Chapter 3

Fish supply chain in India

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Fish is one of the most traded commodities globally, and India is one of the largest producer and exporters of fish. Its global contribution to production in 2018-19 was 7.58% Fish also contributes 1.24% to India's Gross Value Added (GVA) and 7.28% (2018-19) to the agricultural GVA. Fisheries also contribute significantly to food and nutritional security, as well as livelihood and employment generation. Aquaculture also happens to be one of the fastest growing food production systems in the country. The average annual growth rate of fisheries sector over 2014-15 to 2018-19 has been 10.88%. The exports stood at 13.93 lakh metric tonnes bringing in Rs. 46589 crore in 2018-19.

Much of the fish traded globally is from the poorer to the richer countries. There is also is significant domestic trade in most fish producing countries and a significant fish eating population in them. The supply chains in fisheries are often thus complex.

A supply chain, sometimes called a value chain, can be defined as a set of producers, manufacturers, intermediaries, traders, processors, retailers, consumers and/ or any other companies, organizations or entities directly connected by one or more inward and outward flows of products, services, finances, or information from a source to a customer. **Supply chain management** is the efficient coordination, utilization and management of the components of such a chain for maximizing value or/and minimizing the costs. Supply chain management can be defined as the "design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally

While the focus of supply chains is the customer, supply chain management makes it happen and is a process that covers and includes the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management. It also includes coordination and collaboration with channel partners, which may be suppliers, intermediaries, third-party service providers, or customers. Supply chain management integrates supply and demand management within and across companies.

Supply chain management addresses the following problems:

- Configuration and designing of distribution networks.
- Formulation of procurement, production and distribution strategies.
- Logistics decisions.
- Obtaining, processing and utilizing information to make informed decisions.
- Inventory management
- Panning Cash flows.

Globalization, sustainability and supply chains:

With the increased globalization of business, the globalization era, Supply chains have expanded over national boundaries and into other continents. Since the late 1980s, a considerable number of organizations started to integrate global sources into their core business. Now organizations have to work with the goal of increasing their competitive advantage, adding value, and reducing costs through global sourcing.

Thus, it has become important for companies to understand socio economic, political, environmental and cultural factors to add value to their businesses. International price fluctuations, demand and supply analysis, currency fluctuations, sustainability issues and governmental policies have become key factors in the planning and managing of global supply chains.

Consumers have become more aware of the environmental impact of their purchases and companies' , along with non-governmental organizations (NGOs), are setting the agenda for transitions to organically grown foods, anti-sweatshop labour codes, and locally produced goods that support independent and small businesses. Because supply chains may account for over 75% of a company's carbon footprint, many organizations are exploring ways to reduce this and make supply chains more sustainable.

Fish supply chains

A fish supply chain can be described as a set of independent fishers, agents, processors, distributors, and wholesalers/retailers/food services who work together to supply a fish or derived product to the consumer. No individual organization or entity within the fish supply chain is independent. They are interlinked because actions taken by one member of the supply chain can affect, improve or disturb the complete chain and also the livelihoods of fishermen who have fishing as their primary source of income. Fish supply chains have high variation based on factors like fish species and products, harvesting techniques, end users apart from differences in socio economic, environmental and cultural differences among different countries and regions.

Fish supply chains in India can be focussed on the domestic consumer or the export markets.

Different factors that influence fish supply chain:

- Product and country of origin.
- Final destination of the product (Domestic consumption or export)
- Intermediary processes required like peeling, cleaning, smoking, pickling, salting, canning, breading, cooking etc.
- Integration of different links within the supply chain.
- Harvesting techniques.

We could also include production system as a factor as we have two broad systems – capture which is based entirely on wild catching and aquaculture which is akin to farming.

Main problems in achieving efficiency:

- Difficulties in procuring and assembling from different production sites.
- Wide variation in prices and arrivals location wise and time wise.

- Restricted entry into auctioning and whole sale trading.
- Changing consumer preferences in export domestic markets.
- Lack of forecasting mechanisms.
- Lack of proper roads and transportation facilities.
- Structural inefficiencies: This includes the current method of dividing the activities of the supply chain into multiple roles results in fish preservation and handling practices that are based on antiquated cold storage technology. Other issues are indirect quality accountability for fishers, price bullying on the part of processors, staggering waste and financial losses for processors and distributors when flows of supply and demand for fresh fish are not synchronized.
- Disempowered/Poor/Small scale or individual Fishers
- *Traceability Roadblocks:* While all parties in the supply chain agree that traceability is critical for ensuring sustainability, preventing fraud, and ensuring food safety, yet it is not a common practice for accurate data about species, origin, or catch method to accompany a fish through the supply chain. Traceability is now being increasingly stressed as importing countries insist on this and attempts are being made to put systems in place by agencies like MPEDA. Many current realities prevent players from easily sharing information, investing in enabling services and systems, or creating simple, affordable verification systems in a practical way—particularly because the return on these activities is sometimes unclear. An approach that removes key barriers for individuals at all levels of the supply chain can drive more widespread adoption of methods that support traceability as the industry standard.

Quality and other factors influencing Fish Supply Chain

As a raw product, fish is a fresh and perishable and must be delivered to the consumer or the processor in the shortest time span. The factors of high perishability and concerns about quality, quality assurance mechanisms become important. Quality issues reflect not only on freshness, taste, colour, smell, method of harvest, how the fish is handled after landing, and timeliness of delivery.

Suppliers of fish products to the retail sector are small, individual or exporting companies. Food market is now dominated by giant retailers operating in several countries with strict quality, and labelling requirements. Volatility in international markets in terms of supply, demand and prices, problems and standards of traceability of products from origin to end user and variation in quality pose additional problems.

However, labelling and traceability become a problem in capture fishing or marine fisheries. It is quite difficult to tag wild fish at birth. Processed fish products can be labelled easily and can provide quality assurance to the consumer. Thus, different policy initiatives associated with establishing and enforcing quality parameters and standards, initiatives of NGOs like Greenpeace, measures taken by retailers like Wal Mart, ASDA, and Carrefour will be discussed.

Role of Retail chains and key factors influencing and impacting the supply chain of fish

In traditional fisheries economics papers the price is assumed to be exogenous or given (read fixed). In such situation, one need not have much concern with the market. However, the seafood market is highly segmented. Hence, even if the price is exogenous, it matters which market one is targeting. Seafood supply chains have traditionally consisted of many independent. In the past few years, the seafood market and the supply chains for seafood are changing rapidly due to globalization, rise in aquaculture and changes in retail

chains. The COVID-19 pandemic has added another dimension in showing how vulnerable the supply chains actually are as the adjustments needed to meet the shifting consumer demand were tricky and complicated.

Increasing control with the production process in aquaculture leads to productivity growth and market development. Between 1970 and early 2000s, the share of aquaculture in the total supply of seafood has grown 8 times in many countries. New technologies have led to an enormous increase in production. More than 60% of fish exported is now from the aquaculture sector and its contribution to fish production in the country is also increasing, while capture fisheries has plateaued.

Transformation of the seafood market with retail chains

Globalization increases the opportunity for those who are competitive. Seafood supply in the EU, Japan and US is increasing because these markets have the highest ability to pay. Improved logistics and transportation makes these markets increasingly accessible for producers from all over the world. Supply used to be local and regional, now it is increasingly global. Supply has also become more concentrated. Between 1987 and 2005 the top six seafood products went from accounting for 60.1% to 80.3% of total US seafood consumption. The farmed species in the top six have also increased from being only shrimp in 1987 to shrimp, salmon, catfish and Tilapia in 2005.

The retailing sector and logistics are also seeing rapid changes. Retail chains allow for economies of scale and scope in marketing, retailing, logistics and distribution. Very few seasonal products and small scale suppliers get access to the shelves because of higher cost. In most European countries retail chains make up more than 80% of retail sales. Because of this, Traditional outlets like fish mongers disappear

The retail chains are demanding customers

I. Price:

(a) Price level, (b) linkage to market prices, (b) quantity discounts.

II. Volume and timing:

(a) Total volume; (b) regularity of deliveries; (c) flexibility in deliveries;
e.g. in relation to ‘normal’ volumes and times of delivery.

III. Raw material attributes:

(a) Size distribution, e.g. fillets, (b) quality attributes, e.g. colour, fat, texture, taste, (c) fresh vs. frozen, (d) uniform quality, (e) shelf life.

IV. Product range and differentiation:

(a) Fish species, (b) Product varieties, e.g. easy-to-cook, ethnic foods, healthy foods, (c) private labels / brands, (d) consumer advertising.

V. Production process:

(a) Raw materials in feed, (b) environmental effects of production, (c) animal welfare, (d) third party certification, e.g. ISO, EMAS, (e) traceability.

VI. Transaction costs:

(a) Negotiation, (b) planning, (c) control and enforcement, (d) transportation, (e) storage

Industrial buyers also give importance to factors like volume, timing and frequency, flexibility, cost efficiency in distribution and food safety.

The set of extra services and requirements imposed by retailers and industrial customers increase the complexity of the composite product that a supplier is providing and makes it more challenging to manage the supply chain.

Other issues related to fish supply chain

1. Problem of collapsing fish stocks in marine fisheries

The fish and fish products sector is facing the problem of fish stocks collapsing or depleting rapidly. The primary reason for this is the unsustainable consumption and production patterns like increasing levels of consumption, over fishing, excessive aquaculture, and climate change, urbanization of coasts and destruction of biodiversity among the species.

The causes of this problem are lack of ecosystem based approach leading to over fishing, subsidy policies of different governments, unsustainable fishing practices, and IUU fishing.

2. Differences between supply chain issues in sea food commodities

There are two popular product preparations in fish products. And both these types require different strategies at every step of the supply chain.

- Fresh and frozen fillets.
- Prepared and preserved fish.

Frozen and fresh fish fillets are the second largest category of seafood traded globally after shrimp. This includes products like cod, salmon and trout. The most important of prepared and preserved fish is tuna. Tuna is the 3rd most valuable traded seafood and majority of internationally traded tuna is canned. The world's largest exporters of tuna sources most of its tuna from Indian and pacific oceans as chilled domestic fish or frozen chilled fish. Once caught, the fish is sold by tuna trading companies who sell it to tuna processors. Trading companies coordinate trans-shipment onto reefer carriers from multiple vessels and offer volume and continuity of supply to processors as well as economies of scale to vessels owners. The raw fish is selected and after precooking with white meat is sent for human consumption or pet food. After further processing the tuna meat is canned. In tuna sector, many of the processors are contracted and never actually own the fish. Tuna trading companies play a central role in supply, procurement and onward sale of canned tuna.

3. Policy issues that influence fish supply chain:

- International trade policies with specific emphasis on WTO, USFDA regulations, European Union standards etc. and how they influence Indian business.
- Issues like mercury contamination in Tuna.
- Environmental policies and sustainable aquaculture.

4. Wastage in fish supply chain

Waste arises in the supply chain from fishing, aquaculture, processing, transportation, retail, and foodservice and consumer waste. The aim of differentiating between unavoidable waste and avoidable waste, which could potentially be prevented, many fish species contains a high proportion of nonedible components, which must be removed at some point within the supply

chain. It must be noted that in many supply chains this non-edible material is a valuable co product, which is utilized by the fishmeal industry and therefore is not considered to be a waste.

One major reason for wastage is discards. The reasons for discarding fall into two main categories, either what has been caught has little or no market value, or the fish are discarded because of management regulations (like the ban on landing of juveniles sometimes having legal implications). The levels of these discards can vary widely between fisheries. Some fisheries discard very little whilst others discard more than they retain. Some discards are not problematic, as in some cases the fish can be returned to the sea and survive; for example crabs, lobsters, sole, plaice and dogfish all have high survival rates. Otherwise discards account for a large amount of the waste of the fishery resource. To reduce discards, measures should be implemented like improvements to the design of fishing gear in order to minimize the catch of prohibited or unwanted fish, introduction of innovative conservation measures.

Domestic channels of fish supply

A significant proportion of fish caught in the country is traded internally. While the traditional channels still continue to throve, there are also innovations in the same in recent years. The traditional channels include direct selling from the producer to the consumer as well as selling thorough a series of intermediaries that could include the commission agent to wholesaler to big and small retailers. The longer chains are more prominent in the capture sector. The new innovations include online buying and selling, which is an increasing phenomenon in the urban areas. The product profiles have also undergoing changes with cleaned fish being more preferred than whole fish even in the domestic market. Increasing consumer awareness on quality is also a factor that needs to be taken care of.

Fish supply chains are similar to other supply chains in its main components but the intricacies differ due to the inherent characteristics of the product and the length and complexity of the chains. The logistics of the domestic and export trade are different and need to be differently addressed.

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