



**Challenges and Opportunities for MSMEs
in the Fish Value Chain in Ebonyi State**
—Results from a Rapid Reconnaissance Exercise—

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Introduction

1.1. Motivation

The rapid expansion of agri-food value chains (in Nigeria and other developing countries) over the past few decades has been fueled by the investments of numerous micro, small, and medium enterprises (MSMEs) in the midstream and downstream segments. These segments include wholesale, logistics, processing, and retail. Together, the investments influence the availability, affordability, and safety of healthy and nutritious foods such as fish and vegetables. MSMEs face significant obstacles that can hinder their operations, expansion, and productivity. Nevertheless, researchers and policymakers have paid insufficient attention to MSMEs in the midstream and downstream segments of value chains. The RSM2SNF project aims to fill this gap by working with MSMEs along the value chains for fish, tomatoes, and green leafy vegetables to understand the structure, conduct, and performance of these value chains and ultimately to support MSMEs to provide affordable, safe, and nutritious foods.

Objectives

Toward this end, a “lay of the land” or rapid reconnaissance study for the fish value chain was conducted in Ebonyi State. The objectives were:

- 1) to understand the structure of the value chain and how actors at different nodes interact with each other;
- 2) to understand how patterns of behavior vary according to the scale of the enterprise;
- 3) to understand what stakeholders operating in the value chain perceive to be the key challenges and opportunities in the fish subsector; and
- 4) to develop insights that will inform the design of a market study of fish markets, as well as a micro-level study of the fish value chain using “stacked surveys” administered to MSMEs operating at various segments of the value chain.

Brief description of the fish subsector in Ebonyi state

Fish significantly contributes to household food and nutrition security in Nigeria. The fish subsector involves fish production (harvesting fish in their natural habitat, as well as raising fish through aquaculture), fish processing, and fish distribution. These activities create employment and trade that generate income for the rapidly growing population. Fish accounts for about 40% of Nigeria's protein intake, with per capita consumption of 13–13.3 kg/person/year (Liverpool-Tasie et al., 2021; WorldFish, 2018). Nigeria ranks eighth among the top 25 global producers of inland fisheries (FAO, 2020).

Ebonyi is located in southeast Nigeria. The state is situated between latitudes 5°40'N and 6°45'N and longitudes 7°30'E and 8°46'E, and is bordered by Benue State to the north, Cross River State to the east, Abia and Cross River States to the south, and Enugu State to the west (Figure 1). Agriculture is the main means of livelihood of its inhabitants .

Ebonyi State contributes significantly to fisheries and aquaculture in Nigeria, owing to its abundant water resources of inland rivers and tributaries. Ebonyi State has a projected population of 3,221,745 persons in 2020 (NBS, 2018), with a high poverty headcount rate of 79.76 (NBS, 2019). Fish production in the state has significantly increased over the last few years, especially from 2019 to 2020; however, the fish supply deficit remains large (about 76% in 2020) (Table 1).

(a) Ebonyi State



(b) Study sites within Ebonyi State*

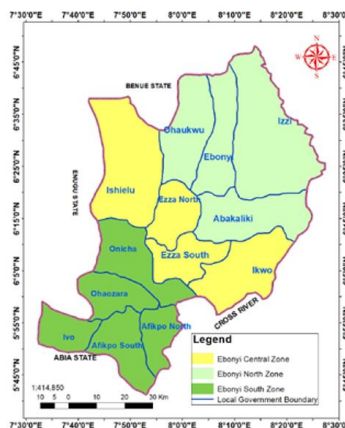


Figure 1. Map of Ebonyi State the zones covered

*Source: Onyeneke et al. (2022)

Table 1. Detailed fish demand and supply statistics in Ebonyi State

Year	Projected Population (persons)*	Fish Consumption Per Capita (kg/year)**	Fish Demand (tons)	Domestic Fish Production (tons)***	Fish Supply Deficit (tons)
2017	2,962,173	13	38,508	800	37,708
2018	3,046,286	13	39,602	900	38,702
2019	3,132,788	13	40,726	9,000	31,726
2020	3,221,745	13	41,883	10,000	31,883

Sources: Authors' compilation

* Demographic Statistic Bulletin (NBS, 2018)

** Demand for imported versus domestic fish in Nigeria (Liverpool-Tasie et al., 2021).

*** Agricultural Performance Survey of Annual Wet Season in Nigeria (NAERLS & FMARD, 2017, 2018, 2019, 2020).

Table 2. Distribution of respondents according to the scale of operation

Scale	Count	Percentage
Nano	13	25%
Micro	30	57%
Small	10	19%
Medium	0	0%
Total	53	100%

Note: Nano = 1-2 permanent workers, micro = 3-9 permanent workers, small = 10-49 permanent workers, medium = 50-199 permanent workers permanent workers.

Table 3. Actors simultaneously operating in multiple value chain segments

Operating in Multiple Segments	Count	Percentage
Yes	11	21%
No	42	79%
Total	53	100%

The rest of the report is structured as follows. Section 2 discusses the methods used for data collection and analysis. Section 3 presents the experiences of participants in the fish value chain in Ebonyi State, grouped by value chain nodes. Section 4 presents key findings related to the cross-cutting issues of gender, environment and food safety. Section 5 concludes with a summary of findings and suggestions for further actions.

Methods

The survey is a rapid reconnaissance to understand the background, structure and patterns operating within the fish value chain in Ebonyi State. It is based on systematic qualitative data collection from interviews with 53 actors operating at different nodes of the fish value chain. First, participants operating at various nodes of the fish value chain (including production, processing, logistics, wholesale, and retail) were identified. Then the research team conducted field visits to interact with these enterprises about their activities. The team verified participation of each key informant in a fish value chain node and the informant's scale of business operations (i.e., nano: 1-2 employees; micro: 3-9 employees; small: 10-49 employees; and medium: 50-99). The key informants were the business owners or operational managers of the enterprise.

The survey team identified and interviewed some key informants in each node of the fish value chain in Ebonyi State, targeting (where applicable) at least one key informant from each agricultural zone of the state (Ebonyi-North, Ebonyi-Central, and Ebonyi-South). The fish value chain nodes identified in Ebonyi State include:

- Fish producers (fish farmers and fishermen);
- Fish processors;
- Fish wholesalers (fresh/frozen/dried);
- Fish retailers (fresh/frozen/dried);
- Input suppliers (feed/fingerling/medicine);
- Transporters.

In all, the team interviewed 53 key informants (Table 4). These key informants are from the different zones of the state in various communities including: Abakaliki, Nkaliki, Kpiri-Kpiri, Ezzamgbo, Onuebonyi, Ikwo, Okposi, Afikpo. Information on the activities of the enterprises was obtained through observation, interaction, and semi-structured interviews. Figure 2 clearly shows the distribution of key informants in each node according to the enterprise scale.

The key informants provided information on their enterprises, including the assets they own, production and handling activities, input procurement, and output marketing activities. They also provided narrative summaries of their experiences as MSMEs, as well as information on how their business activities had changed over time.

Table 4: Distribution of respondents by nodes and scale in the fish value chain

Nodes	Nano	Micro	Small	Total
Production	1	6	1	8
Processing	1	4	1	6
Marketing	8	8	2	16
Input Suppliers	3	11	6	20
Transporter	0	1	0	1

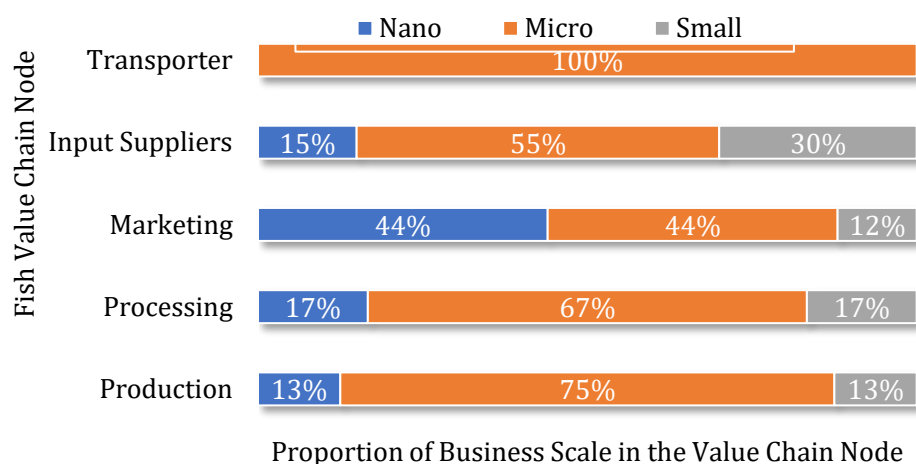


Figure 2. Scale of enterprises along the fish value chain in Ebonyi State

Source: Authors' compilation from field survey

Experiences of MSMEs along the Fish Value Chain

1.2. Producers

Fish production in Ebonyi State is characterized by inland (freshwater) capture fisheries and fish farming. Capture fisheries have long existed in the state, whereby fishermen explored the water bodies in their localities, including the Onuebonyi River and Abonyi

River, Ikwo River, Enyim River, and the Cross-River tributaries at Afikpo. Fishing in Ebonyi State is generally done in groups. Fish capture is made using various types of nets (e.g., cast nets, drag nets, Mali nets), with some special nets (e.g., trammel nets) also set (with bait) and positioned along certain parts of the river. The fishermen's trade involves selling their fish through their acquaintances—in the area—and through market women. The fishermen's scale of operation is largely nano/micro-scale because fishing is undertaken first as a means of subsistence, involving the fishermen's households with limited processing or market participation. The people involved in capture fisheries engage in other occupations for their survival and livelihood during the dry season (January–May). Their market participation and relevance have declined over the years due to diminishing fish supply in the inland rivers.

Fish farming involves rearing and breeding fish in artificial ponds or other containers. In this production system, fish are kept in artificial ponds, fed with commercially formulated feed, bred through an artificial insemination process, and then reared to maturity or marketable size. From the survey, we observed that fish farming is evolving and mainly commenced in the early 2000s. Ponds used by fish farmers in Ebonyi State are made of plastic, tarpaulin, cement-concrete, or earthen materials. Fertilization of ponds (using bagged poultry droppings) is undertaken for certain types of ponds, such as the concrete pond, in order to generate algae, improve the oxygen supply, and create an environment closer to the natural fish habitat. Misuse/abuse of this process is reported to adversely affect fish production.

Most (~75%) of the fish farms operate at the micro-scale enterprise level. Fish production is gradually growing in the state as people become more aware of the importance of fish in their diet. Rather than fishermen shifting into fish farming, we observed an expansion of fish farming/aquaculture through new entrants with adequate capital, etc. Fish farming in the state is not only operated by people trained in fisheries and aquaculture; instead, it includes individuals from different walks of life. The routine activities in fish farming are not time-consuming, which may have also motivated investment in the business by various categories of business-oriented people. From the survey, fish farms are owned by both men and women since land property rights constitute a minimal barrier given the mobile nature of the business (moveable ponds).

Key challenges for fish producers

- Fishermen are faced with the challenge of inadequate storage facilities. Their fish must be sold at the landing site or in the market within a short time frame after capture. These fishermen consume unsold fish in their households or gift them out. There are also indications of fishers smoke-drying the fish using improvised ovens to preserve them longer for household consumption. Fishing yields a variety of fish types (Ecomog fish – *Heterotis niloticus*, *Oreochromis niloticus*, *Labeo coubie*, etc.). However, most of these are quickly sold off because of the lack of technologies to preserve them over long periods (when they can get better sales margins). Hence,

the leftovers from fish sales have to be consumed by the fishermen's families if not sold off cheaply, thereby reducing fishing households' income. The capture fishing business also suffers the disadvantages of a less organized marketing system and limited market access. Some years back, one would find live fresh fish from the fishermen hawked on the roads to sell the soon-to-perish products. While the practice has since been significantly reduced, the reduction could be connected to declining fisheries resources and declining capture fishing participation.

- Fish farming in Ebonyi State, as in most parts of Nigeria, is limited to culturing just a few types of fish (*Clarias* spp., *Heterobranchus* spp., tilapia species, *Heteroclaris* species, etc.). Most fish cultured in the ponds are catfish species.
- Most fish farmers start by purchasing fish seeds (fish fry, fingerlings, juveniles, etc.) out of state and transporting them to their farms. They are then reared to market/table-size fish for consumption. Challenges posed include the stress of transporting fish over long distances, resulting in high mortality of fish seeds and loss of revenue. There is also a scarcity of fish seed supply in the market. To cope with these challenges, farmers learnt and adopted fish breeding (spawning) technology to produce their own fish stock from the purchased parent stock or brood stock raised within the farm.
- The state (especially Ebonyi-Central and Ebonyi-North agricultural zones) is uniquely challenged by poor groundwater quality for fish breeding purposes. This is due to certain impurities in the groundwater. This affects fish breeding, leading to farmers incurring extra costs to treat the water.
- The rising cost of commercial fish feed is a key challenge affecting fish farmers' operations and profitability. Few farms can produce their own fish feed, but sourcing the feed ingredients makes it challenging to produce feed of sufficient quantity and quality. The high cost of fish production occasioned by this challenge translates to a high market price of fish and a reduction in patronage as buyers switch to cheaper alternative protein sources.
- Fish farmers incur costs even after rearing fish to marketable size when there are no off-takers to buy their fish. This is because there is a lack of post-harvest storage facilities to preserve fish outside the pond in forms acceptable to most consumers. Some fish farmers process the fish by smoke-drying to reduce their costs and extend the shelf-life of the fish.

We observed that participation in artisanal fishing is decreasing while fish farming (aquaculture) is increasing. The main reason for decreasing artisanal fish production seems to be associated with decreasing availability of fish in the wild. At the same time, increased participation in fish farming is associated with the perceived viability of the business.

1.3. Aquaculture Input Suppliers

Aquaculture input suppliers sell inputs for fish farming, including fish seed, broodstock, fish feed, and fish medicines. Other inputs marketed (although by fewer input dealers) include movable plastic and tarpaulin ponds, scooping nets, and plastic sieves. However, utensil vendors sell these other inputs in the regular market. Aquaculture input suppliers play an essential role in the fish value chain, and their activities, to an extent, determine the level at which fish farmers operate and hence the quality and quantity of their output.

Fish seed suppliers comprise enterprises that provide fish fry, fingerlings, juveniles, and post-juveniles to fish farmers. They need pond facilities and a good water supply in quantity and quality. Hence, they often establish their sites for producing and storing fingerlings in one place, with the business marketing outlet located elsewhere, often in urban areas to reach buyers easily. The fingerling suppliers sometimes sell other fish needs (feed and medicine) and pond accessories (tarpaulin ponds, plastic ponds, scooping nets, etc.). These fingerling suppliers transport the fish seed to and from many parts of the country and deliver them to customers.

The fish feed and medicine supply business involves enterprises with considerable capital investments such as warehouse acquisition (either by ownership or renting), employing sales personnel, and purchase of large quantities of fish feed. Most of these enterprises are formally registered business outlets, unlike the fish farms (producers). The input dealers' activities entail connecting with distributors of their choice or those within their locale, and they connect the fish feed and fish medicine companies to the retailers and fish farmers (end users). They also offer advisory services to the fish farmers regarding the inputs, especially fish medicine, and they receive feedback on farmers' experiences with and perspectives on the inputs.

Fish input suppliers in Ebonyi State work with distributors in Ebonyi, Enugu, Anambra, Abia, Rivers, Cross River, Kaduna and Lagos States. Some of these input suppliers grow to attain distributorship levels within the state for fish feed and fish medicine manufacturing companies. As distributors, they can move truckloads of feed within and around the state. Certain feed types are not manufactured within the country, and the distribution companies that import these are mainly in locations with seaports (e.g., Lagos, Port Harcourt). Fish medications (antibiotics, vitamins, boosters, etc.) are not marketed in large quantities. For fish medicine, there is a marketing distribution arrangement whereby sales representatives for different fish medicine manufacturers are located in designated areas to bridge the gap in providing fish medicines to the input suppliers. The sales representatives also provide marketing services to raise awareness of the products. The sales representatives are employees of the companies manufacturing or distributing the inputs to various parts of Nigeria. Marketing efforts include the distribution of flyers and advertorials, the distribution of test samples, and other product promotional activities such as awards, rebates, freebies, etc.

Most input dealers (feed and drug suppliers) were first involved in selling other animal feeds and medicines (such as poultry needs). The suppliers indicated that they diversified into selling fish inputs within the last five years as they realized the growing opportunities brought by increased aquaculture production. Some input suppliers find a complementarity across fish inputs and their established poultry feed and medicine sales business. Certain feed distributors take advantage of a combined invoice of fish and poultry feeds to meet the minimum demand quantity requirements when ordering from their product manufacturing companies.

Key challenges of aquaculture input suppliers

- Shortages and periodic scarcity of fish feed affect its supply and price. The feed input suppliers affirmed the country's low fish feed production situation, evident from the delays or non-availability of demanded products from the manufacturing companies. The period of scarcity coincides with the planting season when there is a shortage in the supply of previously harvested grains and industrial feed raw materials. The local production plus imported fish feed quantity is insufficient to match the growing demand in the aquaculture subsector.
- There is seasonality in fish feed sales in the state, usually from September to the second quarter (April – June) of the following year. During this period, the demand for fish feed increases overwhelmingly relative to supply, thus increasing feed scarcity and driving up prices. Here one finds that the feed distributors within the state barely meet the demands of the inputs suppliers who move on to source feed from other parts of the country.
- There is a proliferation of distributorships by the feed manufacturing companies, and this has occurred without regulation of the area of coverage and insistence on the business ethics of the distributors. The distributors engage in retail sales, thereby creating strong competition (via low prices) against the retailers they are meant to serve. This causes some input suppliers to leave the business.
- The shortage of fish hatcheries to serve the growing population of fish farmers is a significant challenge. This is also related to the poor groundwater quality in certain parts of the state, which affects the success of the fish seed breeding process and reduces the supply of fish seed, leading to a search for external supply outside the state. Purchasing fish seed from outside the state has a higher risk of fish mortality during long-distance transportation.

1.4. Wholesalers (Traders)

Fish wholesalers in Ebonyi State comprise those selling live (fresh), frozen, and smoke-dried fish. These are the common groups of bulk marketers of fish found in the state. Fresh fish here implies the live fish, usually from fish producers. Bulk sale of live fish (mostly catfish from fish farms) is carried out by fish producers, selling to those who are interested in resale or own use in their outlets. Although all do not consume catfish, it

has a considerable market in bars, hotels, restaurants, and barbeque joints, where it is made into snacks and meals.

Frozen fish wholesale is one market which has grown over the years with gradual improvements in infrastructure, power supply, and market functions. About 10 to 15 years ago, managing the business in the state was quite challenging due to poor power supply and infrastructure. In recent times, while conditions have improved in areas around the state capital (Abakaliki), it remains tough to engage in frozen fish wholesale business in towns farther away due to less developed infrastructure. The wholesale frozen fish business is capital-intensive. Considerable funds are committed to building/renting the cold rooms, installing cold rooms, and installing standby power generators. There is also need for funds to maintain the assets, purchase fuel to power the standby generating set, and pay for special carriage vehicles for the transportation and supply of frozen fish from the importing companies at the seaport cities (Lagos and Port Harcourt). The frozen fish wholesalers play an essential role in increasing fish consumption by sourcing and providing various types of fish (Scumbia, Mackerel, Sardines, Titus, Croaker, Tilapia, etc.) in 'close-to-fresh' forms and different sizes to suit the different kinds of buyers in the market. Frozen fish products are mainly imported and supplied in cartons of 10–25 kg; hence, wholesaling is done in cartons. Sales are made to frozen fish retailers, smoke-dried fish retailers, individuals buying in bulk (at least a carton), hotels, bars, restaurants, etc. Frozen fish provides alternatives for people not interested in live catfish and others who cannot afford to purchase large fish.

The other categories of wholesalers are the smoke-dried fish marketers. The most commonly marketed smoked-dried fish is the catfish. The smoked-dried fish wholesalers are well integrated with the catfish processors, with their roles interrelated. They engage in bulk sales by packaging the fish, delivering it to the buyers, or selling it at their market outlets.

Key challenges with wholesaling

- Poor infrastructure and power supply: The wholesale frozen fish business contributes to the availability and affordability of fish consumed in the state. However, it is a high-risk, cost-intensive business in the state, and actors have exited the business due to the many challenges. Frozen fish is usually transported across long distances using specific carriage vans with installed chillers. These vans sometimes break down in transit due to poor road conditions, putting the frozen fish at risk of deterioration at the expense of the wholesaler. The wholesalers complain about the exceptionally high cost of transporting frozen fish and, by extension, the need to maintain the fish at freezing temperatures using gasoline-powered electricity generators. These enterprises also have to pay high electricity tariffs. In summary, the business environment is challenging for the wholesale frozen fish enterprise.
- Frozen fish wholesalers often offer credit sales and services to retailers who fail to meet the repayment agreements and timelines. This is challenging because

previous stock repayments are made when retailers come to pick up another stock (possibly on credit). The mutually beneficial relationship is established on trust and is informal. However, the wholesalers do suffer losses due to defaults from time to time.

- The high cost of maintenance of cold rooms and standby power generating sets is yet another challenge. The frozen fish enterprises indicated that it is quite expensive to access the spare parts of the cold room systems given the periodic need for servicing and replacement of parts which are constantly in use and overworked. This is because some spare parts are scarce, imported, and price-sensitive to inflation.
- The market in Ebonyi State for smoke-dried catfish is small; hence, the difficulty for wholesalers to find regular bulk buyers at prevailing prices. Here, one finds wholesalers striving to establish markets for their products outside the state. There are also strong indications that there remains a low acceptance and patronage for smoke-dried pond fish (catfish) because most consumers are concerned about the price, procedures, and feed used in aquaculture production.

1.5. Processors

In Ebonyi State, fish processing involves mainly the smoke-drying of fish to remove more than 90% of the moisture content and extend the shelf-life for fish after harvest. Smoke-drying of fish for commercial purposes is done mainly by fish farmers. Hence, the most commonly smoked-dried fish is the catfish. It was observed that most fish farms are also involved in fish processing (smoke-drying). The commonly used smoking kiln is the box-shaped oven, which is locally fabricated with iron-alloy bars/sheets and mainly uses fuelwood/charcoal as a source of heat energy. Some fish processors also purchase and install industrial smoking kilns with provisions for liquified gas fuel units or electric units in addition to the usual fuelwood-charcoal unit as a heating energy source. Nonetheless, fish processing by these enterprises mainly uses the wood-charcoal as fuel. Smoke-drying is not the most efficient method of drying. However, it is preferred by consumers because of the taste of the processed fish and fish tint (dark brown) after processing.

There are also fish processors involved in the smoke-drying of other types of fish, mainly imported frozen fish. This type of smoke-dried fish is cheaper and is processed in a slightly different manner from catfish. The extent of the smoke-dry process for the frozen fish allows for more residual moisture compared to the catfish. The processors adopt this strategy to meet the demand and taste of other categories of fish consumers. The frozen fish types are smaller and processed in whole or smaller retail sizes. This type of smoked processed fish has a shorter shelf-life (a few days), and there is usually no special packaging for the higher moisture content of smoke-dried fish. Processors of this kind operate at a smaller scale using an improvised smoking kiln made from metal oil drums layered with iron/wire mesh. Wood charcoal is usually the source of heat energy for their smoking kiln.

Smoke-drying is a way of meeting the needs of buyers who do not find it convenient to handle fresh fish or to keep fresh fish in storage. The fish processors indicated that most smoke-dried fish buyers are civil/public servants, especially those with less time to prepare meals since smoke-dried fish is almost-ready-to-consume. Requests for specially spiced smoke-dried fish are increasing. Some processors diversify production by offering paid services of processing fish for others. They also use the smoking kiln to process other animal products (chicken, turkey, pork, mutton, etc.). Processors are primarily micro-scale enterprises, given the nature of their activities and the level of fish consumption in the state.

Key challenges with processing

- The predominant smoke-drying processing method may be affordable but consumes much time and labour. There is also a high risk of losing fish due to burning or over-drying. Most processors have experienced fish loss due to poor management of the heat energy in the smoking kiln. Smoke-drying fish requires a continuous supply of adequate heat energy for more than a day. Here the major challenge is regulating the heat in the smoking kiln, which is manually operated and susceptible to human error and inconsistencies.
- Processors face challenges in storing dry processed fish. Some processors even have to use their smoking kiln space as storage space. This is done to facilitate reheating the unsold processed fish and avoid spoilage. Some processors use refrigerators to preserve the processed fish until sold; however, frequent power outages constitute a significant hindrance and bring extra costs. The gradual deterioration of the processed fish causes the processors to sell at cut prices or to reduce production.
- The increasing cost of wood-charcoal fuel challenges processors. The high cost of various petroleum resources, including domestic gas, is gradually increasing the demand for wood charcoal as an alternative heating fuel source in households and business ventures. Hence, there is a rise in fuel cost for this predominant (smoke-drying) fish processing method in the state.

1.6. Third-Party Logistics Providers

Third-party logistics providers include transporters and motorists who ply the roads outside and within the state and are occasionally contracted to make deliveries. However, there are also designated third-party logistics providers in certain aspects of fish marketing, especially the stock-fish and crayfish business. It is specific to these aspects of fish trade because the primary aggregating market for stock fish and crayfish is location-specific over a broader region.

Stockfish is an imported commodity with a major distributor market in the southeast at Aba in Abia State. Also, crayfish are sourced from the coastal regions. Cross River and Akwa Ibom States are the closest to Ebonyi State. Here third-party logistic providers focus on the transportation of these fish types by liaising with various independent

commodity transporters, collating inventories of the marketers of these fish products and organizing the waybill and delivery down to their pick-up office. These stockfish and crayfish marketers are informed upon arrival of their goods for pick up.

The third-party logistics providers function to minimize costs by not purchasing/owning the delivery vehicles but having these vehicles readily available to transport the fish in a contractual arrangement. The logistics providers are mainly of the micro-enterprise scale comprising 3–5 personnel working at the office (for documentation), the store, and the vehicle onloading/offloading points. They also deliver other foodstuff/commodities apart from fish as a means of business diversification. Specialization in this business model is more recent within the last five years and is relatively uncommon in Ebonyi State.

Key challenges of third-party logistics providers

- There are problems of misplacement of goods at the place of delivery due to improper records and tagging or problems associated with the transporter.
- There are sometimes delays in the delivery of the commodities. This is often due to poor road conditions but is also related to the logistics provider's degree of control over the delivery vehicle schedules.
- There are very few third-party logistics providers specializing in the handling of fish products in the state. The general (un-specialized) logistics providers are less able to produce the right storage conditions for fish, which is a perishable commodity.

1.7. Retailers

These are the most commonly found group of marketers selling various forms and types of fish products in the state. They include sellers of live fresh fish (catfish), frozen fish, stock fish, smoke-dried fish, and crayfish. There are variations in the level of operations and sophistication of the different fish retailers; however, fish retailers mainly operate at the nano-scale. Some wholesalers also retail their fish products.

Retailers of frozen fish involve marketers trading in different capacities. Some have cold rooms (and chilling services), and others have chillers to store fish. This group of markets standardize their sales by selling by weight, and they also sell a wide range of frozen fish (including tilapia and croaker) as well as live fresh fish. These retailers frequently also sell other types of meat.

The other group of frozen fish sellers is dominated by the women who purchase a few cartons from the wholesalers and sell smaller quantities of fish at the market through a process of price haggling without any standardized measures. This category of retailers prefers the smaller-sized frozen fish types (Scumbia, Titus, Mackerel, China horse, etc.). They meet the needs of most consumers. The live and frozen fish retailers also provide services to the buyers such as cutting fish into smaller pieces and/or degutting the fish.

Another group of retailers are those selling different forms of dried fish – smoke-dried fish, stock fish, crayfish, etc. Interestingly, most smoke-dried fish processors (catfish and frozen fish type) market and retail their products. The regular group of dried fish retailers found in the markets mainly source their fish products from outside the state. For instance, the most commonly retailed 'Mangala fish' is a type of smoke-dried catfish. Although catfish is raised and processed within the state, these retailers source the Mangala fish and other catfish types from Onitsha, its primary market in the southeast of Nigeria. Mangala at Onitsha are usually bought from Yola and Maiduguri (the farthest northeast regions of Nigeria). The retailers rely on this dried-fish type to satisfy the buyers interested in consuming smoked catfish that was captured from the wild. The wild smoke-dried catfish type is seasonal, more available at the end of the rainy season and throughout the dry seasons (August – March) but scarce and expensive during the rainy season. The retailers also break up the catfish into smaller pieces packaged and displayed to accommodate different categories of buyers.

Stockfish retail is also common as the retailers purchase bulk from major distributor markets in Aba (Abia State). Stockfish is an essential constituent of most soups prepared in this part of the world. It is imported into Nigeria from Europe and is highly marketed by most dried-fish retailers who purchase it by parts (whole, head, main body, and/or tail). Retailers also break bulk (cutting and breaking the fish into smaller quantities for ease of sales). The market for stockfish is highly affected by import regulations and volatile exchange rates.

Crayfish is another popular fish constituent of most delicacies in Ebonyi State, and it is produced mainly in the coastal areas of Nigeria. It is seasonal and more available towards the end of the rainy season and the onset of the dry season (August – December). Retailers in Ebonyi State mainly source crayfish from the coastal markets of Cross River and Lagos States, and it is then delivered by waybill or transported down to the location. Other species of a small-sized bony type of fish ('kpai', bonga fish, etc.) are accessed from the coastal regions too. These dried bony fish types constitute good soup ingredients, are low-cost, and are usually sold by retailers.

Retailers of dried-type fish often engage in selling all the various types, though some concentrate on selling one fish type. This they do to improve the income from sales. Dried-fish retailers are patronized mainly by individual consumers, whereas live fresh fish is bought chiefly by hoteliers, bars, and barbeque outlets.

Key challenges for retailers

- Retailers face major challenges with storing and preserving their unsold fish, which forces them to reduce purchases. It is difficult for some frozen fish retailers to preserve their fish after daily sales because they either lack refrigerating facilities or a stable power supply, thereby incurring extra costs. Some retailers benefit from the benevolence of their cold room source of fish supply, where

they can keep the remainder of their frozen fish purchases for a given period. Retailers sometimes pay for other cold room services to preserve their fish stock as well.

- Dried-fish retailers experience difficulties storing the fish commodity to preserve the shelf-life until sale. Hence, they incur losses due to the deterioration of the fish or cut-price sales. The smoke-dried frozen fish type must be sold off in two days, after which it rots due to the lack of proper storage.
- Retailers encounter challenges in sourcing the various fish commodities from distant places and transporting these down to their business locations due to the perishable nature of fish.

Cross-Cutting Themes: Environment, Food Safety, and Gender

1.8. Environment

- Production of fish seeds (fish fries and fingerlings) is not common in many parts of Ebonyi State due to poor water quality, especially in Ebonyi North and Ebonyi Central agroecological zones (Nwidembia, et al. 2016).
- Over the years, the depletion of captured fish stock in the rivers and adjoining streams has been attributed to agrochemical activities and the pollution of water channels that feed into the larger water bodies. The Onuebonyi River is typical as this waterbody is situated close to the site of the Ebonyi State fertilizer and agrochemicals industrial plant. Some fishermen complain of a marked decrease in fish stock and the disappearance of various fish types in the river over time. This is corroborated by literature which outlines the environmental challenges caused by the operations of these agrochemical plants, similarly citing the inappropriate disposal of effluents which contaminate the habitat of various living things (Nwali et al., 2016). Fishermen also complain of the rise in the indiscriminate use of agrochemicals in the farmland, especially by farms close to streams and rivers which are easily polluted with agrochemicals via runoff.
- Similarly, many mining activities in the state involve compounds such as lead, zinc, salts, etc. (Eyankware & Obasi, 2021). These activities continue without strict adherence to environmental impact assessment guidelines/rules, thus polluting the environment and adjoining water bodies (Eyankware & Obasi, 2021). A typical example is the lead mining activities in Ikwo and Izzi local government areas which have destroyed many water bodies and channels (Njoku et al., 2020). The rivers crisscrossing these areas are among those where fish capture is said to be declining due to pollution.
- The water quality in various parts of the state is poor, harsh, and unsustainable for rearing fish (especially at early stages) and even for human use. The use of dug-out water wells (notwithstanding its environmental challenges) is being supplemented or substituted with the sinking of water boreholes to

accommodate fish production. The processes for sinking boreholes remain largely unchecked and unregulated despite their potential to disrupt the balance in the ecosystem (Boyd, 2018).

- Ebonyi State's topography and soil profile produce flood plains and make the state prone to flooding in many regions (Choko et al., 2019). High rainfall intensity increases the water bodies' volume, causing the fish to move farther from the reach of the fishermen. Similarly, yearly floods are disastrous to fish survival in the wild, as they disrupt the water habitats. Conversely, the scorching dry seasons cause the fish to hibernate and migrate, resulting in hardly any catch during the dry season.
- Aquaculture, which entails rearing fish in ponds, generates some waste products. Here, pond wastewater is mainly discharged into the adjoining ground surfaces (farmland, road, public drains, etc.) without consideration to the environment. This is entirely unchecked and even more frequent in the peri-urban and rural areas of the state, where there are crop farmlands adjoining fish farms.
- Fish processing here is mainly through smoke-drying, and almost all fish processors depend on wood charcoal as fuel due to the high cost of other energy sources. Using fuelwood and charcoal for fish processing is unsustainable and contributes to environmental degradation and greenhouse gas emissions (Sola et al., 2017).

1.9. Food Safety

- The use of inorganic substances (fish medications, fish boosters, etc.) is not regulated and is mainly unchecked. Fish medications and boosters are prescribed by regular input dealers who mostly do not have professional or other adequate training on the safety measures for the use of these medicines. Some actors in the fish value chain alluded to the improper use of fish medications and boosters which led to losses of fish. The timing of ingestion of these substances by fish stock has food safety implications for humans, considering the active half-life of the chemical substances in the fish.
- Some fish farmers constantly use certain inorganic substances as fish boosters to increase the table weight of fish. These substances have been observed to result in more fat deposition in the fish rather than flesh and muscle tissue growth.
- Some fish marketers alluded to the notorious Sniper insecticide (2-2-dichlorovinyl dimethyl phosphate compound), which is by persons in the dried-fish business to preserve the fish in store (stockfish, smoke-dried fish). The Sniper insecticide compound is highly vaporized and dangerous for human consumption and health.
- As the most preferred procedure by processors, smoke-drying fish is done with little consideration for hygiene. Fish handling during processing and packaging is mainly done with bare hands without strict adherence to hand-washing practices.

- The CO (carbon monoxide) and soot deposits on smoked fish are ignored; rather, smoked fish is merely dusted off and packaged. The interest of the processors is in the unique taste left on the smoked fish by the wood-charcoal effect. Empirical literature reveals both positive and negative effects of using smoke-drying in fish processing (Olaoye et al., 2017).

1.10. Gender

- Fish producers (fish farmers and fishermen) involve primarily male workers, which we estimate at about 71%. This could be related to the production activities, which can be tedious, dangerous, and time-consuming and may affect women's completion of household chores. These activities involve cleaning (washing and scrubbing) the concrete/plastic/tarpaulin pond, maintenance of pond structures, movement of tarpaulin pond structures and their installations (involves lifting of metal poles), fertilization of ponds (using bags of dung), catching of fish during pond harvesting, hatchery activities, etc. More so, capture fishing is deemed an exclusive practice by males in this part of the world where women mostly enter the value chain at the marketing node. The key informants indicated that the activities of artisanal fishing are not befitting for female folk.
- Fish processing (smoke-drying) has a fair share of male and female participation. The usual activities here include cutting and cleaning of fish; preparation of fish for smoking (cutting, removing of viscera, folding/holding fish in place, spicing of fish); preparation of the smoking kiln (cleaning of the smoking kiln, setting of the trays, feeding with charcoal fuel); arranging of fish on trays in the kiln; and the smoke drying proper (which is time-consuming and requires some level of vigilance and discipline). Given that the fish farmers often set up their own processing units, one may find that the male employees are also found in a higher proportion at the processing node of the fish value chain. There is a perception that men are better adapted to critical aspects of harvesting fish from the pond and slaughtering it for processing.
- Fish marketing can be better segmented into wholesale and retail sales. Fish wholesale marketing is more applicable to live and frozen fish businesses where men dominate the workforce. Live fish marketing is also carried out mainly by fish farmers (they usually operate on wholesale of the fish to retail outlets). Frozen fish wholesalers prefer employing men's services because the key activities involve lifting heavy cartons of frozen fish and working in extremely cold conditions. Women are engaged as cleaners, cashiers, deskwork personnel, and so on. The women dominate frozen fish retail; they constitute a union for their trade in the major market. Men involved in the frozen fish retail business are fewer and tend to do the business in combination with sales of other kinds of meat. Men often make live catfish sales at bars, restaurants, and barbeque grill spots. For buyers to

select the live catfish, fish is displayed in temporary pond structures. The appointed chef of the outlet then prepares the snack/meal. The fish retailing market involving dry fish types (smoked fish, stock fish, crayfish, etc.) is dominated by women. It is strongly perceived that women do better with managing the business of perishables.

- The input dealers node of the fish value chain in Ebonyi State has a mainly female workforce. Most of these business outlets have men only as the establishment's owners or as the caretakers of the fingerlings in the pond. This pattern is attributed to the reliability and trustworthiness of women, which is good for the prosperity of the business. This could also be related to the duties involved, which are less tasking physically and are primarily focused on sales (where female disposition is perceived as more alluring) and accountability. The prevailing wage here is also minimal to cater to the needs and dependents of the usual 'breadwinners' (men).

Conclusion

The fish value chain in Ebonyi State comprises fish farmers and fishermen (fish producers), fish processors (smoke-drying), fish marketers (wholesalers and retailers), fish input dealers, and third-party logistics providers. These participants are integrated to some degree. The level of operation and sophistication within the value chain seems rudimentary and in the early stages of value chain development. Some support service nodes or actors are absent in the chain, with implications for its efficiency.

Fish production in Ebonyi State is expanding in scale and scope owing to growing awareness, interest, and involvement in fish culturing (aquaculture). At the same time, participation in capture fisheries has been on the decrease, owing to the unsustainable attributes of the business both economically and environmentally. With greater awareness of the nutritional benefits of fish and their importance in the diet, aquaculture (fish farming) has gained relevance as the most viable alternative to keep live fish in good supply. However, given the cost-intensive nature of fish farming and the economic status of the majority in Ebonyi State, entry into the business is limited by access to resources (i.e., capital).

Aquaculture, like most trade, is supported by input services. Most fish input dealers combine the three components of inputs supply (fingerlings, feed, and medicine). The fish medicine input suppliers do not usually undergo formal training to make fish drug prescriptions/suggestions for their customers (fish farmers). Rather, individuals are informally trained in the business through years of apprenticeship and experience. This shows that the fish experts do not necessarily get involved in the fish value chain. Instead, industry participation is mainly motivated by a business opportunity and is mediated by the availability of investment capital.

The bulk of large sales of live fish come from aquaculture activities, with catfish as the most common type due to its adaptability. Fish farmers use the smoke-drying fish processing method as a way to cut down the cost of production. Processed catfish at bars, restaurants, and hotels are not consumed by the poor.

The organization of fish distribution in Ebonyi State remains haphazard. As such, third-party logistics providers are few and less specialized. The retail fish market is made up of market women who sell the commonly sought-after frozen fish; other retailers who sell live fresh fish and the less common types of frozen fish (tilapia, croaker, etc.); and the sellers of all forms of dry fish (smoked-fish, stock fish, crayfish, etc.). Dried bony fish species exist in the retail market in negligible quantities, and these are neither produced nor processed within the state.

The rate of business registration is low in the fish value chain, especially among marketers, processors, and producers. This is characteristic of enterprises operating at nano and micro-scales, given their small capital structure and level of operations. Most input dealerships are formally registered, and this group operates a more extensive capital base with higher turnovers.

Infrastructural advancement remains at the core of the fish value chain's efficiency and development. The distribution links and support services from input supply to output marketing are crucial for enhancing each node's integration and value creation. For instance, the undeveloped third-party logistics providers' failure to perform facilitative functions for many value chain actors compounds costs and reduces productivity. It is also essential to further understand the demand side dynamics in the fish value chain in Ebonyi State. For this, micro-level data and in-depth analysis are vital.

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