FISH FEED VALUE CHAIN ANALYSIS IN THE NIGER DELTA

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PIND

Foundation for Partnership initiatives in the Niger Delta

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ABOUT PIND

The Foundation for Partnership Initiatives in the Niger Delta (PIND) was established by Chevron in 2010 with a mission to build partnerships for peace and equitable economic development in the Niger Delta region of Nigeria. The objective of these partnerships is to reduce poverty and increase socio-economic benefits by implementing interventions that address the root causes of conflict and poverty in a localized and sustainable manner, resulting in stability and equitable increases in employment and incomes of individuals in nine target states: Rivers, Bayelsa, Delta, Abia, Akwa Ibom, Cross River, Ondo, Edo, and Imo. PIND works to reduce poverty by acting as a catalyst for systemic change in the Niger Delta through four interrelated and interdependent program areas: Economic Development, Peace Building, Capacity Building and Analysis and Advocacy.

For more information on PIND, please visit: www.pindfoundation.org

CHAPTER 1 | EXECUTIVE SUMMARY

Local fish production in Nigeria is about 1.034 million MT per annum made up of aquaculture, artisanal and inshore fishing. Aquaculture or fish farming accounts for about 30% of total production at around 316,000MT. The aquaculture sector has continued to experience significant growth in its contribution to fish production over the last 5 years and demand for farmed fish is expected to continue to rise amidst soaring prices of imported fish and decline in capture fisheries.

The growth of the aquaculture sector is largely linked to the effectiveness and growth of the fish feed value chain, as feed accounts for up to 70% of the cost of farmed fish production in Nigeria.

The fish feed industry in Nigeria has been developing gradually to meet the demands of Nigerian fish farmers. It started with imported feeds and now major local (national) feed producers are developing improved and cheaper feed for the local industry. As fish farming activities continue to expand, it is expected that the fish feed industry will also continue to grow. In the same vein however, poor performance of the feed industry will take its toll on the entire aquaculture sector.

This study, an update of an earlier study by PIND in 2012, was designed to better understand the current structure and dynamics of the fish feed value chain within the bigger aquaculture sector. This will help identify systemic constraints to growth as well as possible areas of potential further intervention by PIND and its partners

The study identified various types of fish feed consumers, mainly farmers, and delineated them into four market segments: subsistence own-farm made feed consumers; small emerging commercial farmers; medium to large farmers; and institutional buyers of feed. The small subsistence fish farmers mainly depend on farm made feed, particularly at the post fingerlings stage, while some of the small, medium and large producers also depend on farm made feed. It is estimated that about 70% of the market consume farm made feed while just 30% of the feed consumed is commercially traded.

Feed accounts for up to **70%** of the cost of farmed fish production in Nigeria.

The total volume of feed consumed in 2016 was estimated at about 507,000 MT. About 93% (473,000 MT) was supplied by local producers while 7% (33,000MT) was met by imports. There are four main categories of local producers: Micro/on-farm feed producers, small commercial producers, medium producers and large industrial producers. The study found that the micro/ own-use farm made producers dominate the market as they produce as much as 70% of the feed consumed in the sector. These feeds are mostly poor quality inefficient feeds. Large producers account for 10% (51,000) of the market while small and medium producers are estimated to supply about 5% and 8% respectively. The Niger Delta market accounts for about 30% of the total feed market going by data obtained from some of the large producers.

There are four channels through which feed gets to the farmers: On-farm production and use; commercial micro and small producers; branded production (medium and large producers); and the import channel. The sector has witnessed some producers upgrade into new channels, e.g., Nigsek, located in the Niger Delta, upgrading from a small producer to a medium producer and graduating into the branded production channel. The sector is also seeing some better structured small producers that are NAFDAC registered and that are positioning to upgrade into the branded channel in the future.

Fish feed production figures were derived from the official fish production figures for the country published by the Nigerian Bureau of Statistics in February 2017 as there are currently no accurate official numbers for the total volume of feed produced in Nigeria.

CHAPTER 1 | EXECUTIVE SUMMARY

Prior to 2015, the fish feed sector witnessed an average yearly growth of 9%, but by 2016 growth was stagnant. This was caused by the devaluation of the Naira which led to an increase in the prices of most goods and services, particularly imports. As result, prices of imported feeds increased significantly leading to a shift in demand for locally produced feeds. This led to a 7% decline in imports and an increase in the demand for better quality feed produced by large and medium producers. The local industrial producers responded by expanding their production, hitting almost 100% capacity utilization of 50,000 Mt at the end of 2016.

New brands of cheaper imports (such as Raanan from Ghana) as well as new industrial processors (such as Olam's new mill in Ilorin) are entering the market that is looking for quality, price competitive feeds. While domestic manufacturing capacity has now grown (2017) to up to 100,000 MT,70% of the market is still met by inefficient, low quality, homemade feed.

Production can expand further to meet the unmet demand for quality feed. This can be done by local quality production or by cheaper imports of quality feeds. There is also the opportunity to substitute for more imports which has not been happening as much as it should, because the productive capacity of large producers is at 100% utilization while the well-structured regulated emerging small producers are constrained by investment capital to expand production.

To improve the effectiveness of the sector and make quality, price competitive feed available to fish farmers, the future vision would be to facilitate change to a level where:

'Fish farmers have increased access to a growing and competitive supply of high quality feeds that meet NAFDAC standards, leading to increased productivity of fish farmers".

Successfully achieving this vision for the value chain will require four elements to come together:

- Promote the value proposition for investment in large scale production;
- Support to the growing SME channel of feed producers to attract expansion capital and improve their feed quality;
- Increase information to (Large) on farm producers of feed on the benefits of shifting to more efficient, higher quality feed; and
- Continued data collection and monitoring of changes in the sector to share the information on investment opportunities and changing dynamics.

CHAPTER 2 | BACKGROUND

2.1 INTRODUCTION

The single most important input in fish farming is good quality fish feed, which represents 60-70% of the cost of operations. This underscores the importance and interest in developing and growing the fish feed industry.

PIND has been working in the Aquaculture sector in the Niger Delta since 2012, addressing key systemic constraints around fish farming practices, access to finance, and access to improved technologies impeding the growth of the sector and the competitiveness of farmers in the value chain.

These activities were informed by a value chain study it carried out in 2011/2012 on the Aquaculture and fish feed sectors. Intervention activities were then designed to address the constraints using a market system approach.

At the production level, intervention activities focusing on increased productivity of fish farmers have led to improvements in the performance of fish farmers and increased sales of feed companies partnering to drive farmer training. Despite these modest gains, access to improved quality feed to many small holder fish farmers still remains a great challenge.

While availability and awareness of the importance of using quality feed have greatly improved, farmers still complain of the high cost of feed. However, PIND's demonstrations have shown that the challenges are rooted in the feeding practices of farmers and not necessarily the cost of feed.
The devaluation of the Naira tends to have worsened the situation for farmers, particularly small holder farmers, by increasing the costs of feed and other inputs. The structural changes emanating from the devaluation portend many challenges but also opportunities for different actors in the fish feed value chain.

The purpose of this study therefore is to update our knowledge on the structure of the feed sector and to get a better sense of how the fish feed market works and how it is changing. We identify the changes that have occurred over the last five years in the various

channels for fish feed supply into the Niger Delta
region: the channels that are expanding and the ones that are shrinking and the driving forces causing the change. We also hope to identify some of the emerging constraints and opportunities in the value chain and the roles of the various support functions. These findings will help in designing market system interventions to address market failures in the fish feed value chain and the aquaculture value chain at large.

2.2 STUDY METHODOLOGY

This study involved two weeks of field activities including the use of key informant interviews. This was later followed up with detailed analysis as well as desk review of secondary materials

Key informant interviews on the ground were carried out across 10 states in and outside the Niger Delta. Value Chain and support market actors across the following states were interviewed and analysis of the data from these interviews formed the bulk of the report:
Delta, Edo, Bayelsa, Ondo, Oyo, Plateau, Lagos, Rivers, Cross Rivers and Imo states respectively.

The team also referenced secondary data sources including the earlier PIND value chain report as well as other studies/reports relevant to the objective of the study.

Animal Feed Production in Nigeria

According to Udo, I.U and Umanah, S.I, Nigeria's livestock feed sector was dominated by poultry feed in the 1980s which accounted for 90% of the animal feed consumed. They noted that during this period, the contribution of fish feed to the overall animal feed production and consumption in Nigeria was insignificant as aquaculture activities were not widespread.

Table 1: % Distribution of Animal Feed Production (1984, 2000 and 2015)

Feed Types	1984	2000	2015
Poultry	90%	68%	80%
Cattle	7%	-	-
Pig	-	29%	5%
Fish	-	1%	12%
Others	3%		
	100%	100%	100%
Total Volume	480, 000 MT	3,600,000 MT	5,300,000MT
Fish Feed Vol.	Negligible	35, 570 MT	636,000MT

Source: *International Journal of Innovative Studies in Aquatic Biology and Fisheries (IJISABF) Volume 3, Issue 1, 2017, PP 14-22 ISSN 2454-7662 (Print) & ISSN 2454-7670 (Online)*

However, by the year 2000, about 35,000 tons of fish feed was consumed by aquaculture farmers as fish farming activities began expanding in Nigeria. This gave fish feed production some recognition in the country even though the total volume was only 1% of the total livestock feed industry.

In the current period, the fish feed industry has grown to be one of the dominant livestock feed markets in Nigeria, second only to poultry feed. According to Udo, I.U et al, it now accounts for 12% of the animal feed market, with poultry feed maintaining dominance at 80%. Table 1 shows that the fish feed industry grew at a significantly faster rate than the poultry industry between 2000 and 2015, 1% to 12% as against 68% t0 80%. The growth in the sector has been driven by the expansion in the aquaculture sector buoyed by the growing knowledge about the opportunities in fish farming and supported by the availability various brands of feed, including imported feeds.

Fish feed in Nigeria is supplied by homemade, small tollers, local industrial producers and importers. Estimating the total volume of feed produced is usually a difficult task as there are currently no accurate official numbers for the total volume of fish feed produced in Nigeria. It is usually derived from fish production figures. At best this gives consumption figures (including imports) as the sector is proliferated with many unregulated informal on-farm feed producers, making it difficult to estimate actual local production figures.

PIND's assessment using data from the Nigerian Bureau of Statistics gives an estimate of 507,000 MT of feed at 2016, while those from Udo, I.U etal estimated up to 630,000 MT as at 2015.

Fish feed Supply

PIND's field survey revealed that there are 3 main sources of fish feed in Nigeria: Imports from outside the country, production by large feed companies (currently 4: Grand Cereals, Premier Feed, Durante, and Chi) and Production by Micro, Small and Medium Enterprises. Our assessment shows that as at 2016, the four large fish feed production companies have a total installed capacity of 51,000MT per annum while imports were estimated to be about 33,000 MT P/A leaving a gap of about 423,000MT which was met by Micro, Small and medium feed producers (including farmers).

Table : Fish Feed Supply and Sources in Nigeria as 2016

Types of Producers	Volume Produced/ Supplied (National)	Volume Consumed (Niger Delta)	% of Feed Consumed
MSMEs	423,000	127,000	83%
Large Producers	51,000	15,300	10%
Imports	33,000	9, 900	7%
Total	507,000	152, 200	100%

Source: Team Estimation based on data obtained on the production volumes of the large producers and estimated volume of imports from USDA GAIN (Global Agricultural Information Network) Report on Nigeria (2013)

Table 2 shows that Nigeria's fish feed production sector is still largely dominated by the Micro, Small and Medium producers, who account for up to 83% of the market. The Large feed producers account for just 10% of the total volume of feed supplied in Nigeria while the remaining 7% is met by imports.

Fish Feed Production in the Niger Delta

Without any accurate official numbers on the volume of feed consumed in the region, one can conservatively estimate that the Niger Delta accounts for 30% of the cultured fish produced in Nigeria and thus 30% of the fish feed consumed in Nigeria. This is coming from the data obtained from the large fish feed producers which shows that about 30% of their feed is sold in the Niger Delta. The fish feed industry in the Niger Delta mirrors the national trend and structure, as a result, the sector is also dominated by micro and small and medium producers who account for 83% of the total feed produced. The gap is met by feed from large producers based outside the region and imports from outside Nigeria. Poor access to quality feed has been a binding constraint faced by fish farmers in the region. The cost and quality of feed is mainly a function of the inputs used and the sophistication and efficiency of the production process.

Fish Feed Inputs

Fish feed is a formulation of plant and/ or animal materials containing macronutrients, proteins, fats, fiber, trace elements and vitamins in the right proportion required for the good health and better growth of fish reared in aqua-cultural systems. For farmers to achieve optimal growth and reduce mortality they need to feed their fish with feeds that contain the right amount of energy, protein, vitamins and other required nutrients. Our Field survey shows that, for different feed producers, selecting the right source materials for

The assumptions and estimation process is explained in the end market section in chapter 4.

these nutrients becomes a function of many factors: Quality, cost, availability of local substitutes and market segment targeted. And since feed cost represents over 60% of the cost of growing fish, efficient input sourcing is usually a viable competitive strategy for producers.

According to the 2014 Delta State fish feed survey, high-quality fish feeds have floatability feature and are high in protein content. The quality of feed, in terms of floatability characteristic, affects the water quality which in turn affects fish health. Though there are also sinking feeds that are of high quality. The problem is that most farmers don't feed properly and excess sinking feed becomes deposited at the bottom of the pond and therefore pollutes the water. The preference for floatability is so that the farmer can see when the fish have eaten enough. Though with training and improved feeding practices, it does not really make much difference whether a feed floats or sink. The best feeds are water stable and are efficiently utilized by the fish so that the accumulation of waste in the pond or tank is minimized, and thus the impact on water quality is minimized. High protein feed content is preferred to lower protein content as the level of protein is a major determinant of achieving adequate size at shorter time.

Quality feed in terms of protein content and 'floatability' is a function of both the processing equipment deployed and the inputs used. Our survey shows that feed producers obtain protein sources from different materials as they try to achieve the right balance between cost and quality in addition to meeting the requirements of their target market segments.

Table : Main Nutrition Sources for Different Types of Producers

Producers	Energy Sources	Protein	Fibre	Vitamins/ Minerals
Micro	Cassava meal, Garri, maize, wheat	Local fishmeal(crayfish dust), blood meal, soya bean, groundnut cake, feather meal etc	Palm Kernel meal, Corn offals, sorghum offals, wheat offals	Bone meal, premix, antibiotics,
Small/ Medium	maize, wheat, guinea corn, millet and cassava flour	Local fish meal, imported fishmeal concentrates, soyabean etc	Grain offals like Corn offals, sorghum offals, wheat offals,	Methionine Lysine, premix, son bone meal
Large	maize, wheat, cassava chips/ Flour	Fishmeal concentrates (Imported), soya beans, poultry meal	Wheat bran,	methionine, Choline chloride, Stay C-vitamins & minerals premix, Ethoxyquin etc

Protein Sources

Table 3 (above) shows the main input sources for different types of producers while table 7 (below) lays out the changes in prices, between 2012 and 2016, of the main inputs for fish feed production. Depending on the feed formulation, protein and energy source materials account for over 80% of the cost of fish feed inputs. Micro producers use mainly locally available plant and animal agricultural products and wastes for their feed formulation. Protein sources are gotten from locally sourced blood meal or fish meal made from crayfish dust supplement with protein from soybean or groundnut cake. This does not guarantee high or sufficient protein content but enables them to keep their feed within a price range that is affordable to their target buyers, small hold fish farmers clustered around their production areas.

Computation from PIND 2012 Fish Feed Value Chain Analysis
According to Eniola Abiodun, 2016, Blood Meal is said to contain high levels of protein, up to 85%. However, small proportions are recommended in feed formulation as it can lead to broken/cracked head in fish

This is more so considering the significant rise in the cost of major inputs for feed production by about 84% between 2012 and 2016.

The recommended crude protein content for grade 1 and grade 2 fish meals by the Standard Organization of Nigeria (SON) is 68% and 60% respectively. This is mostly obtainable in imported fish meal concentrates used by large producers and some small and medium producers who are building a competitive edge around quality. There are cheaper local fish meal substitutes made from whole fish with claims of the required level of crude protein content. Such claims, however, are not officially verified since they are usually not subjected to lab analysis to determine their nutritional contents.
There has been some recent interest in developing alternative sources of protein in fish feed in view of the rising cost imported fish meal. Recent research led by USAID Markets II project has explored the possibility of introducing insect protein as an alternative input to fish meal.

Table 4: Changes in Prices of Major Inputs for Fish Feed Production between 2012 - 2016

Major Feed Inputs	Prices As at 2012 (N/MT)	Prices As at 2016 (N/MT)	% Increase in Prices
Soya beans	90,000	150,000	66.67
Maize	59,000	155,000	162.71
Fishmeal concentrates	300,000	600,000	100.00
Wheat	130,000	240,000	84.62
Wheat Offal	28,000	40,000	42.86
Average increase in prices			91.37
Cassava Flour/ Chips			
Cassava Flour/Chips (Used as energy substitute for maize and also as a binder)	100,000 Large producers where buying at about **N75,000 – N80,000/** MT	150,000 Large Producers are willing to buy at between **N100,000 – N105,000/ MT**	50%

Energy Sources

Energy source materials are another fish feed input with significant cost implication. Maize is the preferred energy source material due to its high energy composition. However, its affordability has been a source of concern to many producers. As shown in table 3, the price of maize has risen by over 160% between 2012 and 2016, the highest percentage rise in price amongst the key inputs for fish feed production. This is due to a combination of factors: weak naira and higher global prices as Nigeria is a net importer of maize[5]. There have also been fluctuations in local maize production brought about by the Boko Haram crisis in the Northern part of the country, the major producers of maize in the country. To cope with the soaring price of maize, producers try to supplement with cheaper local substitutes, particularly cassava-based sources. Micro producers substitute local garri meal (more expensive) while most SME and Large producers substitute with Cassava flour or chips.

[5] Nigerian maize price soars, as global prices increase, The Guardian, February 4th, 2016, https://guardian.ng/news/nigerian-maize-price-soars-as-global-prices-increase/

Computation from PIND 2012 Fish Feed Value Chain Analysis
According to Eniola Abiodun, 2016, Blood Meal is said to contain high levels of protein, up to 85%. However, small proportions are recommended in feed formulation as it can lead to broken/cracked head in fish

PIND assessments show that despite the high demand for cassava flour/ chips by large fish feed producers, as presented in table 4, they are still not able to get enough at the 'right' price (N100, 000 – N105, 000/ ton) from local processors to feed their production lines. Nigeria's total annual HQCF production is about 30,000 tons produced mainly by Thai Farms while the SME processors, particularly, in the Niger Delta, that are functional operate at very low capacity, mostly below 10% and are only willing to sell at N150,000/ ton, a price deemed not competitive enough to Maize. Some small and medium producers patronize local processors for cassava flour at a price close to N135, 000/ ton. However, the quantity they buy is relatively small. Nikseg buys about 20 tons per month.

Table 5: Demand Estimate for Maize and Cassava Flour/ Chips Energy Source Inputs

	Volume Demanded Per Month[6]		Price Offered	
Top Buying Companies	Maize (MT)	Cassava Flour[7] / Chips (MT)	Maize (N/MT)	Cassava Flour/ Chips (N/MT)
Top Feed	1,000	500	145,000	100-105,000
Grand Cereals		500	140,000	100,000
Nigsek	0	20	0	130-135,000

[6] Volume would be a lot higher when poultry demands estimates are included. Typically, fish feed account for less than 5% of the total livestock feed production for the top large producers in the country . Therefore, the volume stated above is just about 5% of the estimated total demand for maize and cassava.

[7] Demand for cassava is dependent on price. Its low protein content and relatively higher cost makes it unattractive for manufacturers

CHAPTER 4 | THE END MARKET FOR FISH FEED IN NIGERIA

4.1 The Nigerian and Niger Delta Fish Feed Market Size

The end market for fish feed is made up of fish farmers. The volume of feed consumed is usually a function of the volume of fish produced, the efficiency of the types of feed deployed, and the knowledge of the farmers. Since there are no reliable fish feed production numbers in Nigeria, total feed consumption estimates were made using official fish production figures from the Nigerian Bureau of Statistics.

Table 6: Pattern [8]of Aquaculture Production in Nigeria 2011 – 2016

Year	Total volume of fish produced	Capture Fisheries	Total volume from fish farms
2011	859,614	638,486	221,128
2012	937,255	683,357	253,898
2013	1,023,636	744,930	278,706
2014	1,123,011	809,780	313,231
2015	1,027,058	710,331	316,727

Source: NBS February 2017

From the above table 6, one can derive the yearly volume of feed consumed from the fish production figures by applying average industry FCR (Feed Conversion Ratio) for fish production in Nigeria. Using an FCR of 1:1.6, the table 7 below gives the yearly volume of feed required to produce the volumes of fish laid out in table 6[9].

[8] *The 2016 figures were calculated by applying a growth rate of 0.76% over the 2015 figure. The Nigerian Bureau of Statistics reported that the fishery sector grew by 0.76% in 2016

[9] The FCR was calculated by using the average of FCRs (1:1.2, 1:2.5, 1:1) from PIND's assessment in the sector. 1:1.2 was gotten from demonstration farms facilitated by PIND and partners, it was estimated that it requires an average of 1.2 tons of locally produced quality floating fish feed to raise 1 ton of fish. 1:2.5 was gotten PIND's survey of the fish feed market in Delta state in 2014, which showed that a good number, up to 62% of farmers, produce some of their own feed with FCRs as low as 2.5:1. 1:1 was reported by the imported brands in the country.

Table 7: Volume of Fish Produced and Estimated Volume of Fish Feed Required

Year	Total volume of fish produced (MT)	Total volume from fish farms (MT)	Estimated Volume of feed used (MT)
2011	859,614	221,128	353,805
2012	937,255	253,898	406,237
2013	1,023,636	278,706	445,930
2014	1,123,011	313,231	501,170
2015	1,027,058	316,727	506,763
2016	1,027,839	316,968	507,148

Table 7 puts the volume of fished consumes in 2016 at 507,148MT. The feeds are of different quality and sources consumed by various categories of end market buyers.

The Niger Delta fish feed market mirrors the national trend and has been estimated to be about 30% of the national feed industry.

4.2 Market Segments

4.2.1 Feeding Practices of Farmers

There are different behaviors that characterize fish farmers which predisposes them to a particular market segment. These include the size of the farm the farmer operates and the level of awareness and knowledge the farmer possesses. A study led by PIND in 2013 highlighted farmer behavior with regards to feed use. It identified that farmers feeding behavior is influenced by the type of farmers (size of farms), type/size of fish stocked and financial strength of the farmer:

Fish feeds are usually categorized into three: starter, grow-out and finisher. All starter feed from 0.1-1.5mm are imported while feed from 2mm to 4mm (grow-out) and 6mm-9mm (finishing) can be sourced both locally and imported. Zooming in on farmers' feed consumption pattern across the various stages of fish production, one observes that all farmers buy imported feed at the starter stage. As the fingerlings or post-fingerlings increase in age and size, they then use a variety of feed from imported to locally manufactured feed. However, the number of farmers buying better quality branded feed gradually decreases from the grower- out stage. By the 5th and 6th month, only a few are using commercially produced feed as significant proportions are substituting with homemade feed. The ideal practice, however, is to grow out a given fish from fingerling stage to table size with high quality manufactured feed. Most farmers resort to homemade feed at the later stages of production due to cost consideration. They would use better quality feeds throughout if they are affordable.

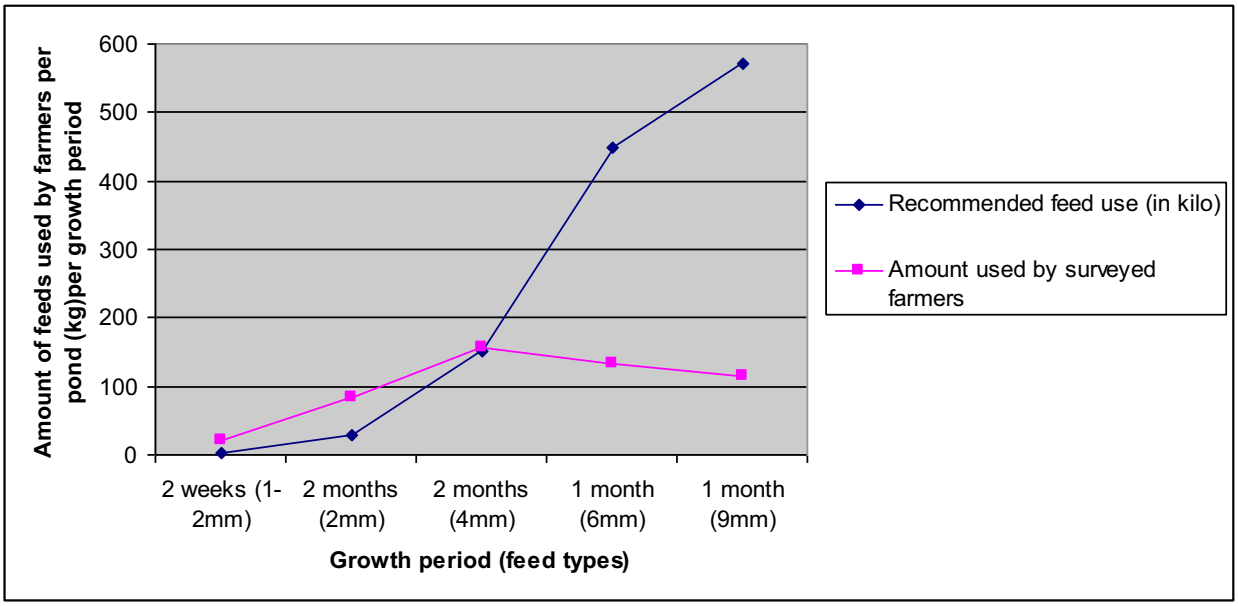
A typical growth cycle vs feed usage for the *Clarias* variety to produce 1 ton of catfish is as follows:

- 2kg of 1mm for 2 weeks
- 30kg of 2mm for 1.5/2 months
- 150kg of 4mm for 2 months
- 450kg of 6mm for 1month
- 570kg of 9mm for 1month

The above estimate is based on an FCR projection of 1.2:1 feed to fish conversion ratio using floating feed and a stocking density of 1,000 fish seeds, assuming 1 cubic meter of water for 15 fingerlings/post fingerling. As the fishes grow and mature they require different a mounts of fish feeds at different periods of their growth cycle.

The graph below depicts a comparison in 2013 between the ideal feeding pattern and practices by surveyed farmers.

Figure 1: Usage of Quality Feed by Farmers



As can be seen from the above graph, many farmers overfeed in the first 2 months, then begin to use less quality feed from the second month, essentially between the post-juvenile and grow-out stage. This means that they make uninformed tradeoffs concerning the amount of quality feed used on their farms through the growth period, especially farmers who belong to the own farm feed consumers and emerging small commercial farmers segments.

Farmers therefore not only require knowledge of the quality of feed they are using but also knowledge of the best ways of feeding to ensure they are feeding the right quantities at the right time throughout the growth trajectory of their fish.

4.2.2 Delineation of Consumers

Going by the consumption pattern described above and key distinguishing characteristics such as size of farms, farmer knowledge, and amount of investment, fish feed consumers can be delineated into four market segments. These are Own on-farm feed consumers, emerging small commercial farmers, medium-sized farmers, large farmers and institutional buyers (Govt. agencies and development program etc.,) who buy feed in bulk for distribution to fish farmers.

The segments and actors therein, are further described below:

ON-FARM FEED CONSUMERS

Small subsistence farmers *that are often at the micro and small level of fish production.*

These are small subsistence farmers who consume farm-made feed, particularly at the post fingerlings stage. They buy fingerlings or juveniles and grow them until ready for sale. They have no broodstock, nor grow their own fingerlings. Most of them have 1-3 ponds (usually within their residential compounds) or within a cluster of farms buying 250-500 fingerlings and produce at small scale for personal consumption and sell the excess. They usually start off their production process using imported feed for the first few months and thereafter resort to using farm produced feed either made by themselves or purchased from other producers of farm-made feed.

The major driver for the large dependence of these farmers on farm-made feed is the considered high cost of branded quality fish feed. Many of these farmers produce the feed themselves or depend on micro-producers who are mostly tollers (independent mixers) who receive fish feed ingredients from fish farmers and mill on their behalf at a fee or buy unbranded packaged feed directly from these producers.

Most emerging commercial farmers start off like this and then grow to become commercial farmers. These farmers usually buy 250-500 fingerlings and then grow them out.

As the aquaculture sector began to grow and farmers gradually began adopting improved fish farming practices. Awareness programs including demonstration activities that clearly highlighted the importance of understanding feed conversation ratios in the choice of feed for fish farming, helped many consumers gradually shift their demand from these unbranded feeds to higher quality fish feed.

However, by 2016, the peak of the macroeconomic challenge in the agricultural sector in Nigeria occasioned by the devaluation of the naira resulted in significant rises in the price of quality branded (67%) and imported fish feed (150%). Many price-sensitive farmers in the Niger Delta reverted to the use of some of these farm-made and unbranded fish feed.

Clearly, the fish feed market is still largely controlled by consumers of these farm made/unbranded fish feed, many of which are of very low quality and poor feed conversion ratios (up to 3:1). There is, therefore, a huge market potential for these branded local producers to continue to penetrate the market either by increasing their production capacities and deepening their marketing/promotion and distribution systems.

SMALL EMERGING COMMERCIAL FARMERS

This category of fish farmers is mostly small farmers who are more commercially oriented and are adopting improved fish farming practices. They also use mostly imported "starter" feed for fingerlings and finish off the "grow out" with a combination of local branded, imported feed or feed from regulated emerging small commercial producers

Farmers at this level are more sensitive to quality and therefore mostly patronize branded fish feed by major local producers as well as some imported feed procured from distributors and retail outlets within the farming communities. As the local major producers continue to demonstrate the quality of their brands and offer competitive prices against imported brands they continue to occupy more of this market.

However, some of these farmers still patronize farm-made feed as finishers (the last few months of production), especially in 2016 at the height of the devaluation as farmers sought cheaper alternatives to rising fish feed prices.

Our survey shows that many of these farmers also responded to the increase in the cost of production occasioned by feed price increases by reducing the length of their farming cycles from six months to four months and practicing three cycles a year, while producing smaller fish.

MEDIUM FARMERS

These are fish farmers who produce mainly to sell to consumers through wholesalers and usually have fairly large farms. The output of these farms are between 1 – 5tons per month and have about 5,000 – 20,000 fish under management. They mainly depend on quality feed from the large producers purchased through distributors and retailers. A few of them still use farm-made feed, particularly at the final stages of production. However, because they are commercially oriented, with fairly large farms, they are usually well disposed to efficient production methods and would

switch to feeds that guarantee a better return on investments: better quality, bigger size over shorter periods and lower mortality.

LARGE SCALE FISH FARMERS

These are similar to the medium scale farmers except for the process sophistication and output, which is above 10 ton per month. Some Large farmers employ an integrated production system producing most of their fingerlings and post fingerlings feed. However, a good number of them patronize branded feeds from large producers.

Many of these large farmers are gradually upgrading their feed production systems to service neighborhood fish farmers who are demanding less expensive quality fish feed. Large fish farmers in this category include Bawo farms in Warri who has recently invested in acquiring a locally fabricated fish feed production plant with the capacity to produce up to six tons a day.

Other notable small and medium fish feed producers, like Makarkute, started off as large fish farmers having an integrated fish farm before venturing into commercial fish feed production.

INSTITUTIONAL BUYERS

These are private and/or public sector institutions who buy feed and distribute to farmers enrolled either as participants in a scheme or members of an association. Early on, the major institutional buyers of feed were fish farmer associations who in a bid to reduce the price at which feed gets to the farmer from distributors sought to buy feed directly from feed companies to distribute to their members. The experience of many such associations who invariably were competing with actors (distributors) in a different functional level in the value chain turned out to be pretty unpleasant.

The case of the UUFFA in Warri where the association enrolled as a distributor of a particular fish feed brand in order to cater directly for the fish feed requirements of her members shows some of the likely consequence of “bad competition” i.e. competition among actors performing different functions in the value chain. In this particular instance, the association could not effectively compete in terms of pricing with the local distributor who found a way of reducing his margin and sold feed at an unbeatable price that saw the exit of the association as many of their members opted to buy from the distributor who offered a better price albeit temporarily, until the association could no longer continue in the business.

Over time, other key institutional buyers, with better buying arrangements, have also emerged in the value chain like some state government agencies and several private sector development

initiatives that procure fish feed directly from Fish feed manufacturers for onward distribution to their beneficiaries.

Delta State Government Youth Agricultural Entrepreneurship program (YAGEP) designed to encourage youth participation in fish farming and other agricultural enterprise reports that it procured as much as 180 Tons of fish feed directly from Chi feeds a large local fish feed manufacturer in one year.

Some of these programs seek to bypass the distributorship channels put in place by the feed companies in order to guarantee unbroken supply of their feed requirements for their initiatives at reasonable prices.

CHAPTER 5 | VALUE CHAIN STRUCTURE AND ANALYSIS

5.1 The Fish Feed Value Chain Map: Then and Now

The Value chain for fish feed in the Niger Delta, a mirror of the Nigerian fish feed industry, is relatively simple. Fish feed producers and importers manufacture and import fish feed and either sell directly to fish farmers (consumers) or sell to distributors/retailers who are close to the farm gates where farmers procure the feed. The value chain map shows a stylized view of the sector, highlighting various actors and functions as well as the linkages between them, from production to the end markets

The fish feed sector, within the period of study (2012-2016), has evolved quite a bit as illustrated by the two maps hereunder, showing industry structure and dynamics as at the two periods under review. Developments in the Nigerian economic landscape have opened up new opportunities and also challenges for players in the sector. More actors have entered the sector and a new channel has evolved. Prices have changed across the channels and buying relationships have also become better arranged. However, teething challenges remain while new ones are springing up, preventing the sector from witnessing greater competitiveness that should bring about the availability of quality price competitive feed to fish farmers in the Niger Delta.

Figure 2: Niger Delta Fish Feed Value Chain Map, 2011

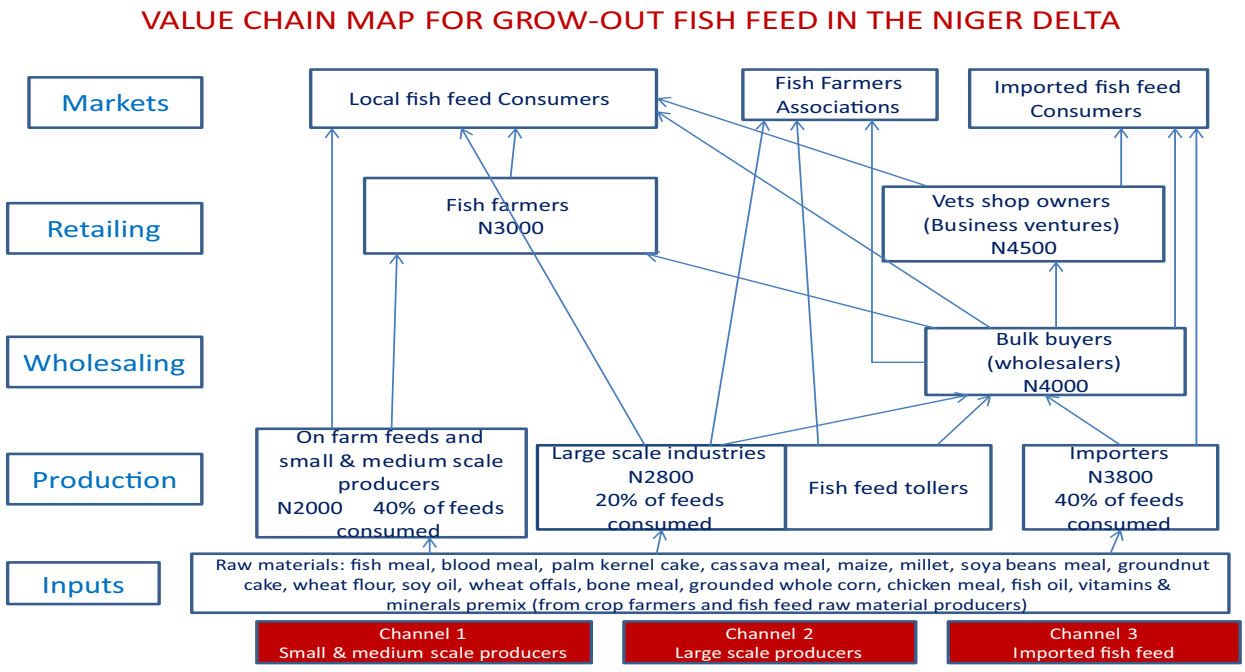
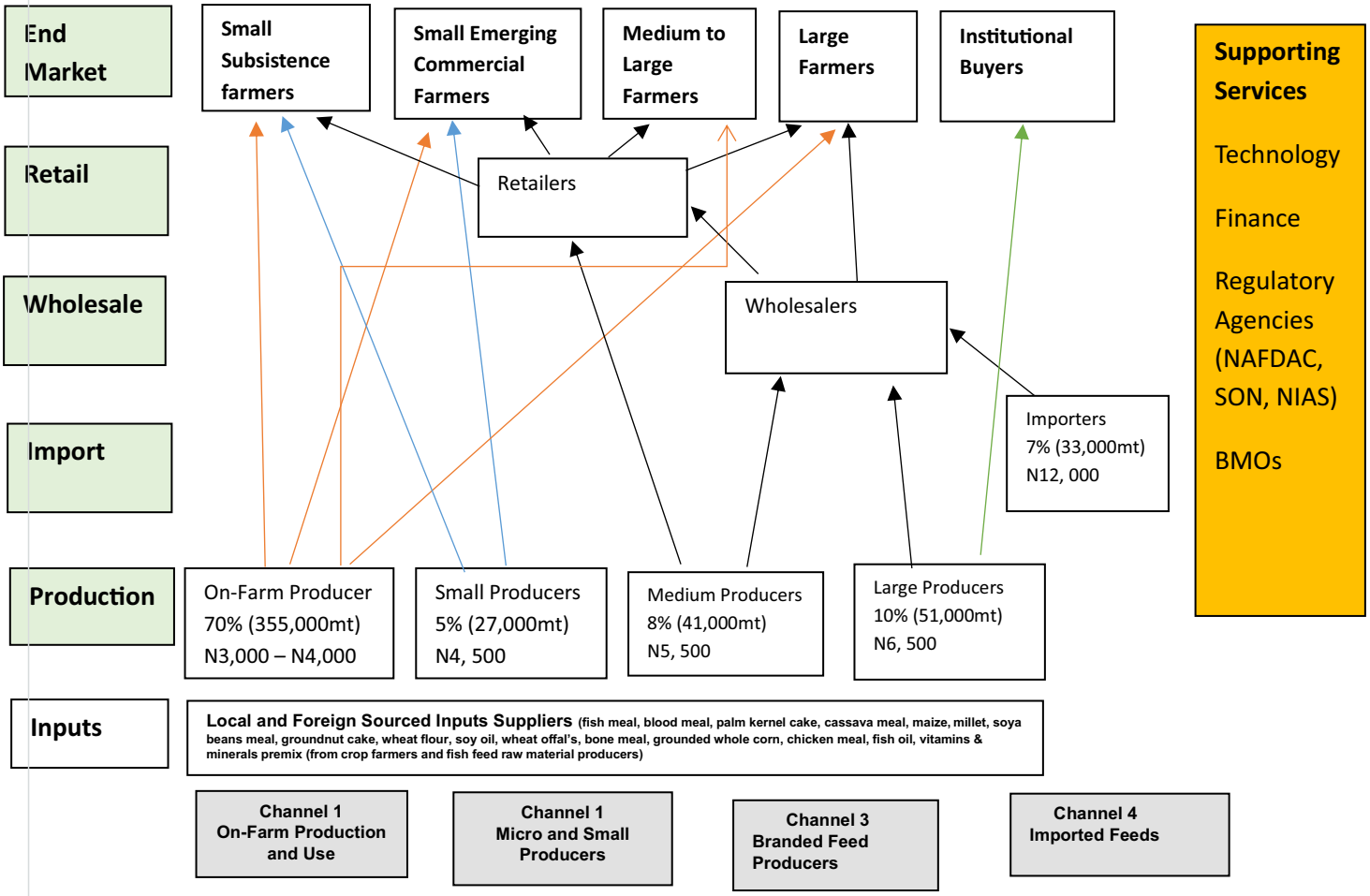


Figure 3: Niger Delta Fish Feed Value Chain Map, 2016

Niger Delta Fish feed VC Map 2016



To develop a strategy for increasing the competitiveness of the fish feed sector in the Niger Delta, and Nigeria as a whole, it is imperative to build a good understanding of the dynamics and structure of the value chain: functions and actors and the channels through which they interact. However, the study will dwell more on the changing dynamics in the sector and the underlying constraints preventing more widespread upgrade and greater competitiveness in the sector, particularly over the last five years

5.2 Functions and Actors

The main functions in the fish feed value chain are fish feed production, import, wholesaling and retailing. The main market actors in the system are feed producers, importers, wholesale distributors, and retailers.

5.2.1 Local Feed Production and Types of Producers

Fish feed is produced by different types of producers categorized into Micro on-farm producers, small producers, medium producers and large producers delineated by their size (production capacity), technology/machines deployed, regulation and types of inputs used. These, in turn, determine the quality of feed produced and the market segment they serve.

Table 8: Characteristics of Different Types of Producers in the Fish Feed Industry

Types of Producers	Size (Installed Capacity (MT) P/A)	Estim. No	Inputs used/ Sources	Regulation	Technology Deployed	Type of Feed Produced
Micro/ on-farm Producers	<100 tons	5000	Micro producers mainly use locally sourced inputs, mainly agricultural product and waste. Larger on-farm producers use a mixture of cheaper local substitutes and imported inputs	Unregulated	Low capacity locally fabricated equipment. Drying and mixing done manually. The larger on-farm producers higher capacity equipment	Sinking feed
Small Producers	100 - 999	56	Mixture of imported and locally sourced inputs	Most are unregulated. Some are regulated	Mainly locally fabricated equipment of higher capacity that averages about of 3 ton/day.	Mainly Floating / Some Sinking
Medium Producers	1000 - 4999	11	Mixture of imported and locally sourced inputs	Regulated	Deploys mainly imported medium extruders of within 1- 3 ton/hr capacity. complemented with higher capacity local equipment	
Large Producers	Above 5000	4	Energy based inputs mostly locally sourced. Protein and vitamins imported	Regulated	Sophisticated imported production lines.	Floating/ Quality slow sinking

Micro/ On-Farm Feed Producers

These are micro, mainly on-farm, feed producers with the capacity to produce less than 100 tons of feed a year. It is estimated that there are up 7000 on-farm feed producers in Nigeria and that about 30% (2,000) of them are located in the Niger Delta.[10] They produce unbranded feed for own use while the surplus is sold to small-hold farmers clustered around their locations. There are also large integrated fish farms that produce feed for own use that belong to this category. The survey field data shows that, in the Niger Delta, this group of farmers, typically produce an average of about 28 tons/ a year, roughly 5 bags o f sinking feed per day. They are responsible for

[10] 70% of total feed is about 355,000 tons/ year. It would require about 7,100 micro producers to produce the estimated total volume, assuming they produce at an average of 50 tons/ year.

about 70%[11] of the total feed consumed in the industry. The micro producers in this category produce mainly sinking feed using agricultural wastes while some of the large farms are beginning to produce floating feeds. In terms of their production technology, there are those who produce the feed in cake form while others have upgraded to deploying small 50kg/h pelletizing machine. They are hardly able to fully utilize the capacity of their pelletizers because of the lack of complementary equipment like mixers and dryers. Currently, there appears to be an increase in the number of micro-producers pelletizing their feed, a change from 2012 when most micro feed was in cake form.

Micro producers are typically unorganized in terms of business structure, produce unbranded, non-standardized, uncertified and non-NAFDAC approved feeds for own farm use and use by poor small-hold farmers whose only chance of staying in fish farming business is through such cost-cutting measures, considering the high cost of imported or locally produced high end feeds. The large own-farm producers are also unregulated.

Small Feed Producers:

These are small commercial producers with the capacity to produce between 100 to 1000 tons of feed per annum. It is an emerging group of commercially oriented small producers. The study estimates that they account for about 5% of the total volume of feed consumed and that there are up to 50 small commercial feed producers in Nigeria with 30% (15) of them located in the Niger Delta[12]. Compared to the micro on-farm producers, the small producers produce higher volumes of feed (average of 465 ton/ per year compared to 28 tons/year in 2016 for micro), deploys higher capacity locally fabricated pelletizers and extruders with a complement of locally fabricated mixers and dryers. As a result, they are able to produce floating and better quality, sinking feed. The small producers' category is further delineated into unregulated and regulated small producers. The regulated small producers produce have NAFDAC certification, produce branded feeds, and are relatively better structured as businesses, though some still lack basic good business management practices like bookkeeping and planning. The unregulated small producers producing unbranded feed, lack NAFDAC registration and are poorly structured as businesses.

Medium Feed Producers

Producers classified in this category have an installed capacity of between 1000 to 5000 tons/ year. The study estimates that they account for up to 8% of the market and there are about up

[11] Udo I.U, Umanah S. I, International Journal of Innovative Studies in Aquatic Biology and Fisheries (IJISABF) Volume 3, Issue 1, 2017, PP 14-22 ISSN 2454-7662 (Print) & ISSN 2454-7670 (Online) DOI: http://dx.doi.org/10.20431/2454-7670.0301003 www.arcjournals.org

[12] 5% of total feed is about 25,000 tons/ year. It would require about 50 small producers to produce the estimated total volume, assuming they produce at an average of 500 tons/ year

to 16 medium feed producers in Nigeria[13], with at least one (Nikseg Foods) located in the Niger Delta. They deploy higher capacity production equipment (extruders, mixers, dryers, etc.) mainly imported from China and produce branded NAFDAC approved floating feeds. It is an emerging channel in the Niger Delta; our field survey revealed that there is probably just one producer that fits the category in the region going by the installed capacity classification even though, on a deeper look, it may be safer to place it within the small producer channel as some of its other characteristics (distribution system, production volume, market served) describe it as such.

Large Producers

These are producers with the capacity to produce 5,000 tons or more volumes of feed per year. There are only four producers in Nigeria that fall within this category, all located outside the Niger Delta. The four producers are Premier Feed (Top Feed), Grand Cereals (Vita Feed), Skretting (Durante) and Chi Feeds. Olam has started producing fish feed, as well in 2016. They have a total installed capacity of 51000 MT/ Yr (enough to double existing supply of locally manufactured feed) and now account for 13% of the total fish feed produced in Nigeria as they increase their sales. Most of the large producers are also producers of poultry and other livestock feed, so fish feed is a small percentage of their total feed production.

5.2.2 Importers

Imported feeds account for a significant proportion of the high-quality fish feed market in the Niger Delta. Global Trade Atlas Database estimates that about 33,000 tons of feed were imported into the country in 2016, down from 41,000 tons in 2015. The decline was primarily due to the depreciation of the local currency which led to an increase in prices of imported goods.

There are various licensed importers in Nigeria though many known brands (like Multifeed) have left the market since the naira devaluation. The biggest importers include Aller Aqua, Skretting (starter feed), Coppens, Raanan, and Olam[14] which recently introduced its Aqualis brand. The foreign brands dominate the less than 2mm (starter feed) range, a niche they have successfully built over the years as local large producers are not able to efficiently compete in the segment. Though imported feeds vary in quality, it is nonetheless, thought to be of higher quality than locally produced feeds due to higher protein content and better FCR.

[13] 8% of total feed is about 40,000 tons/ year. It would require about 16 medium producers to produce the estimated total volume, assuming they produce at an average of 2500 tons/ year

[14] Olam has also started manufacturing in Nigeria. They plan on producing three branded feed products of varying levels of crude protein for different market segments. They are importing starter feed, and some of their top brand, Aqualis, but expect to make it all locally in the next few years.

5.2.3 Wholesalers

Feed distribution is a very important function in the fish feed value chain, particularly to large and medium producers and importers who depend on distributors to reach the final consumers. Wholesalers play a key role in fish feed distribution and warehousing. They interface between the producers, retailers and the farmers, bringing feed produced in factories located in other parts of the country to fish farmers in the Niger Delta. They purchase feeds directly from the manufacturers or importers in large quantities at specific prices depending on the sizes, weights, brand, and buying arrangement. The purchase terms are usually influenced by the strategic importance of the wholesaler to the manufacturer typified by the categorization of the wholesalers, particularly in the large production companies. The categorization reflects their buying volume (quantity and rate of turnover), length of relationship and ge ographical coverage.

Table 9: Categories of Feed Distributors and Margins Made (4mm)

Brands	Key Agent	Super Sub	Sub Dealer	Retail	% Margin (Key to Super Sub)	% Margin (Super to Sub)	% Margin (Sub to Retail)
Vital Feed (Regular)	5,880	5,930	6,030	6,130	1%	2%	2%
Olam (Aqualis - imported)	6,690	N/A	7,100	7,400		6%	4%
Olam (Blue Crown	5,452			5,700			4%
	Wholesalers		Retail		Margin (%)		
Topfeed	6200		6300		2%		

Some producers categorized them as either key distributors, super sub-distributors, or sub-distributors. The key distributors buy directly from the large producers and sell to the super sub-distributors, while the super sub-distributors sell directly to the sub-distributors. However, the three categories still sell directly to retailers and farmers at manufacturer recommended prices depending on their feed purchase prices. This determines the price at which the feeds get to the final consumers. The super sub-distributors may buy directly from the producers but at a super-sub distributor price. This is to keep the competitive edge of the key distributors as strategic partners. Other producers may just have one layer of distributors (Key distributors) who manage and sell either to retailers or directly to consumers.

Wholesalers sell to retailers after adding a margin on the purchase price from the manufacturers or importers. This also determines the price at which the feeds get to the final consumers. There are also cases where wholesalers sell directly to the consumers, mostly to large fish farmers who buy in large quantities. In such cases, the consumers get it at a slightly lower price than they would have if they bought through retailers. The margins made by the different categories of distributors range between 1% to 6%, imported feed distributors tend to make the highest

margin. However, key distributors with significant volumes and huge turnover do not just make their money on margin; they obtain huge discounts. Depending on their turnover, they can get as much as 4% discount off the going price for their category of distributors.

Most wholesalers of fish feed are also distributors of poultry feed. Our field survey showed that 60% of the wholesalers surveyed sell both fish and poultry feeds. Though fish feed sales are becoming more significant, poultry feed still accounts for over 80% of the livestock feed market. However, the wholesalers mentioned that fish feed distribution is more viable than poultry feed due to the seasonal nature of the poultry feed business. Some poultry farmers only produce for targeted festive periods.

5.2.4 Retailers

These are small enterprises who buy feed in small quantity from the wholesalers and sell directly to end users (Farmers). They buy at discounted prices from the wholesalers and add their margins before selling directly to the end users. They are mostly located very close to farm clusters for easy access to farmers. Their average profit margin for both local and imported is about 2% margin

5.3 Channels

The study identified 4 different channels through which different categories of feed producers provide feed to the final consumers. The channels were delineated using a myriad of variables: production capacity, equipment, market served (behavior of the consumer), distribution system (relationships). The four channels are on-farm production, commercial micro and small producers, branded production, and imports.

On-farm producers Channel:

Serves the on-farm feed consumers who are mainly small subsistence fish farmers. Some larger fish farms who make and consume their own feed belong to the channel. The feeds are supplied by micro and other larger on-farm feed producers who largely produce for own use but sell their surpluses to farmers clustered around the farms where the feeds are produced. It is characterized by thousands of micro feed producers who generally utilize mainly agricultural wastes and or cheaper input substitutes for feed formulation to keep their production cost low in order to competitively sustain their fish farming operations. The channel accounts for over 70% of the fish feed market and is the dominant channel in the fish feed value chain. Prices range from N3,

500 per 15kg bag to N4,200 depending on the type of producer and quality of inputs used. The feeds produced are mostly post-fingerlings and grow-out stage feeds.

Commercial Micro and Small Producers Channel:

Serves small emerging commercial fish farmers who largely depend on commercially available cheaper and price competitive feed. The channel is supplied by commercial micro and small producers, two different producers but which are producing for sale but sell directly to end buyers. This is an emerging channel of micro and small feed producers who produce mainly for commercial purposes, taking advantage of the high cost of high-end feed to meet the needs of small commercial fish farmers.

Two types of feed are sold in the channel: regulated and unregulated feed. Regulated feeds are produced by small producers whose feeds are NAFDAC certified while unregulated feeds are non NAFDAC certified feeds produced by micro producers and some small producers.

Prices range between N4,000 to N5,000 and are comparatively cheaper than those of the large and medium producers, due to the lean structure (low overhead), lower quality inputs, and thus lower operational cost of the producers. There is the opportunity to support some small producers with the right incentive and capacity to expand and upgrade into this channel. This will further increase the availability of quality price competitive feeds in the region. The feed is supplied directly to the farmers who sometimes order before they are produced. Some of the regulated small producers are beginning to sell through retailers and are barely able to meet the demand for their feed.

Branded production channel

Serves mainly medium and large farmers who buy feed commercially, and government institutions who purchase feed for social agricultural programs. The channel also supplies feed to small emerging fish farmers who are growth-focused, and as a result, patronize branded quality feed. The feeds are supplied by medium and large feed producers comprising the 4 large feed producers with a combined capacity of 51,000 metric tons/ year and up to 16 medium producers mostly located in the western and northern part of the country with an estimated capacity of 40,000 tons/ year. Feed in this channel are of standard quality and meet the minimum nutritional requirements by both NAFDAC and SON, including those produced by medium producers which are said to be of comparable quality to those by the big four large producers, Makarkute is a good example.

Almost all the medium to large producers, except Nikseg (a medium producer), are located outside the Niger Delta. However, one of the large four, Premier Feeds, has a 6,000 ton/ year mill which is being set up in Cross River State. The feeds get to the consumers through Wholesalers

and retailers. The producers have major distributors in all the states in the Niger Delta through which they get their feed to farmers in the region. The major distributors further distribute through retailers. PIND's assessment revealed that the Niger Delta market is becoming more important and significant for actors in this channel. Two of the four large producers surveyed during the study noted that as much as 30% of their feed is sold in the Niger Delta, up from an average of 11% in 2014.[15]

Price ranges from between N5, 500 to N6,500. Feed by the medium producers gets to the final beneficiaries for about N5, 500/ 15kg bag while those from large producers sell for an average price of N6500.

4. Imported channel

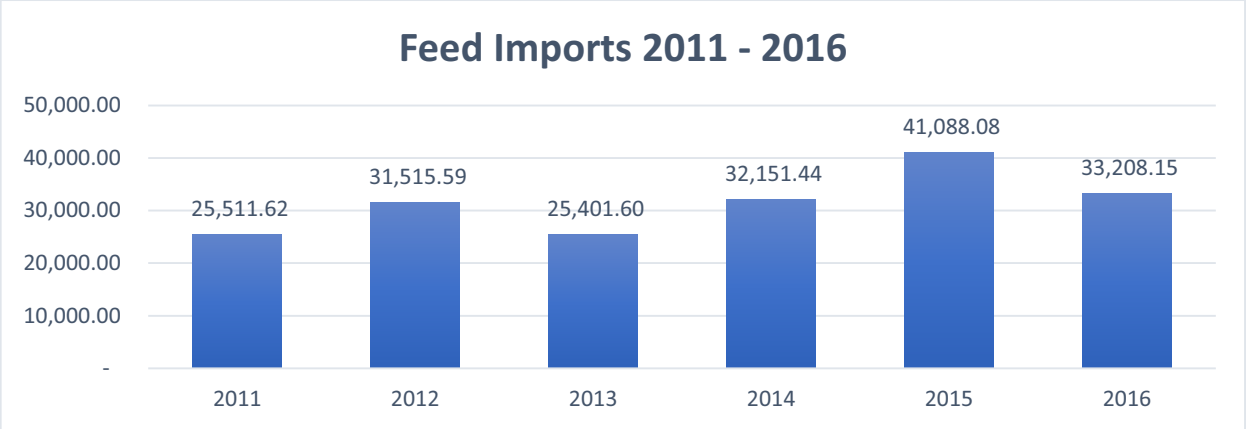
Importers supply two types of feed to consumers in this channel – starter feed and grow-out feed. They supply the smaller than 2mm starter feed to all the consumers in the fish feed value chain. It is a market niche that is solely met by imports, as local producers are not able to effectively compete in the product area. A few local large producers had ventured into this segment but did not find it viable, as the volumes are small. Starter feed requires highly efficient production processes and large production volumes to bringing about economies of scale that would make it viable which the multinational producers can achieve serving many markets around the world.

The second type of feed is the grow-out feed post fingerlings feed (2mm to 9mmm range) which they supply to mainly medium and large feed consumers who are particular about efficiency and quality of feed. This used to be dominated by imported feeds but there has been stiff competition from producers in the local branded feed channel (medium and large producers) in the last two years occasioned by the weakening of the local currency which has given rise to a reduction in the demand for imported feed due to the high cost of imports.

There are quite a few players and brands in the import channel as at the end of 2016, however, the major brands are Coppens, Aller-Aqua, Raanan, and Skretting. The major importers, together with other small importers supplied 33,000 tons of feed to end buyers in the value chain in 2016, down from 41,000 tons supplied in 2015. This is further discussed in the dynamics section.

[15] Average of estimates obtained from Grand Cereals and Premier Feeds. Both companies account for over 70% of the feed produced by large producers in Nigeria.

Figure 4: Feed Imports, 2011 to 2016



Source: Global Trade Atlas database

The major importers distribute through wholesalers who further reach the final consumers through retailers. Small importers sell directly to consumers or through retailers. Fingerlings feed (1mm to 2mm) are packed in 15 kg bags and sold to wholesalers at an average price of N10,100 who sell to retailers at N10,300 while retailers sell to the final consumers at about N10,500. It sometimes gets to the final consumers at above N11 000. Coppens is packed in 5kg bag but sold in the same price range as other feed. Meaning that a 15kg Coppens starter feed would sell for about N30,000 in the market.

The grow-out feeds are packed in 15kg bags and are sold through wholesalers and retailers. Our survey data show that on the average, grow-out feeds are sold to wholesalers at an average of 8,500 who sell to retailers at N8,800 while the final consumers get it at about N9,000.

Overall, distributors make an average of N350/ bag from feed distribution. Imported fish feed sales have witnessed a lot changes in the last 5 years which would be discussed in the dynamics section.

CHAPTER 6 | SUPPORTING ORGANIZATIONS AND REGULATORY ENVIRONMENT

Fish feed production still a relatively young and emerging industry; support services are still underdeveloped and rules and standards required for the efficient performance of the sector are either lacking or infectively implemented. The following actors and institutions currently support the fish feed industry

1. Equipment Fabricators

Fish feed producers require a different range of equipment in their production process. They require extruders, pelletizers, mixers (wet and dry), dryers, crushers, grinders. At the large producers' level, the equipment is integrated into an automated production line, while they are stand-alone at the SME and Micro level. The large producers do not face many challenges with their equipment apart from rising cost of maintenance and replacement parts since the units are mostly imported. On the other hand, the MSME (Micro Small and Medium) producers depend mainly on local fabricators for their equipment. The capacity and reliability of locally fabricated equipment also determine, to a great extent, the efficiency, productivity , and competitiveness of the local MSME producers.

Our field assessment shows that there has been a gradual increase in the equipment range manufactured by local fabricators. As at 2012 there very few fabricators in the fish feed industry and none could fabricate extruding machine. Currently, most of the poultry feed equipment manufacturers can now manufacture some machines specific to the fish feed production process. Local fabricators are also beginning to manufacture extruding machines which were hitherto only imported. The availability of cheaper locally fabricated extruders is helping small farmers produce floating feeds, the reason more micro and small producers are able to produce floating feeds. Most of the local fabricators are located outside the Niger Delta, mainly in Ibadan (South West Nigeria). However, the study team met a local fabricator in Calabar who produces pelletizing machine and other fish feed production equipment. He confirmed that Niger Delta fabricators are only beginning to delve into fish feed equipment fabrication and that at the moment they do not have the technical capacity to produce extruding machines for the production of floating feed.

There is an opportunity for local fabricators to expand considering the growth experienced in the aquaculture sector over the last five years and the related expansion in the fish feed industry. However, technology upgrades have not kept pace with the level of growth in the aquaculture and fish feed industry. Local fabricators are constrained by low technical skills, the reason most are still unable to produce extruding machines. They are also faced with rising cost of inputs (like steel, angle irons, bars, electrodes, grinding and cutting discs, etc.) which are mostly imported. Many of them are not properly organized as viable businesses and thus face funding constraints. On the demand side, there is a high preference for imported machines by local producers due to reliability concerns. The fabricators also complain of low demand from small and micro

producers, the major users of local machines, due to rising cost of the machines and lack of limited sources of funds for the micro and small producers

The high preference for imported feeds was due to their quality in terms of floatability and high protein content which only a few local feeds companies could achieve considering the high cost of extruding machines. Furthermore, the difference in prices between good local feeds and imported feeds was marginal. Five years down the line, more local feed companies are now able to produce floating feed even at the micro and small enterprises level. This is, also, in part due to the availability cheaper locally fabricated extruders in the country. More local feed companies are now able to produce floating feed even at the micro and small enterprises level. This is, also, in part due to the availability cheaper locally fabricated extruders in the country. There is also the growing awareness of quality locally manufactured feeds and the entrant of new large producers into the sector.

2. Financial Institutions

Financial institutions play a key role in the sector, they provide finance to sustain and/ or expand operations in the fish feed sector. There is a good relationship between financial institutions and the large and medium producers in channel 3. This is, however, not the case with the micro and small producers. The issue of poor access to finance for small enterprises in Nigeria is well-known. There is the need to support the better-structured and regulated small emerging commercial producers to access expansion capital. This could mean supporting the structured small producers to be bankable and then packaging them to SME friendly financial institutions for funding.

3. Associations

Fish feed producers, and livestock feed producers, in general, do not have sound associations or platforms that bring them together. In 2010, a livestock feed association (Nigerian National Feed Association -NNFA) was formed during a feed summit held in Ibadan to advance animal feed production in Nigeria. The association never really took off and no attempt has been made since to resurrect it or set up another body. NNFA was supposed to help monitor and enforce compliance with good manufacturing practices and to organize essential capacity building for all stakeholder and government officers on feed safety. An effective association would certainly help improve standards in the industry and also provide a platform for small producers to access funds to expand.

4. Regulatory Institutions

The fish feed industry is ineffectively regulated; there is no particular institution effectively in charge of ensuring that policies and standards required to grow the sector are developed and implemented. There are government agencies established to play such role across many sectors. Enforcement, however, has been really poor. Some of the institutions are:

NAFDAC

The National Agency for Food and Drug Administration and Control (NAFDAC) is a government institution in charge of safeguarding public health by ensuring that only the right quality food, drugs, and other regulated products are manufactured, exported, imported, advertised, sold and used in Nigeria. Regarding fish feed production and importation in Nigeria, they have the following guidelines in effect.

- Guidelines for obtaining a permit to import feed supplement, feed concentrates, feed additives, premixes, and fish meal.
- Guidelines for registration of locally manufactured animal feed, pet food and premixes.

The detailed guidelines are presented in Annex 2.

Our field assessment revealed that the importation guidelines seem better enforced as non-licensed imported feeds hardly make it into the country. On the other hand, and despite their presence in every capital city in Nigeria, enforcement at the local manufacturing level can be judged to be very poor considering the number of unlicensed and unbranded feeds produced in the country. The ineffective regulation at the local production level is said to be caused by funding constraints and inadequate human resources required by the agency to effectively carry out their monitoring function. They also claim that most of the unregulated feeds are farm made and not sold through commercial outlets, making them difficult to track. They noted that they have severe penalties for producers that are producing and selling unregistered feeds. Small producers, on the other hand, claim that the bureaucracies within NAFDAC and the corrupt practices of some of their staff make it difficult for small producers to obtain NAFDAC license.

Standard Organization of Nigeria - SON

The Standard Organization of Nigeria (SON) is the apex standardization body in Nigeria with a mandate to ensure the:

1. Preparation of standards relating to products, measurements, materials and processes among others, and their promotion at the national, regional and international levels;
2. Certification of industrial products;

3. Assistance in the production of quality goods;
4. Improvement of measurement accuracy and circulation of information relating to standards.

Regarding animal feed, they have standards on methods of sampling and analysis of animal feeds stuff in Nigeria. Specifically for fish, they have a specification for fishmeal as livestock feedstuff under NIS 265. They issue importation permits to importers of fish feed and certification for local producers. Their standards cover requirements for raw materials (inputs), microbiological requirements, packaging, and labeling.

PIND's field assessment showed that importers and large and medium local manufacturers comply with SON's standards and have NIS certificates for their products. However, the unregulated small and micro producers tend not to care about SON's standards.

There are other institutions whose activities are supposed to help strengthen the fish feed industry, unfortunately, their impacts are hardly felt in the industry. They include:

- Nigerian Institution of Animal Science (NIAS)
- African Regional Aquaculture Centre (ARAC)
- Fisheries Society of Nigeria (FISON)
- Ministries of Agriculture (State and Federal)
- Agriculture Research Council of Nigeria (ARCN)

7.1 Trends

Shift in Demand from import to locally produced feed

There has been increasing demand for locally produced feed and a noticeable decline in the demand for imported feed, due to the devaluation of the local currency and resultant hike in prices of imported goods, particularly since 2016. This was most significant in channel 3 where there has been a substantial increase in the volume of feeds produced, particularly by large producers.

As shown in Table 9, large local producers witnessed a significant increase in both volume of feed produced and capacity utilization over the period surveyed. Prior to 2015, this was driven by the overall growth in the aquaculture sector which gave rise to signifi cant investment in local feed production. As a result, the number of large producers rose from 1 in 2012 to 4 in 2014 while the sector also saw the emergence of a medium producer, Nigsek Feed, in the Niger Delta in 2015. The import channel also grew within this period.

Table 10: Capacity Utilization Trend of Producers Surveyed

Producers	2012				2016				Average % Increase in Capacity Utilization
	Average Installed Capacity (MT/Y)	Average Volume produced (MT) P/A 2012	Average % Capacity Utilization 2012	% ND Vol	Average Installed capacity (MT/Y) 2016	Average Volume produced (MT) P/ A 2016	Average % Capacity Utilization 2016	% ND Volume	
Micro/ On-farm	49	23	29%	100%	49	28	43%	100%	148%
Small	674	144	23%	100%	674	465	72%	100%	313%
Medium	2500	N/A	N/A	N/A	2500	1000	40%	100%	-
Large	18,000	9,000	50%	11%	12,750[16]	12,500	98%	32%	100%

Source: Team calculation using field data

However, between 2015 and 2016, the devaluation of the naira spiked the prices of imported goods, including imported fish feeds, causing a shift in consumption from imported feeds to

[16] The sector had just one large producer in 2012 (Grand Cereals) with a total installed capacity of 18,000/annum. By 2016 the total installed capacity had increased to 51,000/annum but produced by 4 companies. This brought down the average installed capacity down to 12,750 MT/A from 18,000 MT/A. These figures do not include Olam's recently opened feed mill which has a capacity exceeding 50,0000 MT/annum, but is not yet at full production.

cheaper local substitutes, mainly quality branded feeds by large and medium producers in channel 3. As shown in tables 10, the feed sector stagnated as farmers grappled with soaring cost of inputs. However, large producers witnessed an expansion in both the volume of feed produced and capacity utilization, most hitting almost 100% capacity utilization. The increase has been in response to growing demand for cheaper locally manufactured quality feed occasioned by the devaluation of the naira and the resultant huge increase in the price of imported feeds. Table 6 shows that prices of imported feeds have gone up by as much as 151% as against 66% increase in feeds produced by large local producers.

Table 11: Trend - Fish Production vs Volume of Feed Used

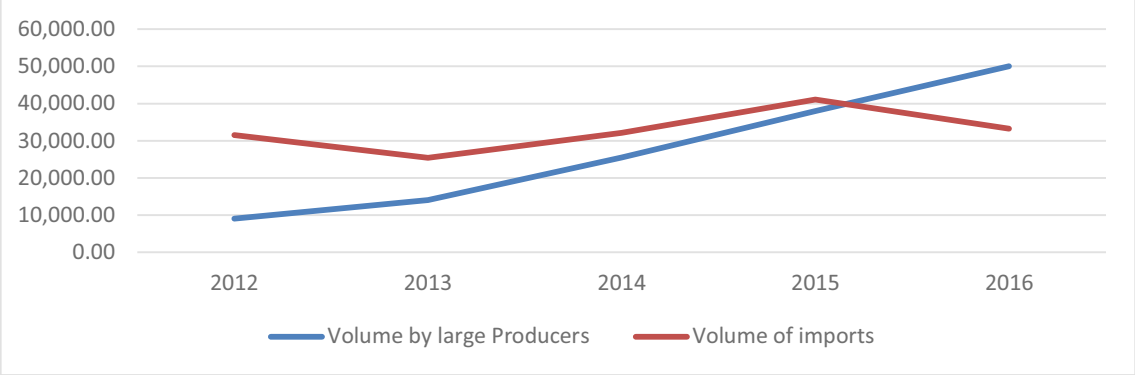
Year	Total vol. of farmed Fish Produced (MT/Y)	Estimated Volume of feed used (MT/Y)	Volume of feed by Large Producers (MT/Y)	Volume of Fish Feed Imported (MT/Y)
2012	253,898	406, 236.80	9,000.00	31,515.59
2013	278,706	445,929.60	14,000.00	25,401.60
2014	313,231	501,169.60	25,500.00	32,151.44
2015	316,727	506,763.20	38,000.00	41,088.08
2016	316,967	507,148.34	50,000.00	33,208.15

Source: NBS, Global Trade Atlas database, and Data from field survey

The current dynamics also lays credence to the growing acceptance of locally branded feed in channel 3 as substitutes to imports, hugely so, as there has been increased knowledge on the improved quality of feed by branded local producers.

Figure 2 compares the trend in the volume of feed produced by large producers to import volumes over the 2012 to 2016 period. The graph shows a clear shift and divergence between 2015 and 2016. Imports fell by 8,000 tons while large local production rose by 12, 000 tons, even though the overall sector remained stagnant. The data corroborates our field findings which show that many fish farmers who used to patronize imported grow-out stage feed are now shifting to large local while the starter feeds are still imported due to the lack of local substitutes. Our findings also show that more subsistence and micro producers are resorting to on-farm feed production in order to stay in business, while some large farms who hitherto produced their feeds are shifting to large local as feed production becomes less cost effective for them .

Figure 5: Volume Trend – Large Producers VS Imports



But it is important to note that the shift towards domestic production has probably be en slowed by the current production capacity constraints.

Importers seeking cheaper imports leading to the emergence of Cheaper, Price Competitive Import Brands

According to the 2013 Delta fish feed survey report, the Nigeria fish feed market, as at 2012, was proliferated with imports from USA (Ziegler brand), China (Sharp brand), Brazil (Pira brand), Netherlands (Coppens), Israel (Multifeed and Raanan). The leading feeds, back then, in the Niger Delta, were Coppens and Multifeed. Some of the brands, like Ziegler and Multifeed, had to exit the market as they were no longer able to compete while most of those that stayed significantly reduced their grow-out stage feed and concentrated on the starter feed stage. However, the sector is witnessing a new set of fingerlings and grow-out stage feeds being imported into the country at cheaper prices while feeds from neighboring countries are also becoming competitive.

Table 12: Price Shifts of Major Imported Brands Vs Alternatives (15kg Grower-out Feeds)

	Brands[17]	Price as at 2012 (N)	Retail Price 2016 (N)	% Increase
Foreign Brands				
1	Coppens	5,000	N14000	180%
2	Skretting	4,500	N10,000	122%
3	Multifeed	4,500	No longer available	
	Average increase in prices			**151%**
Local Brand				
	Vital Feed	3,950	6,600	67%
West Africa Brand				
	Raanan	4,200	7,700	83%
New Cheaper Foreign Brand				
	Aller Aqua	N/A	8,000	
	Aqualis (Olam)	N/A	7,000	
	Blue Crown (Olam)	N/A	5,400	

As illustrated in Table 11, Aller Aqua and soon to be launched Aqualis from Olam are two imported brands that are competing with the branded local channel in both price and quality. This is an important shift in the sector that is keeping the imported feed channel competitive and doing well, even if it is not growing in volume; but for the likes of Aller Aqua, the import channel would have fallen even lower. This is particularly important in the South West of Nigeria where there are smaller cheaper imported brands that are still being used regularly.

Raanan, has invested in production in Ghana for sales to Nigeria in lieu of their Israeli production and is competing with the large local producers and keeping the import channel competitive. They able to sell at N7,700, only about N1,000 higher than Vital feeds.

The above scenario has also led to a large reduction in the number of brands from Europe, US, and Israel, while there is increasing supply of imported feed from cheaper sources. Olam's new feed is coming from India (while it builds its new feed mill) while Raanan is producing out of Ghana. There are also other smaller brands that are coming in from Asia.

Increasing Investment in Domestic Feed Production by Major Industrial Producers

The study also found that the sector is witnessing increasing new investment by major brands in response to growing opportunities in farmed fish production and the quest for quality price competitive feeds by fish farmers. Premier Feeds, makers of Top Feed invested in an 18,000 MT/Y mill Ibadan in 2014 and are currently adding another 11,000 MT/Y locate d in Calabar in the Niger Delta. Skretting/ Durante has already set up a 10,000MT/ Yr production capacity factory

[17] Coppens, Multifeed and Skretting were the major foreign brands available in 2012. Raa nan was also popular but was brought in from Ghana in 2016, whereas it used to be imported from Israel. Ghanaian products benefit from trade agreements between West African countries and are therefore not subjected to the same set of trade regulations as products from outside West Africa. Vital Feed from Grand Cereals was the major local brand back in 2012.

which is almost always fully utilized. Olam, currently importing their fish feed brand, Aqualis, has set up a fish feed mill with total capacity of 7,500 MT per month in Kwara state (Ilorian), which has just become operational. While not yet manufacturing at capacity, it is estimated that about 50,000mt will be produced in 2018 for fish feed production. Aller Aqua, currently being imported from Denmark, has announced it is making plans to set up a fish feed mill in Nigeria.

The emergence of better structured small and medium producers that are upgrading into the branded local channel.

The sector is also seeing the emergence of better structured and NAFDAC regulated small and medium fish feed producers, a trend that is also occurring in the Niger Delta. Though many of the emerging small commercial producers are unregulated, the regulated ones are getting efficient and expanding their market share.

Table 13: Price and Profitability of Local Feed Producers

Channels	**2012**			**2016**			**% Incr. in Av. Cost price/ bag**	**% Incr. in Av. Sales Price/ bag**
	Average Cost Price/ bag	Average Sales Price/bag	% Sales Margin	Average Cost Price /bag	Average Sales Price/ bag	% Sales Margin		
Micro Producers	1850	2517	36%	2633	3500	33%	42%	39%
Small	2555	3325	30%	3540	4425	25%	39%	34%
Medium	-	-		4500	5500	22%		
Large Producers	3229	3875	20%	5375	6450	20%	66%	66%

Table 12 shows that small producers compete effectively on price due to their lean operational structure and use of cheaper locally available inputs. As the quality of their feed improves, they tend to maintain the price competitive edge due to their low-cost set-up even with the increased cost of better quality inputs. Nikseg is one of such company that grew out of the small feed channel to a medium company now competing with the large producers in the branded feed channel. Grandpa and Agro Protein are small emerging producers that are regulated and are making investments to expand and improve the quality of their feeds.

Overall, the small producers are expanding and capturing more market share due to their cost competitiveness. However, the majority are still underperforming and are constrained by poor business management skills which limit their ability to develop and implement growth strategies to take advantage of the unfolding market opportunities brought about by the high cost of imports. They lack sound business practices and are unable to raise external funds required for

expansion and equipment upgrade. Many still offer unbranded poor quality feeds due to poor technical skills and weak regulatory environment. There is the opportunity to intervene in the channel, working with incentivized small producers to bring about better performance and upgrade to bigger channels. This will ensure increased availability of quality price competitive feeds to fish farmers in the region.

Still a strong dependence on own production in the later stages of fish farming

As has been mentioned in previous sections, over 70% of the feed produced in the sector is own-use farm made. They are mainly inefficient and unregulated poor quality feed with FCR as high as 1:2.5. Field engagement reveals that more farmers, particularly the weak and subsistence fish farmers, are shifting to homemade feed to stay in business due to rising cost of feeds. This portends a large opportunity to grow and improve the effectiveness of the sector.

7.2 Driving forces

The above trends are driven by:

I. Increasing demand for feed overall in response to increasing production of fish.
II. Increasing demand for quality feed. The sector now has better-informed farmers who have seen the benefit of using efficient feeds and are now demanding and using higher quality feed.
III. The devaluation of the local currency leading to high feed prices is pushing the shift towards domestically produced feeds, this has particularly been the case over the last one year.
IV. Changing views by the major feed manufacturers that fish feed is no longer just a side product, small percent compared to poultry, but now a mainstream product with future growth prospects. This is driving investment in the sector.
V. Falling purchasing power of fish farmers. This is limiting the ability of farmers to purchase quality feed throughout the cycle. Some farmers, particularly at the micro and subsistence level, are now going back to using inefficient farm-made feeds at most stages of fish production.
VI. Investment (both domestic and FDI) into the sector. New investments are happening while some are being announced. However, it is expected that there will be a lag while the factories are built. This is expected to alter the dynamics in the future.
VII. Limited investment capital for the small-scale producers. This impedes the capacity of the small producers to both improve feed quality and to expand operations, to take advantage of the growing demand for quality price competitive feed which they can competitively meet. This is keeping the dominance of poor quality farm-made feed segment.

VIII. Low levels of knowledge and weak sources of information. This is also one of the factors keeping producers, particularly the smaller feed producers, from upgrading and expanding into new channels.

7.3 Sector Update as at December 2017….New Entrants, Better Competition and Positive Outlook Envisaged

Since the initial field assessment in February 2017, the fish feed sector has witnessed the entrance of new players who are positioning to take advantage of emerging opportunities in the industry. Chief amongst them is Olam Nigeria, a leading agri-business multinational. The company earlier in the year diversified into the livestock feed industry with the introduction of its imported Aqualis brand. The feed compares effectively with other major imported and local brands both in terms of quality and price, and as a result, was received in the market. Recently, they began local production of fish feed and introduced their second brand, Blue Crown, in the market. They plan a 4000mt/ month production and are already at 2,000MT/month. At full capacity, it would mean an additional 48,000Mt/ per year of quality locally branded feed , almost doubling (from 51,000mt to 99,000mt) [18]the current total volume of feed supplied by local large producers in the branded feed channel

Table 14: Prices and Crude Protein Level of Olam Vs Grand Cereals brands

	Olam Feeds (New Entrants)					Grand Cereals Feeds			
	Blue Crown		Aqualis			Vital Regular		Aquaboom	
	Key Distributor (N)	Retail Price (N)	Key Agent	Sub Dealer	Retail Price (N)	Key Distributors (N)	Retail Price (N)	Key Distributor (N)	Retail Price (N)
less than 2mm	N/A	N/A	9,390	10,275	10,500 [19]	N/A	N/A	N/A	N/A
3mm	5,452	5,700	7,085	7,350	7,600	6,260	6,560	5,170	5,470
4mm	5,452	5,700	6,690	7,100	7,400	5,880	6,180	5,170	5,470
6mm	5,167	5,500	6,515	6,845	7,100	5,730	6,030	4,800	5,100
9mm	4,975	5,400	6,215	6,545	6,900	5,530	5, 830	4,695	4,995
Crude Protein	42%		45%			42%		38%	

Olam's entry and competitive strategy were clearly in response to market demands: quality, price competitive feeds. Table 13 shows the prices of the various sizes of both Olam's brands as

[18] This could further increase to 105,000 mt if the additional 6000mt mill being established by Premier Feed (Top feeds) in Calabar is included.

[19] This normally comes in 5kg bag. The price shown is that of 15kg, to ensure a common basis for comparison.

at December 2017 while table 14 compares Aqualis to other major imported brands in the starter/ fingerlings feed category. At 700 per kg and a 45% crude protein, Aqualis is significantly cheaper and of comparative quality with other major brands in the segment. The grow-out and finisher feed of both Aqualis and Blue Crown compete better on price and quality compared to other brands. Blue Crown, with a higher crude protein content (42%) than other locally manufactured brands was specifically introduced to compete with branded local feeds produced by the large feed producers.

Table 15: Prices of Major Imported Fingerlings Stage (1.5mm) Feeds (Per Kg)

Sizes	Brands	Retail price (N)	Crude Protein
1.5mm	Aqualis	700	45%
1.5mm	Coppens	1900	54%[20]
1.5mm	Aller Aqua	1400	56%[21]

To remain in business, some of the existing local large producers have begun introducing new brands to compete with Olam. Grand Cereal recently re-introduced its Aquaboom brand, a lower crude protein variant selling cheaper than Blue Crown. Its introduction was a direct response to Olam's Blue Crown though the later boasts of higher crude protein.

The entry of a major player like Olam in the fish feed sector shows that there is good investor confidence in the sector. This is more so when considered in light of the growing demand for quality, price competitive locally manufactured feed, the strong global outlook for animal feed, [22]and the relatively underdeveloped state of the Nigerian fish feed industry; the outlook surely looks very positive for the sector. The implication is that the sector would likely witness the entrance of more efficient players, competing on both quality and price. This could lead to the exit of inefficient producers. Local producers, as a result, must improve and become more efficient to remain competitive.

[20] https://www.coppens.com/en/feed-programs/industrial/catfish/495340-startpremium4953-54

[21] file:///C:/Users/ADMIN/Downloads/540-African%20catfish-en.pdf

[22] http://olamgroup.com/products-services/food-staples-packaged-foods/grains/animal-feeds-protein/

CHAPTER 8 | OPPORTUNITIES FOR UPGRADE AND VISION FOR GROWTH

The main objective of this analysis is to understand the changing dynamics and structure of the fish feed industry with a view to identifying changes in the demand for feed, and opportunities for strengthening and expanding the efficiency of the value chain in order to make the fish sector more competitive. This will lead to improved performance of actors in the sector and increased availability of quality, price competitive feeds for farmers in the aquaculture industry.

End market Opportunities

Our analysis of the sector has shown that there are opportunities to improve the performance and growth of the fish feed sector. The biggest opportunity is to expand production to meet the unmet demand for quality feed, since a huge part of the market (over 60%) still depends on inefficient, poor quality feed. This would mean replacing the unbranded low quality feeds with local quality production or cheaper imports of quality feeds.

There is also the opportunity to substitute for more imports. This has not been happening as much as it should because the large companies are at 100% capacity utilization, while the emerging regulated small producers are constrained by expansion capital.

The response to both of these is increased investment in production to meet the demand, both by small producers (like Granpa) or large investors (the big four + the new ones Olam, Aller Aqua, etc).

Constraints to Meeting the Opportunities

The analysis identified a number of factors that are constraints to reaching the above opportunities in the value chain. The relationships between the actors within the different channels are critical, including both the vertical linkages (coordination between different functional actors) and the horizontal linkages (relationships between actors within the same function).

These constraints are manifested in the form of poor business management and technical skills, poor access to finance, and poor regulatory environment. For the aquaculture sub-sector to effectively capture the opportunities for growth that lies ahead, these market failures in the fish feed value chain need to be addressed. Our analysis has also shown that the biggest opportunity for growth in the Fish feed value chain lies in the small, medium and large local fish feed production channels.

Vision for Growth

From the analysis and opportunities identified for growing the fish feed sector, the future vision for the value chain would be to facilitate change to a level where:

'Fish farmers have increased access to a growing and competitive supply of high quality feeds that meet NAFDAC standards, leading to increased productivity and competitiveness of fish farmers'

Strategy for Achieving the Vision

Achieving the vision will a four-pronged strategy with following sets of activities and partners as points of leverage:

1. Promote the value proposition for investment in large-scale production. This would entail:
   a. Providing information on the demand and size of the market to stimulate investment in large-scale production. It will require articulating a business case and engage large producers in channel 3 to expand their operations in the sector. This could also be expanded to other major investors looking for viable business opportunities.

   b. Increasing linkages to the outreach agents, like Aquaculture Services Providers (ASPs), which are stimulating demand for high-quality feed

   c. *The Points of leverage to achieve this could be: large feed companies, Investment Promotion Agency, national and regional Chambers of Commerce, e.g. FOSSCCIMA*

2. Support to the growing commercial small producers' channel
   a. On the supply side, upgrade the capacity of small and medium producers to supply quality price competitive feed to the market. This would mean supporting incentivized small producers in the emerging small commercial channel to upgrade so that over time, they can graduate into the branded channel as medium producers. It would require technical and business skills upgrade, linkages to financial institutions to raise expansion capital, certification by NAFDAC, etc.

   b. On the demand side, upgrade the skills of farmers to adopt best feed practices and use of quality feed. This may also include events to improve their awareness of the improved quality of feed produced by regulated small producers, to stimulate demand for feed produced by regulated small producers.

c. *Points of leverage – NAFDAC, ASPs, BMOs*

5. Increase information and awareness on the benefits of using quality feeds to (Large) on farm producers of feed.
    a. Organize awareness campaigns and Information Workshops on the benefits using quality feeds to large on-farm feed producers
    b. It would also require articulating a Cost-Benefit Analysis to support the case for quality commercially available feed.

    c. *Points of leverage CAFAN, Associations (UUFFA), feed companies*

6. Continued data collection and monitoring of changes in the sector to share the information across the segments

    a. *Points of leverage: NBS, Researchers, Universities, NIOMR*

Points of leverage

These are the main economic or institutional actors which can reach large numbers of the target beneficiaries in the aquaculture sector.

a. NAFDAC – They have registered lists of feed millers and statutory obligations to regulate and enforce standards in the feed industry.

b. Fish Farmers Associations. They can serve as a medium to reach farmers, some of whom are on-farm feed producers. An example is CAFAN and UUFFA.

c. ASPs (MASPs) – They help stimulate demand for quality feed and are link between farmers and large feed companies

d. Investment Promotion Agency and Chambers of Commerce – They organize investment forums and have links to high-end investors

e. Large Feed companies – They have interest in the growth of the sector as

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ANNEX – Feed Producers, Distributors and Prices

Names of distributors	% of locally produced feeds sold (2012)	% of imported feeds sold (2012)	% of locally produced feeds sold (2016)	% of imported feeds sold (2016)
Aquapet	0	100	0	100
Darrel farm Int. Limited.	30	**70**	100	**0**
Skypath Int. limited	0	**100**	30	**70**
AEC Agro system limited	40	**60**	75	**25**
Priscy enterprise	0	0	90	10
Magnificent Nig. Ltd	75	25		
Flair's Collection	30	**70**	70	**30**
Opuade & co. Nig. Enterprise	0	**100**	0	**100**
Watertight co.nig ltd	0	0	100	0
Uncle Francis Nig. Ltd.	0	0	85	15
Sec Farms	45	**55**	100	**0**
Funtab	45	**55**	70	**30**
Moore Ventures	100	0	100	0
Cat Fish Expert Global Venture	60	**40**	70	**30**

Distribution PRICES

Comparative Price of Locally produced fish feed from distributors 2012/2016

Types of Feed	2012			2016			
	Average purchase price per 15kg	Average sales price per 15kg/N	Margin	Average purchase price per 15kg	Average Sales price per bag 15kg	Margin	% increase in margin.
Vital Feeds	4000	4200	200	6200	6500	300	
Chi feeds	3500	3800	300	5900	6200	300	
Skretting/Durante	6000	6200	200	9500	10000	500	

	Average margin	233	Average Margin	366	57%

Current purchase and sales price of retailers across various sizes.

Vital Feed

Size(s)	Purchase price (N)/15kg	Sales Price (N)/15kg
2mm	6,450	6,550
3mm	6,450	6,550
4mm	6,150	6,250
6mm	6,050	6,150
9mm	6,050	6,150

Top feeds

Size(s)	Purchase price (N)/15kg	Sales Price (N)/15kg
2mm	6,550	6,650
3mm	6,250	6,350
4mm	6,200	6,300
6mm	5,900	6,000
9mm	5,900	6,000

Skretting

Size(s)	Purchase price/15kg	Sales Price/15kg
2mm	10,300	10,500
3mm	9,800	10,000
4mm	7,300	7,500
6mm	7,300	7,500
8mm	7,300	7,500

Dickem Aquatech

Size(s)	Purchase price/15kg	Sales Price/15kg
2mm	5,400	5600
3mm	5,400	5600
4mm	5,400	5600
6mm	5,400	5600
9mm	5,400	5600

Imported feeds

Feeds/Sizes	Purchase price (N)	Sales Price (N)
Aqualis (2mm)-5kg	10,300	10,500
Coppens (2mm)-5kg	9,800	10,000
Prime (2mm & 3mm)-5kg	7,300	7,500
Skretting (2mm & 3mm)-15kg	7,300	7,500
Aller Aqua (2mm)	8,500	8,900
Aller Aqua (4.5mm)	7,900	8,100
Aller Aqua (6mm)	7,800	8,000
Aller Aqua (8mm)	7,500	7,700

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