



GHANA AGRIBUSINESS PLAYBOOK SERIES

2026



TILAPIA & CATFISH

Value Chain Analysis

A mapped breakdown of the value chain, from farmgate to factory, and who captures what along the way.

Center for Entrepreneurship
Ashesi University



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<https://agribusinessplaybook.com/playbook/tilapia>



Executive summary

THE THESIS

Most of the value in Ghana's tilapia and catfish sits in the chain around the fish. This analysis follows a kilogram of fish from seed and feed to the plate, shows who captures the markup, and locates the missing middle where the biggest openings sit.

This standalone Value Chain Analysis carries the same content as the value chain pillar of the Tilapia and Catfish Playbook, presented here as its own document for readers who need the chain analysis on its own.

A kilogram of tilapia roughly doubles in price from the farm gate to the retail slab, and roughly triples for the same size of fish in a supermarket, at 2016 prices. Little of that markup reaches the farmer, who takes the production risk. Value leaves the farm in two directions: upstream to imported feed, and downstream to the traders who move the fish. Few businesses have yet built the processing and cold chain that could earn more of it. That thin middle, with little industrial processing of farmed fish and little organised cold chain, is the biggest opening in the sector.

Ashesi University | Berekuso, Ghana | 2026

Figures are as reported between July and September 2026 and may have changed since.



Contents

Value Chain Analysis · *Oreochromis niloticus* · *Clarias gariepinus*

Glossary	4
VALUE CHAIN Tilapia and Catfish Value Chain Analysis	5
The chain at a glance	5
Link one: seed and feed	7
Link two, production: two parallel chains, plus the live-catfish trade	8
Link three: the traders who move the fish	10
The price ladder from farm gate to supermarket	11
Who earns what, and why the farmer earns least	13
Who holds power in the chain	15
The missing middle: the biggest opening in the sector	18
The chain priced, link by link	20
The value-capture openings, ranked	22
The risks that sit inside the value chain	24



Glossary

Fingerling

a young fish, past the fry stage, stocked into a cage or pond to be grown to table size.

GIFT / Akosombo

two improved Nile tilapia strains. Akosombo, bred by the CSIR Water Research Institute, is the only improved strain approved for farming in Ghana and copes better with heat and low oxygen; GIFT, bred by WorldFish, grows faster in trials but is not approved, and illegally imported GIFT stock has been found on some farms.

Cage culture

growing fish in net enclosures floating in open water, the dominant method on Lake Volta.

Biosecurity

the set of practices that keep disease off a farm and stop it spreading between farms.

Monosex (all-male)

a batch of only male fish, which grow faster and more evenly than a mixed batch.

Feed conversion ratio (FCR)

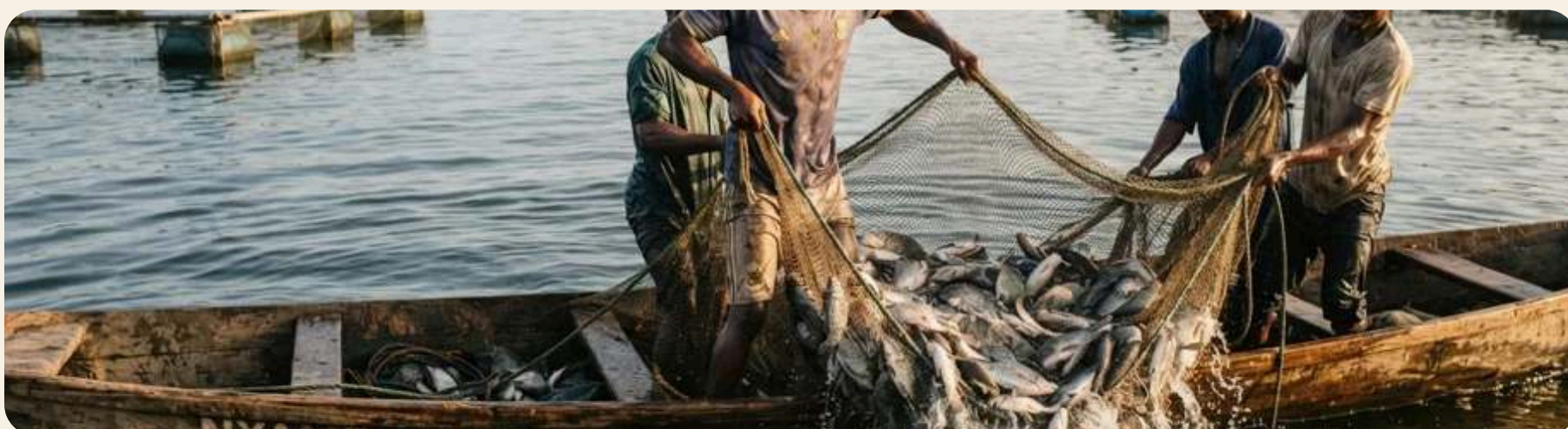
kilograms of feed needed to add one kilogram of fish. Lower is better.

ISKNV

infectious spleen and kidney necrosis virus, the disease that has caused heavy losses on Ghanaian tilapia farms since 2018.

Point-and-kill

the live-fish trade, common for catfish, where the buyer selects a live fish and it is killed to order.



THE CHAIN, LINK BY LINK

Tilapia and Catfish Value Chain Analysis

The chain at a glance

Ghana's tilapia chain is short and simple: seed and feed suppliers feed a set of farms, the farms sell to aggregators and traders, and the traders sell fresh whole fish to consumers. There is almost nothing in between. IFPRI researchers described the chain as relatively short and simple, like those in Egypt and Zambia.¹ A short chain gets fish to the plate quickly and cheaply. It also means little processing, portioning, freezing or branding happens, so little of the money that work would bring is earned.



The value chain runs through a thin, informal middle



Processing and cold chain barely exist, so value leaks out of the chain

FIGURE 1 The value chain from seed and feed to the plate, with the thin, informal middle where value leaks

The chain runs from seed and feed, through the farm, to a thin, informal middle of traders and smokers, and on to the plate. Value is lost in the gap in the middle.

Source: Rurangwa et al.,² Ragasa et al.,³ Asiedu et al.⁴

Q WHAT THIS MEANS

Most of the money in the chain sits at its two ends. At the input end, feed takes most of the cost. At the downstream end, processing and cold chain would earn most of the value if someone built them. The farmer sits between the two ends, taking the biological risk and the thinnest margin. The best openings move a business from the farm toward feed at one end or toward processing and cold chain at the other.

² Eugene Rurangwa et al., *Development of Aquaculture in Ghana: Analysis of the Fish Value Chain and Potential Business Cases*, IMARES Report C021/15 (IJmuiden/Yerseke, Netherlands: IMARES Wageningen UR, 2015), <https://edepot.wur.nl/337344>.

³ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

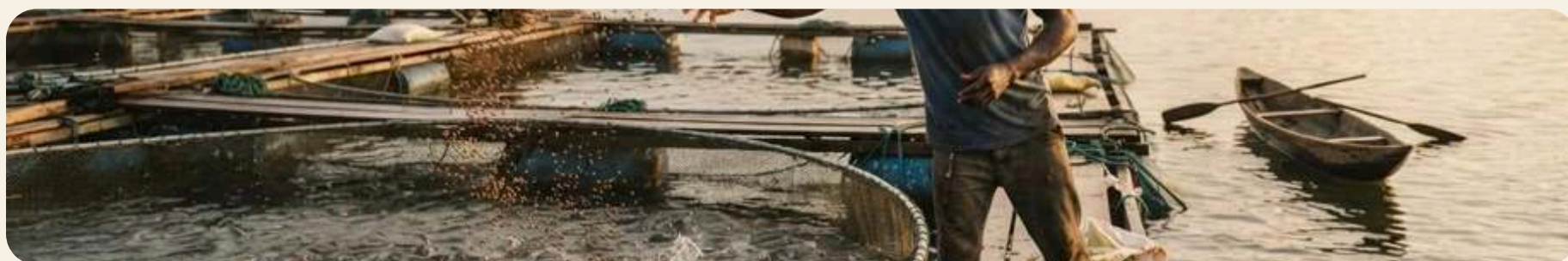
⁴ Berchie Asiedu, Pierre Failler, and Yolaine Beyens, "Enhancing Aquaculture Development: Mapping the Tilapia Aquaculture Value Chain in Ghana," *Reviews in Aquaculture* 8, no. 4 (2016): 394-402, <https://doi.org/10.1111/raq.12103>.

① Link one: seed and feed ①

Most of the money is decided before a single fish is stocked. **Feed is the biggest input, at about three-quarters of the cost of raising fish in cages,⁵ and one local mill has long dominated supply. In 2015 Raanan was the only specialised local aquafeed mill, producing about 25,000 tonnes a year for Ghana at full capacity;⁶ by 2017 it produced about 30,000 tonnes and sold about 70 percent of that in Ghana.⁷ Imported brands and small local mills supply the rest.** Imported feed, from the likes of Coppens, Aller Aqua and Skretting, runs about 30 percent dearer than local, and port taxes and fees add 20 to 30 percent to the cost of imported feed.⁸ Feed price is therefore shaped by a few suppliers and by an exchange rate the farmer cannot control, and it is the main reason a kilogram of tilapia cost about US\$1.51 to produce in Ghana against US\$0.78 to 1.29 in Bangladesh,

Egypt and China.⁹ Feed decides how competitive the sector is.

Seed is the second input, and its quality affects every later stage. Hatcheries produced about 382.8 million fingerlings in 2024,¹⁰ but disease can travel with the fingerlings. About 63 percent of farms sampled on the lake sourced broodstock or fingerlings from a farm that tested positive for ISKNV.¹¹ Fingerlings are a small share of farm cost, 6.62 percent on small-scale cage farms in 2022, yet their quality decides survival and therefore whether the cage ever earns anything.¹² Cheap, unscreened seed can cost a whole batch. Pillar 1 covers the biology of seed. In business terms, feed and seed decide the farmer's economics, few suppliers provide them, and both are business openings.



⁵ Emmanuel Kaboja Magna et al., "Profitability Analysis of Small-Scale Cage Aquaculture Farms in the Volta Lake of Ghana," *Aquaculture Research* 2023 (2023): Article 1314660, 1-10, <https://doi.org/10.1155/2023/1314660>.

⁶ Rurangwa et al., *Development of Aquaculture in Ghana*.

⁷ Efua Konyim Okai, "Feeding Ghana's Aquacultural Growth," *The Fish Site*, 19 June 2017, <https://thefishsite.com/articles/feeding-ghanas-aquacultural-growth>.

⁸ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

⁹ Catherine Ragasa et al., "Accelerating Pond Aquaculture Development and Resilience beyond COVID: Ensuring Food and Jobs in Ghana," *Aquaculture* 547 (2022): Article 737476, <https://doi.org/10.1016/j.aquaculture.2021.737476>.

¹⁰ Ministry of Fisheries and Aquaculture (MoFA), *Programme Based Budget Estimates for 2025: Medium-Term Expenditure Framework (MTEF) for 2025-2028* (Accra: Ministry of Finance, Republic of Ghana, 2025), <https://www.mofep.gov.gh/sites/default/files/pbb-estimates/2025/2025-PBB-MFAD.pdf>.

¹¹ Angela N. A. Ayiku et al., "Molecular Epidemiology and Current Management of Infectious Spleen and Kidney Necrosis Virus (ISKNV) Infection in Ghanaian Cultured Tilapia," *Aquaculture* 581 (2024): Article 740330, <https://doi.org/10.1016/j.aquaculture.2023.740330>.

¹² Magna et al., "Profitability Analysis of Small-Scale Cage."

OPPORTUNITY

An independent feed mill is the strongest entry point in the chain. Because feed is about three-quarters of a cage farmer's cost and one local mill has long dominated supply, cheaper, reliable local feed improves the economics of every farm at once. In 2015 a business case costed a 30,000-tonne mill at about US\$4.2 million, assuming a gross margin of about US\$250 a tonne.¹³

A certified hatchery sells disease-screened seed into a market that produced 382.8 million fingerlings in 2024,¹⁴ while cutting the disease that unscreened seed spreads. Small on-farm feed milling is a smaller version of the feed-mill business. Local producers undersold Raanan by 10 to 35 percent in 2021 and 2022.¹⁵



Feed is the sector's biggest cost and its most concentrated market.

① Link two, production: two parallel chains, plus the live-catfish trade ①

Production is three overlapping businesses, and entrants who confuse them plan badly. The tilapia side runs on two parallel chains. At the top sit a

few large integrated farms, then medium farms, then several hundred small-scale cage farms: around 2016 the Fisheries Commission counted

¹³ Rurangwa et al., *Development of Aquaculture in Ghana*.

¹⁴ MoFA, *Programme Based Budget Estimates for 2025*.

¹⁵ Catherine Ragasa et al., *Profitability and Sustainability of Small-Scale Aquafeed Producers in Ghana* (SSRN Working Paper, 2024), <https://doi.org/10.2139/ssrn.4754241>.

ten large and eight medium tilapia farms,¹⁶ and a 2022 survey drew on a list of 256 small-scale cage farms.¹⁷ A separate live-catfish trade runs alongside. The two largest farms are fully integrated: they own their hatcheries and their cold stores, they grade and gut before sale, and they reach the market through their own channels. Tropo Farms, the leading tilapia producer in West Africa, employs about 917 people and supplies through about 3,000 mostly women traders, and is scaling toward 30,000 tonnes on a US\$10 million AgDevCo loan.¹⁸ It is an example of a large integrated anchor farm. Smallholders work differently. They buy seed and feed from others, sell fresh whole fish at or near the farm gate, and depend on traders to move it. They farm the same lake and the same fish, but run very different businesses.

Running alongside both is the **live-catfish chain**, which works very differently from tilapia. Catfish is sold live into the point-and-kill trade, bars and roadside spots where the customer picks a live fish and it is killed and grilled to order, at a farm-gate pool price of about GH¢40 a kilogram for whole catfish in September 2026.¹⁹ Because it is sold live or smoked, it avoids the cold-chain problem that hurts fresh tilapia, and it earns a higher price from bars and restaurants. In European tank systems African catfish yields from about 300 kilograms (Hungarian flow-through) to 1,500 kilograms (Dutch recirculating systems) a cubic metre a year at a feed conversion of about 0.9 to 1.4, reaching 1.1 to 1.6 kilograms in 30 to 50 weeks,²⁰ so a live-catfish grow-out supplying urban bars is a separate business with its own market.



¹⁶ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

¹⁷ Magna et al., "Profitability Analysis of Small-Scale Cage."

¹⁸ AgDevCo, *Tropo Farms Secures \$10m from AgDevCo to Expand Tilapia Fish Production in Ghana* (London: AgDevCo, 29 October 2024), https://www.agdevco.com/site/assets/files/2132/agdevco_tropo_-_press_release_october_2024.pdf.

¹⁹ Chamber of Aquaculture Ghana, "Fresh Tilapia and Catfish Pool Price Status, Week 38 (Year 2026)," *Weekly Update*, 23 September 2026, <https://chamberofaquaculture.com/chamber/assets/img/2026img/38.jpeg>.

²⁰ András Péteri et al., *African Catfish (Clarias gariepinus, Burchell 1822) Production with Special Reference to Temperate Zones: A Manual* (Budapest: Food and Agriculture Organization of the United Nations, 2015), <https://openknowledge.fao.org/server/api/core/bitstreams/f8fb572b-7d08-45cc-ac5c-4aa7ef4c5e4d/content>.

TABLE 1

The three producer chains and where an entrant fits

THE PRODUCER TIER	SCALE AND STRUCTURE	HOW IT REACHES THE MARKET	WHAT IT MEANS FOR AN ENTRANT
The two largest integrated farms	About 3,000 to 6,000 tonnes each in 2015, Tropo targeting 30,000; own hatcheries and cold stores	Own grading, cold storage and trader networks (about 3,000 for Tropo)	The anchor model; hard to compete with directly, so supply it or partner with it
Eight to fifteen medium farms	About 50 to 1,000 tonnes; buy in seed and feed	Sell to wholesalers and cold stores; lean on large farms for advice	The realistic scale-up target once skills and offtake are tested
100 to 300 smallholders	About 1 to 50 tonnes; one to ten cages	Sell fresh whole fish at or near the farm gate to traders	Crowded, with thin margins and little say over price; enter only with a cost or offtake advantage
The live-catfish trade	Separate, smaller, cash-based	Sold live into point-and-kill bars and restaurants; also smoked	A distinct premium chain that avoids frozen-import competition

Sources: Rurangwa et al.;²¹ Ragasa et al.;²² Magna et al.;²³ AgDevCo.²⁴

 MARKET SIGNAL: INTEGRATION IS WINNING

The sector is moving toward large integrated farms. Tropo already runs its own hatchery, grow-out, cold storage and a network of about 3,000 traders, and its 2024 loan is financing a modern processing facility.²⁵ An entrant will rarely beat a large integrated farm on its own terms. Supplying it with seed, feed or out-grown fish, or copying its model at smaller scale, is a workable position.

Link three: the traders who move the fish

Between the farm and the plate sits a layer of aggregators and traders, and it does much of the work in the chain while also drawing many farmer complaints. Aggregators pick fish up at the farm gate, and the degutting, descaling and icing is done by small traders and cold stores rather than by any organised processor.²⁶ The trade is large. Tropo alone reaches the market through about

²¹ Rurangwa et al., *Development of Aquaculture in Ghana*.

²² Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

²³ Magna et al., "Profitability Analysis of Small-Scale Cage."

²⁴ AgDevCo, *Tropo Farms Secures \$10m*.

²⁵ AgDevCo, *Tropo Farms Secures \$10m*.

²⁶ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

3,000 traders, most of them women.²⁷ These traders move a perishable product from scattered cages to scattered markets. They work informally, on ice and by road, and take a large share of the gap between farm and retail prices.

Farmers feel this as the **cost of the middlemen**. In the profitability survey, farmers named the high cost of middlemen, the distance from farm to

market, and poor transport among their top constraints,²⁸ and during the COVID-19 disruption 56 percent of pond farmers surveyed had difficulty selling their fish.²⁹ The farmer has no alternative route to the buyer, no cold chain of their own, and no shelf-stable product, so they accept the farm-gate price and the trader keeps the difference. This lack of choice creates the opening for cold-chain aggregation.

🌀 The price ladder from farm gate to supermarket 🌀

An IFPRI survey tracked a kilogram of regular and size-1 tilapia up the ladder at 2016 prices: about GH¢9 to 11 at the farm gate, GH¢11 to 13 wholesale, GH¢18 to 25 at cold stores, wet markets and roadside outlets, and about GH¢29 in a supermarket, where larger size-3 fish reached GH¢40.³⁰ Retail was roughly double the farm gate, and supermarkets charged about three times the farm gate for the same size of fish.

Prices are now about four to five times higher, allowing for the 2026 price being for gutted fish: the Chamber of Aquaculture Ghana's farm-gate pool price for gutted 300 to 400 gram tilapia was GH¢50.55 a kilogram in September 2026, up about 16 percent since January,³¹ and four medium fresh tilapia cost GH¢100 in an Accra market in April 2026.³²



²⁷ AgDevCo, *Tropo Farms Secures \$10m*.

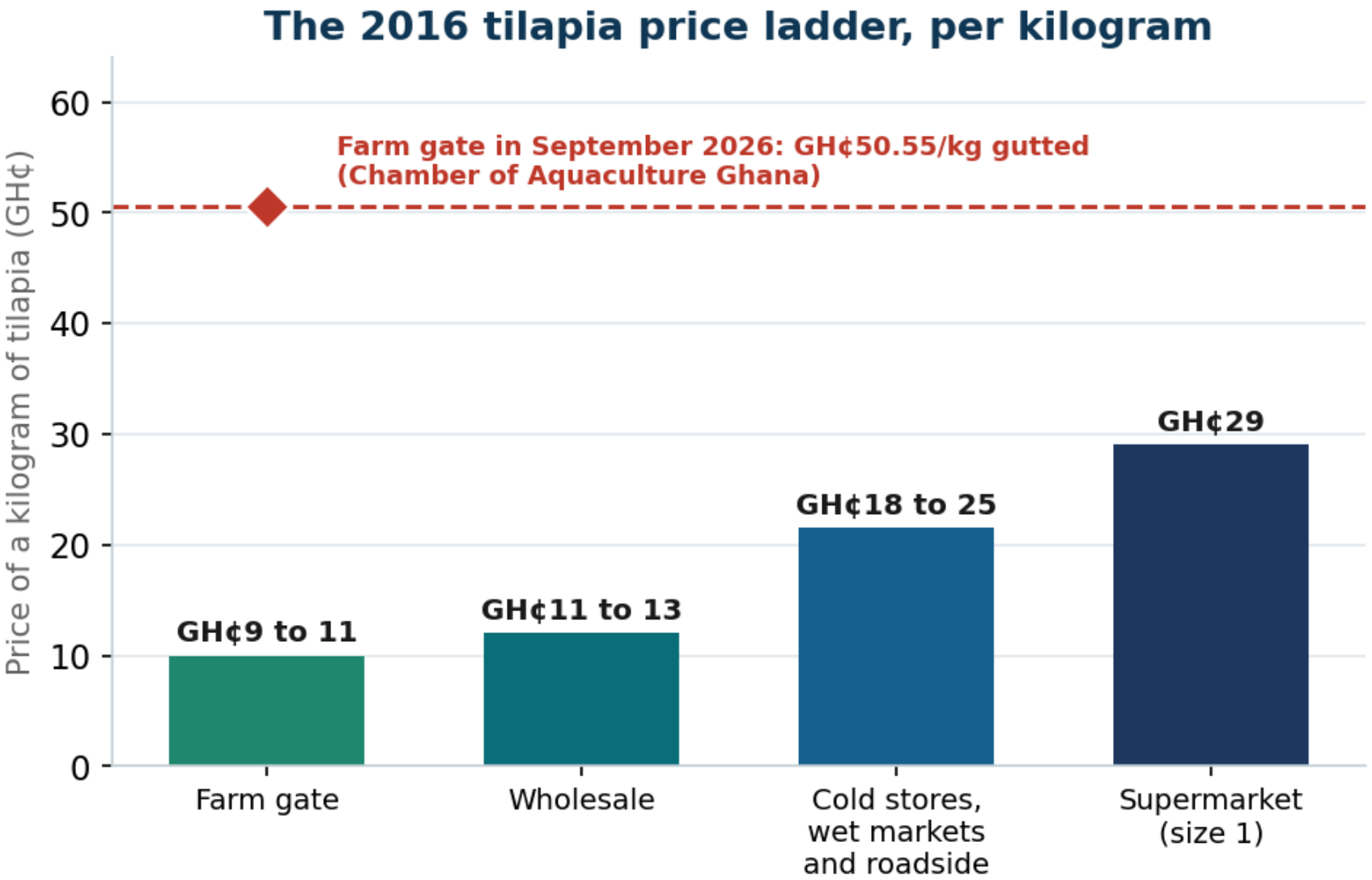
²⁸ Magna et al., "Profitability Analysis of Small-Scale Cage."

²⁹ Ragasa et al., "Accelerating Pond Aquaculture Development."

³⁰ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*

³¹ Chamber of Aquaculture Ghana, "Fresh Tilapia and Catfish Pool Price Status, Week 01 (Year 2026)," *Weekly Update*, 6 January 2026, <https://chamberofaquaculture.com/chamber/assets/img/2026img/1.jpeg>; Chamber of Aquaculture Ghana, "Pool Price Status, Week 38 (Year 2026)."

³² Emmanuel Oppong, "Channel One TV Market Price Barometer-April 2026: Garden Eggs Lead Produce Pressure, Tilapia Prices Stay Stable," *Citi Newsroom*, 28 April 2026, <https://www.citinewsroom.com/2026/04/channel-one-tv-market-price-barometer-april-2026-garden-eggs-lead-produce-pressure-tilapia-prices-stay-stable/>.



Sources: Ragasa et al. (2018); Chamber of Aquaculture Ghana (2026)

FIGURE 2 The tilapia price ladder: farm gate to wholesale to retail to supermarket, per kilogram

A kilogram of tilapia roughly doubles in price from the farm gate to the retail slab, and roughly triples for the same size in a supermarket, at 2016 prices. Most of that markup is captured after the fish leaves the farm.

Source: Ragasa et al.,³³ Table 3.2 (2016 prices).



³³ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

TABLE 2 The 2016 tilapia price ladder, from farm gate to supermarket

RUNG ON THE LADDER	WHO SELLS HERE	PRICE, GH¢ PER KG	WHAT IS ADDED AT THIS RUNG
Farm gate (Lake Volta)	Smallholder and medium farms	about 9 to 11	The fish itself; nothing added
Medium and large sales outlets	Farm depots and wholesale points	about 10 to 14	Grading, gutting, first bulking
Wholesale markets and cold chains	Wholesalers, cold stores	about 11 to 13	Icing, storage, bulk breaking
Roadside and wet-market traders	Mostly women retailers	about 18 to 25	Transport, retail risk, small-lot selling
Supermarkets	Modern retail	up to about 40	Shelf, chill, packaging, convenience

Source: Ragasa et al.,³⁴ IFPRI GSSP Working Paper 49, Table 3.2 (2016 prices; regular and size-1 tilapia except the GH¢40 supermarket price, which is for size-3 fish; size 1 was GH¢29).

Q WHAT THIS MEANS

The doubling from farm gate to retail pays for moving a perishable fish through an informal chain. Between the farm and the shelf the fish is only iced, transported and re-sold in small lots. Few operators fillet it, freeze it, smoke it to export grade or brand it, and as much as GH¢8 a kilogram went to transport and traders' margins at 2016 prices.³⁵ A business that processes fish at that stage could earn a margin that today goes on handling.

Who earns what, and why the farmer earns least

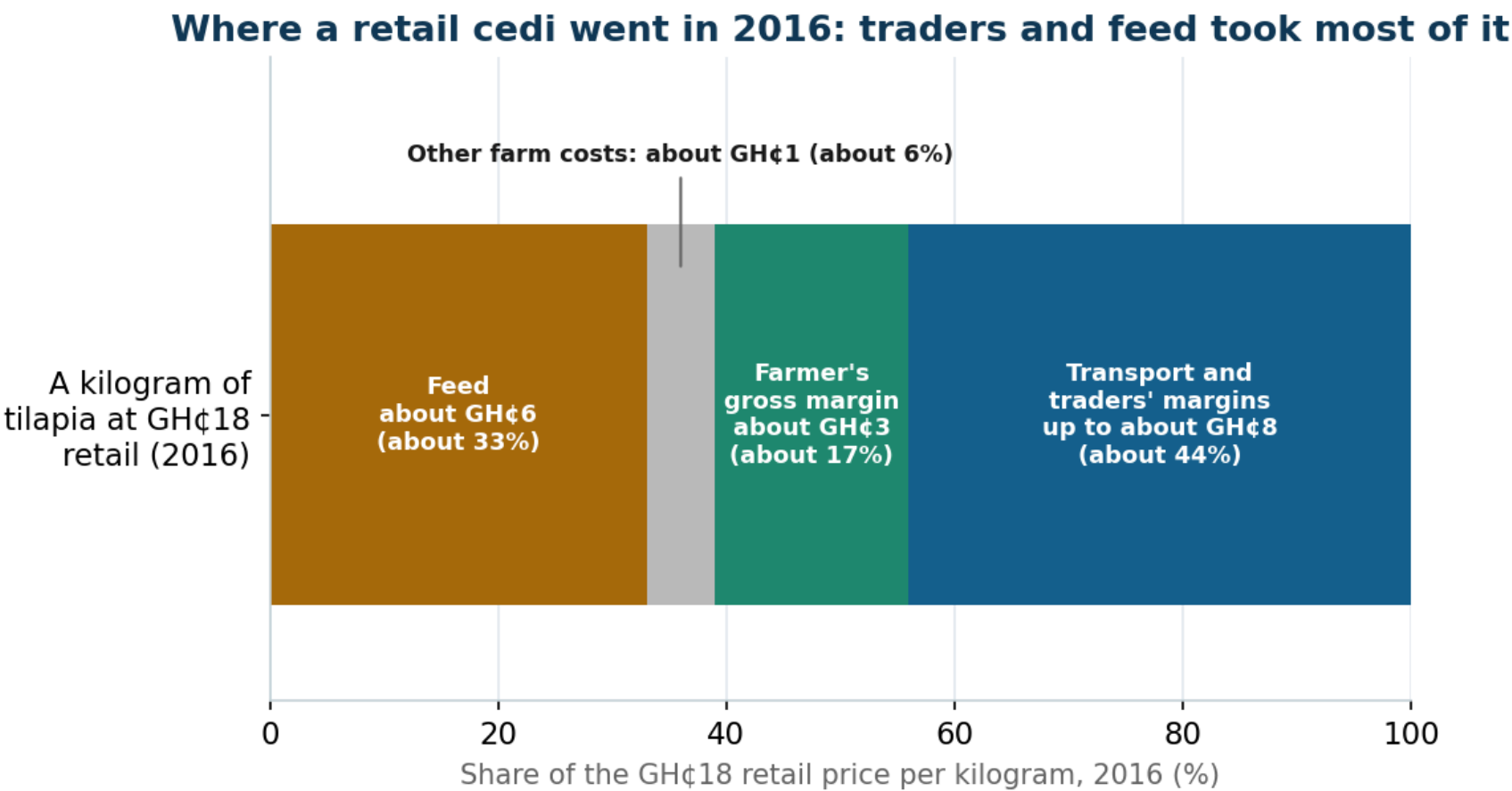
The farmer carries the biology, the disease, the feed-price shock and the mortality risk, then sells a fresh whole fish at the bottom of the ladder and hands the rest of the value to others. Upstream, about 77 pesewas of every cedi a small-scale cage farmer spends goes on feed,³⁶ part of it on

imported brands and imported ingredients. Downstream, the roughly two-times farm-gate-to-retail markup is captured by traders and retailers who pay for ice, transport and small-lot selling. The farmer is squeezed between the two.

³⁴ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

³⁵ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

³⁶ Magna et al., "Profitability Analysis of Small-Scale Cage."



Source: Ragasa et al. (2018), 2016 prices

FIGURE 3 Where the value goes: the farmer takes the risk but not the largest share of the final price

The farmer takes the production risk but not the largest share of the final price. The value goes upstream to feed and downstream to the traders who move and sell the fish.

Source: Ragasa et al.,³⁷ cost and price data at 2016 prices.

Farming itself is profitable: the average small-scale Lake Volta cage farm surveyed in 2022, with one to ten cages, returned about GH¢127,261 a cycle on revenue of about GH¢395,231, a benefit-cost ratio of about 1.47 and a return on investment of about 47 percent,³⁸ and an earlier survey of 97 farms found an average return on cost of about 36 percent per

six-month cycle.³⁹ The farmer's profit is real, but it swings with feed and disease. Safer and larger margins sit at the two ends of the chain, where the farmer has no part. An entrant who wants a lasting margin should consider owning part of feed, seed, cold chain or processing, where most of the value sits, before adding another grow-out cage.

³⁷ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

³⁸ Magna et al., "Profitability Analysis of Small-Scale Cage."

³⁹ Kwami Adanu and Mawufemor Adanu, "Returns to Tilapia Fish Farming in Ghana: Implications for Tilapia Pooled Investment Vehicles," *Journal of Entrepreneurial Finance* 18, no. 2 (2017): Article 3, <https://doi.org/10.57229/2373-1761.1301>.

MARKET SIGNAL: BACK THE RESILIENT NODE

Because grow-out looks profitable on paper, pooled investment schemes in this sector promised backers well above 80 percent a year and went insolvent.⁴⁰ For value-chain investors, the safer choices are feed, seed, cold chain and processing. A borrowed-money bet on grow-out, the riskiest link, is the weaker choice.

① Who holds power in the chain ①

An entrant also needs to know who controls the chain and who wants it to change. Figure 4 places each actor by its power over the chain and by its interest in seeing the chain formalised and the missing middle built. Power sits at the top with the state, the feed producers, the large

integrated farms and the financiers, while the actors who most want the chain to change, smallholder farmers, hatcheries and the missing-middle entrants, sit at the bottom with the least power to change it alone.



⁴⁰ Adanu and Adanu, "Returns to Tilapia Fish Farming."

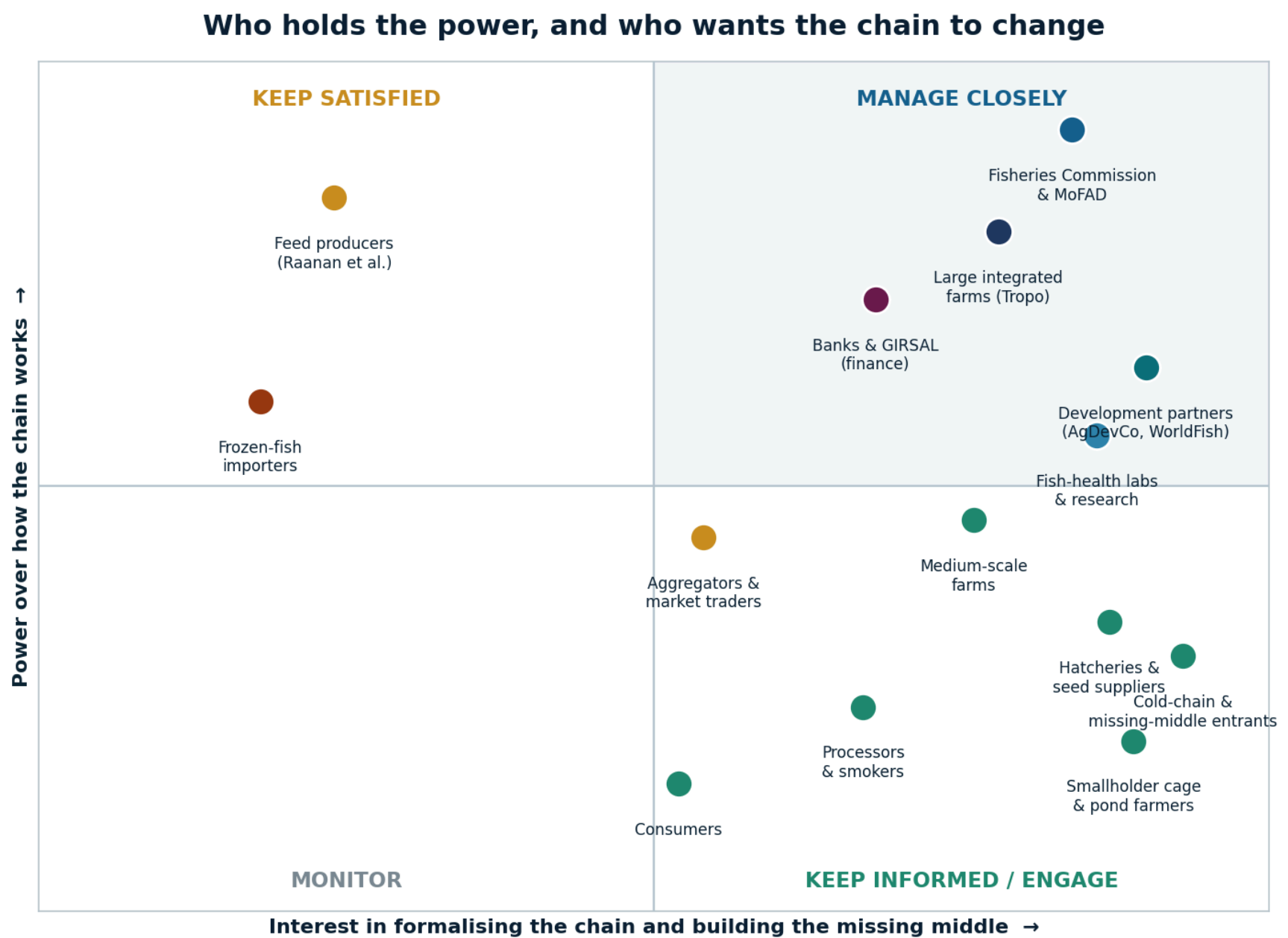


FIGURE 4 The stakeholder power-interest grid: who controls the chain, and who wants it formalised

Power sits top-left and top-right with the state, the feed makers, the big farms and the financiers; the actors who most want the chain formalised, farmers, hatcheries and the missing-middle entrants, sit bottom-right with the least power. An entrant needs a powerful ally to make progress.

Source: Author synthesis of the Pillar 6 and 7 evidence base (2026).



TABLE 3 The tilapia and catfish chain actors, mapped by power and interest, and what each means for an entrant

ACTOR	ROLE IN THE CHAIN	POWER	INTEREST IN CHANGE	WHAT IT MEANS FOR AN ENTRANT
Fisheries Commission and MoFAD	License, regulate and set the plan (Pillar 7)	High	High	Controls entry; engage early, because a licence once held protects your position
Feed producers (Raanan and two others)	Supply the biggest cost line, near-monopoly	High	Low	They gain from things as they are; a new local feed mill competes with them
Large integrated farms (Tropo)	Produce at scale, now building processing	High	High	Potential anchor buyer and offtaker; supply it or partner with it
Banks and GIRSAL	Finance and de-risk the chain	High	Medium	Approach them with honest per-cycle numbers; they fund sound businesses
Development partners (AgDevCo, WorldFish)	Fund seed, feed and processing gaps	Medium to high	High	The most willing capital for the missing middle; co-invest alongside them
Fish-health labs and research	Diagnose disease, certify seed	Medium	High	Allies for a certified-seed or biosecurity play (Pillars 1, 3)
Frozen-fish importers	Hold the low-income, no-fridge market	Medium	Low	The powerful incumbent to displace with shelf-stable local product
Medium-scale farms	The scalable production middle	Medium	High	Natural first customers for feed, seed and aggregation services
Aggregators and market traders (mostly women)	Move fish from farm to plate	Medium	Medium	Control access to market despite little formal power; work with them
Hatcheries and seed suppliers	Set survival at the first link	Low to medium	High	Under-served and open to change; the certified-seed opening is here
Cold-chain and missing-middle entrants	The layer that barely exists yet	Low	High	Most interest in change, fewest established players, most room to grow
Smallholder farmers, traditional processors and smokers, and consumers	Take the risk, eat the fish	Low	High	Provide demand and labour but hold little power; serve them, and seek change through stronger allies

Sources: author synthesis of Pillars 6 and 7, drawing on Rurangwa et al.⁴¹ and Okai⁴² for feed supply, AgDevCo⁴³ for Tropo, and Ragasa et al.⁴⁴ for input and market access.

MARKET SIGNAL: ALIGN WITH A HIGH-POWER ALLY TO MOVE

A new entrant starts in the bottom-right of the map: high interest in changing the chain, low power to do it alone. The way up is to align with a high-power, high-interest ally in the top-right: the regulator for a licence and legitimacy, a large integrated farm or development partner for offtake and capital. Secure one such ally before stocking fish or building a cold store.

① The missing middle: the biggest opening in the sector ①



Traditional women-led smoking: the main processing most fish gets today.



Fresh fish in the open sun with no ice: the cold-chain gap that spoils fish before sale.

Ghana produced about 121,809 tonnes of farmed fish in 2024, up from about 116,108 tonnes in 2023,⁴⁵ and tilapia is close to 80 percent of it,⁴⁶ yet little farmed fish is processed industrially, most is sold fresh on ice, and the government calls post-harvest losses a major challenge.⁴⁷

Most processing of farmed fish is small-scale smoking, frying, salting and drying, much of it by women, and industrial capacity is only now being built: Tropo's 2024 loan finances a modern processing facility.⁴⁸ This thin processing and cold-chain layer is the missing middle.

⁴¹ Rurangwa et al., *Development of Aquaculture in Ghana*.

⁴² Okai, "Feeding Ghana's Aquacultural Growth."

⁴³ AgDevCo, *Tropo Farms Secures \$10m*.

⁴⁴ Ragasa et al., "Accelerating Pond Aquaculture Development."

⁴⁵ MoFA, *Programme Based Budget Estimates for 2025*.

⁴⁶ Food and Agriculture Organization of the United Nations, GLOBEFISH, *Ghana: GLOBEFISH Market Profile 2023* (Rome: Food and Agriculture Organization of the United Nations, 2026), https://www.fao.org/media/docs/globefishlibraries/profiles-2023/ghana_globefish-market-profile_2023.pdf.

⁴⁷ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*; Ministry of Finance, Ghana, *The Budget Statement and Economic Policy of the Government of Ghana for the 2026 Financial Year* (Accra: Ministry of Finance, 2025), <https://mofep.gov.gh/sites/default/files/budget-statements/2026-Budget-Statement-and-Economic-Policy.pdf>.

⁴⁸ AgDevCo, *Tropo Farms Secures \$10m*.

The missing middle has three expensive consequences. First, loss: with little cold chain to hold a glut, fish that cannot be sold fresh is dumped cheaply or spoils. Second, **import vulnerability**: because there is no shelf-stable, portioned local product, cheap frozen imports hold the low-income, no-fridge market that fresh local fish cannot reach, with about 254,800 tonnes of frozen fish worth about US\$171.9

million in 2024, most of Ghana's fish imports by value, with no frozen tilapia recorded.⁴⁹ Third, lost value: few producers reach the high-value markets. Women smokers who met EU safety standards could earn around GH¢100 a kilogram of smoked fish in 2022, roughly ten times the price in local markets,⁵⁰ while farmed tilapia is mostly sold fresh, at about GH¢50.55 a kilogram gutted at the farm gate in September 2026.⁵¹

The missing middle: processing, post-harvest loss and the smoked-fish premium



FIGURE 5 The missing middle: little processing, post-harvest losses and the smoked-fish premium

Little cold chain and little export-grade processing make this thin middle the biggest opening in the sector.

Source: Ministry of Finance;⁵² AgDevCo;⁵³ Crossland.⁵⁴

⁴⁹ United Nations Statistics Division, *UN Comtrade Database: Ghana (Reporter 288), Imports of HS 03 and HS 0303, 2024 and 2025, and Exports of HS 0302.71 and HS 0305, 2024* (New York: United Nations, 2026), <https://comtradeapi.un.org/public/v1/preview/C/A/HS?reporterCode=288&period=2024&partnerCode=0&cmdCode=03,0303,0304&flowCode=M>.

⁵⁰ Imogen Crossland, "Behind the Smoke: The Story of Female Fish Smokers in Ghana," *Sustainable Food Trust*, 29 July 2022, <https://sustainablefoodtrust.org/news-views/women-fish-smoking-ghana/>.

⁵¹ Chamber of Aquaculture Ghana, "Pool Price Status, Week 38 (Year 2026)."

⁵² Ministry of Finance, *Budget Statement and Economic Policy 2026*.

⁵³ AgDevCo, *Tropo Farms Secures \$10m*.

⁵⁴ Crossland, "Behind the Smoke."

OPPORTUNITY

Investors have started to fill the missing middle. Tropo's 2024 loan is financing a modern processing facility,⁵⁵ a sign that investors expect returns from processing and cold chain.

A processing and cold-chain business turns a fresh commodity that fetched about GH¢50.55 a kilogram gutted at the farm gate in September 2026⁵⁶ into shelf-stable, portioned, branded product: fillets, vacuum packs and export-grade smoked fish. It cuts post-harvest loss and lets a local brand hold the shelf-stable market that frozen imports own today.

Cold-chain aggregation needs less capital: branded refrigerated vans and cold stores that capture part of the farm-gate-to-retail spread while cutting loss, the model Tropo already runs.

OPPORTUNITY: THE DIGITAL MISSING MIDDLE

The missing middle is also a digital opening. A cold-chain aggregation platform that matches farmers to buyers, schedules refrigerated pick-up and tracks the fish from cage to shelf can earn part of the two-times spread and cut loss, using software as well as equipment.

Export sales depend on traceability. Because export buyers, the EU above all, take fish only from approved and traceable establishments, digital batch traceability and cold-chain records are a low-cost first step for a processor that wants to reach the export-grade smoked and fillet markets. Pillar 8 lists the tools available now.

The chain priced, link by link

Each link in the chain has its own operators, (Table 4).
prices, weak points and business openings



⁵⁵ AgDevCo, *Tropo Farms Secures \$10m*.

⁵⁶ Chamber of Aquaculture Ghana, "Pool Price Status, Week 38 (Year 2026)."

TABLE 4 The tilapia and catfish value chain priced link by link, with the opening inside each break-point

LINK	WHO OPERATES IT	MARGIN OR PRICE	WHERE IT BREAKS	THE OPENING
Input, feed	Raanan (largest local mill), De Heus, importers and small mills	about 77% of small-scale cage cost (2022); imports about 30% dearer	Near-monopoly, high price, FX and tariff exposure	A 30,000-tonne mill: about US\$4.2m at 2015 costs
Input, seed	About 19-plus hatcheries; large farms self-supply	About GH¢0.80 to 2.00 a fingerling in 2026 listings; about 14% of 2026 cage cost	Output 382.8m in 2024; much seed carries disease	A certified hatchery selling into the gap
Production, cage	2 largest integrated farms, 8 to 15 medium, 100 to 300 small	Cost about GH¢25.50 a kg live on the 2026 cage model; return about 65% on cost	Feed cost, disease, mortality, theft, thin credit	Out-grower supply to an anchor; efficiency edge
Production, live catfish	Separate grow-out feeding urban bars	About GH¢40 a kg at the farm gate (September 2026)	Fragmented supply into hospitality demand	Dedicated live-catfish grow-out and urban delivery
Aggregation	Wholesalers, aggregators, about 3,000 mostly women traders	Farm gate 9 to 11 to wholesale 11 to 13 (2016); farm gate about 50.55 gutted (September 2026)	High middlemen cost; distance; informal, on ice	Organised, branded cold-chain aggregation
Processing	Mostly small-scale women smokers; industrial processing only now being built (Tropo)	Export-standard smoked fish about GH¢100 a kg (2022)	The missing middle; little industrial processing	Filleting, freezing, branded export-grade smoking
Cold chain and retail	Cold stores, roadside, wet markets, supermarkets	Retail 18 to 25 and about 29 in a supermarket (2016)	Thin cold chain; fish dumped or spoiled in gluts	Frozen import-substitution; branded retail

Sources: Asiedu et al.,⁵⁷ Asiedu et al.,⁵⁸ Rurangwa et al.,⁵⁹ Ragasa et al.,⁶⁰ Magna et al.,⁶¹ AgDevCo,⁶² Crossland,⁶³ Chamber of Aquaculture Ghana,⁶⁴ Ministry of Fisheries and Aquaculture.⁶⁵

57 Asiedu, Failler, and Beyens, "Enhancing Aquaculture Development."
58 Berchie Asiedu, Pierre Failler, and Yolaine Beygens, "Ensuring Food Security: An Analysis of the Industrial Smoking Fishery Sector of Ghana," *Agriculture & Food Security* 7, no. 1 (2018): Article 38, <https://doi.org/10.1186/s40066-018-0187-z>.
59 Rurangwa et al., *Development of Aquaculture in Ghana*.
60 Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.
61 Magna et al., "Profitability Analysis of Small-Scale Cage."
62 AgDevCo, *Tropo Farms Secures \$10m*.
63 Crossland, "Behind the Smoke."
64 Chamber of Aquaculture Ghana, "Pool Price Status, Week 38 (Year 2026)."
65 MoFA, *Programme Based Budget Estimates for 2025*.

⑤ The value-capture openings, ranked ⑤

The openings can be ranked by their effect and by how much capital they need. The best positions sit at the two ends of the chain: feed and seed upstream, processing and cold chain

downstream. Another undercapitalised grow-out cage in the middle faces crowding and thin margins.

🍃 OPPORTUNITY

1. An independent or premium feed mill. It improves every farm's economics at once, and would cost about US\$4.2m for a 30,000-tonne mill at 2015 costs.
2. A processing and cold-chain plant making fillets, vacuum packs and export-grade smoked fish, cutting post-harvest loss and holding the shelf-stable market from imports.
3. A certified improved-strain hatchery, selling disease-screened seed into a market of hundreds of millions of fingerlings a year while cutting the disease that unscreened seed spreads.
4. Cold-chain aggregation. Branded refrigerated distribution that captures the two-times farm-to-retail spread and cuts loss, at lighter capital than a full plant.
5. A dedicated live-catfish supply chain into point-and-kill bars, avoiding frozen-import competition entirely.
6. Import-substitution frozen or portioned tilapia, taking the shelf-stable segment that informal frozen imports hold today.
7. A contract-farming or out-grower model around a feed-and-processing anchor, locking in supply and stabilising smallholder margins, the Tropo network at smaller scale.



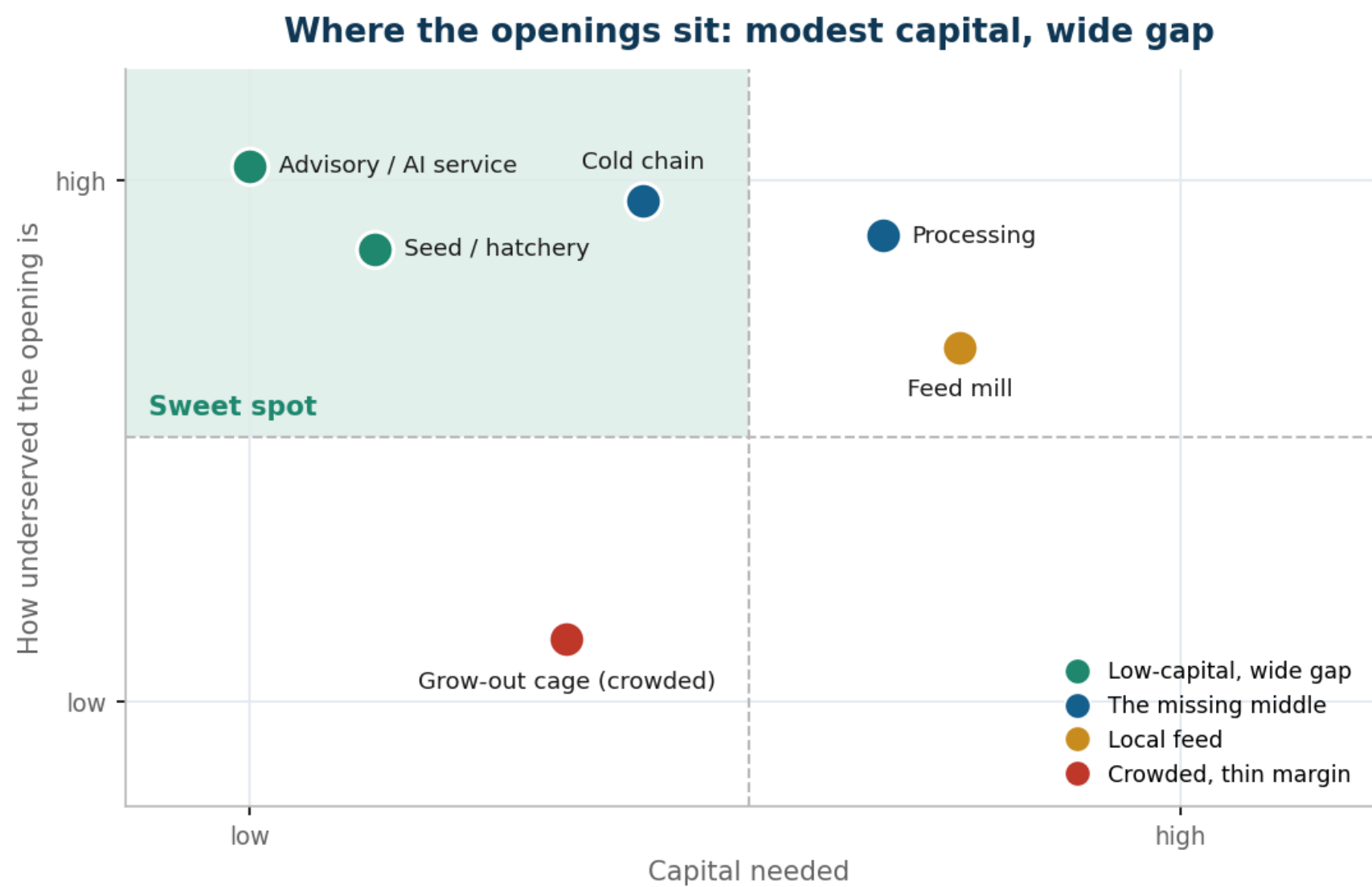


FIGURE 6

The value-capture openings mapped by capital needed against the size of the gap they fill: seed, cold chain and advisory services need modest capital, processing and a feed mill need more

The low-capital openings with a wide gap are advisory, seed and cold chain; feed milling and processing fill a wide gap but need more capital.

Source: Author synthesis of Rurangwa et al.;⁶⁶ Ragasa et al.;⁶⁷ AgDevCo.⁶⁸



⁶⁶ Rurangwa et al., *Development of Aquaculture in Ghana*.
⁶⁷ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.
⁶⁸ AgDevCo, *Tropo Farms Secures \$10m*.

⑤ The risks that sit inside the value chain ⑤



Thin cold chain, heavy post-harvest loss

VERY HIGH

WHAT IT IS

There is little organised cold chain for farmed fish, so a glut cannot be held and moved. Fish is iced and rushed to market or it is lost, which forces farmers to dump at low prices and wastes a large share of what they raise.

EVIDENCE

Farmed tilapia is sold mostly fresh on ice, with little cold storage to hold a glut, and shelf-stable forms are small-scale smoked, salted and dried fish.⁶⁹

WHO IT HITS

Smallholders hardest, who have no storage of their own and must sell fresh whatever the day's price; also the wider sector, which loses fish in every glut.

HOW TO MANAGE IT, AND THE OPENING

Build or buy into cold storage and refrigerated distribution. The matching opening is a cold-chain aggregation business that earns part of the farm-to-retail margin while cutting loss.



Little industrial processing

HIGH

WHAT IT IS

Because industrial filleting, freezing and export smoking of farmed fish is only now being built, the farmer is stuck selling fresh whole fish at the bottom of the price ladder and cannot reach the high-value forms that earn many times more.

EVIDENCE

Little farmed fish is processed industrially and most is sold fresh on ice,⁷⁰ **while smokers who met EU safety standards earned around GH¢100 a kilogram in 2022, roughly ten times the local market price.**⁷¹

WHO IT HITS

Every producer who wants a lasting margin above the fresh-fish price, and the sector's export plans.

HOW TO MANAGE IT, AND THE OPENING

Add the processing the chain lacks. Tropo's 2024 modern-processing investment shows that lenders will now fund processing, and early entrants can set the standard.



⁶⁹ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*; Asiedu, Failler, and Beyens, "Enhancing Aquaculture Development."

⁷⁰ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

⁷¹ Crossland, "Behind the Smoke."



The single-feed-supplier squeeze HIGH

WHAT IT IS

Feed is the largest cost in the chain and one local mill has long dominated supply, so feed price and availability often decide whether a farm survives. A price rise or supply gap upstream hits every farmer at once.

EVIDENCE

Feed is about 77 percent of small-scale cage cost,⁷² **Raanan was the only specialised local aquafeed mill in 2015,⁷³ imported feed costs about 30 percent more, and port taxes and fees add 20 to 30 percent to imported feed.⁷⁴**

WHO IT HITS

Every farmer, but hardest on smallholders with no buying power and no ability to hedge feed price.

HOW TO MANAGE IT, AND THE OPENING

Lock feed supply and price where possible, buy through groups, and give priority to local feed. The opening is a feed mill. The pressure feed prices put on farmers is the business case for a new mill.



Undercapitalised entry at the wrong node MEDIUM

WHAT IT IS

Most newcomers start with a few grow-out cages. This is the most crowded and riskiest part of the chain, with thin margins, and undercapitalised newcomers often fail there. Value concentrates at feed, seed, cold chain and processing.

EVIDENCE

The farmer captures the least of the roughly two-times farm-to-retail markup, carries the feed and disease risk, and past pooled investment schemes promising well above 80 percent a year went insolvent.⁷⁵

WHO IT HITS

First-time entrants and small investors who back a cage because it is the visible part of the business.

HOW TO MANAGE IT, AND THE OPENING

Enter at a sturdier link in the chain, or enter grow-out only with a real edge (secured feed, contracted offtake, a cost advantage). Base the investment on the numbers.



⁷² Magna et al., "Profitability Analysis of Small-Scale Cage."
⁷³ Rurangwa et al., *Development of Aquaculture in Ghana*.
⁷⁴ Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.
⁷⁵ Adanu and Adanu, "Returns to Tilapia Fish Farming"; Ragasa et al., *A Blue Revolution in Sub-Saharan Africa?*.

KEY TAKEAWAYS

- At 2016 prices a kilogram roughly doubled from farm gate to retail and about tripled in a supermarket, and the farmer earned the smallest margin.
- Value leaks two ways: upstream to feed, about three-quarters of farm cost and partly imported, and downstream to traders, who add only ice and transport yet take much of the two-times markup.
- The missing middle, little industrial processing and little cold chain, is the biggest opening in the sector.
- Smoked fish that met EU standards sold for around GH¢100 a kilogram in 2022, about ten times the price in local markets.
- Enter at feed, seed, cold chain or processing, where margins are larger. Tropo's move into processing shows where investors are heading.



🕒 Practitioner intelligence 🕒

📖 FOR STUDENTS

Think of fish farming as a chain and ask who earns the margin at each step. Trace one kilogram of tilapia from a Volta cage to a supermarket shelf and write down who earns what at each rung; you will see the farmer earns least and takes the most risk. Then study the two ends where margins are larger, feed upstream and processing downstream, and build skills for one of them. An internship or small job with an aggregator, a cold store, a smoker or a feed producer shows you more about where money is made than working a grow-out cage.

🔍 FOR ENTREPRENEURS

Think twice before starting with grow-out cages, the most crowded and riskiest part of the chain, with thin margins. Consider a feed mill, a hatchery, cold-chain aggregation, live-catfish supply, or a small processing and smoking operation. Many newcomers fail because they enter the most visible part of the business, the cage, while the lasting margin sits at feed, seed, cold chain and processing. If you do enter grow-out, do it only with a real edge: secured feed, contracted offtake or a clear cost advantage, and plan to add feed, seed, cold chain or processing as you grow.



↗ FOR INVESTORS

Choose the link in the chain with care, because the farmer carries the risk and captures the least of the farm-to-retail markup, and pooled grow-out schemes have already gone insolvent chasing returns the farms could not pay. Back feed, seed, cold chain and processing, where margins are larger and where Tropo's processing investment shows the missing middle starting to fill. Diligence should ask where feed comes from, whether cold chain exists, and whether the venture owns one of these stronger links or is another cage exposed to feed and disease.

🔗 FOR FACULTY

Assignment: hand students the 2016 price ladder (farm gate about GH¢9 to 11, retail about GH¢18 to 25, supermarket about GH¢29 for size-1 fish), the September 2026 farm-gate price of about GH¢50.55 a kilogram for gutted fish, and the fact that feed is about three-quarters of farm cost. Have them build a one-page value-distribution chart showing who captures each cedi, then design one business at feed, seed, cold chain or processing and justify its capital and margin numbers, for example a feed mill costed at about US\$4.2 million in 2015, or a processing plant aimed at the export-standard smoked-fish market. It shows, in numbers, why most of the value sits beyond the farm.

👤 FOR ECOSYSTEM ACTORS

Public support does most good when it helps build the missing middle: processing, cold chain and competitive feed. Each tonne processed locally keeps value in Ghana that now goes abroad, and each cold store cuts post-harvest loss. Tie public support and the Fisheries and Aquaculture Development Fund created by the Fisheries and Aquaculture Act, 2025 (Act 1146), to processing, cold-chain and feed capacity ahead of more grow-out cages, and measure success as the share of farmed fish that is processed, cold-stored and sold as a durable local product. Avoid subsidising more production into a chain that cannot store, process or move it.



Where this connects. Pillar 1 sets out the biology behind the feed and seed openings. Pillar 5 examines the same farm margin in its cost-and-returns model, where feed at three-quarters of cost is the leak to the input end seen from the farm. Pillar 7 covers the financing, policy and investment that aim to bring processing, cold chain and anchor investments into the missing middle.





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