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Organisation and structural constraints of the catfish supply chain in Côte d'Ivoire

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ABSTRACT

In Côte d'Ivoire, catfish remains marginal in aquaculture despite real consumption potential and strong dependence on fish imports. This article examines the organisation and structural constraints of its supply chain. The study combines a quantitative survey of 200 fish farmers and 38 fishers with semi-structured interviews conducted with 128 actors across the chain. Results show a triply fragmented structure: weak and poorly specialised local aquaculture production, continental catches that remain largely invisible in official statistics, and growing dependence on imported Asian siluriforms. The sector operates mainly through informal relations, with no contractualisation or vertical coordination. Catfish is also constrained by persistent food taboos. Together, these factors maintain a structural lock-in. The article argues for integrated governance linking input provision, market structuring and the sociocultural revalorisation of the product.

KEYWORDS: Ivory Coast; catfish; supply chain; structural constraints.

INTRODUCTION

The fisheries and aquaculture value chains now play a central role in food security, international trade and employment, particularly in the Global South (FAO, 2020; Ababouch et *al*., 2023). This situation creates significant imbalances: small-scale producers are integrated into value chains characterised by high standards of quality, traceability and compliance, without always having access to appropriate institutions and coordination mechanisms (Ababouch et *al*., 2023). In this context, certain 'flagship' species benefit from targeted investments, support programmes and structured governance mechanisms, whilst other species, which are potentially significant, remain confined to fragmented and poorly organised markets. This is the case in Côte d'Ivoire, where tilapia attracts the bulk of attention at the expense of African catfish species (Clarias gariepinus, Heterobranchus spp.). Nevertheless, these species are recognised for their biological robustness, their tolerance to varied environmental conditions and their value for aquaculture (Kebtieneh et *al*., 2024; Khatib and Jais, 2021; Atta et *al*., 2024; Moyo, 2024). However, this particular focus on local tilapia production falls short of the population's consumption expectations. Indeed, Côte d'Ivoire consumes over 800,000 tonnes of fish per year, or approximately 24.5 kg per capita in 2024, making fish the primary source of animal protein, far ahead of meat. Yet, national production, estimated at 84,000 tonnes in 2024, covers only 10 % of the population's needs (MIRAH, 2024). As a result, the country has resorted to massive imports of 750,000 tonnes of fish, including around 80,000 tonnes of farmed fish (Ministry of Finance and the Budget, 2024). This dependence on imports is long-standing and structural (Domingo, 1978). The marginalisation of catfish in Côte d'Ivoire is not solely due to political, technical or economic factors; it is also rooted in social perceptions and long-standing dietary taboos. However, according to a study by the FAO (2023), catfish is now the most widely farmed species in West Africa, which stands in stark contrast to its low profile in Ivorian policies. Several studies show that, among various ethnic groups (e.g. the Agni and Nyabwa), catfish is associated with taboos, totems or symbolic risks that limit its consumption without eliminating it entirely (Abalé, 2023; Niamien, 2019). The findings of the study by Atta et *al*. (2024) conducted a survey of 557 working Ivorians confirms this ambivalence: 63.2% of respondents reported consuming catfish, with rates sometimes exceeding 50% in most regions and among most ethnic groups. In this context, the Ivorian catfish

sector finds itself at the crossroads of several dynamics: growing pressure to reduce dependence on fish imports; a focus of policies and technical support on tilapia; changing dietary practices and a relative weakening of certain taboos; and the persistence of a catfish market organisation that remains unclear and poorly documented. Existing research focuses primarily on the cultural, health and nutritional aspects of catfish consumption (Atta et *al*., 2024; Abalé, 2023; Niamien, 2019; Koumi et *al*., 2016; Ducarme and Micha, 2003; Kumolu-Johnson et *al*., 2010).

A few older studies do, however, describe the supply and marketing of fish in Côte d'Ivoire (Domingo, 1978; Anoh, 1999), without specifically addressing catfish or the contemporary structure of its supply chain. The way in which the catfish market is currently supplied, structured and governed therefore remains poorly documented.

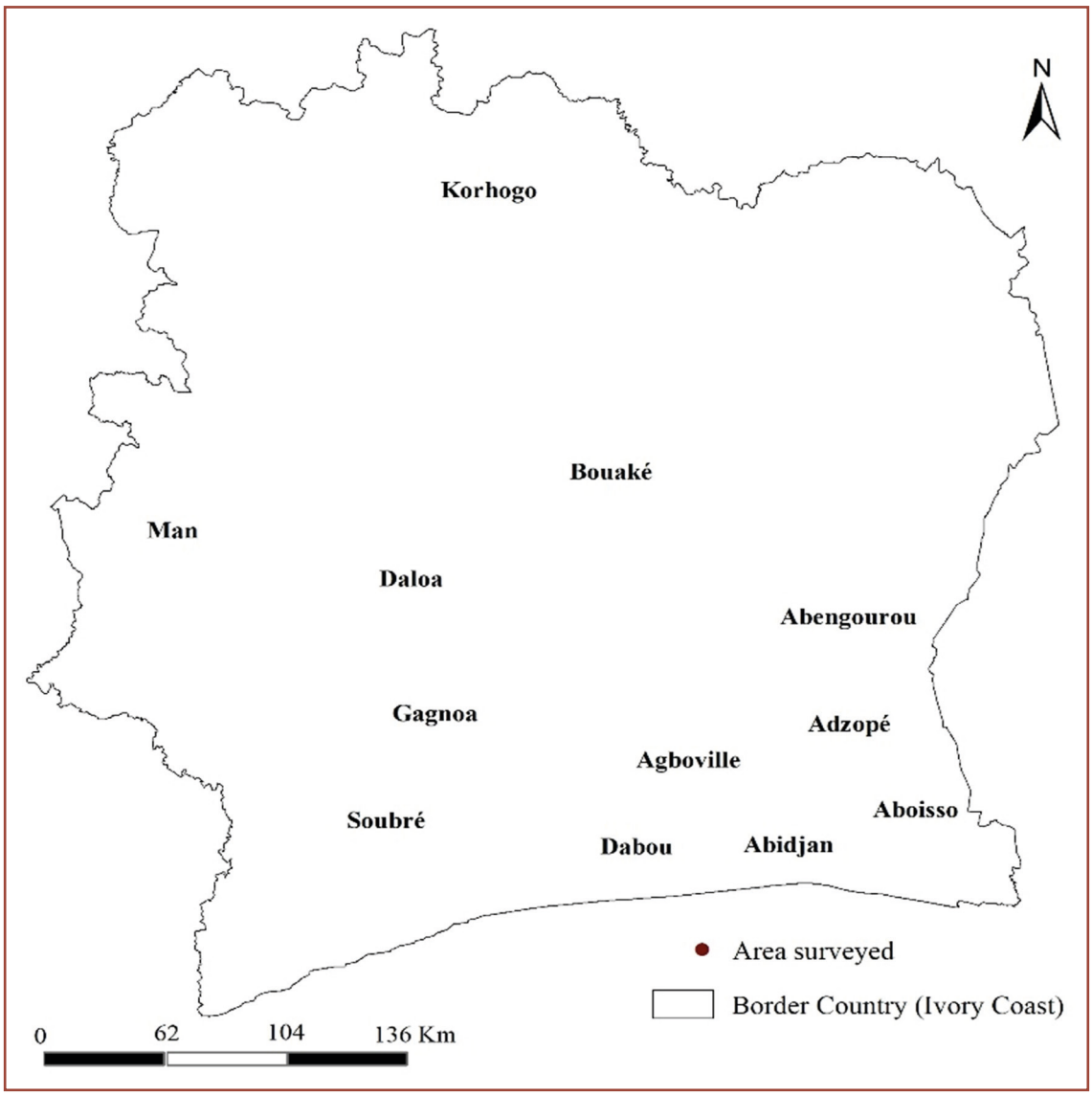
This study therefore aims to analyse the organisation of the catfish supply chain in Côte d'Ivoire and to identify the structural constraints hindering its development. The article is organised around three lines of analysis: (1) how is the Ivorian catfish market supplied and structured? (2) how do stakeholders cooperate and coordinate along the supply chain? and (3) why does this chain remain poorly structured, and what structural constraints keep the sector in a state of systemic lock-in, despite proven consumption potential? The aim is to analyse how the interplay between productive, organisational and socio-cultural factors shapes the current trajectory of the catfish market in Côte d'Ivoire, and to identify the levers likely to strengthen its structuring.

MATERIALS AND METHODS

This study is based on a mixed-methods approach combining quantitative surveys and qualitative research, with the aim of analysing the organisation and structural constraints of the catfish supply chain in Côte d'Ivoire. Data collection took place between January and April 2025 and covered all the main links in the sector. The analysis focuses on supply and distribution dynamics. This approach forms part of the value chain and supply chain analyses of the fisheries sector (Ababouch et *al.,* 2023; Castillo Jiménez et *al.,* 2021).

The surveys were conducted in several towns covering potential catfish production and marketing areas in Côte d'Ivoire. These were the towns of Agboville, Adzopé, Abengourou, Aboisso, Dabou, Bouaké, Man, Gagnoa, Daloa and Korhogo (Figure 1).

Figure 1 – Location of survey areas



Source: BNETD, 2011; Our surveys, 2026.

The fieldwork involved several categories of stakeholders. Five importers of fishery products were interviewed at the Abidjan fishing port, the main point of entry for frozen products. They were selected on the basis of two criteria: (i) being registered as an importer of fishery products with the Directorate-General of Customs, and (ii) regularly trading in catfish according to data from the DPSP-MIRAH. The aquaculture production sector was studied through a questionnaire survey of 200 fish farmers and 38 fishermen spread across the aforementioned localities. They were selected at random from the national lists provided by InterAqua and Interpêche respectively, the sector's umbrella organisations. The questionnaires, administered via the KoboCollect app, aimed to identify the role of catfish

in production systems, the perceptions of producers and their customers, and the marketing channels used.

Intermediaries were interviewed using semi-structured interviews. Respondents were identified using the snowball sampling method, starting with catfish farmers. In total, 25 25 fish wholesalers, 16 processors specialising in smoked catfish and 25 restaurant owners were interviewed, as well as the managers of 62 fishmongers. These interviews focused on the economic motivations, difficulties encountered and the logistical and commercial constraints associated with this species.

Further interviews were conducted with key contacts at the Ministry of Animal and Fisheries Resources (MIRAH). The Deputy Director of Aquaculture and the officer responsible for fisheries production statistics within that Directorate; the head of statistical services at the Fisheries Directorate for import data; and the President of InterAqua. These interviews followed a semi-structured guide covering sectoral policies, available data and the development prospects for the catfish sector.

The quantitative data were analysed using Microsoft Excel, employing descriptive statistics and cross-tabulations. The qualitative data were manually coded by theme, enabling the identification of stakeholders' rationales, forms of coordination and the main barriers to the integration of catfish into the national fisheries sector.

RESULTS

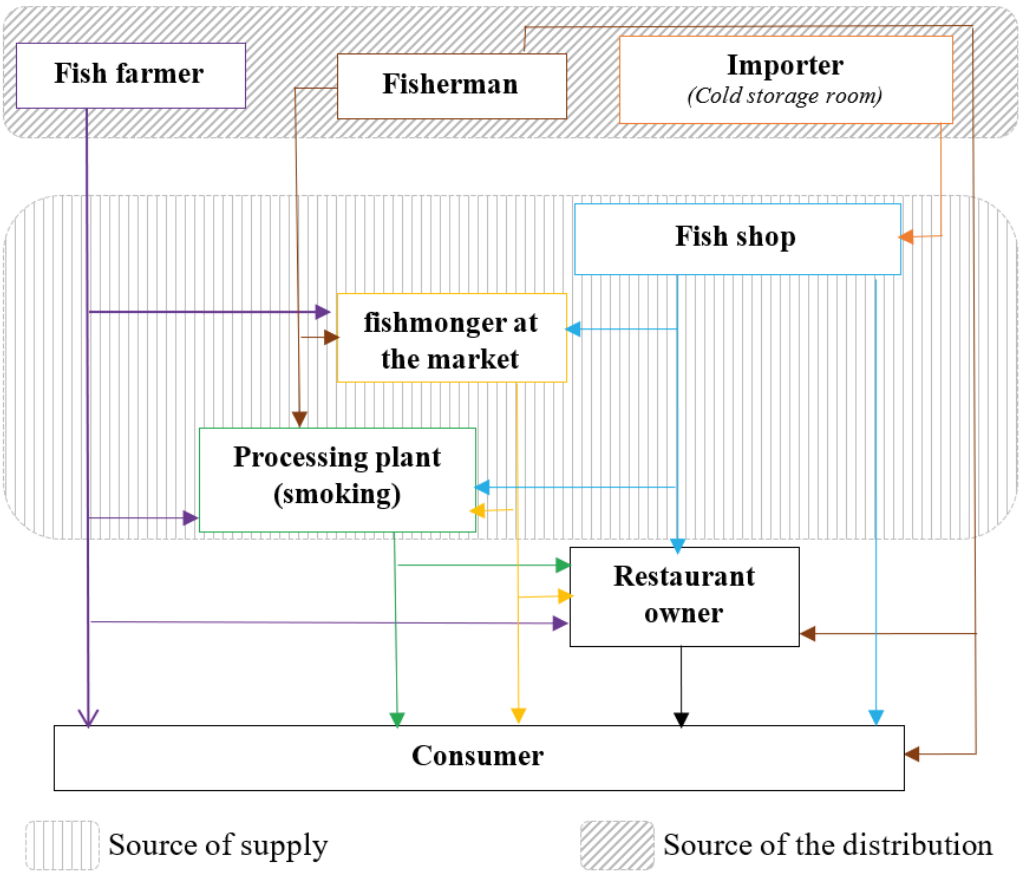
Structure of the catfish supply chain in Côte d'Ivoire: a triply fragmented architecture

The mapping of the catfish supply chain in Côte d'Ivoire (Figure 2) reveals a multipolar structure, in which three categories of stakeholders supply the market: fish farmers, artisanal fishermen and importers. These supply sources converge on a network of distributors (fish wholesalers, cold stores, fishmongers, processors) before reaching end consumers, either directly or via restaurants.

Figure 2 shows that the availability of catfish in the various markets stems mainly from local production (fishermen and fish farmers) and imports. Unlike fishermen and fish farmers, who maintain direct commercial links with consumers, importers necessarily go through fishmongers, who handle the distribution of imported catfish. As fish farming production is low, the fish is

sold directly on local markets without going through an intermediary such as a 'fishmonger'. This is also the case for fishermen, who deliver directly to fish wholesalers, processors, restaurateurs and consumers. However, this multi-polar supply structure remains poorly organised. The various players in the supply chain operate independently, without contracts, shared rules or a common organisation.

Figure 2 – The catfish supply and marketing chain



Source: Field surveys, 2025.

Local catfish aquaculture: a marginal and non-specialised activity

The survey of fish farmers reveals a low level of interest in catfish production. Only 8% of respondents engage in dedicated catfish monoculture (Clarias gariepinus and Heterobranchus longifilis). These farmers are mainly found in the districts of Comoé (Abengourou), Montagnes (Man) and Bass-Sassandra (Soubré). Among these farmers, stocking is deliberate and accompanied by appropriate technical management. This technical management involves sourcing fingerlings from specialised hatcheries or experienced fish farmers, feeding supple-

mented with animal by-products, and maintaining low stocking densities to limit cannibalism. However, even among these dedicated producers, catfish occupy a secondary or tertiary position in their fish farming systems, behind tilapia (Oreochromis niloticus) and, in some cases, heterotis (Heterotis niloticus), known by the local name 'Cameroon'. The volumes of catfish produced remain modest. On average, producers yield 350 kg per farmer per cycle; no operator exceeds one tonne per year. This low output is partly due to the limited technical expertise of the operators and constraints regarding access to fry and suitable feed.

With regard to training, only 12% of fish farmers who intentionally produce catfish have received training specific to this species, compared with 78% for tilapia. This imbalance in technical support reflects the institutional prioritisation of tilapia and is one of the main reasons for the catfish sector's lag.

Furthermore, 38% of the fish farmers surveyed harvest catfish at the end of the cycle even though they had not deliberately introduced this species into their ponds (Table 1). These farmers are mainly found in the central- western and south-western regions of Côte d'Ivoire. Two mechanisms explain this phenomenon. On the one hand, the unintentional introduction of catfish into ponds in extensive systems, either through contamination of tilapia fry batches or through natural colonisation from surrounding aquatic environments. On the other hand, the functional use of catfish as a predator in tilapia-catfish polyculture systems, to control the unchecked reproduction of tilapia in the event of failed sexing. In both these scenarios, catfish is neither a production target nor a product valued in its own right. Rather, it is an opportunistic resource, caught as by-catch during fishing operations, but rarely quantified or marketed in a structured manner. Table 1 summarises this classification of producers and the associated volumes.

Table 1 – Classification of catfish farmers and estimated production volumes (n=200)

Type of fish farmer	% of respondents	Intent	Average volume (kg/cycle)	Status of catfish
No-producers	54%	-	-	-
Dedicated monoculture	8%	High	350	Intentional by-product
Mixed farming with a predator management function	16% (out of 38%)	Average	Not quantified	Functional production
Unintentional presence (extensif)	22% (out of 38%)	None	Not quantified	Opportunistic by-product

Source: Field surveys, 2025.

Table 1 shows that more than half of the fish farmers surveyed (54%) do not produce any catfish. Several reasons are cited. The lack of identified market outlets is the main obstacle (44% of non-producers). A lack of technical capacity comes in second place (32% of non-producers). Finally, 24% of non-producers cite personal dietary taboos. Indeed, as members of ethnic groups for whom catfish is associated with a totem or a cultural or religious prohibition, they refuse not only to consume the species but also to rear it. They consider it contradictory to produce an animal that they cannot touch or sell within their own community.

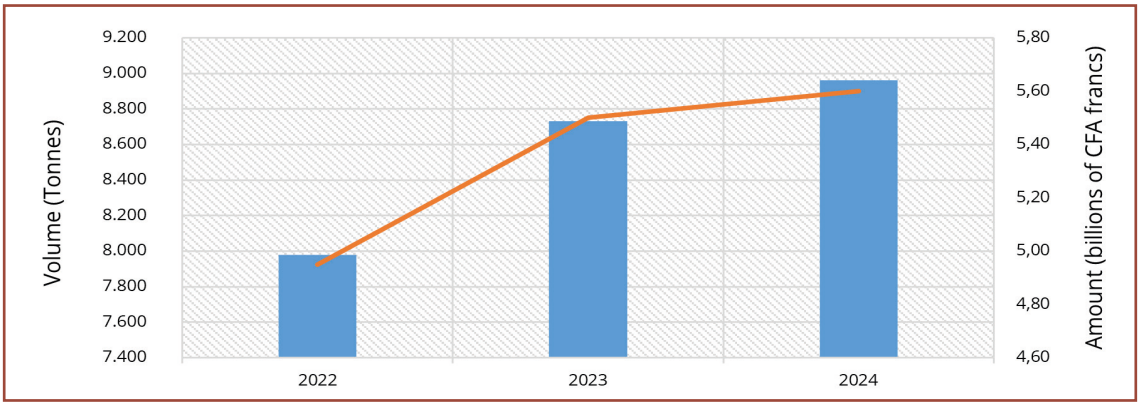
Small-scale catfish fishing: a structural decline and statistical invisibility

Small-scale freshwater fishing has historically been a source of catfish, particularly in the Grand-Lahou and Dabou lagoons, as well as in inland waterways. The fishermen interviewed for this study unanimously report a decline in catches over the last ten years. This trend, although not quantified, is consistent with observations of dwindling fish stocks in lagoon environments documented in the literature. Several explanatory factors are put forward by those involved. These include the degradation of aquatic habitats, overfishing, and hydrological disturbances linked to hydraulic developments. Furthermore, the educational level of the fishermen interviewed is generally low. 39% have never attended school, 45% have not completed primary education, and only 16% have reached secondary level. As for MIRAH staff, institutional interviews reveal a significant lack of material resources (boats, data collection forms, GPS) which limits field visits and the reliability of the data collected. The highly seasonal nature of catches is concentrated in the rainy season. Catfish are sold in bundles of 2 to 6 fish depending on their size, with prices ranging from 3,000 CFA francs to 20,000 CFA francs, directly to consumers or fishmongers, without weighing or traceability. This informal organisation makes it impossible to estimate catch volumes at the national level. This statistical invisibility is all the more problematic as MIRAH data do not distinguish between the volumes of different catfish species in inland fisheries statistics, which aggregate all captured species under generic categories. Faced with this decline in fishing and the inability of local aquaculture to compensate, the Ivorian market has gradually turned to imports, the volumes of which have grown significantly in recent years.

Catfish imports: a growing dependence, but an ambivalent role

Customs data reveal a sharp increase in catfish imports into Côte d'Ivoire (Figure 3).

Figure 3 – Trends in the volume and cost of catfish imports in Côte d'Ivoire between 2022 and 2024



Source: Directorate-General of Customs, Côte d'Ivoire; DPSP-MIRAH, 2025.

In 2022, 7,980 tonnes of catfish (Pangasius spp., Silurus spp., Clarias spp., Ictalurus spp.) were imported. This volume rose to 8,960 tonnes in 2024, representing an increase of nearly 1,000 tonnes over two years. Figure 3 illustrates this trend and puts the share of catfish in total fish imports into perspective. In 2024, catfish accounted for 1.2% of the 733,000 tonnes of fish imported into Côte d'Ivoire, a modest proportion, but one that is steadily increasing.

These catfish come from ten supplier countries (Table 2).

Tableau 2 – Provenance des silures importés en Côte d'Ivoire en 2024

Importing country	Weight (in tonnes)	Share (%)	Value (in millions of CFA francs)
Vietnam	3 461	38.6	2 160
Oman	1 486	16.6	926
Sénégal	1 115	12.4	693
Chine	1 006	11.2	626
Malaisie	697	7.8	433
Yemen	491	5.5	303
Mauritanie	294	3.3	181
Uruguay	265	3	162
Other Countries	96	1.1	61
Inde	49	0.5	28
Grand total	**8 960**	**100**	**5 573**

Source: Directorate-General of Customs, Côte d'Ivoire; DPSP-MIRAH, 2025.

Vietnam dominates with 39% of imports, supplying pangasius (Pangasius hypophthalmus), known locally as 'machoiron piqué'. It is followed by Oman (16.6%) and Senegal (12.4%), which export sea catfish, then by China (11.2%), a supplier of yellow catfish of the Bagridae family, and Malaysia (7.8%), whose catfish are distinguished by their elongated, torpedo-shaped morphology.

Imported catfish are packed in 10 kg cartons (photo 1), whole and frozen, and distributed mainly via the large cold stores at the fishing port of Abidjan. According to data held by the DPSP-MIRAH from the survey conducted in 2024 by the PREPICO 2 project on the catfish market in Côte d'Ivoire, it appears that the regions of Mé (Adzopé), Agne-by-Tiassa (Agboville) and Indenié-Djuablin (Abengourou, Niablé) constitute the three main destinations for redistribution to the interior of the country. In Abidjan, the districts of Abobo and Yopougon are the best supplied.

Photo 1 – Imported catfish, packed in cardboard boxes at a fishmonger's in Abobo

Source : Niamien K., 2025.

Despite this growth in imports, imported catfish remains a niche product. Only 20% of the 62 fishmongers surveyed sell it regularly. The others favour tilapia, mackerel, sardines and horse mackerel, which are perceived as more commercially profitable and enjoy more stable demand. This marginalisation of catfish in distributors' supply strategies reflects both weak final demand and the persistence of negative perceptions associated with this product.

Organisation of stakeholders and coordination mechanisms: between informality and opportunism

An analysis of the relationships between stakeholders reveals a complete absence of formal contractual arrangements throughout the value chain. Whether it be fish farmers, fishermen, importers, fish wholesalers or fish-

mongers, no written contracts or medium- to long-term commitments govern transactions. The dominant operating model relies on regular but informal customer relationships. Fish farmers and fishermen have a list of regular customers, whom they contact by telephone at the time of harvest or catch.

This structural informality leads to high volatility in supply flows and makes any planning or traceability impossible. It also reflects low institutional trust. Stakeholders favour interpersonal ties, based on affinity and habit, over contractual mechanisms, which are perceived as costly, rigid or unsuited to the local context.

Catfish, a secondary product in stakeholders' strategies

For all the stakeholders interviewed, catfish plays a secondary, or even marginal, role in their fish product portfolios. Several factors combine to explain this marginalisation. On the one hand, the irregularity of local supply is a major obstacle. Monoculture fish farmers produce volumes that are too small to sustain a regular market. Producers using polyculture only have catfish available at the end of the cycle, i.e. once or twice a year, in an unpredictable manner. Fish wholesalers and fishmongers are therefore unable to source a continuous supply, which discourages them from incorporating catfish into their commercial range on a long-term basis. Furthermore, the low demand perceived by distributors limits their interest in this product. Fish wholesalers and fishmongers mention a limited customer base, consisting of 'discerning consumers' who know where to source catfish and appreciate its flavour. Several restaurant owners, out of the 16 surveyed, refuse to include catfish on their menus, citing insufficient demand and the prevalence of food taboos among their clientele. This perception of a narrow market discourages investment in promotional strategies or diversification of the product range. Finally, competition from tilapia, demersal species and small pelagic fish plays a decisive role. These species largely dominate aquaculture and distribution in Côte d'Ivoire. Tilapia, in particular, benefits from a positive image, a stable supply, structured marketing channels and a competitive price. Faced with this undisputed leader, catfish struggles to find its place and remains confined to the status of an alternative product, consumed by a minority.

Qualitative hierarchies and symbolic differentiation

The interviews reveal the existence of a perceived quality hierarchy between catfish from different sources. According to fishmongers, catfish caught in lagoons and rivers is regarded as the benchmark product by 'dis-

cerning consumers'. It is valued for its superior taste and authenticity, and sells for a higher price than farmed or imported catfish (Table 3). This quality premium reflects a social construction of value, in which the 'wild or natural' character of wild-caught catfish is associated with greater naturalness and a sense of local roots.

Locally farmed catfish is considered acceptable. Its flavour, influenced by industrial feed, is regarded as less pronounced. Furthermore, its limited and irregular availability makes it unattractive to distributors. Imported catfish, particularly pangasius (Pangasius hypophthalmus), commercially marketed under the local name 'machoiron piqué', has enjoyed considerable success, particularly when served braised in street-side restaurants and maquis. This acceptance can be explained by a strategy of symbolic dissociation. Pangasius is not identified as a catfish by Ivorian consumers, which shields it from the negative connotations associated with the Clariidae family. This commercial success of pangasius suggests that the development of local catfish could benefit from a symbolic repositioning strategy, aimed at dismantling prejudices and promoting the nutritional and taste qualities of the product.

Table 3 – Catfish prices by origin and form (CFA francs)

Origin / Type	Fresh (CFA francs /kg)	Smoked (CFA francs /kg)
Wild-caught	1 500 – 2 500	5 000 – 10 000
Locally farmed	1 000 – 2 000	4 000 – 8 500
Imported	1 300 – 1 600	3 000 – 6 000

Source: Fishmongers' surveys, 2025.

Table 3 shows that smoking appears to be a major economic value- added strategy. It enables the selling price of catfish to be tripled or quadrupled, whilst facilitating its preservation in the absence of an adequate cold chain. Smoking also meets the taste preferences of a significant proportion of Ivorian consumers, who appreciate the smoky flavours and firm texture of fish prepared in this way.

Structural constraints and systemic bottlenecks

Beyond the fragmentation of supply sources and the informal nature of relations between stakeholders, the catfish sector in Côte d'Ivoire faces structural constraints that hinder its development. These constraints, which are technical, institutional and socio-cultural in nature, interact to form a system of barriers that will require coordinated interventions to overcome.

Technical shortcomings and a lack of dedicated infrastructure

The persistent shortage of fry is the main technical constraint identified by fish farmers. Fish farmers who deliberately rear catfish produce their own fry. Others purchase them from experienced fish farmers or from public aquaculture stations such as the one in Jacqueville or the Oceanographic Research Centre in Layo. Since 2025, a private hatchery specialising in the production catfish has been established in Soubré. Given the low demand, fry are produced on an ad hoc basis, without any regularity. This weakness at the upstream end of the sector is identified by fish farmers as the primary constraint. The inability to obtain quality fry, in sufficient quantities and at the right time, discourages attempts at diversification. 11% of the fish farmers surveyed stated that they had given up on producing catfish after several unsuccessful attempts to source fry. This situation contrasts with the tilapia sector, which benefits from a well-developed network of public and private hatcheries capable of responding rapidly to demand.

The second technical shortcoming concerns feed. Fish farmers use only commercial feed designed for tilapia, as there is no specific feed for catfish available on the Ivorian market. However, the nutritional requirements of catfish, a carnivorous species, differ significantly from those of tilapia, an omnivorous species. This mismatch affects zootechnical performance (growth, feed conversion ratio) and, ultimately, the profitability of the farm. Fish farmers sometimes attempt to supplement the commercial feed with fishmongers' waste, chicken intestines or insect larvae, but these practices remain marginal and poorly standardised. The feed suppliers interviewed justify their reluctance to import catfish feeds by citing the current low demand, illustrating a classic vicious circle.Paradoxically, given the low volumes traded and the prevalence of smoking, stakeholders do not regard the cold chain as a priority constraint.

Statistical gap and failure of information systems

The catfish sector in Côte d'Ivoire suffers from a significant statistical gap. The departments responsible for fisheries resource development face difficulties in collecting data on catfish, whether from aquaculture or inland fisheries. The only reliable data concerns catfish imports, provided by the Directorate-General of Customs. This lack of a market information system leads to several major shortcomings.

On the one hand, it makes it difficult to manage the sector. Public authorities and trade organisations have no indicators to guide sectoral policies, assess the impact of interventions or anticipate changes in demand. On the

other hand, it creates information asymmetries between stakeholders. Fish farmers are unaware of the availability of fry among breeders, fish wholesalers are unaware of prices charged elsewhere, and processors cannot anticipate changes in demand. This lack of transparency fosters disorganisation and opportunism, and discourages long-term investment. Finally, this statistical invisibility helps to keep catfish out of aquaculture development strategies, which remain focused on tilapia. In the absence of data, catfish remains a 'non-issue' in sectoral assessments and public policy documents.

Sociocultural barriers and the catfish's low status as a food source

The interviews reveal that negative perceptions associated with catfish persist. These perceptions severely limit its social acceptability. 17% of fish farmers who do not produce catfish cite cultural or religious taboos (totem) as the reason for this choice. In other words, they do not consume catfish themselves and refuse to produce it for cultural or religious reasons. These taboos reflect deeply held beliefs in certain communities, where the catfish is associated with mystical forces or considered impure. Beyond rigid stereotypes, many stakeholders and potential consumers harbour a general mistrust of catfish, which they describe as 'witch fish', 'scavenger' or 'dirty'. These perceptions, fuelled by oral accounts and popular beliefs, are reinforced by the catfish's biological and ecological characteristics. Its opportunistic diet, its ability to survive in low-oxygen waters, and its physical appearance (scaleless skin, long barbels) all contribute to amplifying this myth surrounding the catfish.

DISCUSSION

The results highlight an Ivorian catfish industry that is marginal, fragmented and dependent on imports. This situation contrasts sharply with the trends observed in countries such as Nigeria, Kenya, Ghana, Zambia and Uganda, where catfish (Clarias gariepinus) plays a significant role in commercial aquaculture and relatively well-structured value chains (Imade and Odum, 2024; Obiero et *al*. 2019; Kaminski et *al*., 2022; Lawal et *al*., 2024; Enwel et *al*. 2023).

In Côte d'Ivoire, only 8% of the fish farmers surveyed deliberately rear catfish as a monoculture, with average yields of around 350 kg per farmer per cycle. Most fish farmers (38%) only end up with catfish as a result of opportunistic polyculture.

This situation, which could be described as 'diversification by default', echoes Lazard's (2017) assessment of the structurally unsustainable nature

of subsistence fish farming models in sub-Saharan Africa. In his view, these models hinder the development of a genuine catfish sector, as production volumes remain low, irregular and are sold on an opportunistic basis (Lazard, 2017). Mbokane et *al*. (2022), in a comparative review of the challenges of catfish farming in Southern Africa, identify six categories of recurring structural constraints within African catfish sectors. They note the limited availability of quality fry, the unsuitability of available feed, the lack of training and technical support for fish farmers, difficulties in accessing finance, the weakness of rural extension services, and the underdevelopment of marketing channels. All six of these constraints are present in the Ivorian context, confirming that the marginal status of catfish in Côte d'Ivoire is not an exception, but the local manifestation of a continental issue.

The constraint relating to inputs is the most significant. Barasa and Ouma (2024), in a study conducted in Kenya on the supply of Clarias gariepinus fry, show that mortality rates among larvae and fry can reach 32.5 to 99.8 per cent of batches depending on rearing conditions, making the supply of fry unpredictable and discouraging fish farmers. These authors draw an illuminating contrast with South-East Asia, particularly Vietnam for pangasius, where mastery of artificial reproduction techniques and the establishment of a dense network of specialised hatcheries have helped to secure the upstream part of the supply chain. In Côte d'Ivoire, this situation is exacerbated by the use of feed formulated for tilapia in the absence of formulations suitable for catfish, which undermines zootechnical performance. Feed suppliers justify their reluctance to import specialised formulations by citing the current low demand. This situation illustrates a classic vicious circle in which the lack of suitable feed discourages producers, who in turn generate too little demand to encourage suppliers to invest. Adebayo and Daramola (2013), in an economic analysis of catfish production in Ibadan, show that feed costs represent the main expense for fish farmers and that insufficient capital is a major barrier to entry into the sector. In Côte d'Ivoire, where the sector is structurally less developed, these constraints are even more decisive. At the continental level, Ragasa et *al*. (2022), in an analysis of aquaculture in sub-Saharan Africa, highlight that the sector's growth remains hampered, beyond production volumes, by governance deficits in value chains. They describe these shortcomings as poor coordination between the links in the chain, insufficient access to credit for small-scale producers, and weak marketing infrastructure. These

characteristics are fully evident in the Ivorian catfish sector and explain its persistent marginalisation despite proven potential.

In terms of value chain organisation, Liverpool-Tasie et *al*. (2024), in an analysis of aquaculture value chains in three Nigerian states, show that Nigerian stakeholders are developing partial vertical integration as a strategy to circumvent market imperfections. This partial integration is virtually absent in Côte d'Ivoire, where relations between links remain purely informal and opportunistic. These authors also emphasise that fry production is a highly specialised, geographically concentrated activity, and that fry are often transported over long distances from hatchery hubs to production areas; an organisational structure that Côte d'Ivoire lacks for catfish.

According to Little et *al*. (2016), freshwater species that contribute to local food security are often overlooked in development priorities. In this context, the catfish (Clarias gariepinus), despite its undeniable biological advantages, is frequently treated as a secondary species in technical support schemes, which often focus on tilapia. This situation is not unique to Côte d'Ivoire. Contrary to the notion that aquaculture in the Global South primarily benefits affluent consumers, numerous studies show that it actually supplies domestic markets accessible to the working and middle classes (Belton et *al*., 2018). In Ghana, where aquaculture is overwhelmingly dominated by Nile tilapia, the catfish (Clarias gariepinus) sector remains secondary in terms of production volumes (Mantey et *al*., 2020; Akpalu et *al*., 2025). Conversely, in Nigeria, the world's leading producer of African catfish, catfish accounts for around two-thirds of national aquaculture production, and the sector's growth is underpinned by the spread of artificial breeding techniques, mass production of fry and the development of dynamic urban markets (Lawal et *al*., 2024; Enwel et *al*., 2023). The contrast with the Ivorian situation highlights the decisive role of sectoral policies and targeted investments in the trajectory of an emerging industry.

The lack of reliable data on catfish catches in Côte d'Ivoire highlights a wider problem shared by many countries in sub-Saharan Africa (Kolding et *al*., 2016). Whilst the FAO estimates that freshwater fisheries account for 30–40% of total fish production in West Africa (Béné et *al*., 2016), national data collection systems remain largely focused on marine fisheries and formal aquaculture. This gap hinders the design of policies for the sustainable management and utilisation of continental species, including catfish. Beyond the statistical shortfall, stakeholders' accounts of declining stocks point to classic

mechanisms characterised by habitat degradation, overfishing and hydrological disturbances (Euzebio, 2024).

The rise in imports of catfish in West Africa is part of a trend towards increasing dependence on fishery products (Belhabib et *al*., 2019). These trade flows, dominated by Vietnamese pangasius (Pangasius hypophthalmus), are driven by growing urban demand for affordable and convenient products. The commercial success of pangasius in Côte d'Ivoire, sold under the name 'machoiron piqué', illustrates how symbolic barriers can be circumvented through a strategy of taxonomic repositioning (Little et *al*., 2016). By dissociating pangasius from local catfish in consumers' perceptions, importers have created a market that avoids the stigma associated with local species. However, this reliance on imports raises several issues. Firstly, it increases Côte d'Ivoire's food security vulnerability to external shocks, as demonstrated by the COVID-19 pandemic (Béné et *al*., 2021). Secondly, it deprives local producers of market opportunities, even though farmed catfish offers environmental and nutritional benefits (Obiero et *al*., 2019). Finally, it perpetuates a trend of devaluation of local products, which are perceived as 'inferior' to imported products (Belton et *al*., 2018). The absence of formal contracts between actors in the catfish value chain in Côte d'Ivoire reflects a well-documented feature of African aquaculture sectors: the predominance of commercial relationships and informal networks of trust (Toufique and Belton, 2014). Market studies on fish in West Africa also describe these client-trust relationships as the dominant mode of coordination (Anoh, 1999; Dème and Dème, 2021). This informality offers advantages such as flexibility and low transaction costs; however, it structurally limits vertical coordination and long-term investment (Reardon et *al*., 2009). In the case of catfish, opportunistic supply maintains a discontinuity in supply that discourages distributors from specialising in this product. Only 10% of the fishmongers surveyed sell catfish, confirming its status as a niche product. This situation contrasts with that of tilapia, where large volumes and a regular supply justify investments in the cold chain and structured distribution networks (Kassam and Dorward, 2017). The emergence of a catfish sector would therefore require collective coordination that goes beyond the individual interests of the stakeholders. Experiences with production contracts between fish farmers and processors, documented in Ghana (Mantey et *al*., 2020) and Kenya (Obiero et *al*., 2019), show that such coordination is possible and requires institutional support.

In Côte d'Ivoire, the prejudices surrounding the catfish form part of a complex web of beliefs that combines lineage totems, the sanctification of certain fish populations, and health-related fears. A recent study by Atta et *al*. shows that, despite a generally high consumption rate (63.2% of the 557 respondents), catfish remains associated, across all regions and among many ethnic groups, with prohibitions, totems and taboos that can extend to the worship or fear of the animal, with accounts of 'allergies' and illnesses attributed to its consumption (Atta et *al*., 2024). More broadly, research in ethnobiology highlights that these dietary taboos have a lasting impact on access to animal resources and influence production patterns, far beyond mere economic considerations (Bobo et *al*., 2015).

Beyond Côte d'Ivoire, research carried out in Benin shows that catfish is considered taboo food for certain families and for pregnant women, in the same way as pork or certain bush meats. These prohibitions are passed down by elders without always being based on explicit justifications, yet they have tangible effects on access to animal protein (Lokoussou et *al*., 2021).

Thus, the Ivorian catfish sector appears to be a system with significant potential, yet one that remains locked. From the perspective of the geography of food systems, catfish could play a strategic role in diversification sources of animal protein in urban and peri-urban areas. This is because demand for fish remains high and imports account for a significant proportion of the supply. Reviews of the links between fisheries, aquaculture, food security and poverty reduction emphasise that the benefits of these sectors do not depend solely on the quantities produced, but on how value chains are governed, territorialised and linked to nutrition policies (Béné et *al*., 2016; Farmery et *al*., 2018).

CONCLUSION

This study highlights the fundamental paradox of the catfish sector in Côte d'Ivoire. The study employs a mixed-methods approach combining a quantitative survey of 200 fish farmers and 38 fishermen, semi-structured interviews with 128 sector stakeholders, and the analysis of secondary market and institutional data.

Despite recognised biological advantages, proven market potential and a national context of heavy reliance on fish imports, the catfish supply chain remains poorly structured. Analysis shows that this situation stems from a combination of production, organisational and socio-cultural constraints, rather than a simple technical or economic shortfall.

From a supply perspective, the sector relies on a fragile balance between a declining small-scale fishing industry, an aquaculture sector that remains marginal, and growing imports of Asian catfish. The depletion of fishery resources, insufficient local production of fry and the lack of clearly identified market outlets limit producers' commitment. Conversely, imported catfish benefits from better logistical organisation and greater social acceptance, reinforced by mechanisms of symbolic dissociation, which shield it from the negative perceptions associated with local catfish.

The study also highlights the central role of socio-cultural factors in shaping the sector. Food taboos and persistent prejudices contribute to fragmenting demand and hindering production initiatives, without, however, resulting in widespread rejection. Actual consumption of catfish, particularly in smoked form, reveals, on the contrary, that there is significant scope for adding value to the product. In this regard, smoking emerges as a key driver of value creation, facilitating preservation, meeting local taste preferences and significantly improving selling prices.

Beyond the case of the catfish, this research confirms that the development of the fisheries and aquaculture sectors depends less on production volumes than on how value chains are organised, coordinated and localised. Catfish could thus contribute to the diversification of animal protein sources in Côte d'Ivoire, provided that concerted action is taken to address the availability of fry, the strengthening of technical capacities, the organisation of distribution channels and consumer awareness. These results argue in favour of an integrated approach to the governance of the sector, linking production, organisational and socio-cultural issues. ●

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