted that, this future growth is majorly dependent on the improvement of fish landings. Alternatively, if the fish landings tend to decline further from the levels of 2022, CRISIL expects the industry remain stagnant or show moderate signs of decline during the aforementioned period when compared to fiscal 2022.

According to IFFO, aquaculture growth is not limited by availability of fish meal, though it remains an essential feed constituent which is not easy to substitute. Growth of the aquaculture industry will thus provide an opportunity for fish meal and fish oil players.

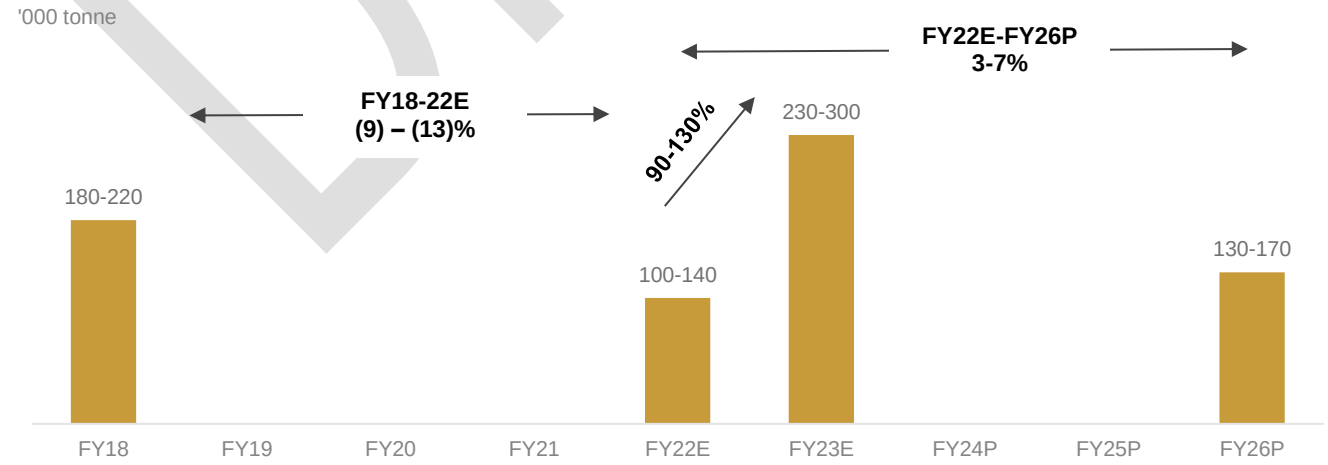
Though there exists an adequate demand for fish meal and fish oil in India driven by the aquaculture industry, the production of fish meal and oil depends on the natural availability of fishes and prevailing climatic conditions during the period in turn creating a supply constraint. In addition to that, the fish availability also depends on the reduction in unsustainable fishing practices wherein juvenile fishes are being caught and processed resulting in overexploitation of resources leading to reduction in fish stock.

Industry size of Indian fish meal and fish oil (value terms)



Note: E: Estimates, P - projected
Source: CRISIL MI&A Research

Industry size of Indian fish meal and fish oil (volume terms)



Note: E: Estimates, P – projected
Source: CRISIL MI&A Research

6.3. India's fish meal and fish oil (FMFO) export trend

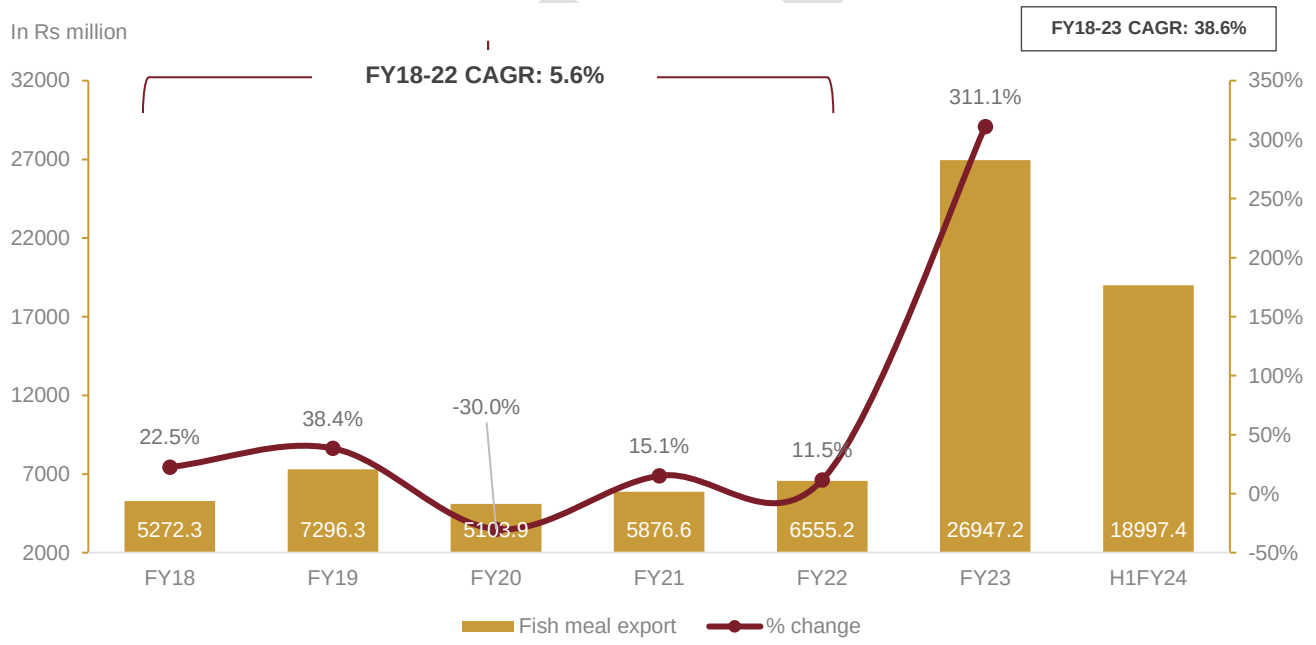
The Indian fish meal and fish oil industry caters to both export and domestic markets. It is marked by seasonality. According to industry sources, the peak season for exports is from August to December/January. Export demand is dependent on production from the top 10 producing countries and inventory levels.

Post sluggish growth between fiscal 2018-22, fish meal exports saw a rise in fiscal 2023 supported higher landings

In value terms, fish meal exports increased at ~5.6% CAGR from Rs. 5,272.3 million in fiscal 2018 to Rs. 6,555.2 million in fiscal 2022. Fish meal exports have stagnated with fiscal 2022 volumes at ~70 thousand tonne, registering mild growth of 0.1% from fiscal 2018. Growth has not been uniform across years, as exports are dependent on factors such as: i) the catch during a year, which is affected by climate changes, and ii) demand from the domestic compound feed industry.

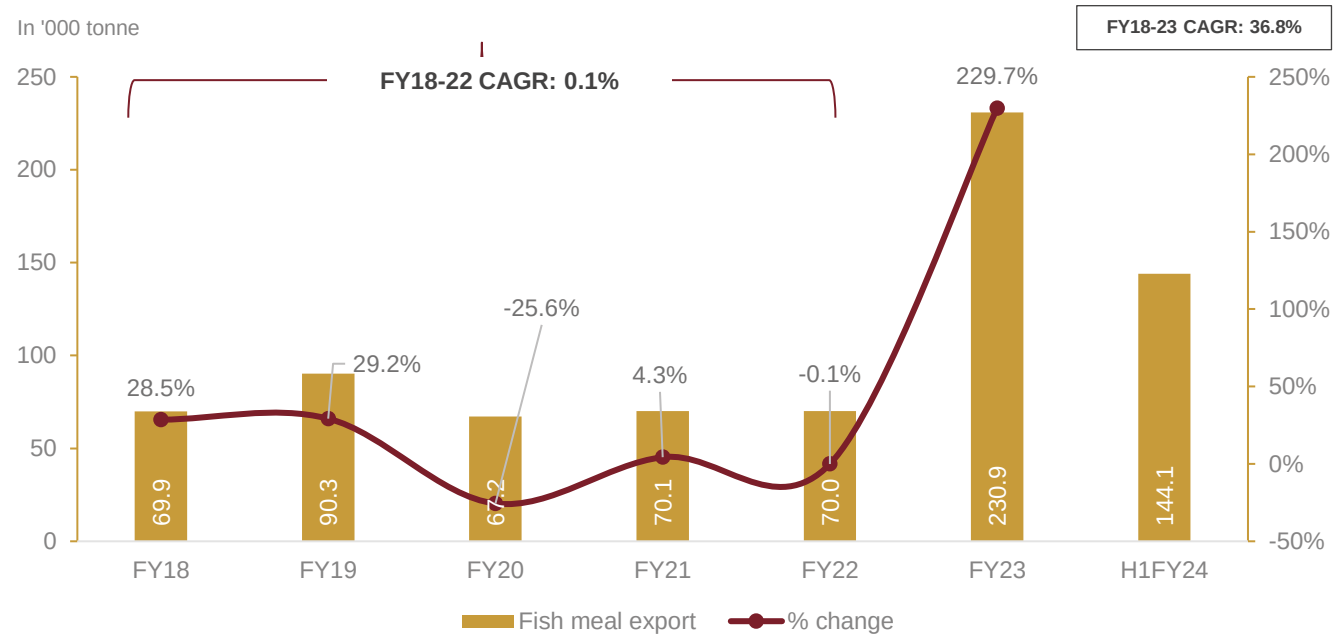
In fiscal 2023, the fish meal exports saw huge jump reaching Rs. 26,947.2 million. This rise in exports of fish meal during fiscal 2023 can be majorly attributed to the rise in raw material resources – oil sardine landings, coupled with shortage of fish meal production in Peru (a leading manufacturing country). This, coupled with depreciation of India rupee against the US dollar, has provided a further push for exports during the fiscal 2023 period.

India's exports of fish meal in value terms (FY18-H1FY24)



Source: DGCI&S, CRISIL MI&A Research

Exports of fish meal in volume terms (FY18-H1FY24)

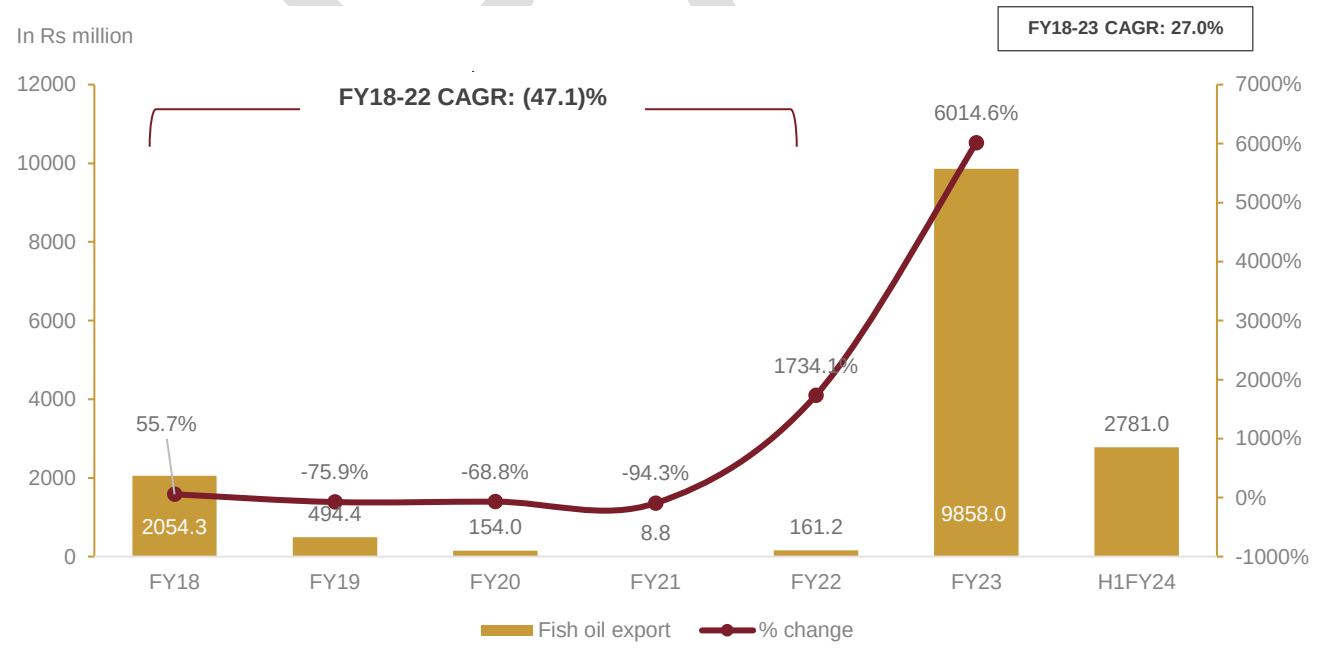


Source: DGCI&S, CRISIL MI&A Research

Led by rise in fish landings fish oil exports saw a huge jump in fiscal 2023

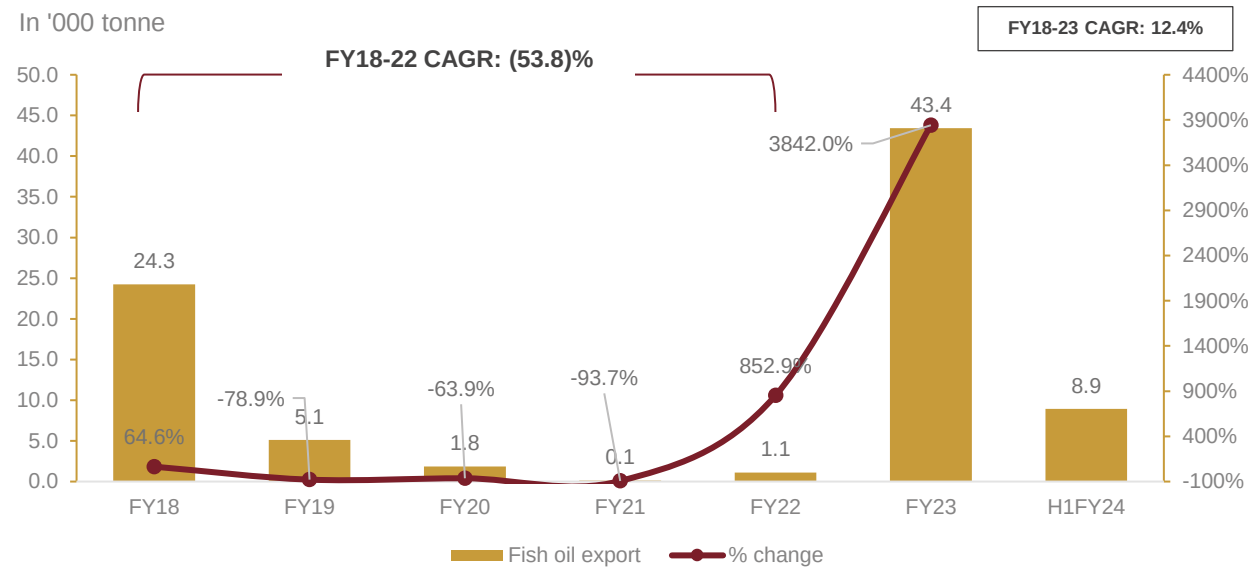
Fish oil exports in value terms declined from Rs. 2,054.3 million in fiscal 2018 to Rs. 161.2 million in fiscal 2022 at a CAGR of ~47%. The volume of fish oil exports also saw a dip at a similar rate as value. In volume terms, fish oil exports dropped from 24.3 thousand tonne in fiscal 2018 to 1.1 thousand tonne in fiscal 2022 at a CAGR of 54%. Growth in fish oil exports was affected by species and quality of fish landings.

Exports of fish oil in value terms (FY18-H1FY24)



Source: DGCI&S, CRISIL MI&A Research

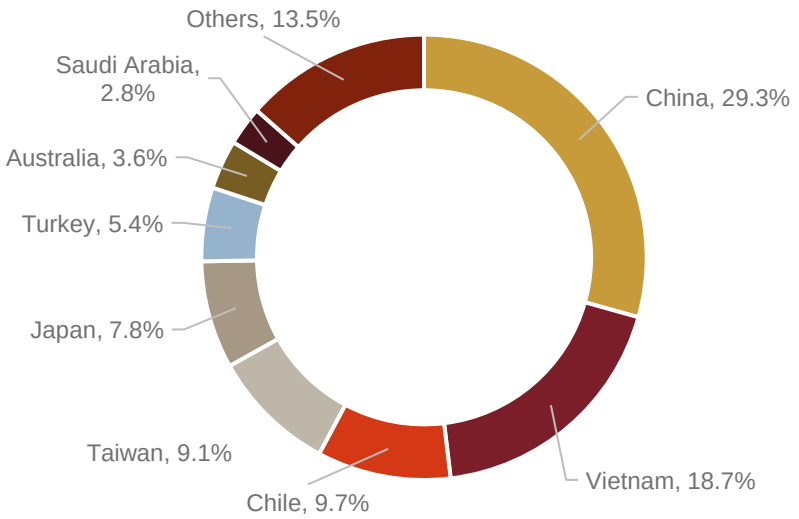
Exports of fish oil in volume terms (FY18-H1FY24)



Source: DGCI&S, CRISIL MI&A Research

As mentioned earlier in the case of fish meal, exports of fish oil also saw a rise during fiscal 2023 due to higher landings of oil sardines, production shortage in the Peru region and a higher exchange rate scenario in the global markets.

Share of countries in Indian fish meal and fish oil exports: as of fiscal 2023 (In value terms)



Source: DGCI&S, CRISIL MI&A Research

In value terms, during fiscal 2023, China, Vietnam, China and Japan became top 4 exporting nations for India in terms of fish meal and fish oil.

7. Overview of the global animal feed industry

7.1. Demand from aquaculture farms to boost fish feed and allied industries

The anticipated growth of the aquaculture industry is expected to drive growth of the fish feed and allied industries, which can be seen from the growth rate in exports.

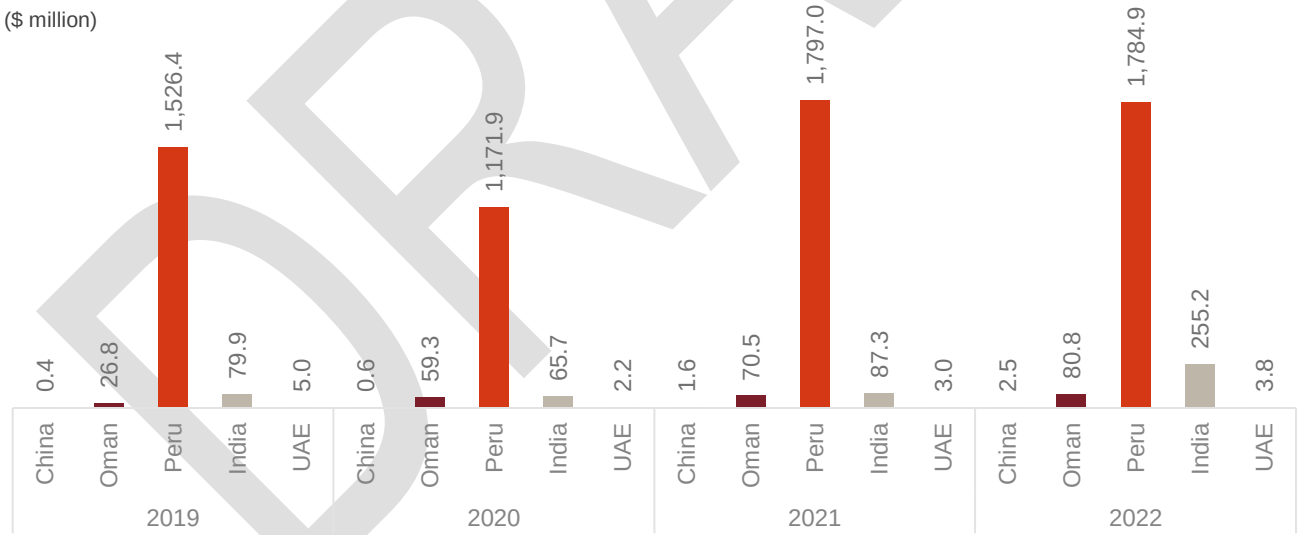
China, Chile, Denmark, Iceland, India, Japan, Norway, Peru, Thailand, the US and Vietnam are the key producers of fish meal and fish oil. China utilises fish meal primarily for the domestic industry. In fact, China is a net importer of fish meal, largely for its aquaculture farm and feed industries.

As per IFFO data, Peru is the leader in fish meal and fish oil production, as it has the largest and superior-quality oily fish along its coast. Due to low domestic consumption, the produced fish meal and fish oil are sold in global markets.

In the European Union, Norway and Denmark are the major producers of fish meal and fish oil. Norway is the largest consumer of fish meal and fish oil globally, due to its aquaculture production.

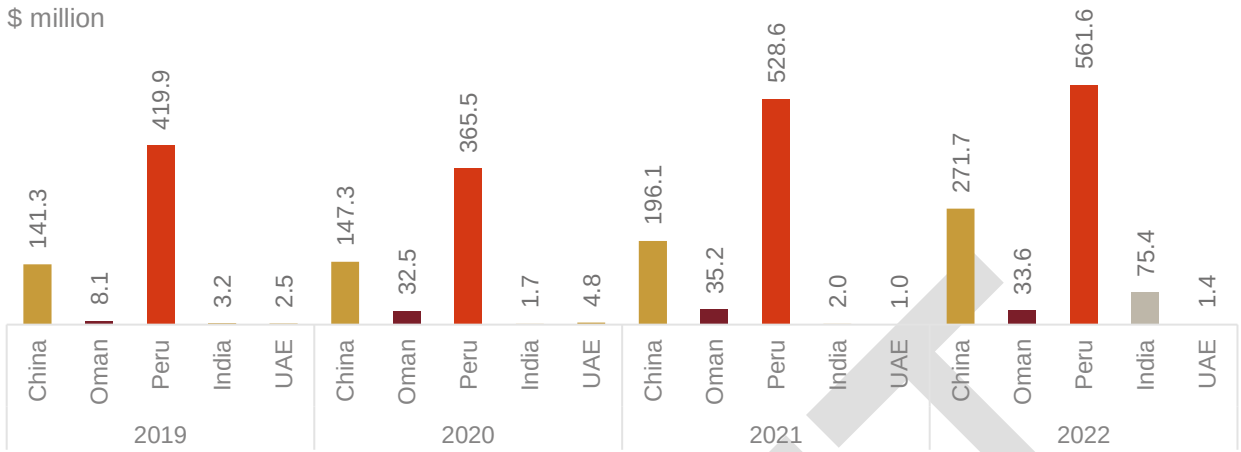
As per industry interactions, India is not a major exporter of fish meal and fish oil when compared with the top 10 countries. On average, the Indian fish meal and fish oil grade contains lower protein than the Peruvian grade, owing to limited availability of high-quality oily fish along its shores. The country's main export markets for fish meal and fish oil are Australia, Bangladesh, Japan, Malaysia, Saudi Arabia, Taiwan, Thailand and Vietnam.

Export of fish meal from select countries



Note: Six-digit HS code from UN Comtrade is considered to arrive at the export figures; HS code used is 230120.
Source: UN Comtrade, CRISIL MI&A Research

Export of fish oil from select countries



Note: Six-digit HS code from UN Comtrade is considered to arrive at the export figures; HS code used is 150420.
Source: UN Comtrade, CRISIL MI&A Research

8. Competitive assessment of key players

Data in this section is obtained from publicly available sources, including annual reports of players, regulatory filings, and/or company websites. The financials used in the competitive section are re-classified by CRISIL based on the annual report and financial fillings by the players.

CRISIL has considered the following companies as competitors for Mukka Proteins Limited. These lists of companies either operate in same line of business or offer same product portfolio as that of Mukka Proteins Limited and available in public domain. Please note the peers set considered below is an indicative list and not an exhaustive list of players present in the fish meal and fish oil industry

8.1. Operating parameters

Brief information about key players in the industry

Company name	Established in	Registered as company in	Production capacity (in metric tonne per day)	Plant locations	Corporate office
Mukka Proteins Ltd	2003	2010	167	Mangalore, Karnataka	Mangalore, Karnataka
TJ Marine Products Pvt Ltd	2004	2014	240	MIDC Ratnagiri, Maharashtra	Udupi, Karnataka
Arbee Aquatic Proteins Pvt Ltd	1978	2013	82	Alleppey, Kerala	Kottayam, Kerala
Akash Fishmeal and Fish Oil Pvt Ltd	-	2015	160	Vengurla, Maharashtra	Sindhudurg, Maharashtra
Omega Fishmeal and Oil Pvt Ltd	2011	2011	200	Ratnagiri, Maharashtra	Mumbai, Maharashtra

Note:

- *Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players*
- *Other than mentioned above, plants of subsidiaries for Mukka Proteins Ltd are located at Ullal (Karnataka), Jafarabad (Gujarat), and at Asrar and Shinas in the Sultanate of Oman.*
- *Data on production capacity for all players is sourced from MPEDA as of 9th December 2023 and reflects the export-approved standalone capacity*
- *Capacity mentioned above is output capacity for respective players*

Source: MPEDA, CRISIL MI&A Research

Product offerings of key players

Company name	Fishmeal	Fish oil	Fish soluble	Other
Mukka Proteins Ltd	✓	✓	✓	✓
TJ Marine Products Pvt Ltd	✓	✓	✓	-
Arbee Aquatic Proteins Pvt Ltd	✓	✓	✓	-
Akash Fishmeal and Fish Oil Pvt Ltd	✓	✓	-	-
Omega Fishmeal and Oil Pvt Ltd	✓	✓	✓	-

Note:

- *Other includes product offerings unrelated to fish meal and fish oil processing*
- *Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players*

Source: CRISIL MI&A Research

Exports of fish meal and fish oil

Financial year	FY18	FY19	FY20	FY21	FY22	FY23	H1FY24
Fish meal exports ('000 kg)							
Mukka Proteins Ltd	21,460	28,412	37,596	34,320	15,200	40,630	26,500
Total India exports	69,875	90,296	67,180	70,089	70,032	230,916	144,064
Share in (%)	31%	31%	56%	49%	22%	18%	18%
Fish oil exports ('000 kg)							
Mukka Proteins Ltd	2,823	1,038	962	113	0	4,594	0
Total India exports	24,252	5,107	1,846	116	1,102	43,433	8,934
Share in (%)	12%	20%	52%	98%	0%	11%	0%

Note:
Standalone Mukka Proteins Ltd is considered for above analysis
Source: Company interactions, DGCIS, CRISIL MI&A Research

Market share (fiscal 2022)

Company name	Total operating revenue (Rs. billion)	Market share (%)	Indian fishmeal and fish oil industry (Rs. billion)
Mukka Proteins Ltd	6.9	45-50%	13-17

Note: Market share is based on standalone financials
Source: CRISIL MI&A Research

Market share (fiscal 2023)

Company name	Total operating revenue (Rs. billion)	Market share (%)	Indian fishmeal and fish oil industry (Rs. billion)
Mukka Proteins Ltd	10.6	25-30%	32-41

Note: Market share is based on standalone financials
Source: CRISIL MI&A Research

Capacity share of fish meal and fish oil

Overall capacity estimated (MT per day)	Mukka Proteins Ltd (MT per day)	Share (%)
4,600 – 5,200	416	8-9%

Note:

- *Overall capacity is as per MPEDA database as of March 2023*
- *Capacity for Mukka Proteins Ltd is as of March 2023*
- *To arrive at the MPEDA capacity for fish meal and fish oil CRISIL has considered*
  - *Capacity of players who manufacture items of type Dried & Other Non-edible, Others-Non-Edible & Others-Edible, Others-Non-Edible, Frozen & Others-Non-Edible as per MPEDA database.*
  - *Capacity of fish meal and fish oil given out in MPEDA newsletter of January 2020.*
- *Capacity additions in fish meal and fish oil industry is limited by the low-capacity utilization and scarcity of resources*
- *Above-mentioned capacity for Mukka Proteins Ltd includes fish meal, fish oil and fish soluble*

Source: MPEDA, CRISIL MI&A Research

Financial parameters

Key financials for fiscal 2023

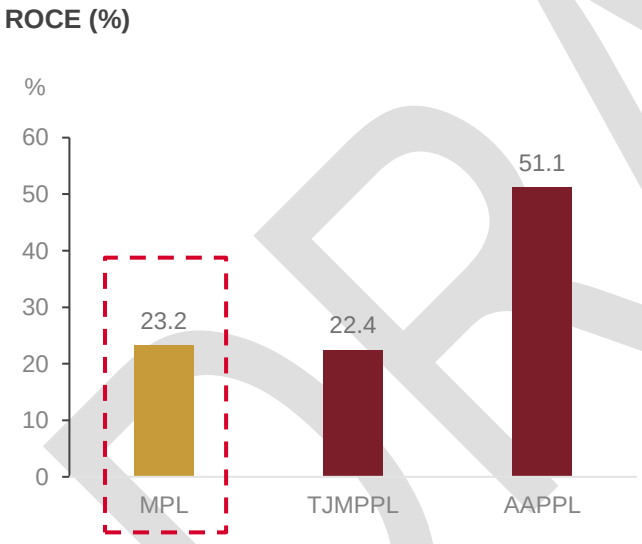
Company name	Standalone/ consolidated	Operating Revenue	CAGR (FY20-23)	Operating profit	Operating profit margin	Net profit	CAGR (FY20-23)	Net profit margin
		Rs. million	%	Rs. million	%	Rs. million	%	%
Mukka Proteins Ltd	Standalone	10,664.0	24.5%	656.7	6.2%	394.2	45.4%	3.7%
TJ Marine Products Pvt Ltd	Standalone	4,536.3	39.3%	198.9	4.4%	105.1	134.5%	2.3%
Arbee Aquatic Proteins Pvt Ltd	Standalone	1,097.1	40.3%	157.0	14.3%	96.5	79.8%	8.8%
Akash Fishmeal and Fish Oil Pvt Ltd #	Standalone	807.7	N.Ap	52.6	6.5%	4.3	N.Ap	0.5%
Omega Fishmeal and Oil Pvt. Ltd #	Standalone	38.0	N.Ap	(25.5)	(67.1)%	(69.6)	N.Ap	(183.4)%

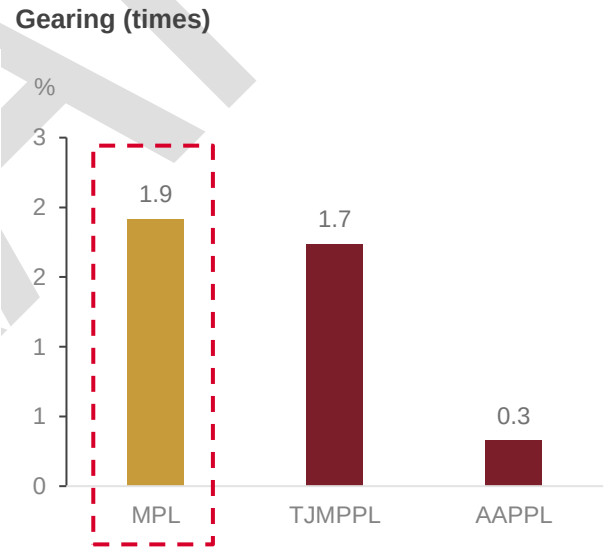
Note:

- *Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players*
- *#: Values are as of fiscal 2022 as fiscal 2023 data for respective companies is not available on Ministry of Corporate Affairs (MCA)*
- *N.Ap: Not applicable*

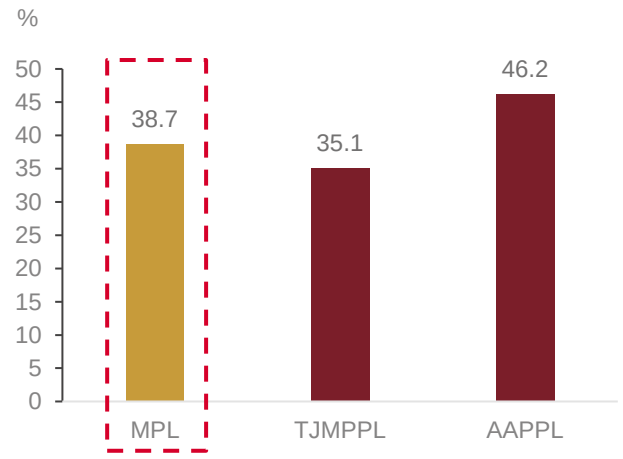
Source: Company annual reports, CRISIL MI&A Research

Other key financial ratios for fiscal 2023

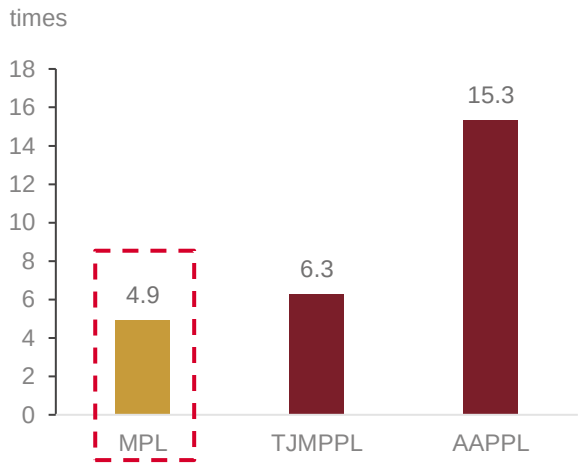




ROE (%)



Interest coverage (times)



Note:

- *MPL: Mukka Proteins Ltd; AAPPL: Arbee Aquatic Proteins Pvt Ltd; TJMPPL: TJ Marine Products Pvt Ltd*
- *For Akash Fishmeal and Fish Oil Pvt Ltd and Omega Fishmeal and Oil Pvt Ltd, the latest available data is as of fiscal 2022; hence they are not mentioned above*

Source: Company annual reports, CRISIL MI&A Research

Key observations

- Mukka proteins limited through its promoters has presence in the fish meal and fish oil industry since 1975. Among the other players listed above, Arbee Aquatic Proteins Pvt Ltd has presence in the fish meal and fish oil industry since 1978.
- Over the past 5 years, fiscal 2018 to 2022, share of Mukka Proteins limited in fish meal exports from India has ranged from 30-60% in volume terms and in fiscal 2023 the share of Mukka Proteins Ltd stand at 18%. It is to be noted that the share of Mukka Proteins Limited varies acutely on a year-on-year basis. During the fiscal 2023, the export of fish meal (in volume terms) for Mukka Proteins Ltd has seen a rise, however, company's share in the industry during the same period saw a dip compared to fiscal 2022. This can be attributed to substantial increase in high fish landings during the fiscal year leading to small or seasonal players re-entering the market coupled with production shortage in Peru region providing for an export opportunity for the Indian market.
- Between fiscal 2018 to 2022, share of Mukka Proteins limited in fish oil exports from India has ranged from 20-50% in volume terms and in fiscal 2023 the share of Mukka Proteins Ltd stand at 11%. During the fiscal 2023, the export of fish oil (in volume terms) for Mukka Proteins Ltd has seen a rise, however, company's share in the industry during the same period saw a dip when compared to previous fiscals as mentioned above. Further, it is to be noted that the share of players in the industry varies acutely on a year-on-year basis depending upon various factors which include overall fish landings during the period, quality of fish caught, price for fish oil in the export market, demand for fish oil in the export market and demand catered by other major exporting nations such as Peru and China.
- As per CRISIL estimates, Mukka proteins limited with total operating revenue of Rs. 6.9 billion, has a market share of 45-50% in the fish meal and fish oil industry for fiscal 2022 which is estimated to be around Rs.13-17 billion for the corresponding period.
- As per CRISIL estimates, Mukka proteins limited with total operating revenue of Rs.10.6 billion, has a market share of 25-30% in the fish meal and fish oil industry for fiscal 2023 which is estimated to be around Rs. 32-41 billion for the corresponding period.

- In terms of operating revenues, among the players compared above Mukka Proteins limited is the largest player with operating revenue of ~Rs. 10.7 billion for fiscal 2023. TJ Marine Products Private Limited is the second largest player with revenue of ~Rs. 4.5 billion for fiscal 2023. Similar data on operating revenue is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered.
- Operating revenue for Mukka Proteins limited has grown at a CAGR of ~24% from fiscal 2020 to 2023. Operating revenue of Arbee Aquatic Proteins Pvt Ltd has seen a faster pace of growth at a CAGR of ~40% during the aforementioned period. Similar data is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered.
- Net profit for Mukka Proteins limited has grown at CAGR of 45.4% from fiscal 2020 to 2023. Meanwhile, TJ Marine Products Pvt Ltd grew at the fastest pace, at ~134% CAGR, among the peers mentioned above. Similar data is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered
- In terms of profitability, Arbee Aquatic Proteins Pvt ltd. ranks higher among the players listed above, with net profit margin of ~14% for fiscal 2023. It is followed by Mukka Proteins limited and TJ Marine Products Private Limited. Similar data is not available for Akash Fishmeal and Fish oil Private Limited and Omega Fishmeal and oil Private Limited during the period considered
- As per CRISIL estimates and MPEDA database, Mukka Proteins Limited (at consolidated level) occupies a share of 8-9% in the overall fish meal and fish oil capacity in India. The low share in capacity can be attributed to non-operation of few units and limited utilization rates of plants in fish meal and fish oil industry, as CRISIL has considered capacities registered with MPEDA for fish meal and fish oil industry.
- It is vital to note that, unavailability of raw materials i.e., fish species required to produce fish meal and fish oil acts as the major constraints in the fish meal and fish oil industry rather the production capacities available.

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