Chapter 24

Input and service delivery system in fisheries

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India is endowed with a broad range of marine and aquatic resources, which support a thriving fish economy. Bounded by the Indian Ocean along its southern, eastern and western borders, India's exclusive economic zone (EEZ) extends over a distance of 8 129 km and encompasses an area of 2.02 million km^2. As well as the ocean, a variety of inland water bodies – rivers and canals, reservoirs, lakes, lagoons, floodplain wetlands, and brackish water ponds – all add to the diversity of aquatic resources in the country. India is the fourth-largest capture (marine and inland) fisheries and second-largest aquaculture nation in the world (FAO, 2020). India is the second largest fish producer in the world accounting for 7.58 percent of the global production. India's fish production reached an all-time high of 14.16 million metric tonnes in 2019-20. This sector contributes 1.24 percent to GVA in the economy and 7.28 percent to GVA from agriculture. Export of marine products in 2019-20 was 12.9 lakh metric tonnes and Rs 46,662 crore. Several initiatives of the central government, such as the Blue Revolution and the Pradhan Mantri Matsya Sampath Yojana (PMMSY), have attempted to tap the potential of the sector (Economic review,2021).

The entire fisheries system is divided in to capture fishery and culture fishery. India is the 2nd largest producer of fish in the world and about 68% of India's fish comes from the aquaculture sector. In terms of employment, the sector supports the livelihood of over 28 mn people in India especially the marginalized and vulnerable communities. The Government of India estimates that the fisheries sector supports the livelihood of nearly 16 million people in India at the primary level, and almost twice that number along the value chain (Van Anrooy et al.,2 022). Therefore, an efficient delivery system for fishery inputs and services can play a crucial role in the growth of farm income. The most of the fishers and input dealers are experiencing challenges and constraints in accessing and supplying the fisheries inputs respectively. The most notable constraint faced by farmers is access to farm inputs due mainly to poor delivery system in country.

Major inputs required for the fishery development are given below

1. Labour

Labour is the important element of any production system. Major labour market in the fishery sector constitutes by the fishermen community. The Government of India estimates that the fisheries sector supports the livelihood of nearly 16 million people in India at the primary level (Table 1), and almost twice that number along the value chain (Van Anrooy et al.,2022). In terms of employment, the aquaculture supports the livelihood of over 28 mn people in India especially the marginalized and vulnerable communities. However, the sector witnessing a downward mobility or migration of labours from fishery to other sectors due to economically not viable and unprofitable especially after the modernisation.

Table 1: Number of fishermen engaged in fishery activities

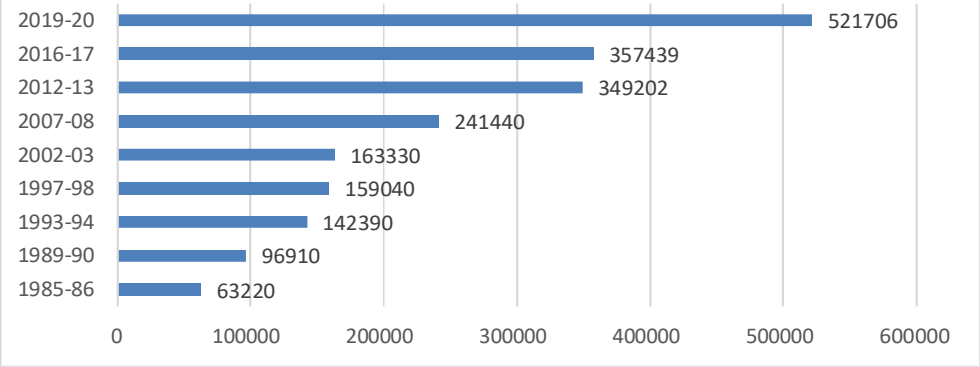
	Male	Female	total
Inland	1,3,0,13,978	10103842	2,31,17,820
Marine	26,51,652	22,99,065	49,45,717
	1,56,65,630	1,23,97,907	2,80,63,537

Source: Fishery statistics 2020

2. Fish seed and feeds

Fish seed means fish egg, larva or post-larva of fish or the spawn, fry or fingerling of fish. Fish seed production means all the operations leading up to and including final harvesting of the seed from the seed crop field. The freshwater aquaculture system in the country is primarily confined to the major Indian carp, Katla, Rohu, and Mrigala, while exotic carp, gorge carp, silver carp, and common carp become the second major group (Shukla et al.,2021). An adequate supply of carp seeds of the required species at the appropriate time is essential for the success of aquaculture activities (Katiha et al.,2003). Major inputs for the aquaculture system are feed and seeds of fishes. In past decades, the major seed source was wild catches from natural water bodies such as rivers, streams, estuaries, and the sea. In recent years technologies have been developed for high and quality production of fish seeds, such as selective breeding, hypophysation, induced breeding by hormonal injection (ovaprim, ovatide),and intensive breeding(Katiha et al.,2003).The development of indigenous technology of hypophysis revolutionized the spawning of major carp.

Figure 3. Fish seed Production (lakh fry)



Studies show that one of the biggest limitations of aquaculture development is the chronic shortage of quality fish seeds and feed, which has been overcome by technological advances in fish feed and seed production. Moreover, the availability, quality, and quantity of fish seeds have a significant impact on the aquaculture industry (Nyimbili&Musuka, 2017).

3. Craft and gear

Vessel and gear are the major fishing equipment's. Fishing gears are defined as tools used to capture marine/aquatic resources, whereas how the gear is used is the fishing method. Additionally, a single type of gear may also be used in multiple ways. Different target species require different fishing gear to effectively catch the target species. Trawlnet , Gillnet , Driftnet , Ringseine , Purseseine , Boatseine ,Bagnet ,Shoreseine , Castnet ,Hooks & line are the important gears used in India for fishing. Technological advances in introducing new equipment for fishing gears, the mechanization of fishing crafts, and the introduction of modern methods for navigation and fish location have led to a significant increase in fish production in India over the years. Based on the technology used in the vessel it is further divided into three, mechanised, motorised and non-motorise.

Mechanized craft: Any fishing craft with engine permanently fitted to the hull, which uses machine power for both propulsion as well as fishing operation like casting and pulling the net, operating lines, etc., is identified as mechanized craft. It includes Trawler, Gillnetter, Purseseiner, Dolnetter, Ringseine.

Inboard craft: Any fishing craft that has an engine permanently fitted to the hull or central portion of the craft, which is used only for propulsion and not for fishing operation, is identified

as Inboard craft. It includes Wooden Built, Iron Built, Wood Fibre etc. ***Motorized (Outboard)*** craft: Any fishing craft that has an engine fitted temporarily outside the craft, which is used only for propulsion and not for fishing operation, is identified as motorized craft. Dugout canoe, Plank built boat, Plywood boat, Fibre glass boat.

Non-motorized craft: Any fishing craft that does not use any kind of machine power for propulsion as well as fishing operation. Dugout canoe , Catamaran , Plank built , Ferro cement , Thermocol , Outrigger canoe, Masula boat.

4. Ice and cold storage facility

Safety and quality issue is a major concerned that affect the efficiency of the supply chain of fish. Since fish is a highly perishable commodity, it starts spoilage within a short period of period time. Ice is the major material used for chilling purpose. Ice plants play major role in fish quality management during transportation and processing. Available ice plants and cold storage facility in different marine state of India is given in table 2.

Table 2: Ice plants and other cold storage facilities sanctioned under blue revolution scheme from 2015-16 to 2019-20 in India

Items	No
Ice plants	221
Cold storage facility	8
Ice plant cum cold storage unit	104
Refrigerator and insulation trucks	206
Insulator truck 6t capacity	112

Source: fishery statistics, 2020

Development in ice plants and cold storage units facilitate to improve the countries fish export. One major issue is the lack of awareness about need to use ice, non-availability of good quality ice and affordable prices. The institutional mechanism to assure quality and safety of fish is limited to occasional inspection by the authorities, but is quite inadequate and doesn't serve as a deterrent. One immediate necessity is to provide infrastructure and facilities for cold storage across the supply chain, including the retail markets.

Service delivery system in fishery sector

2.1. Credit delivery

Availability and access to adequate, timely and low-cost credit from institutional sources is particularly important for small and marginal farmers. Along with other inputs, credit is essential for establishing sustainable and profitable farming systems.While examining the credit delivery system in the fisheries sector, which mainly involves informal players such as auctioneers-middlemen, third-party shareholders and private moneylenders; and formal sources such as fish fed societies, cooperative banks, commercial banks and non-banking financial institutions.

2.1.1. Informal credit financers

a. Auctioneers / Commission agents

This is usually a feature of inter-linked deals, in which the commission agent/auctioneer enters into an output-tying contract with the vessel-owner, and the fisherman in need of a loan. The contract is purely an unwritten and on mutual trust between payee and payer. Under the commission agent system, fishermen get credit under the condition that the future catches from their vessels are marketed through the commission agent/auctioneer at an agreed-upon rate of commission. Commissions are based only on the quantity of fish catch up and uncorrelated to the amount of outstanding debt. As long as a debtor fisherman has an outstanding loan, he is bound by the contract not only to continue selling their catches through the creditor-auctioneer but also to pay the due commission per catch.

b. Third party

Third-party share is another way to raise funds for capital expenses or unforeseen expenses such as repairs and maintenance. These shares are usually issued to people outside the fishing community or to businessmen outside the locality those who wish to invest in the fishing business. Interest is paid as a share of the harvest income from fishing. The value of a share in a fishing vessel is generally determined unilaterally by the primary shareholders, but it is strongly related to the financial performance of the vessel in question, the experience of the captain, and the general reputation of the shareholders and crew.

c. Money lenders

Money lenders played an important role in the credit financing among the fishermen community. Factors such as the urgency of funding requirements and faster access with less procedure have made them more acceptable. Interest rate charged by the money lenders are predetermined rate at regular intervals. Volumes of catch up, type or condition of vessel are not a considerable condition for availing loans.

d. Fisherman to fisherman

In addition to the above informal loans, the fishermen also resort to mutual loans, which are interest-free financial transactions based on the trilateral relationship between the fishermen. The triadic relationship between the debtor, the creditor, and the community ensures that the parties involved are insured against each other at any time through a severe financial crisis through forced transaction systems (baiju et al., 2019). It reveals the culture and unity of the fisherman community.

2.1.2. Formal credit institution

The formal agencies in delivery of credit for fisheries include scheduled commercial banks (CBs), regional rural banks (RRBs), cooperative societies, and private sector banks. These agencies lend credit for several activities in fisheries sector. In case of traditional fishers (artisanal fishers), the Kerala State Co-operative Federation for Fisheries Development Ltd. (Matsyafed) provides credit to a diverse set of activities.Some of non-banking financial institutions are also rendered credit services to the fisherman. These are the financial companies registered under companies act 1956 and are providing loans and advances, acquisition of shares, stocks, bonds, hire-purchase, insurance business under the RBI rule of law (Baiju et al.,2019). Easy access to loans without sufficient guarantees is the main advantage of this institution and this is the winning card of these forms of institutions however interest rates are higher than banking institutions. Muthoot fin crop, Bajaj finance are some of the leading creditors in this sector.

Micro finance is another major bank of beach. It provides loans to poor fishermen for the financial needs of their families and small businesses. For example, in Kerala, Society for Assistance to Fisherwomen (SAF), an agency functioning under the Department of Fisheries,

GoK provides micro credit to fisherwomen to initiate micro enterprises, and cultivate thrift among fisherwomen. There are several other agencies in India that disburse credit to fisherfolk though SHG platforms.

2.2. Market system in fishery sector

A market is a place where the exchange of goods and services takes place as a result of the interaction of buyers and sellers either directly or through intermediary agents and institutions. Marketing is the series of human activities by which a product is exchanged between the producer and the consumer during which the place, time, form and possession desires of the consumers are satisfied. To make fish available to consumers at the right time and in the right place requires an effective marketing system. Fishermen who catch fish by labouring overnight (from common-property water bodies) do not usually sell fish in retail markets. At the break of day, they take their catches to places where traders meet them and bargain by the lot (FAO, 2022). The domestic fish marketing system in India is neither efficient nor modern and is mainly carried out by private traders with a large number of intermediaries between producer and consumer, thereby reducing the fisherman's share in consumer's rupee. Fish marketing system of the state can be broadly classified into two such as traditional and modern system of fish marketing. The traditional fish marketing system is more common in the state, even though modern and digital marketing models have recently emerged. In the case of marine fishes, marketing starts from the fish landing centres whereas, in the case of inland fishes, marketing starts at farm gate.

2.2.1. Traditional fish marketing system

Traditionally fish marketing and distribution systems have involved collecting, processing and transporting fish from fishermen in remote landing areas to major consumption centers. Fresh fish is sold from the landing site to intermediate processors who smoke the fish (sometimes the smoking is done by family processors) and sell to wholesalers or middlemen at a distance, who pass through some middlemen and are finally sold to customers.Fish landing centres are the primary fish markets from where fishes are transported to the wholesale or retail markets and these centres had the maximum number of intermediaries like auctioneers, commission agents, retail traders and export agents (Aswathy*et al*, 2014). In the traditional marketing system, a large number of intermediaries are involved. Various marketing channels involved in the marine fish

marketing system is given below, almost similar marketing channel exist in inland fisheries (CMFRI, 2020). **Marketing channel** is defined as a path traced in the direct or indirect transfer of title of a product as it moves from a producer to an ultimate consumer or industrial user. Thus, a channel of distribution of a product is the route taken by the ownership of goods as they move from the producer to the consumer or industrial user. Kohls and Uhl have defined marketing channel as alternative routes of product flows from producers to consumers. The number of intermediaries between the fishermen and the final consumers varies in different marketing channels, based on the quantum of landings and the effort required to perform various marketing functions such as assembling, cleaning, grading, processing, storing and transportation (Sathiyadhas*et al*, 2011). Different market channels in the traditional marketing system given below.

Channel 1: Primary market/landing centre →Auctioneer → Agents of freezing plants → Freezing plants → Fish stalls/ Exporters → Consumers

Channel 2: Primary market/landing centre → Auctioneer → Processors (curing) → Wholesalers (dry fish) → Retailers/ Exporters → Consumers

Channel 3: Primary market/landing centre → Auctioneer → Wholesalers (primary market) → Wholesalers (retail market) → Retailers → Consumers

Channel 5: Primary market/landing centre → Auctioneer → Commission agent → Wholesalers (interior market) → Retailers → Consumers

Channel 6: Primary market/landing centre → Auctioneer → Retailers/On-line retailers/Bulk purchase → Consumers

Fish from the distant landing centres were able to reach, wholesale and retail markets due to the technological advancements in marine fish transport and processing. The perishable nature of fish, on the other hand, necessitated its prompt disposal at each point of transaction, resulting in the involvement of many intermediaries in the marketing channel, leading to high marketing costs and margins (Aswathy et al., 2014). Besides auctioneers, market intermediaries in the traditional marketing system includes wholesalers, retailers, vendors, marine/ inland fishermen cooperatives, contractors. They were involved in the supply chain and undertake various activities such as cleaning, grading, sorting, processing, icing, packaging and transporting at

various levels of marketing. For instance, in Kerala fishermen welfare society (Matsyafed) performing the auctioneer's duty to avoid the exploitation of auctioneers. They also provide credit to the needy.

Market functionaries or institutions move the commodities from the producers to consumers. Every function or service involves cost. The intermediaries or middlemen make some profit to remain in the trade after meeting the cost of the function performed. In the marketing of agricultural commodities, the difference between the price paid by consumer and the price received by the producer for an equivalent quantity of farm produce is often known as farm-retail spread or **price spread**. Sometimes, this is termed as **marketing margin**. The total margin includes: (i) The cost involved in moving the product from the point of production to the point of consumption, i.e., the cost of performing the various marketing functions and of operating various agencies; and (ii) Profits of the various market functionaries involved in moving the produce from the initial point of production till it reaches the ultimate consumer. The absolute value of the marketing margin varies from channel to channel, market to market and time to time. Marketing costs and margins for major marine fish species in Kerala is depicted in table 3.

Table 3: Marketing costs and margins for major marine fish species in Kerala

Particulars	Seer fish	Tunnas	Pomfrets	Mullets	Mackerels	Oil sardines
Marketing channel I: Fishermen (Kerala)-Auctioneer-Commission agent-retailer-consumer (Kerala)						
Marketing costs as share of landing price (%)	2.9	16.7	4.4	10.0	5.1	11.4
Marketing margins as share of landing price (%)	33.7	31.7	37.3	34.0	38.5	45.7
Fishermen's share in consumers' rupee (%)	70.0	63.8	67.1	65.9	66.3	59.5
Marketing channel II: Fishermen (Kerala)-Auctioneer-Women vendors-consumer (Kerala)						

Marketing costs as share of landing price (%)		1.0	2.4	3.0	5.8
Marketing margins as share of landing price (%)		41.5	49.4	48.5	27.5
Fishermen's share in consumers' rupee (%)		70.2	65.9	66.0	75.0
Marketing channel III: Fishermen (Karwar)-Auctioneer-Commission agent (Wholesaler)-wholesaler-auctioneer-retailer-consumer (Kerala)					
Marketing costs as share of landing price (%)	8.1	9.3	20.9	26.9	77.9
Marketing margins as share of landing price (%)	69.7	29.5	66.6	60.7	108.1
Fishermen's share in consumers' rupee	56.8	53.2	42.6	29.1	15.0 (%)

Source: Aswathy, 2014

2.2.2. Modern marketing system

Online fish marketing is an innovative approach in the fish marketing system, trying to meet the increasing demand and delivery of high-quality fresh fish at an affordable rate within shortest time period (Salim, 2018). The rise of e-groceries and latest cost-effective freezing technologies had increased online fish retailing (Vishal ,2015).Online marketing of fish is also a growing business, especially after the Covid pandemic. Digital marketing/e-marketing, often called online marketing, internet marketing or web marketing, has gained popularity over the past decade. With the advent of social networks, e-marketing also now boasts of a new branch of social media marketing. People prefer to shop at home rather than crowd purchase. Online

platforms like WhatsApp and Facebook can be useful for this. Web marketing, blog marketing, you tube marketing are different form of online marketing. Example 'Fishwaale' in assam, India's first e-fish market platform (Singh, 2021), 'LIVE to FISH' and 'Pachameen' in Kerala are some successful ventures in this area. Elimination of intermediaries is the prime feature of online markets.

In an efficient marketing system, the share of fishermen is higher due to the lesser involvement of the middlemen.A market can be graded as efficient, only when the price spread is minimum (Narayanakumar and Sathiadhas, 2006).Price spread is the difference between the price received by the producer and the price paid by the consumer for any given commodity at a point of time in a market. Marketing efficiency is the ratio of market output (satisfaction) to marketing input (cost of resource). An increase in this ratio represents improved efficiency and a decrease denotes reduced efficiency. A reduction in the cost for the same level of satisfaction or an increase in the satisfaction at a given cost results in the improvement of efficiency. Some of the problems in fish marketing include high perishability and weight of materials, high diversity in size and weight among species, high cost of storage and transportation, lack of assurance of quality and quantity of the commodity, low demand elasticity and high price spread (Kumar et al.,2008).

Insurance system

Insurance is one of the widely adopted means for risk management and is used the world over as an effective instrument for containing and mitigating a wide variety of risks such as asset risks, production and management risks, market risks, personal and health risks (Parappurathuet al.,2017).In the case of fisheries, insurance covers risk factors such as loss or damage to fishing vessels, gear and equipment, loss of fish and human life at sea, stock failure due to disease, climate change, and for subsequent natural calamities likes cyclone, flood and droughts etc. The institutional mechanism available to cover the risk in the fisheries sector is very less and the main policy schemes in the sector are accident insurance, vessel insurance and insurance cover for selected stock in aquaculture.

Accident insurance: It is the most promising insurance product in the capture fishery sector and covers active fishermen's risk of life or disability while engaged in fishing activities. Among the

insurance schemes, 'Group Accident Insurance Scheme for Active Fishermen' is the major scheme currently in operation, which covers the life and disability risks of the boat crew.

Vessel insurance: vessel insurance covers risk of loss and damage to the craft's hull and body while engaged in fishing at sea. Due to high premium, the number of vessel insurance subscription quite low among boat owners. And also available vessel insurance policies are quite low in fishery sector.

Concerns over input -service delivery system for the fisheries development

a. Lack of formal institutional credit mechanism

In the absence of the formal sector financing, the credit requirement is met through informal means, which possess the fishermen in the circle of debt trap and poverty. the biggest drawback of the output-tying credit system is that it leaves the fisherman permanently indebted, unable to get rid of his outstanding debts, and forced into a permanent bond of commission payments. Formal credit institutions are not accessible to the fishermen. Lack collateral security and low debt repaying capacity are the major barriers to accessing formal credit services. Special attention should be paid to this.

b. Lack of market information

The actors in the whole supply chain needs information on various dimension- arrival of fish (inland and marine, in various markets), varieties of fish available in various markets and fish prices. However, market intelligence system on fish is highly under-developed, which hinders policy development and best-informed consumer decision making.

c. Lack of quality fish seeds

The non-availability of quality fish seed was the major constraint in culture fisheries. which has been overcome by technological advances in fish feed and seed production. Moreover, the availability, quality, and quantity of fish seeds have a significant impact on the aquaculture industry.

d. Inadequate infrastructure developments

The fisheries sector remains vulnerable to losses, despite a fair amount of share in the national exports, due to multiple reasons. The main reason for the same is poor post-harvest infrastructure

facilities. In India demand for fish and fishery product has been increasing at the same time the loss in the post-harvest fisheries has been massive, estimated at around 15 percent due to inadequate post-harvest infrastructure in the country.For instance, hook and line kind of fishing, dumping of the catch and poor container facilities make the harvest vulnerable to losses. Further, the type of vessel and facilities such as availability of ice, drainage facilities and access to the markets are other key components that influence the post-harvest loss on-shore. Similarly, the nature of retail and wholesale markets for the catch including processing of the catch is crucial in determining the loss off-shore (Sivagnanam, Priya and Pulikkamath, 2019). The fisheries sector has specific characteristics with reference to its harvesting and post-harvest handling. Hence, it needs infrastructure that takes care of its quality from harvest to final consumption.

e. Inadequate risk covering mechanism

One of constraints of risk financing mechanisms in the marine fisheries sector is lack of adequate, and affordable insurance policy schemes in the country. Not only marine but also inland fisheries such as fish farming face the same. For instance, the number of independent insurance policies in India is very few in vessel insurance. Currently, four public insurance companies hold less than 1,000 active policies. According to the latest maritime census (2016), the number of fishing vessels operating in the country is 164302, of which 42656 are mechanized, 95957 are motorized, and 25689 are conventional. The number of insured craft in India is estimated to be 5000-7000. In other words, only 3-4 percent of the country's fleet is insured (Van Anrooy et al. 2022). In addition, available risk covering policies are not affordable to the poor fishermen due to high premium rate.

f. Market intermediaries and inefficiency

About three-fourths of total marine fish landed in Kerala is marketed domestically. . The fish marketing system in the state is highly complex, involves multiple stakeholders, intermediaries and benefactors with high level of diversity in market structure and conduct. Though modern and innovative marketing models are emerging in recent years, marketing practices followed are predominantly old and traditional in many areas with inefficiencies pervasive across the value chain. The major market imperfection in fish supply chain emerges in the stage of auctioning. Fish auctioning is highly unorganized and is rooted in traditions. The market charges and operations are unregulated, and is characterized by monopoly elements. There is barriers to entry

as a fish auctioneer (Kumar *et al*, 2008).Other than performing the function of auctioning, their activities are both horizontally and vertically integrated: they serve as a major agents for informal credit to the fishing sector, financing both capital requirements for acquiring fishing vessels and daily fishing operations, supplying of axillary inputs like ice, providing fuel (diesel, kerosene) on credit etc. The credit offered to the fishermen is tied with output marketing operations. The real interest rate charged by the auctioneers is much higher than the market interest rate. However, one useful function is that the auctioneers shoulder the risks in financing fishing operations as fish catch depends on an element of probability, and therefore the repayment is a risky affair. Further, there are several irregularities persist in the structure, conduct and performance of the marketing system, as is observed in case of price determination, weighing and quality checking, payment, large element of reduction in quantity of fish on several pretexts etc. In that sense the fish auctioning system has large element of imperfections and exploitative elements. On the other end, consumers are charged high for their fish purchase. Over a period of time, the retail price of fish has increased at a higher rate compared to several other food commodities, resulting in large price spread. Further, this renders several consumers inaccessible to fish.

References

- Aswathy, N., Narayanakumar, R. and Harshan, N.K. (2014) Marketing costs, margins and efficiency of domestic marine fish marketing in Kerala, Indian Journal of Fisheries, 61(2): 97-102.
- Baiju, K. K., Xavier, A. K., Ramachandran, C., & Shinoj, P. (2019). Some insights into the credit transactions of small-scale fishers along the Kerala coast, India.
- CMFRI [Central Marine Fisheries Research Institute]. 2020. Marine Fish Landings in India 2020 [on-line].Available: http://eprints.cmfri.org.in/15781/1/Marine%20Landings%20in%20India %202020.pdf [04 April 2022].
- FAO (2022) Fisheries and Aquaculture Division [online]. Rome. [Cited Tuesday, July 12th 2022]. https://www.fao.org/fishery/en/countrysector/naso_india
- FAO. 2020. The State of World Fisheries and Aquaculture 2020: Sustainability in action. Rome. www.fao.org/3/ca9229en/CA9229EN.pdf

- Fishery statistics (2020). Handbook of Fishery statistics. Department of Fisheries Ministry of Fisheries, Animal Husbandry & Dairying Government of India, New Delhi.
- Government of Kerala.(2021). Economic review. State planning board. Trivandrum
- Katiha, P. K., Jena, J. K., & Barik, N. K. (2003). Profile of key inland freshwater aquacultural technologies in India. *A Profile of People, Technologies and Policies in Fisheries Sector in India*, 59.
- Kumar, B. G., Datta, K. K., Joshi, P. K., Katiha, P. K., Suresh, R., Ravisankar, T., ... & Menon, M. (2008). Domestic fish marketing in India–changing structure, conduct, performance and policies. *Agricultural Economics Research Review*, *21*(conf), 345-354.
- Kumar, B. G., Datta, K. K., Joshi, P. K., Katiha, P. K., Suresh, R., Ravishankar, T., Ravindranath, K. and Menon, M. 2008. Domestic Fish Marketing in India – Changing Structure, Conduct, Performance and Policies**.** *Agric. Econ. Res. Rev.* 21 () : 345 - 354.
- Narayanakumar, R., & Sathiadhas, R. (2006). Domestic fish marketing opportunities for marine fisheries sector in India. In *National Workshop on Post harvest Methods and Domestic Fish Marketing Opportunities* (pp. 59-67). State Insitute of Fisheries Technology.
- Nyimbili , B. and Musuka, C.,G.(2017). Fish Seed Availability, Quality, Quantity and Its Significance to Aquaculture Development in Zambia, *Innovative Techniques in Agriculture*.
- Parappurathu, S., Ramachandran, C., Gopalakrishnan, A., Kumar, D., Poddar, M. K., Choudhury, M., ... & Sunil, P. V. (2017). What ails fisheries insurance in India? An assessment of issues, challenges and future potential. *Marine Policy*, *86*, 144-155.
- Salim, S. S. 2016. Fish consumption pattern in India: Paradigm shifts and Paradox of export trade (Fish consumption pattern in India, exports-Overview). Food and Beverage News. 25-28 p.
- Salim, S. S., Monolisha, S. and Sunil, P. V. 2020. Fish Consumption: Gauging the determinants of consumption and buying patterns across Kerala markets. J. Mar. Biol. Ass. India, 62 (1) : 33 – 40.
- Sathiadhas, R., Narayanakumar, R. and Aswathy, N. 2011. Efficiency of Domestic Marine Fish Marketing in India – A Macro Analysis. *Indian J. Fish.* 58 (4) : 125-131.
- Sivagnanam, K. & Priya, T. & Pulikkamath, Ashraf. (2019). Problems of Inadequate Post-Harvest Infrastructure in Fisheries.

- Upadhyay, A. D., Jagpal, P. D. and Roy. 2017. Structural performance of fish market and socio-economic status of market functionaries of Naveen Machhali Mandi Mahanva of Gorakhpur, Uttar Pradesh. Econ. Aff., 61:511 p.
- Van Anrooy, R., Espinoza Córdova, F., Japp, D., Valderrama, D., Gopal Karmakar, K., Lengyel, P., ... & Zhang, Z. (2022). *World review of capture fisheries and aquaculture insurance 2022* (Vol. 682). Food & Agriculture Org.