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"The Market for Catfish and other Aquaculture products in Nigeria"

USAID Nigeria Maximizing Agricultural Revenue and Key Enterprises in Targeted Sites (MARKETS)

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The Market for Catfish and other Aquaculture products in Nigeria

prepared for

USAID MARKETS

by

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Abbreviations

CAGR	Calculated Average Growth Rate
FAO	Food & Agriculture Organization of the UN
SS-SE	South-South and South East Region
M & N	Middle & Northern Belts
SW	South West Regions
PH	Post Harvest
Mt	Metric ton

Introduction

The aim of the MARKETS Aquaculture Market study is to conduct a feasibility analysis focused on assessing existing and future markets for table-ready fish (including tilapia) and to identify appropriate supply/distribution chains and appropriate technologies for the handling and marketing of live, dead and processed fish.

Key tasks are to:

- Establish the size, scale and market trends of the import fish market and, in particular, to identify the competitive edge that Nigerian fish currently has or could have in the future, against imported products.
- Identify trends, changes and developments within the domestic marketing of fish and make recommendations as to how Nigerian farm raised fish can best penetrate this market.
- Consider the entire fish value chain as well as market segmentation in order to identify target markets and provide possible parameters for pricing in an expanding market.
- As far as possible, discern the Nigerian consumers' requirements and demands with respect to fish and fish products to best identify the potential market position for freshwater fish in Nigeria.
- Attempt to quantify the volumes of fish marketed in Nigeria and the relative size of different market segments, e.g. imported, frozen, fresh sea-water, fresh fresh-water, processed, live fish, direct to consumer sale, traditional restaurant sale (bukas), emerging sophisticated retail outlets, retail chains, etc.
- Draft recommendations for improved market chains for the various product types (live fish, dead fish, fish filet, smoked fish), including recommendations for meeting quality assurance standards, market planning and promotional considerations.
- List equipment and training required to improve the marketing and distribution and value addition of aquaculture products.

The project began with an initial one week desk study in Abuja to investigate the secondary literature and prepare the survey methodology and questionnaires. After discussions and testing, an inception report was prepared, discussed and agreed to by the MARKETS team on February 23rd 2006. From this, a field work schedule, set targets, interview strategy and draft outline of the report was prepared.

Mr. Dixie (international marketing consultant) and Mrs. Susana Ohen (local marketing consultant) then embarked on a 2 ½ week market research tour, which chiefly involved interviewing consumers, traders, retailers, restaurant owners, fast food outlets and fish farmers. In total over 100 interviews were conducted.

Table 1 Interviewees by Region

Region	Consumers	Restaurants	Traders/Retailers	Farmers	Totals
N-M	3	2	25	5	35
SW	3	6	15	8	32
SS-SE	7	6	18	6	37
Totals	13	14	58	19	**104**

Interviews were conducted in Abuja, Kaduna, Kano, Jos, Ibadan, Lagos, Onitsha, Abia, Port Harcourt and Delta. The data collection took place between February

and April 2006 and involved participatory, qualitative and quantitative techniques. Participatory Rural Appraisal (PRA) and Rapid Market Appraisal (RMA) techniques were employed. On May 2nd at the University of Ibadan, Mrs. Ohen and Mr. Dixie presented their findings to an audience some 45 members of the aquaculture sector.

The following report is structured to provide an overview of the fresh fish market in Nigeria as of 2005, and the value therein of catfish (specifically farmed catfish). A detailed discussion section provides an analysis of the 100+ market research interviews covered. Finally the report distills these findings for three target products: fresh catfish, smoked catfish and tilapia before presenting some options for interventions.

Acknowledgements

The authors of this work would like to sincerely thank all the fish farmers, traders and fast food outlets for their patience and willingness to participate in this study. This study would not have been possible without their contribution.

The contributions made by USAID–MARKETS staff are gratefully acknowledged. Particular thanks are due to Ms. Rabi Musa, Ms. Roseline Afolabi and Mr. Nonso Nzewi for their invaluable work as translators in the field. We would like also to specially thank Jim Miller for providing us with useful and necessary contacts for this study.

Last but not least, we are grateful to Winrock International for providing funds for this study. We believe the findings of the study will greatly enhance the implementation of the MARKETS vision particularly in promoting the development of the aquaculture sector in Nigeria.

Executive Summary

Farmed catfish currently accounts for approximately 25% of the 110,000 metric tons of catfish consumed annually in Nigeria, with approximately a 50:50 split between smoked and fresh catfish. Of the fresh fish consumed, farmed catfish amounts to approximately 50%. The most important outlets for fresh fish are the traditional restaurants where catfish is the key ingredient in the widely consumed pepper soup.

In total, the farmed catfish sector in Nigeria is worth approximately $75 million at the farm gate, which translates to consumer spending at end-markets of nearly $180 million. The sector employs about 25,000 people of which nearly 66% are in the catering/restaurant sector. Farm prices are approximately N100/Kg lower in the principal catfish farming areas of the South West (i.e. N 325/Kg) as compared to N430/Kg in the Middle Belt and in the South-South/South East regions.

Demand currently exceeds supply, particularly in the SS-SE region and the Middle belt. Consumers, retailers, traders and restaurant owners all reported the trend of increased sales of fresh catfish and expected that trend to continue in the future. Catfish farmers acknowledged that the enterprise is profitable and are striving to continue increased production (which is increasing at an average rate of 25–33% per year).

The undersupply of farmed catfish may amount 5,000 Mt/year. This deficit will likely be filled by the expanding production within the next 1-2 years. Urban markets (where farmed fish is primarily sold) are expected to grow by +3% annually due to population growth. Once these two demands have been satisfied, additional supply will have to be absorbed by stimulating sales through lower retail prices. Fortunately, catfish being a semi-luxury product, will have high price elasticity (we have an estimated a figure of +3.5%). Thus a 12.5% fall in average retail price (from N575/Kg to 500/Kg) could easily lift sales by 50%. Our projections suggest that with such a fall in prices the additional output of the fish farming sector can be absorbed over the next 2–3 years. With assistance, this can probably be achieved by eliminating unnecessary costs in the market chain. Thereafter, unless consumption can be further stimulated, any continued fall in prices will begin to seriously impact producers' profit margins.

The twin strategies of a pro-market farmed catfish program will be:

- **Eliminate unnecessary costs in the market chain** so that producer margins can be maintained (as far as possible), and consumer prices will fall, stimulating higher purchasing levels.

- **Actively encouraging increased usage** through product promotion, market linkages, and the development of new business linkages.

Intraregional transportation amounts to 5% of total retail costs. Effective promotion of local fish farms could likely reduce this cost by approximately 66%. However, as some fish will by necessity continue to be transported long distances, there is an opportunity to lower transport costs through consolidation into larger loads. Reduced transportation costs and lower post harvest losses are likely to be achieved through improved post harvest techniques i.e. larger water tanks. Correct tank design (insulation, light exclusion, lower fish densities), coupled with improved post harvest handling (more frequent water changes, insulated & shaded basins to hold fish at retail & restaurant level) will lower the levels of weight loss among fish and reduce skin damage and fish deaths. We estimate that post harvest weight loss add about 14% to retail prices for fish

transported long distances, with fish deaths and skin damage adding an additional 1.3%. Much of the post harvest weight loss is inevitable, but a target for loss reduction could be 1/3 of the 15% of added retail cost. Post harvest losses are noticeably lower for locally produced fish (amounting to about 9% of the retail price), but a target here could be a 1/5 reduction in this figure. There is an obvious need to develop practical and appropriate post harvest methods suited to Nigerian conditions, and disseminate best practices to the production, retail, trading and restaurant sectors.

Trader and retailer margins typically amount to about 15% of the retail price for catfish moved long distances. The margin for locally produced and harvested fish is much the same, partly because the retailer takes on more of the transport and trade financing roles. In long distance marketing channels, options certainly exist for direct buying via secondary wholesalers. Indeed, this is already happening. Selling prices to retailers can almost certainly be kept more honest if retailers had better insights into current costs and pricing data. At the moment there is a lack of transparency in the market chain. All traders and most retailers rely on cell phones. More direct selling, better market intelligence, more transparent pricing and lower costs could be achieved by developing databases of contacts, farmers, traders and retailers and disseminating this information so that the players can contact and trade with one another. Effective local marketing is currently compromised because the timing of 'on farm' fish sales often conflict. There is room for fish farmers to work together so that the timing of sales is more evenly distributed. There may also be an opportunity for farmers to operate auction style markets, either on their farms or collectively in the markets.

This report will argue that currently the domestic demand for catfish is under supplied. This is most evident in the SS-SE and in the Middle belt. Our best guess is that this amounts to 10-20% of the current market. These locations are where production can be most safely promoted. The benefits in terms of lower costs and reduced post harvest losses have been presented earlier.

It is expected that as outputs increase to the point where supply starts to test levels of demand, fish farmers will need to take a much more proactive approach to sales and marketing. This is likely to involve conducting their own market research, establishing closer contact with retailers, traders, restaurants and possibly fish smokers, producing products per market demands (particular sizes and quality) and perhaps taking the product further down the market chain. These will constitute new activities for producers. Experience elsewhere has shown that producers benefit from training and support in starting this process and developing these skills. Marketing extension could be a valuable intervention in this area.

The majority of catfish are consumed in pepper soups, which is a very narrow product base. Consumers have indicated that they would welcome new recipes and ways to cooking catfish (this point is also true for tilapia). The MARKETS team observed that catering outlets in particular are developing new ways of cooking catfish. Creative thinking is required about how this new recipes can be effectively disseminated to all levels of consumers. Pepper soup consumption is closely associated with beer drinking. It could be to the mutual benefit of both industries if breweries were persuaded to make reference to catfish pepper soup and beer in their advertising campaigns.

Experience from Abuja has shown the importance of the local buka as an sales outlet. Forcing out small roadside bukas has a larger negative economic impact. There are probably useful functions for catfish associations in acting as advocates to protect the buka sector.

Our analysis and field observation led us to believe that the smoking of farmed catfish presents a new profitable activity for women's micro-enterprises, initially in the SW. The economics of catfish smoking needs to better understood, so profitability can be verified and lessons learned about how the enterprise can be improved. For example, the 'Chokor' smoking system is widely used in other parts of West Africa, has lower fuel requirements and might be more profitable than the system used locally. Smoking is a way that less desirable/marketable product (small sized catfish, out grades and dead fish) can be utilized. Smoking could be an additional activity for fish farmers, or alternatively it may make more sense to promote business linkages between fish farmers and local smokers. We believe smoking could absorb 5,000 Mt/yr. of farmed catfish in Southern Nigeria.

Farmed tilapia presents a longer term opportunity for Nigerian aquaculture, with grilled tilapia increasingly becoming a feature of the diet. Fast food chains are keen to develop tilapia based dishes. This would both create demand and promote the product. To do so, they would need assured reliable supplies from fish farms. Also required would be the development of appropriate post harvest techniques for tilapia (probably involving crushed ice and insulated boxes) and embed this into the commercial supply chain.

This report includes likely farm prices for tilapia of different sizes e.g. N245 – 275/Kg for 700g fish. These are the most important basic numbers with which to carry out a feasibility study of the potential profitability of farming tilapia in Nigeria. Verifying that tilapia farming could be profitable is an important 'next step'. Currently there is some small scale pilot production of tilapia underway in Nigeria. The important question is how this production can be most effectively used to build the foundation of a new Nigerian aquaculture sector.

This existing supply of tilapia fish could be used to develop appropriate post harvest handling systems and disseminate those techniques among the fish trading sector. We believe this could be achieved by results orientated contract research, whereby research institutions are challenged to work with the private sector to develop a cost effective system of transporting tilapia. Developing an effective post harvest system among a few influential traders is perhaps the most rapid way of disseminating results and promoting the new technology.

Fast food companies have also expressed a keen interest in developing a number of dishes based on tilapia. To do so the product must be competitive with croaker in term of price and reliable supply. The advantages of working with the major fast food chains is that they will create widespread interest and awareness for tilapia and develop ways of preparation well suited to Nigerians. In short, the fast food chains can become 'product champions' whose will stimulate other outlets to experiment with the product, which in turn will create demand stimulating the emergence of a large scale tilapia sector. However, they will do this only if they are guaranteed a secure and reliable supply (e.g. quantity, quality, size, time of delivery/collection etc). There exists great potential here to create linkages between tilapia producers with the requisite levels of organization to deliver sufficient quality and volume, and fast food chains committed to the product. The post harvest system development described earlier would form part of this process.

Grahame Dixie & Susan Ohen
Abuja
May 1st 2006

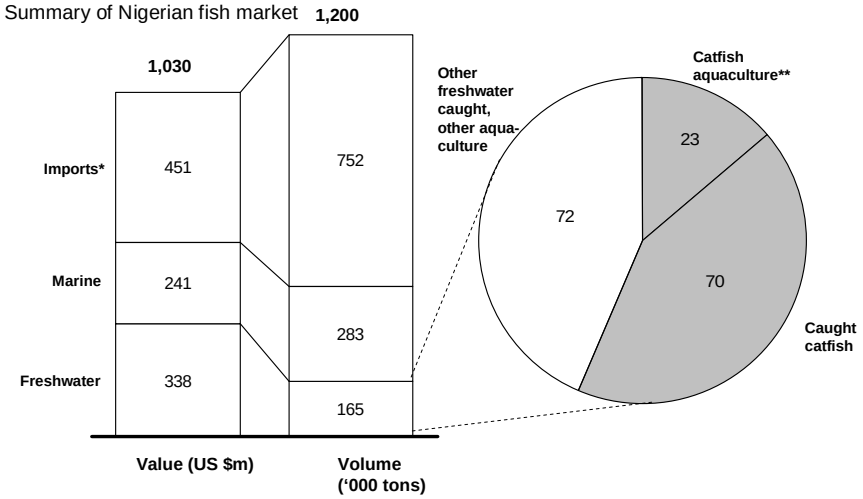
1. Overview of the fish sector

1.1 Overall size of the fish market

Earlier this decade the overall size of the market for fish in Nigeria was estimated at 1.2 million tons, which is equivalent to a wholesale value of over $1 billion. The bulk of the market is for frozen imports, a low priced product retailing in the range of $1/kg (i.e. N150) to $1.50/kg (N220). Frozen fish common in the Nigeria marketplace include Mackerel, Croaker, Sardines and Herrings. Widely consumed among all social classes, fish is especially appreciated as a cheap source of protein.

Figure 1

Freshwater fish accounts for about 33% the value and 14% of the volume of fish consumed in Nigeria



* Frozen fish, largely imported from Iceland

** Catfish accounts for an estimated 90% of total aquaculture in Nigeria

Source: FAO, team analysis

The Nigerian marine sector has been in decline for a number of years, most markedly within the industrial shipping sector, where the number of active fishing fleets has fallen.

Artisanal fishing makes up about 85–90% of the domestically wild caught fish. Fresh water catches amount to 180,000-200,000 tons/yr, of which catfish types are the single most important category, likely comprising 40-50% of the catch. Supplies from this sector are currently in decline.

The most rapidly expanding sector of the fishing industry has been in the supply of farmed fish, most notably catfish. Marketed live, these products retail at prices in the range of N500–600/kg (i.e. $3.50 to $4.30/kg)

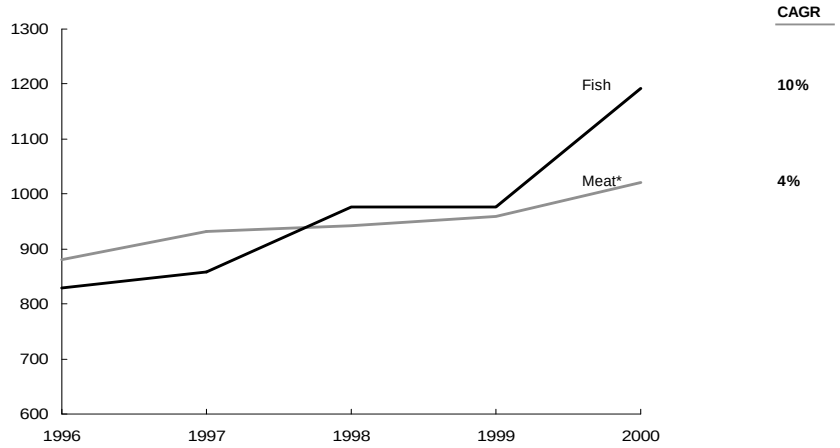
1.2 Role of fish in a diet

In 2001, the fisheries sector contributed between 1.11 to 2.4 % to the GDP i.e. between 3.0 and 6.0 percent of the total Agricultural GDP. Fish is a major source of animal protein in Nigeria and has continued to grow in importance over the years, particularly as a substitute to higher priced beef. Studies confirm the increasing shift from meat to fish consumption among households in Nigeria (CBN/NISER 1992).

Figure 2

FISH CONSUMPTION IS GROWING & EXCEEDS MEAT CONSUMPTION IN NIGERIA

Consumption in Nigeria, '000 tons



* Bovine meat, pig meat, mutton and goat meat, poultry
Source: FAO, Team analysis

Fish is so important that a pot of soup without it is considered incomplete, even when there are other varieties of meat available. A wide variety of fish are used for different meals preparations in the various parts of Nigeria. The most commonly used varieties include catfish, tilapia, bonga, croaker and various kinds of imported smoked fish (stock fish). Frozen fish are also widely used.

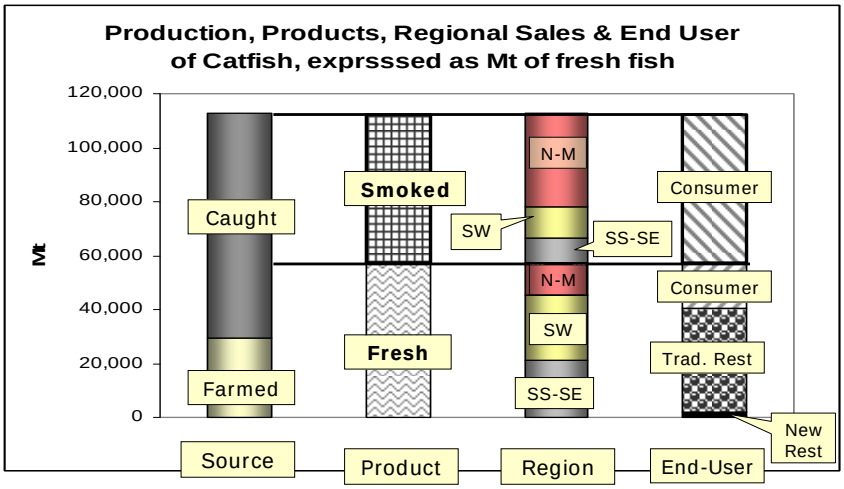
Fresh or smoked fish is most often used, depending on the occasion or dish. It is common to find fresh fish pepper soup as a major menu feature in most Nigerian restaurants and bukas. Pepper soup commonly uses catfish and tilapia as primary ingredients. Smoked fish is also an important ingredient in other soups, and is often eaten with garri, amala, semovita or foofoo. A common delicacy in South South Nigeria is coconut rice, garnished with smoked tilapia. In addition, the roasting (grilling) of tilapia is becoming more common along the streets of major Nigerian towns.

1.3. The Market for Catfish

The graph below represents our best estimate of the total annual supply of catfish (110,000 Mt) of which about 75% is wild caught. Approximately half the annual supply is smoked, mainly in NE Nigeria. Smoked catfish sales are strongest in the Northern part of the country, and sold to households principally for use in soups. Fresh catfish sales are mainly made in the South, with about 70% being sold to traditional restaurants for pepper soup. A new market is developing to supply modern style restaurants who are using catfish in nontraditional recipes e.g. as a fast food, or steamed/baked in foil.

Figure 3.[1]

Around 75% of catfish supply is caught fish, the bulk of which is smoked with strongest sales in the Northern half of Nigeria. Fresh catfish sales are stronger in the Southern half of the country. The major market is the traditional restaurants (e.g. Bukas)



The supply and market for talapia is significantly smaller than that of catfish. Growth for this market segment is linked to restaurants and street vendors grilling the fish. A small amount of tilapia is sold as a smoked product.

The graph below illustrates the value chain for catfish. The major production cost is feed which amounts to about $39 million annually, of which over half will be the cost of imported ingredients (fish meal, concentrates, vitamin, fish oil & young fish feed etc). The annual farm gate value is about $75 million – assuming production of about 30,000 tons[2] of catfish per year. Value rises to about $120 million at the retail level. It is estimated that about 70% of fresh fish is currently being sold in restaurants, especially in bukas. This point in the market chain is where the great majority of jobs are created. At about 0.8 job/Mt[3] per year this might be expected to generate about 15,000 to 18,000 jobs within the sector.

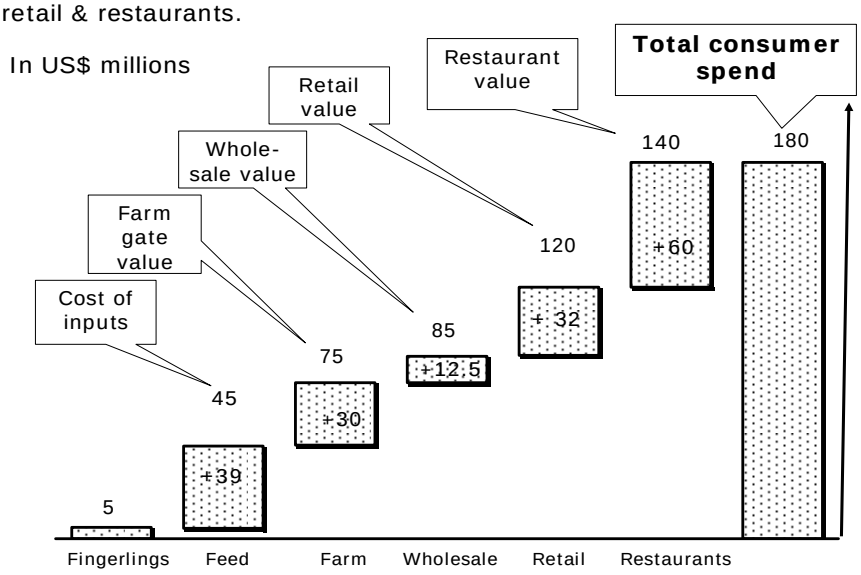
[1] For more detailed figures see table 2 in section 6.2.

[2] Official statistics have indicated a static output at 30,000 tons for a number of years. FAO initially estimated 50,000 tons annually, our own estimates are lower at around 30,000 tons, based on an annual fingerling supply of around 40 million and imports of feed required to grow catfish too a marketable size of 300 g. The output is rapidly expanding, almost certainly at over 25%/yr.

[3] See Figure 20, section 4.1.2, later in this report.

Figure 4

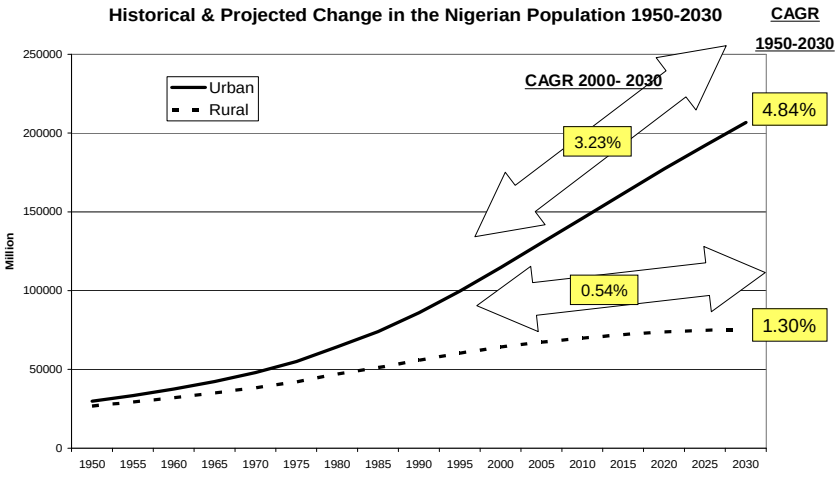
The catfish sector currently attracts over $ 180 mn of consumer spending. Over ½ the Value Added occurs after production, and especially in shops retail & restaurants.



The major commercial market for catfish is in Nigeria's metropolitan centers and smaller towns. The graph demonstrates how the urban population has been rapidly expanding, and is projected to grow over the next 25 years at a rate 6 times faster than the rural population. The continuing growth in the urban centers will fuel a growing demand for fish products and will have a significant impact on the market.

Figure 5

The Nigerian urban population is growing fast (+ 3% p.a.). Currently about 48% of the 130 mn population live in towns, by 2030 the urban population will reach nearly 2/3 and amount to over 130 mn



Source: FAO

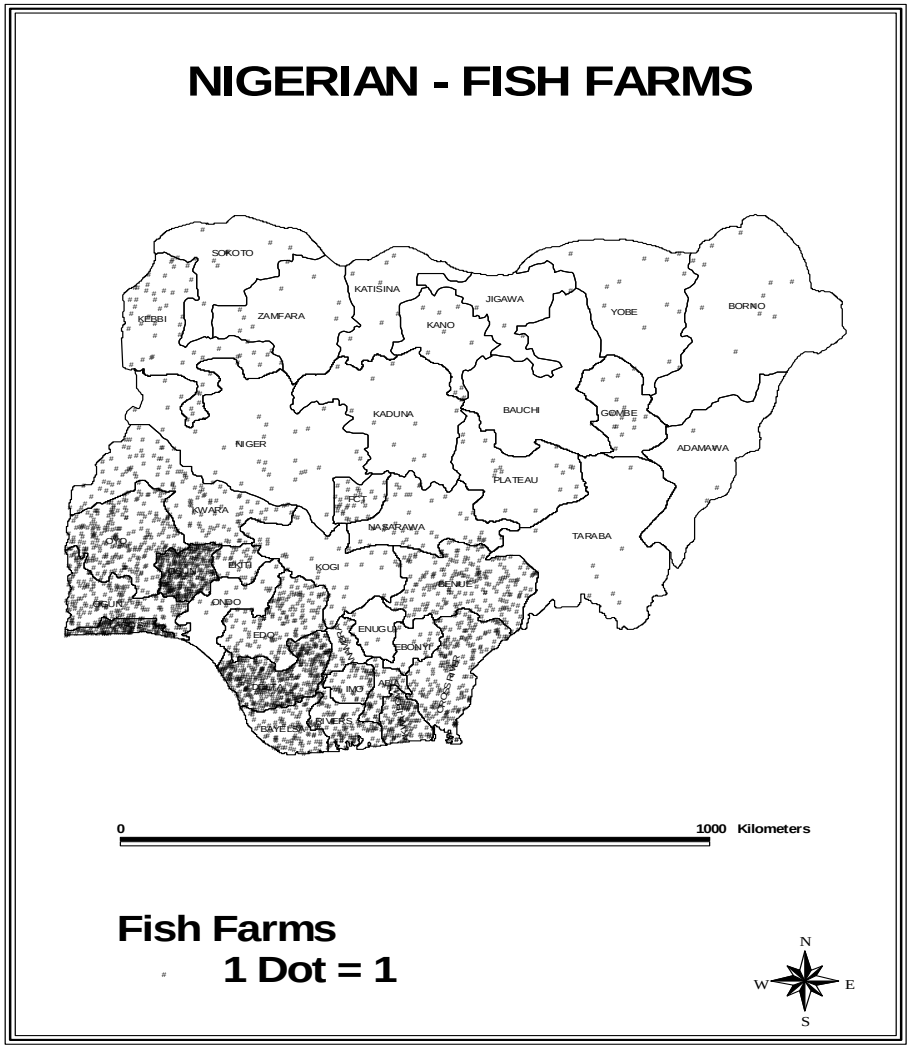
Typically urban consumer are better off economically, eat higher proportions of animal protein, and being relatively 'cash rich, time poor' are much more likely to purchase from restaurants, use fast food outlets and purchase prepared and semi prepared food products.

2. Overview of the aquaculture sector in Nigeria

2.1 Location of Fish Farms

The map below (based on data gathered by the FAO/National Special Program for Food Security) gives an indication of the location of some 2,600 fish farms in Nigeria. Although the survey has been shown to have weaknesses (e.g. some major farms have been omitted, while including others known to be inoperative) the figures do provide a general indication of scale and geographic distribution. Clearly there are a large number of fish farms in Nigeria, probably closer to 3,000, many of which are operating well below their potential. The highest densities of fish farms are in and around Ibadan, Lagos and its environs.

Figure 6



Source: FAO/ NSPFS

2.2. Type of Farming Systems

In broad terms there are three types of fish farming systems used in Nigeria. The most common and the one responsible for the greatest level of output are simple earthen ponds. The requirements for this type of system are clay soils and an abundant supply of clean water. Flow-through systems represent an advancement in terms of technology and associated set up costs, and also requires a plentiful supply of clean water. The most technically advanced and capital intensive systems are the recycling systems. These systems typically cost approximately $150,000 per 100 tons/yr. produced. The table below summarizes the main advantages and disadvantages of each system.

Earthen Ponds	
Advantages	Disadvantages
Low capital costs Lowest potential unit cost of production Simplest system to manage Believed to produce a more robust fish with longer life out of the pond	Needs specific conditions (clay soil plus plentiful water) Larceny is difficult to control Subject to bird predation Limited control over sizes Once pond drained committed to sale Often seasonal production (i.e. low during the rains & highest in October-November) coinciding with the weakest periods of demand / highest periods of supply Prone to flooding Larger land area required
Flow Through System	
Advantages	Disadvantages
Relatively simple to manage Comparatively low cost production system Intensive land use Production system offers greater control over sizes, quality and harvest date	Needs access to plentiful supplies of clean water Capital investment costs
Recycling Systems	
Advantages	Disadvantages
Greatest management control in production Strict control over robbery possible Far improved methods of monitoring production & performance Production system offers greater control over sizes, quality and harvest date	Highest Capital costs More critical management requirements Highest unit costs of production Fish believed to be least robust

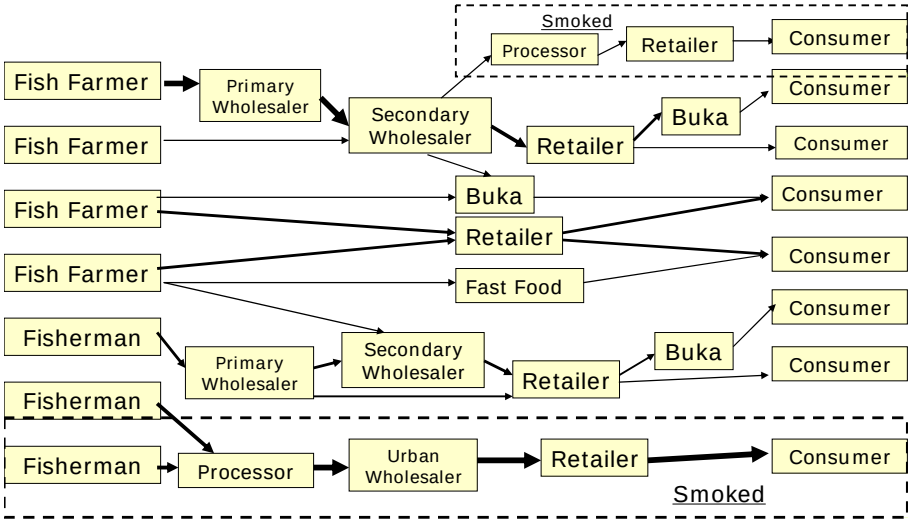
3. Catfish marketing channels

3.1. Characteristics of the Nigerian Market

An overview of the Catfish Marketing Chain is presented below. The width of the lines serves to indicate the relative importance of the individual links. Farmed catfish are almost universally sold at the farm site. Primary wholesalers have been responsible for developing the trade from the major fish farms in the SW region. Traditionally, primary wholesalers transport live catfish to secondary wholesalers, however recently secondary wholesalers are visiting the production zone where the primary wholesaler often purchases on their behalf. Secondary wholesalers will then sell to other retailers, while sometimes functioning as retailers themselves. Retailers then sell to restaurants and to home consumers. Particularly in the major production areas retailers and restaurants are cutting out the middlemen and increasingly buying directly from the farm. The majority of fresh catfish, especially the larger sizes, is ultimately sold to bukas, restaurants and hotels.

Figure 7

Catfish Marketing Chain



Wild caught catfish is typically marketed through primary wholesalers who transport the product to the urban markets, where sales are made to secondary wholesalers and retailers. The bulk of drying and smoking is carried out in the extreme NE of Nigeria (where demand is highest), although some farmed catfish is being smoked in Southern Nigeria. Urban based wholesalers typically buy from the production zone, store their stock in town and sell directly to retailers on demand.

4. Market Results

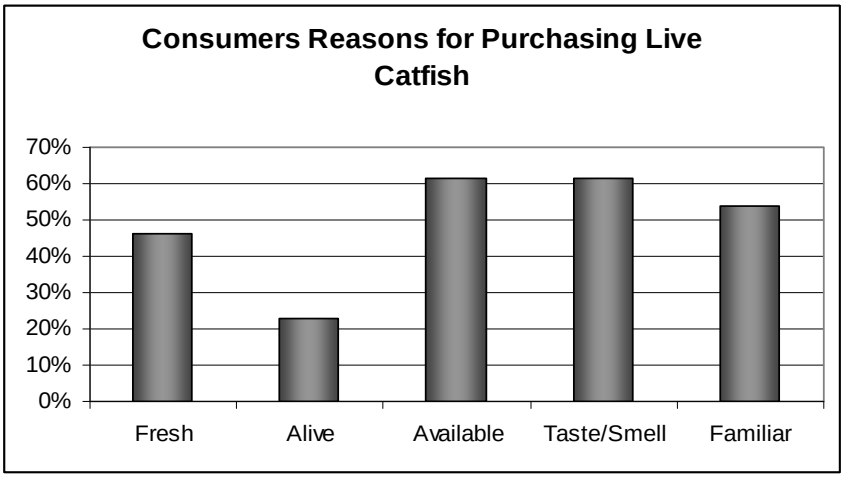
4.1 Fresh Catfish

4.1.1. Fresh Catfish Consumers

75% of consumer interviews were held in the marketplace after having purchased live catfish from a retailer. The remaining 25% were discussions held with customers in restaurants/bukas.

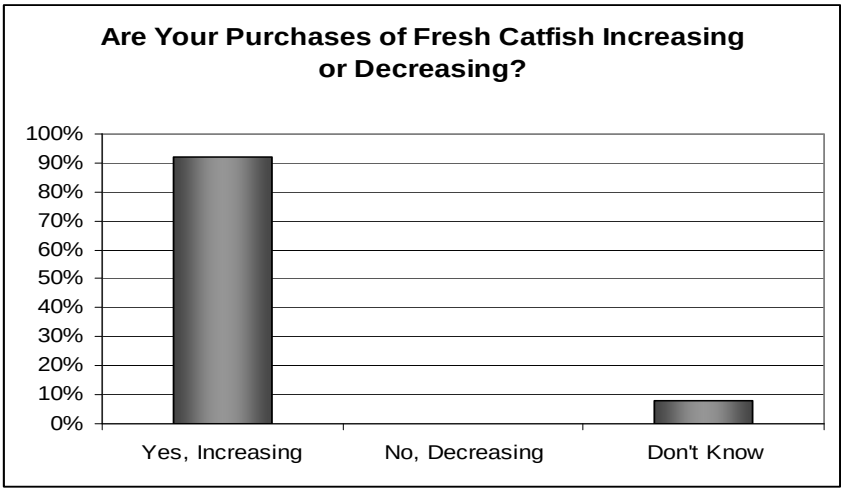
Consumers had a number of reasons why they preferred to purchase fresh catfish. Key reasons cited were ready availability (reference will be made later to the issues around availability and the potential for increased sales), familiarity with the product and preparation methods, the preference for a fresh product as well as its taste and smell.

Figure 8



Other comments included that pepper soup (with beer) was a popular way to relax at the end of the day. One customer said he would prefer to purchase fresh scaly fish, but that none was available, so he bought catfish. Other comments included that the fish was 'fleshy and easy to cook'. Over 90% of consumers said that they were increasing their purchases of catfish, with 15% identifying concerns over bird flu as a reason for their increase in fish consumption.

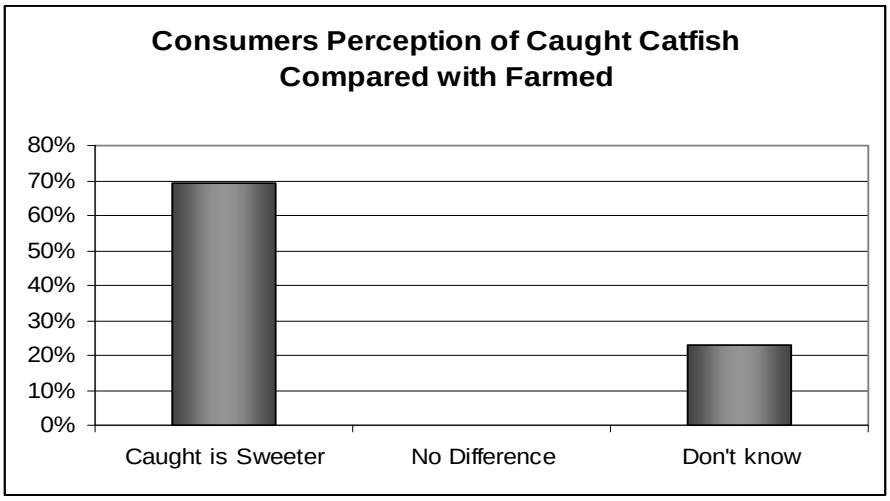
Figure 9



70% of catfish purchasers also bought beef, 45% bought chicken as well as some snail and oxtail. Comments were made about the health benefits of white meat, and a significant number of customers made reference to a perception that after a certain age (normally about 35) red meat should be given up entirely. Nearly 80% said that their catfish purchase was going to be used in pepper soup and about 40% would use the catfish for other soups or stews (often the head is used in pepper soup and some of the remains in other preparations). However pepper soup was easily the most popular use of the fresh catfish purchased.

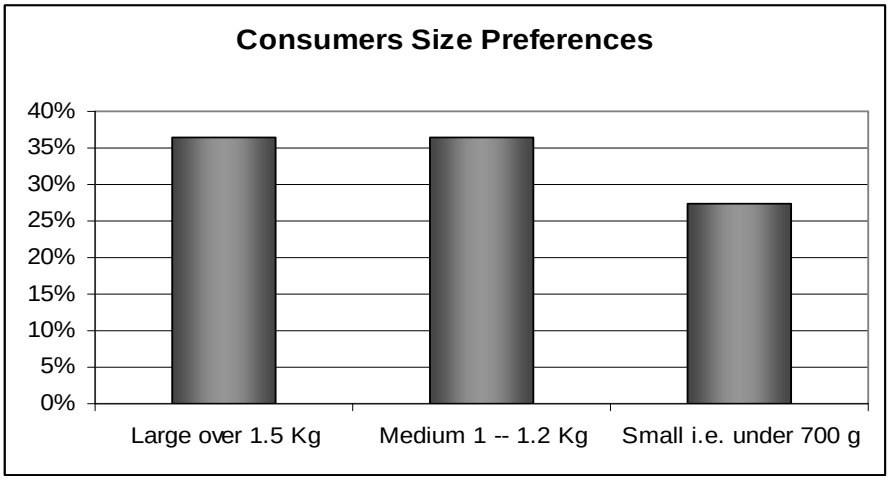
Worth noting is a perception amongst consumers that farmed catfish is an inferior tasting product to wild caught – in much the same way that country raised chicken are often preferred to mass produced broilers.

Figure 10



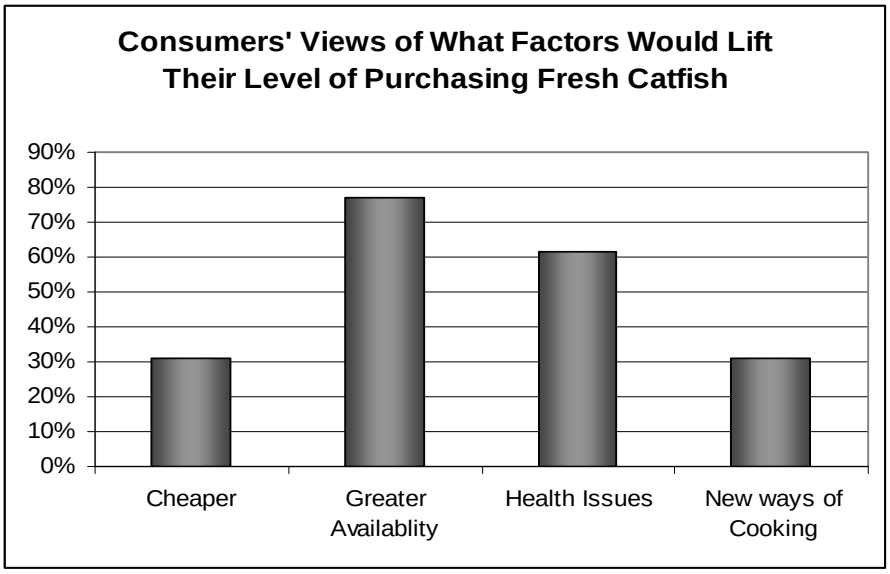
Consumers displayed little overall size preference. One consumer stated a clear preference for large sizes but admitted that he probably could not afford a large catfish and would actually buy a medium or small sized fish.

Figure 11



According to our consumer panel, the most important factor that would increase catfish sales would be increased availability followed by promotion of its health benefits. Surprisingly, cheaper prices and new recipes were considered less important.

Figure 12



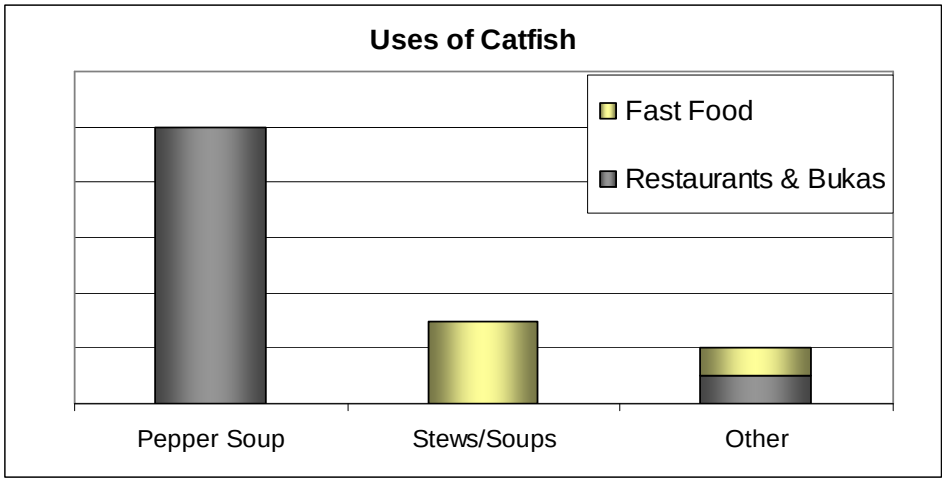
However, all the consumers interviewed independently stated that there was not enough fresh catfish currently available on the market. Partly this confirms their opinion that if the product was more available their level of purchase would increase. However, in the view of the interviewers, consumers are aware of the laws of supply and demand, and that in the current situation where demand exceeds supply, prices are inevitably high. Additional supplies would not only overcome availability problems, but would also be expected to lead to a significant fall in retail and restaurant prices.

4.1.2. Restaurants, Bukas and Fast Food Outlets

Elsewhere in this report it is estimated that around 75% of all fresh catfish is ultimately consumed in restaurants and bukas[4] where the primary use is in pepper soups. Interestingly, none of the newer fast food chains are attempting to compete against these traditional catering outlets by producing pepper soup. Instead they are mainly using catfish in catfish stews and soups. In Abuja, the survey detected the emergence of a new recipe for cooking catfish, involving the wrapping of the fish with spices in a foil and cooking over the grill. Currently this method is being used to cook whole fish. This recipe could be adapted as a fast food product using individual 300–350 g portions.

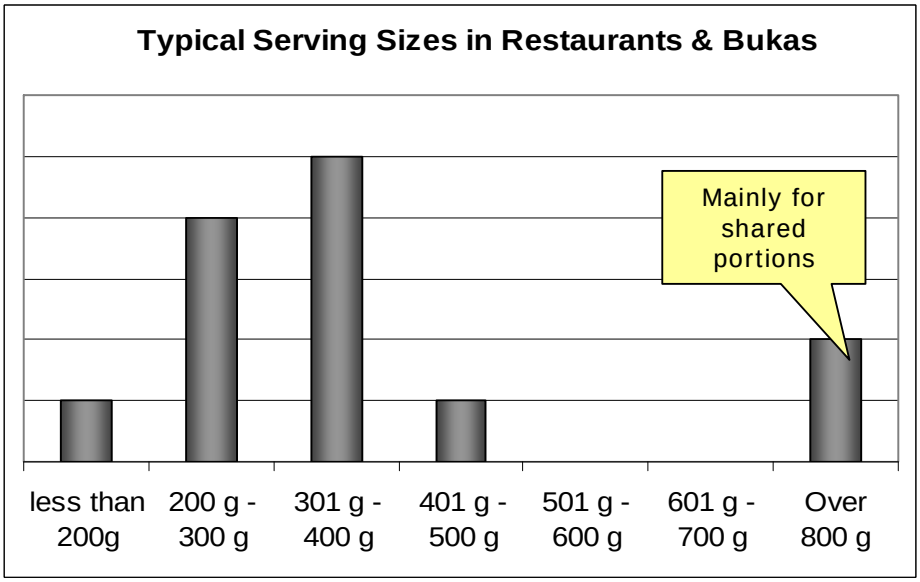
[4] The impression gained in the field interview program was that a higher proportion of fresh fish is eaten at home in the South-South and South East.

Figure 13



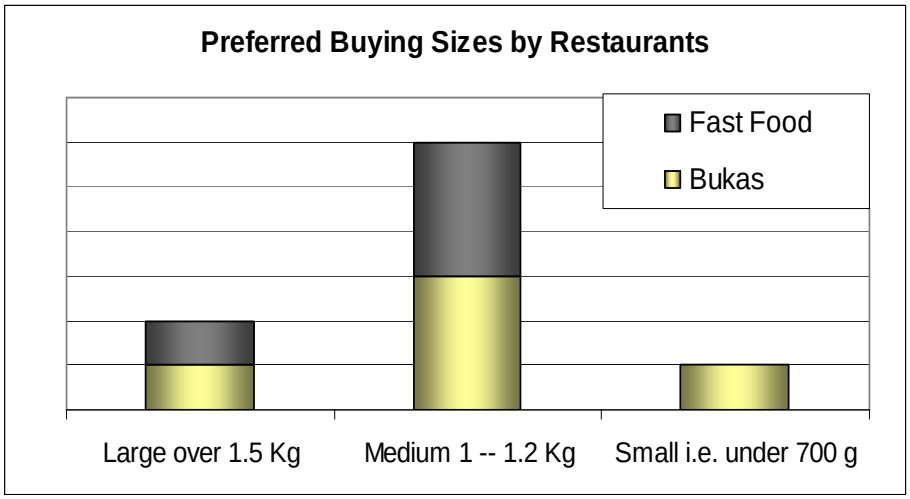
The graph below illustrates the typical amounts of fish used in each portion (typically ranging from 250 to 350g). It is important to note that the catfish head is an important, and often more expensive ingredient, of pepper soup. In the fast food chains the head is not always used in the soups/stews (instead it is used for staff food). Some bukas offered a 'point and kill' service whereby the customer could choose a live catfish for preparation, often for sharing between a group of friends or amongst a family.

Figure 14



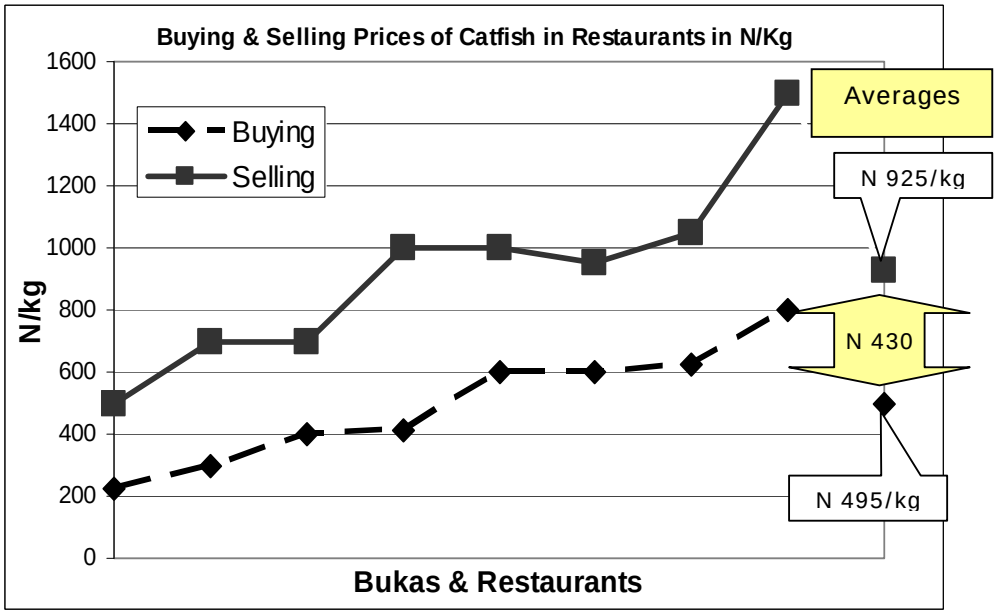
The graph below demonstrates that the bulk of fast food chains are looking for consistent sized fish, typically in the range 1 to 1.2 kg. Interestingly, the more traditional restaurants and bukas will accept a full range of sizes, although each individual establishment will have their own buying preferences. Some would buy smaller fish (cheaper per kg) and focus on the lower end of the market.

Figure 15



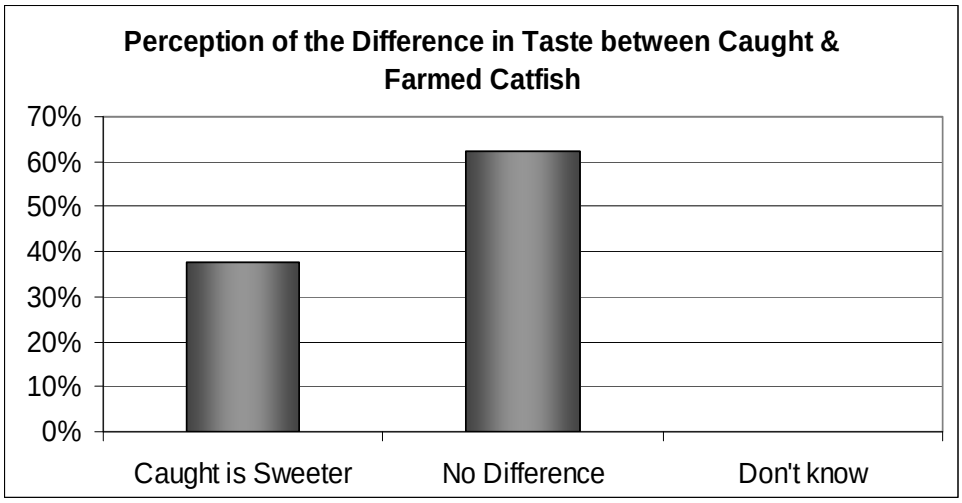
The graph below sets out the price per kg for buying and selling fresh catfish. Typically, purchase prices average N500/kg and selling prices N925/kg - an increase of about N430/kg. (N.B. this should not be confused with profit, this margin will have to cover ingredients, energy, rent, labor, equipment). The important question is whether a reduction in the retail price of catfish would be reflected in a lower menu price. The evidence here is that in general (i.e. in 3 cases out of 4) lower buying prices would result in lower prices for catfish dishes. In one instance, a cheaper purchase price was used by the restaurant to increase its margin. When this issues was debated amongst the interviewees and interviewers it was felt that if catfish prices declined, restaurant owners would try and hold prices steady and take a larger margin. Over time competition between restaurants would be expected to lead to menu prices falling, and ultimately an increase in sales.

Figure 16



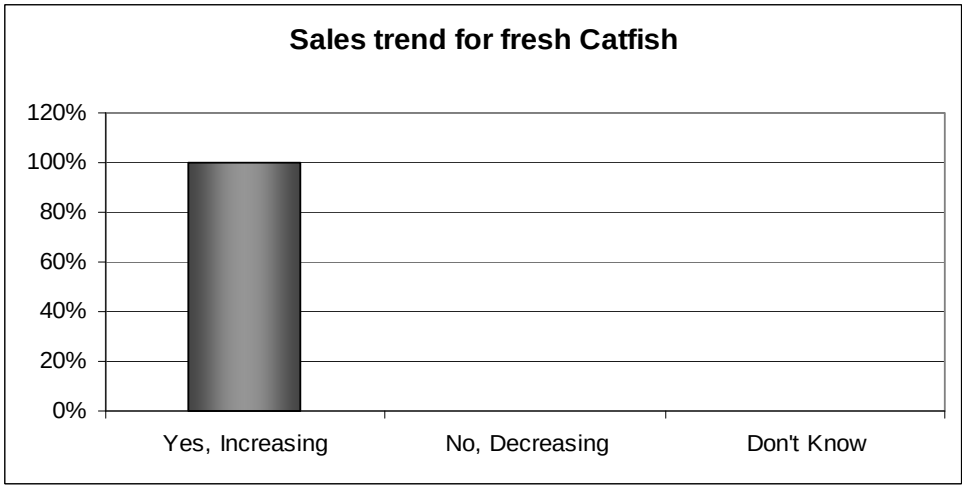
The graph below demonstrates that amongst restaurant owners, there was far less prejudice against farmed catfish in term of flavour. This probably indicates that the claimed difference in taste is largely imaginary as restaurant users are probably the most experienced users of the product.

Figure 17



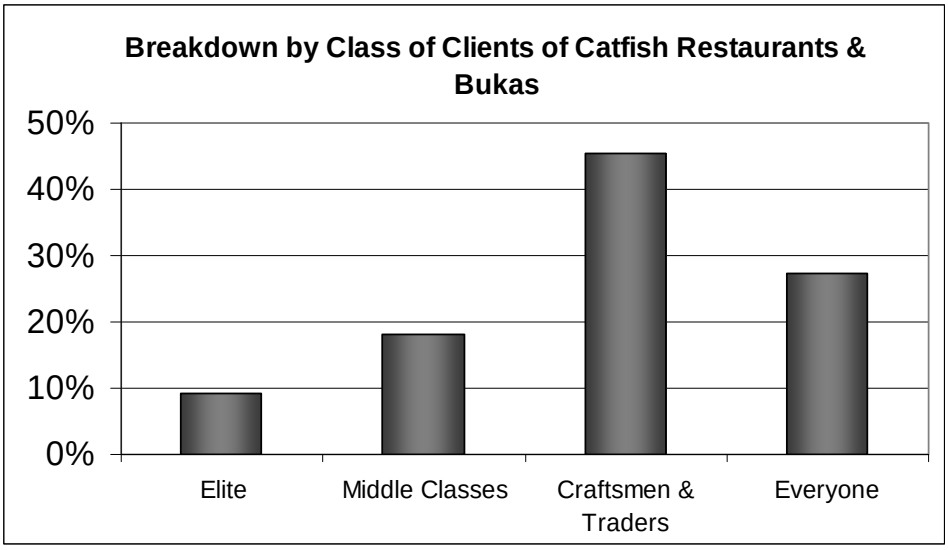
All the restaurants and bukas interviewed said that their sales of catfish were increasing.

Figure 18



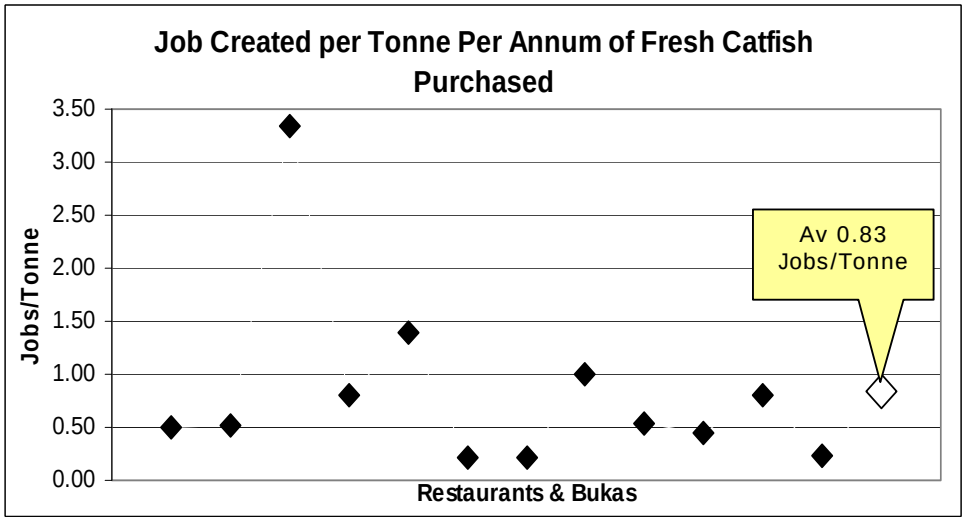
The figure below graphically demonstrates that catfish is not a product of the wealthy and the elite. In practice, the product is popular across all classes and especially among craftsmen and the trading community. (N.B. this is not to imply that catfish is universally popular, it appears that catfish is a product which evokes both strong positive and negative reactions).

Figure 19



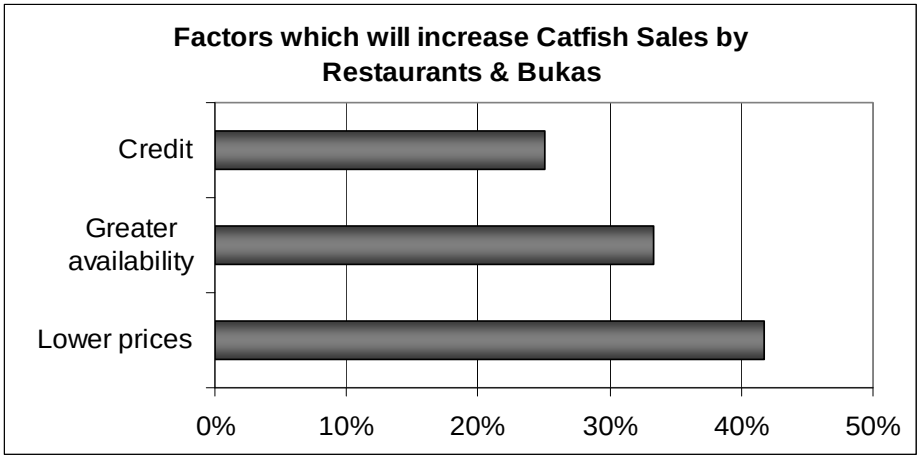
The survey was able to give a quantitative assessment as to the number of jobs created in the restaurant sector. Typically, for each ton of catfish purchased per year, ¼ to 1 full time job is created. The average figure was one job per 1.25 Mt of catfish purchased (i.e. 0.83 job per ton of catfish purchased per year). This means that due to their high volume of purchases, restaurants generate more jobs than any other retail outlet. It is estimated that through the sale of 30,000 Mt of farmed catfish, with 75% being sold via bukas, the sector has created an estimated 17,000 jobs.

Figure 20



The graph below illustrates that lower prices, supported by credit availability and greater product availability would lead to an increased volume of catfish sales to restaurants and bukas. Currently most bukas have arrangements with their supplier to receive a day's credit (Annex 1 includes a summary of interview findings with most of the major fast food chains).

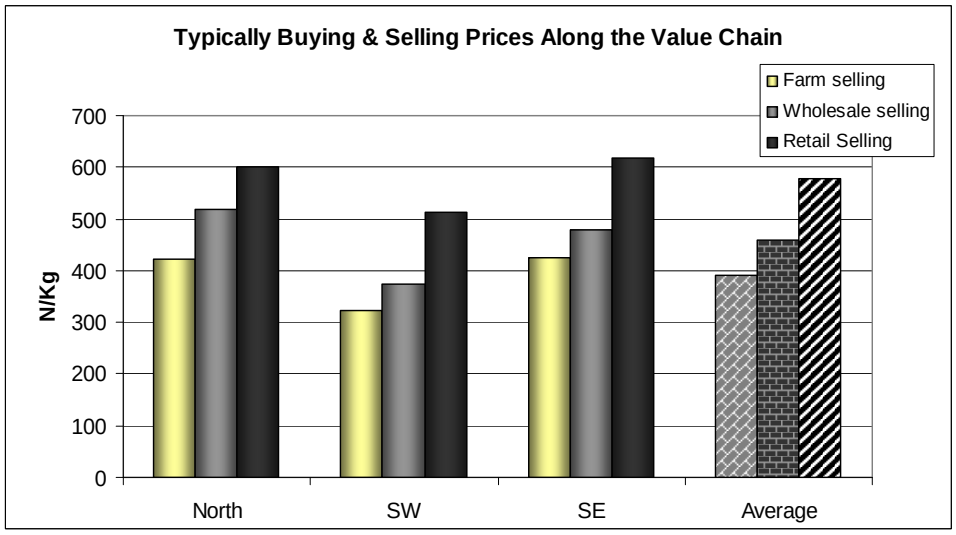
Figure 21



4.1.3. Retailers, Wholesalers and Traders

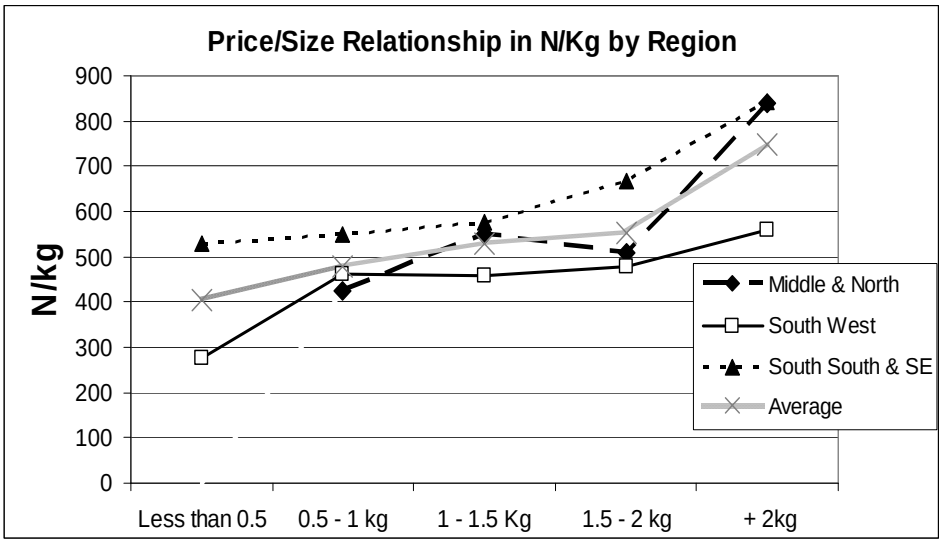
The graph below shows the degree of price variation (N/Kg) at different points along the value chain in the three regions analyzed. Prices are significantly lower in the South West, with farm gate prices averaging N330/kg, compared to N420/Kg in the other two regions.

Figure 22



The graph below shows the price-size relationship for fresh catfish by region, in terms of retail price. This demonstrates that the price per kilo changes little for fish between 700 g to 1.75 Kg, but is typically significantly lower below 500 g and significantly higher above 2 Kg. Marked differences exist between regions. Prices are highest in the SS and SE regions, with little differences noted between the smaller and medium sizes but a demonstrable increase in price for the largest fish. This would indicate the strongest overall demand is for fish in this premium size class. The weakest demand is in the South West, with overall lowest prices for both the smallest and the largest sizes.

Figure 23

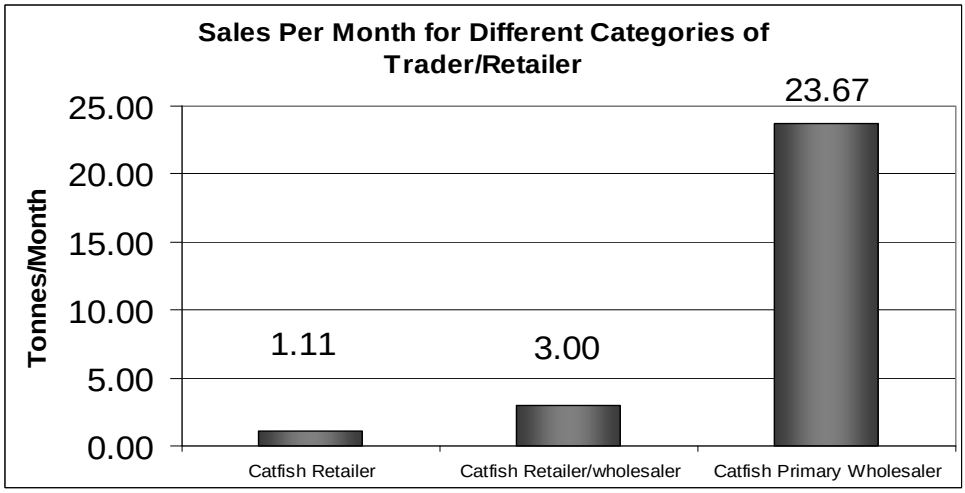


Retailers and traders can be divided into three categories. Basic retailers selling fish to consumers and to smaller bukas turnover approximately 1,100 kg of fish per month (i.e. 13 tons per year). The number of jobs created is about 0.12 per ton of catfish (i.e. 1 retail job per 8 tons sold annually). This is about one sixth the job creation rate of the restaurant sector.

A second category is retailer/wholesaler - those buying at farms and selling to the smaller basic retailers, while also functioning as a retailer themselves. Annually they may handle about 36 tons of catfish.

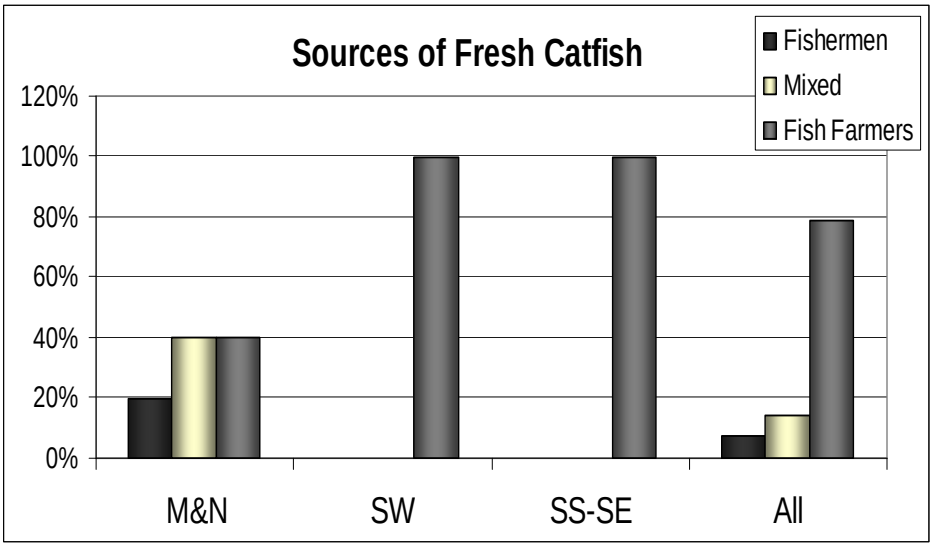
Thirdly are the primary wholesalers, mainly found in the SW areas, who buy fish directly from the major fish farms and either sell to visiting retailer/wholesalers (as described above) or organize transportation of live fish to major markets (e.g. Abuja, Onitisha) where they then sell to retailers and retailer/wholesalers. These major traders will trade in over 200 tons per year (the largest responsible for selling over 500 tons of catfish per year).

Figure 25



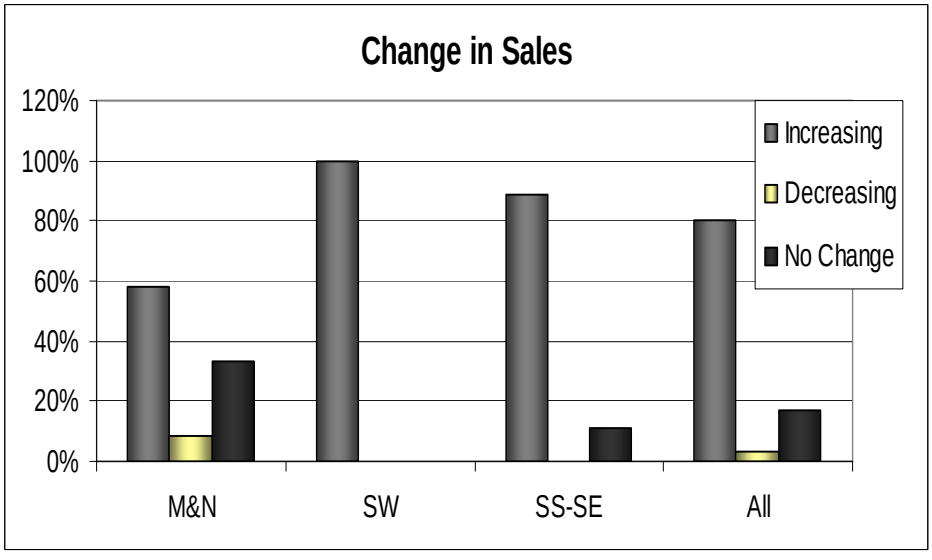
Among the retailers interviewed, the most important source of fish in the South[5] is from farms, while in the Middle and Northern belts wild caught fish is an equally important source.

Figure 25



Again, almost all retailers and traders reported increasing sales of catfish. The only exception was in Abuja, where two factors are at work. The new Kado market, although among the better equipped and laid out, appears to be having difficulty attracting sufficient trade. Secondly, and possibly more importantly, a number of small bukas in Abuja have been forced out of business by the local authorities. This has had the effect of reducing the market size, although there has been concurrent growth in demand from larger and more formal restaurants. The important point is that smaller and less formal restaurants form a vital part of the catfish market, and the industry should be prepared to lobby for their protection if urban authorities threaten them with closure.

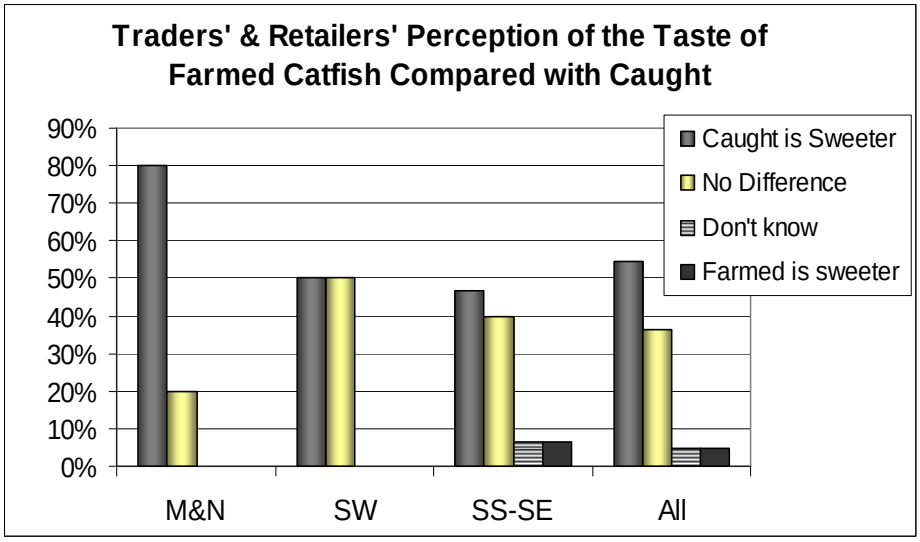
Figure 26



[5] The interviewers believe that since the focus of the study was farmed catfish, wild caught supplies tended to be overlooked, and that the above graph under-represents the importance of wild caught fish in the market chain.

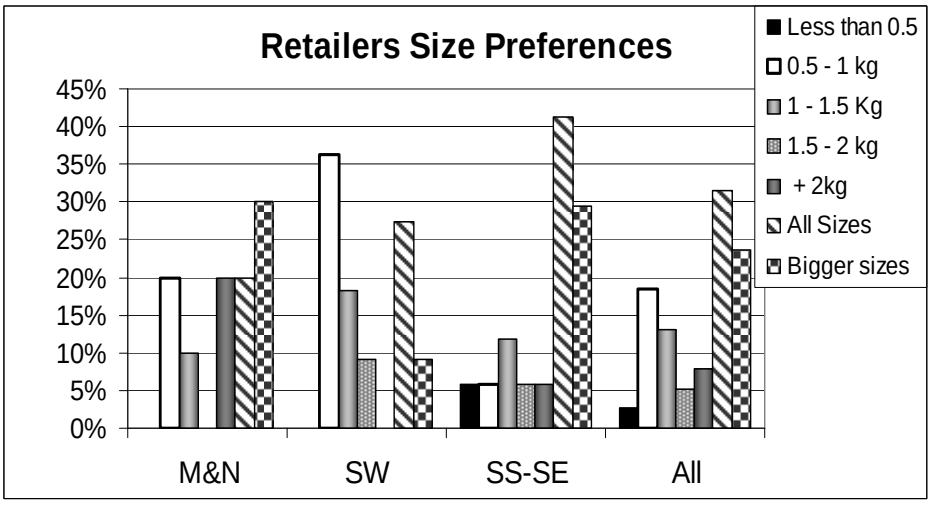
The graph below demonstrates that in the Middle and North regions, where a significant proportion of the market is supplied by wild caught fish, there is the strong perception that farmed fish is less 'sweet' and has an inferior taste. In Southern Nigeria, where farmed catfish hold a larger market share, this view is not nearly as strong. The implication being that this perception of difference in taste maybe purely personnel and based on local experiences.

Figure 27



The survey revealed that the market was remarkably diverse in terms of its size preferences. Retailers were often ready to purchase all sizes, especially in the South-South/South East region. A number of outlets recognized that the larger catfish offered better value for money and would prefer to purchase bigger fish but that the higher unit costs limited sales. Some retailers who focus on sales to consumers (as opposed to restaurants) preferred smaller sized fish. Very large catfish, i.e. over 2 kg, were seen as a minor product with limited sales potential.

Figure 28

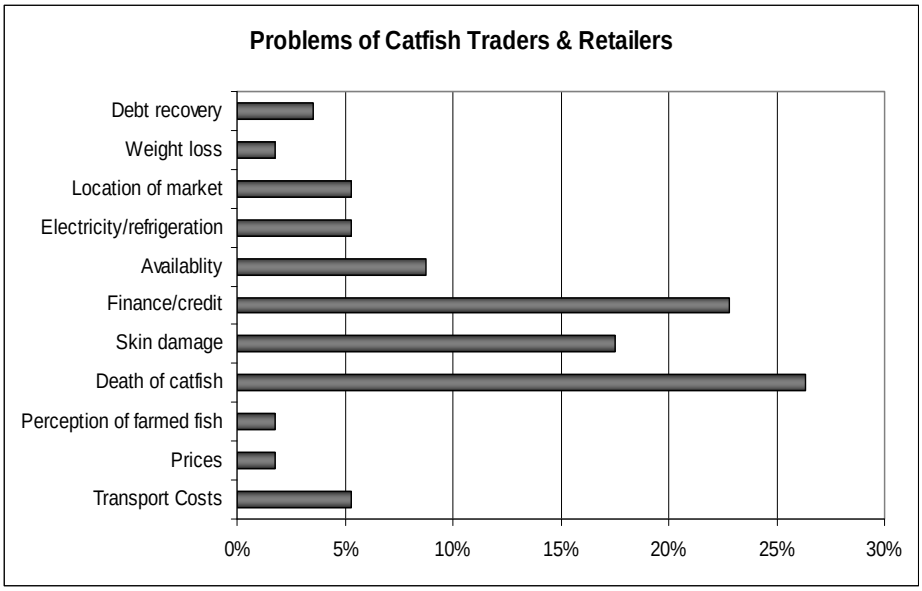


Catfish death (in transit) and trade financing were the most common problems cited by retailers and traders. Dead fish sell at only half the retail prices for live fish, representing an obvious negative impact on the retailers' profit. The causes of death were generally perceived as extreme temperature variation (especially in

Jos). It was the interviewers' opinion that there was a low-level of knowledge among retailers and traders as to the best way to manage live stocks. Basins were often small and exposed to full sun. Water was not changed sufficiently often, mainly because due to limited access. In Southern Nigerian traders provided palm oil kernels to the fish, convinced that this was a suitable fish food. Skin damage, which also reduces market price, was seen as a major problem in the SS-SE region. It is interesting to note that traders have reduced the volume of catfish in each basin from 30 kg to 25 kg for long distance transport in order to reduce the levels of skin damage and deaths. Traders believe that much of the post harvest damage to fish occurred during transport (i.e. the use of small basins in micro-buses). Traders often made the point that limited finance and credit options constrained their ability to improve their individual businesses. Especially in the SS and SE regions, credit availability was seen as the third greatest constraint.

Secondary issues were debt recovery, market location (specifically the Kado market in Abuja), electricity (mainly for refrigeration), skin damage (reduced sales price) and transportation costs.

Figure 29



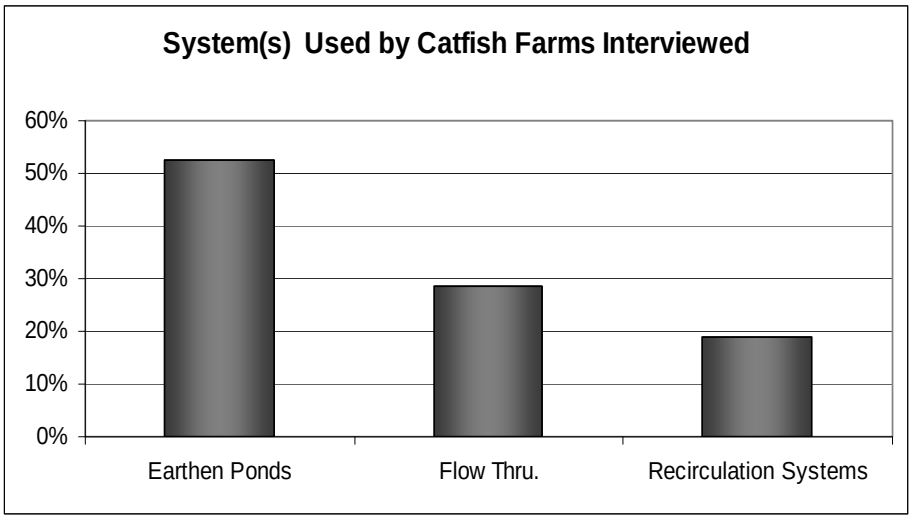
It is interesting to note that overall price and post harvest weight loss were not generally perceived as problems. The weight issue is important, because fish will generally lose between 10-15% of their weight as they proceed through the marketing chain. This is not perceived as a major problem because although fish is purchased at the farm by weight, thereafter fish are sold by piece. However, we observed that traders were highly skilled at estimating by eye the value of a unit purchased, a skill we were able to test using scales. They could easily increase the sale price of individual fish sold in order to compensate for weight loss, as well as revenue losses related to death and skin damage.

4.1.4. Fish Farming

Interviews were conducted at 18 fish farms, of which 60% were in the SW region (i.e. Lagos, Ota and Ibadan), 30% in the South South – South East region and 10% in the Northern and Middle belts. This distribution broadly reflects the number of farms per region as well as the ease of accessing the farms. A slight majority of farms used earthen ponds; flow through systems accounted for nearly

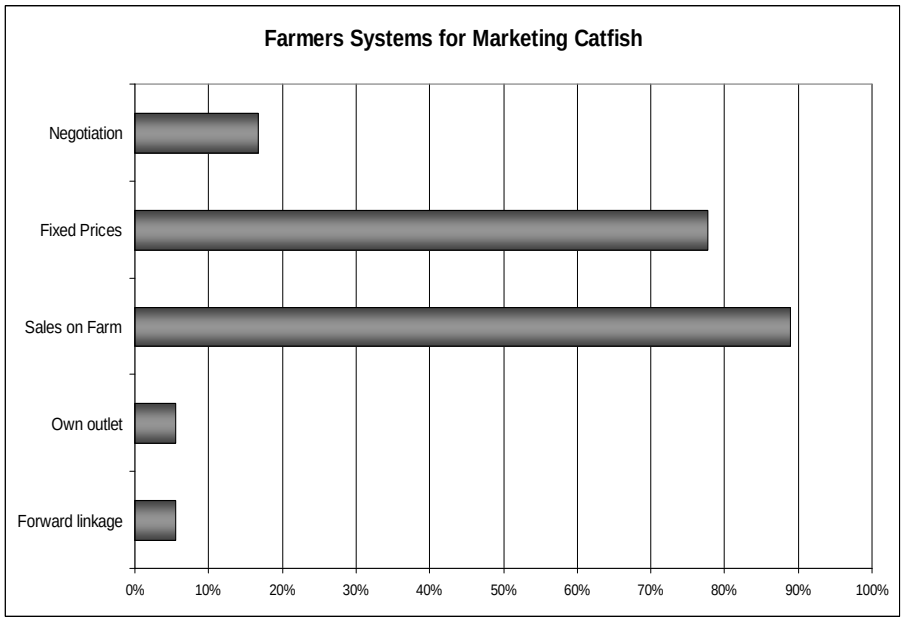
30%, and recirculation systems comprised approximately 20% of the farms visited.

Figure 30



The vast majority of catfish sold on farm go to visiting traders/retailers at specific days/times, and at fixed prices. Occasionally there is some negotiation over price and quality. One farmer has developed his own outlet to enable him to sell directly to the local market. Another supplied catfish to his own restaurants.

Figure 32

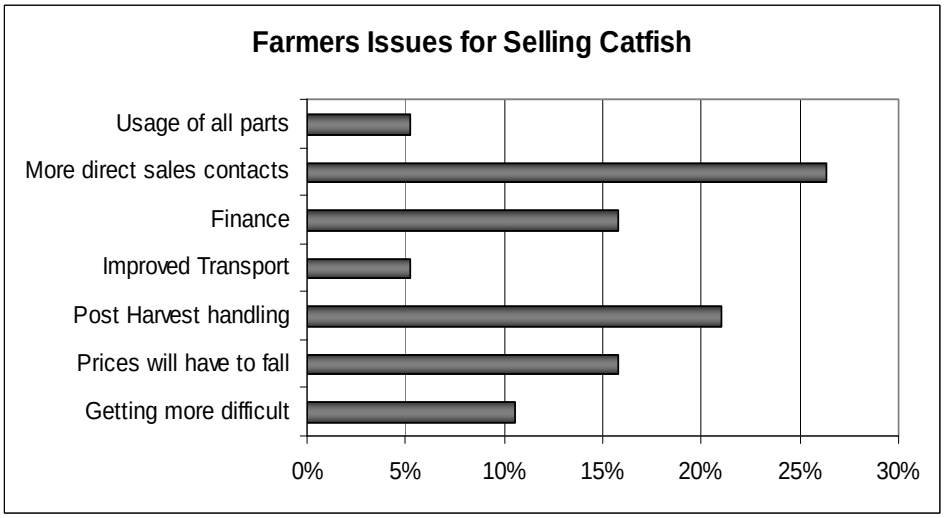


Farm prices were significantly lower in the SW, i.e. Ibadan and Lagos, and highest in the North and Middle Belts as well as in the South-South/South east areas.

Figure 32

Farmers in the SW articulated a feeling that marketing of fresh catfish was becoming more difficult, especially in the months September-November. Some farmers in the SE also recognized problems in selling fish, although these were mainly associated with an overall lack of organization (e.g. many farms trying to sell fish on the same day). Many farmers anticipated increased difficultly in selling catfish in the future.

Figure 33



In anticipation of marketing problems, farmers said that they would like to have direct contact with traders further down the marketing chain. There was a frustration among farmers, especially in SW (and in particular Ibadan) that primary wholesalers were shielding their sources of supply from secondary wholesalers and retailers. In addition, in locations such as Onitsha, retailers felt that they were forced to pay higher prices than necessary because they were not able to buy direct from the farm or because they did not have access to up to date farm gate selling process.

Farmers realized there were opportunities to reduce post harvest losses with improved handling of fish. In the future they expected farm gate prices to fall and they would be forced to take a more proactive attitude toward marketing and possibly providing credit to their buyers.

4.2. Other Fish Products

4.2.1. Catfish Filets

A catfish filet will have only 50% of the weight of the fresh fish, and would exclude the head, which in Nigeria is considered the prime cut of the fish. The markets for filets would be small and limited to the elite and the expatriate community. No action is recommended.

4.2.2. Smoked Catfish

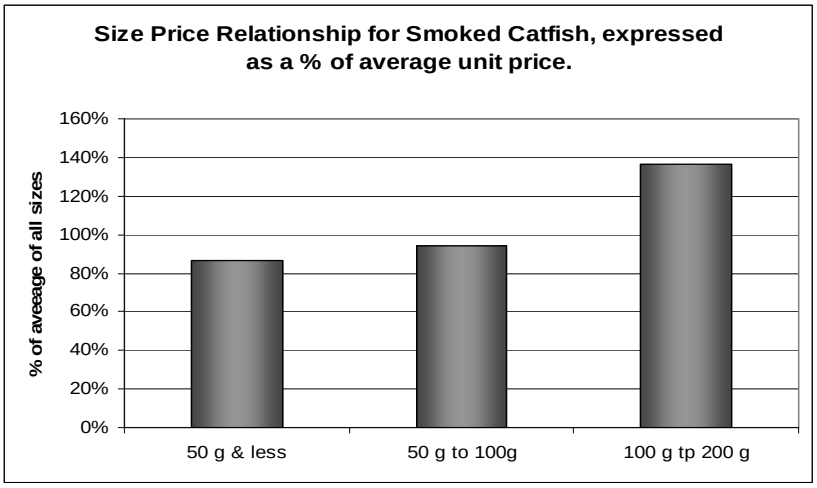
In Northern Nigeria the smoked fish sector appears to be two or three times larger (an observation based on number of retail outlets) that for fresh fish. Smoked catfish is mainly sourced from NE Nigeria (often from the market near Maiduguri). In Southern Nigeria the number of fresh and smoked fish retail outlets seems to be equal but they are sell a wider range of fish species, with catfish amounting to only about 30% of all smoked fish sold. In the north this percentage is over 80%.

The price of smoked catfish appears to be about N900 kg ($6.43/kg) in the buying locations. Traders from town purchase smoked catfish from the processing areas in NE Nigeria; organize transport (often shared), warehouse in town, and deliver supplies directly to smoked fish retailers at a price of about N1300-1200/kg. Retailers then sell the smoked fish at about N1600/Kg ($11.30/kg). As the graph shows, larger/heavier smoked fish fetches a premium price. Price per kg can fluctuate by +/- 25% based on size alone and average prices should be treated with caution. Prices for smoked fish are higher in Southern Nigeria, probably by N100-200/kg at retail.

Retailers go through a lot of trouble to display their smoked fish in neat piles of roughly the same sized fish, the skin shiny from palm oil. Smoked fish are typically transported in old cigarette cartons with a net weight of 10 kg (gross weight 11.5 kg). Smoked catfish can hold in storage for up to 1 month.

Figure 34

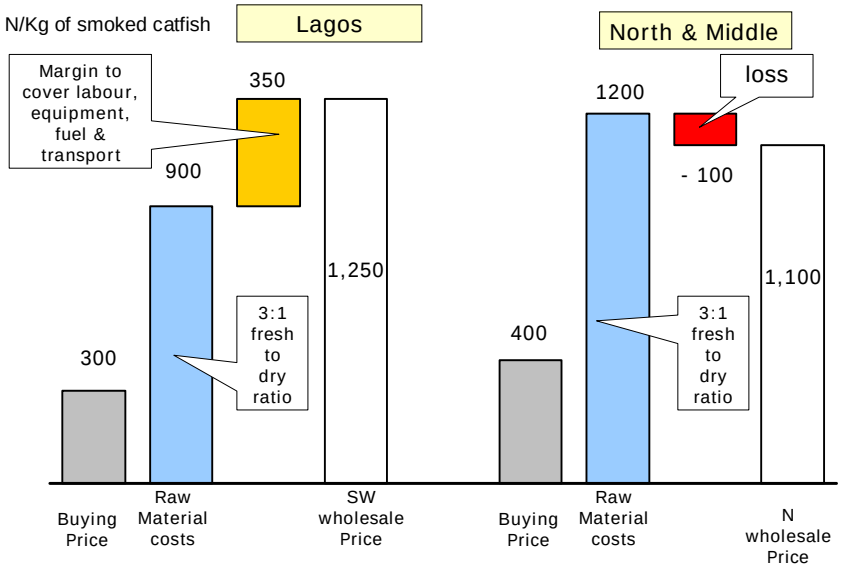
Size matters when it comes to smoked Catfish prices. Larger catfish obtain 40% premiums in term of unit price than the smallest sizes. However, even the largest sized dried catfish represents a relatively low weight fresh fish (e.g. 500to 600 g for typical larger size grades)



The accurate input-output ratio for smoked catfish is not known. A reasonable assumption would be about 3:1. At these ratios a catfish purchased by a drier/smoker in Southern Nigeria at N300/kg could almost certainly be profitably sold at a price of N1200-1300/kg. This is shown in the graph below.

Figure 35

Draft calculation of the economics of smoking catfish show that there could be a positive margin in the extreme South, while at current costs & prices farmed catfish cannot be smoked profitably elsewhere



The MARKETS team observed a number of fish driers in Southern Nigeria. Some bought fresh catfish, processed it and took it into the more major town markets to sell. Other driers operated on a price-for-service basis. We believe that the drying of catfish will develop as a micro-enterprise in South Nigeria. They will be able to effectively absorb out-graded, smaller, dead or dying fish.

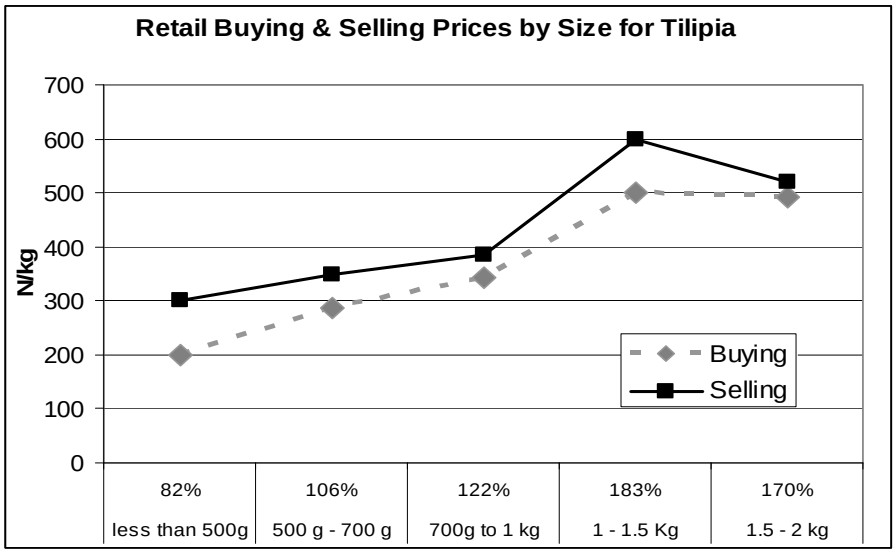
4.2.3. Tilapia

One of the strongest markets for Tilapia is Jos. The trade estimated that the volume of tilapia sold locally was broadly the same as fresh catfish. According to local opinion, the development of the trade could be traced back to the advent of roadside tilapia grills.

Two of the fast food chain companies (Mr. Biggs & Mama Cass) are especially keen to secure reliable supplies of tilapia as they see it as an ingredient with high potential for a number of different fish meals, especially grilled tilapia. Fast food buyers favorably compared tilapia to croaker, and are looking to buy tilapia (+ 700 g/per) at competitive prices i.e. N275 to 330/kg. This pricing is broadly in line with current prices for tilapia in the 500 g to 1 kg range.

Almost 100% of tilapia is currently wild caught. Most of the sizes are small, with 250 to 600 g being the most typical size range. Larger tilapia obtains significant price premiums. For example, fish over 700 g maybe be sold to retailers at N340/kg compared with only N 200/kg for the smallest sizes.

Figure 36



The main concern expressed by the primary wholesale traders is the post harvest handling of tilapia. They are mostly accustomed to handling live catfish. Wholesalers/retailers were far less concerned, as they have experience with holding fish in refrigerators or ice boxes for up to 5 days. Existing talapia wholesalers typically carry wild caught fish under ice in cigarette cartons. This seems to be effective.

A number of the major catfish producers are considering diversifying into tilapia. While there will likely be some demand, it may be more strategic for professional fish farmers to concentrate initially on building the market for tilapia in partnership with the fast food chains. These purchasers would ensure a ready market, and promote wider acceptance of tilapia as a desirable food source. In time this could act as a generator for larger market demand at all levels.

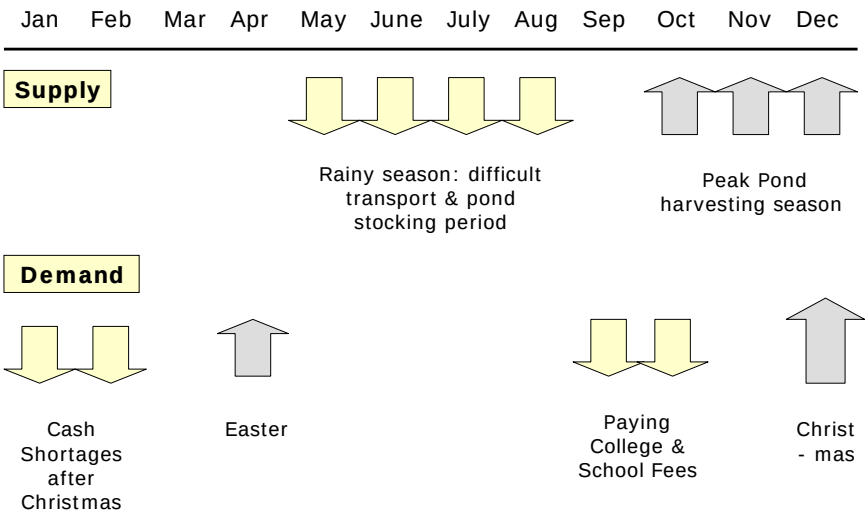
5. Fresh Catfish Product information

5.1 Supply, demand and prices

The sale of catfish is continuous throughout the year, but has strong seasonality especially at Christmas and Easter. Demand is at its lowest in January/February and again in September/October. During these periods, luxury purchases and discretionary spending are down because consumers are focused on paying school and college fees[6].

Figure 37

The Seasonality of Catfish Supply and Demand, with supply lowest during the rainy season and highest in October & November and demand peaking at around Christmas and lowest in January/February



Peak supply occurs in October-December when catfish started in ponds during the rainy season (May through July) is harvested. Supply is at its weakest during the rainy season itself, due in part to difficulty in accessing the smaller farms. During this time intensive catfish farms (i.e. recirculation and flow through) provide the majority of what is available to the market.

All sectors of the market chain reported increasing sales the expectation that this trend will continue. Although part of the growth in sales can be attributed to the recent 'bird flu' outbreak, there is a longer term trend driven by increased availability, rising popularity of fish (and pepper soup), health concerns, lowering prices and increased household income. Output has also increased and is set to continue, as demonstrated by virtually all the business expansion plans examined[7].

Prices remain relatively stable. During the last season, prices weakened during September and October, corresponding with the season of low demand and an over supply (as the 1st new season catfish from ponds start to be harvested). Another view is that in 2005, the prices were forced down by an increase in imports. At this time the market observed the availability of frozen catfish in packaging of obscure, but possible foreign origin. The Government then banned

[6] Similar slumps in demand are found in chicken marketing

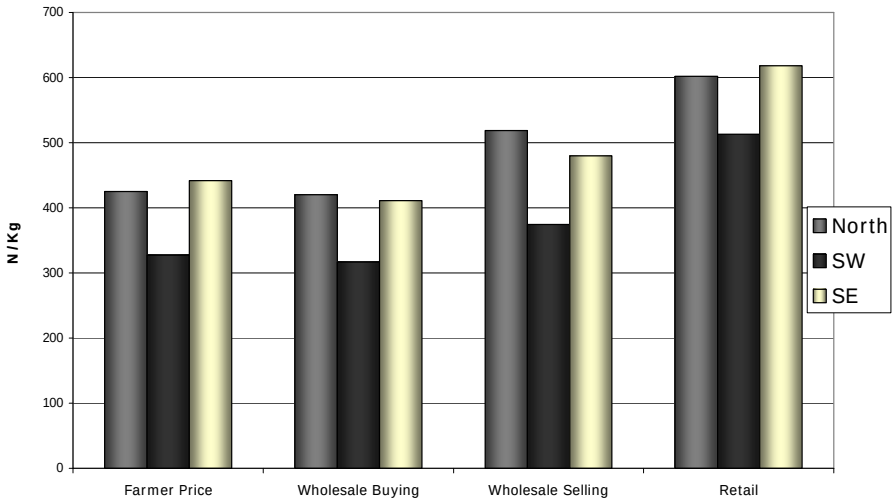
[7] Most of the larger established fish farms have increased output by 25-35% pa,. and are set to continue this rate of growth for the next 2 -3 years.

imports and prices rebounded. The change in policy was viewed as successful, however it now seems likely that the fish were not imported, but were mass harvested from a major fish farm due to production problems. The resulting frozen fish were marketed at about half the price of the fresh product. Once this limited supply was absorbed by the market, prices rebounded.

The price of catfish is much lower (approximately N100 or about $.70/kg) throughout the market chain in the South West region, than in other regions of Nigeria. The reasons for this are clear: SW is the area of greatest production; transport costs are lower and marketing chains are shorter. One or possibly two middlemen are eliminated as retailers tend to buy direct from farms. Much of the catfish in the Northern and South Eastern thirds of the country is imported from the SW (or wild caught from rivers and lakes).

Figurer 38

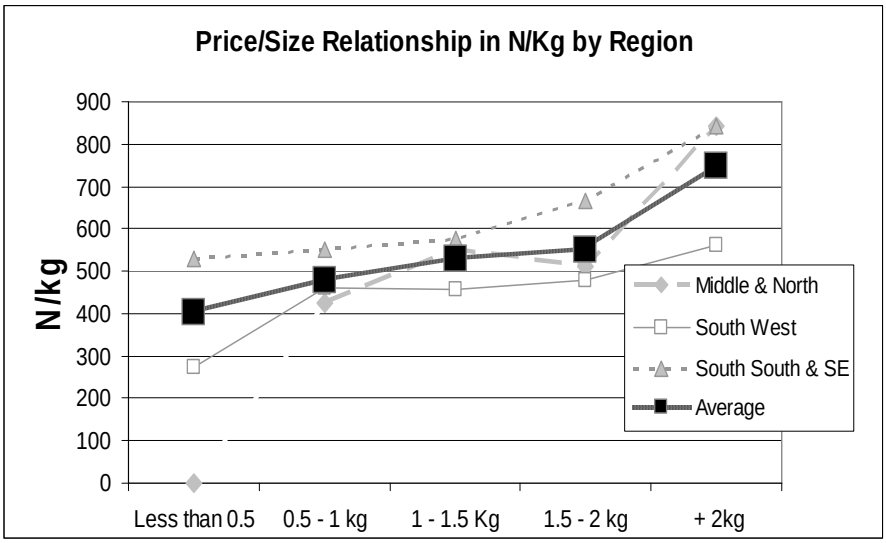
Farm gate, Retail buying and selling prices are about N 100/kg lower in S-W Nigeria (i.e. Lagos & Ibadan) than in the rest of country, mainly because of higher production, shorter marketing chain and especially direct buying by retailers



We would expect that increased production, especially in the SS-SE region, and a corresponding reduction in transport costs would cause prices in that region to fall, probably to levels lower than they are currently in the SW. As the effects of these lower farm gate prices filter through the market chain, prices of both live catfish and pepper soup will fall, leading to a potential increase in sales.

The graph below shows the typical price/size relationship at the retail level. Prices increase significantly from 500 g to 750 g, thereafter value per kg increases more slowly up until about 1.7 kg, when prices increases rapidly, but with a corresponding decrease in sales volume.

Figure 39



5.2 Fish quality

For catfish traders one of the key quality factors is the robustness of the live fish. A dead fish immediately loses half it value. Among traders, farmed fish are preferred as they appear hardier and less affected by handling.

Traders in the SS-SE region were particularly concerned about skin damage (exposed red patches). In Jos the key issues were fish death due to temperature variation. It was the team's view that significant reduction in post harvest losses could be made through simple improvements in the frequency of water changes and in the insulation of baths and tanks.

Transport from Ibadan to the markets in Middle and SS-SE regions represents a cost of about 10%. Typically, 25 kg of live product is transported in standard plastic basins, with a sack tie over the top to stop the fish escaping[8]. A typical micro-bus may contain 1.2 Mt (i.e. 50 basins). Prices are based on distance and time traveled, but costs from Ibadan to Abuja (N40/kg) and Ibadan to Onitsha (N30-25/kg) were quoted. This system, with its piecemeal loads, relatively low critical mass, and high levels of stress on the fish offers considerable opportunities for improvement. An insulated truck, capable of carrying fish in bulk, in darkened conditions and under moderated temperatures would likely find an important role in the sector. External funding and technical assistance will likely be needed to put together a trial design. The larger picture is that the support technologies needed for the further development of the internal market for farmed fish (both tilapia and catfish) will rely on improved post harvest handling practices; primarily better conditions for transport of live catfish and a the use of crushed ice for tilapia.

Most of the larger farmers interviewed talked about market pressures which caused them to increase their typical size of fish sold[9]. Among household consumers there was a demand for smaller sizes, so that for a reasonable price they could still afford to buy a whole fish. Their preference is much more likely to be in the size range of 500 g to 1 kg. Fast food chains are looking for fish in

[8] The Catfish industry appears to have developed standards in that 30kg catfish are transported per basin for short distances. It appears that the catfish industry has learned that 25kg gives improved results when fish are transported any distance (+4 hours)

[9] One sells fish of around 2 kg; another has increased the size of fish sold from 1-1.3 kg, to 1.4-1.7kg.

standard sizes which allow for individually costed portions that can be consistently be turned out by the kitchens. In fact, it seems that the market can absorb a wide range of size preferences. However, it seems that in the current undersupplied market, the larger and better organized farms have migrated to the supplying the most profitable section of the market, which is for larger sized fish (i.e. + 1.4 kg each). As supplies increase it is expected that the larger sized niches will be continue to be filled, while the smaller sized, and lower per kg priced niches will start to be filled more readily. This trend is already being observed. In the future, we expect the shape of the price/size relationship to look broadly the same, just lower by about N75-100/kg.

There are mixed opinions as to whether farmed fish taste inferior to wild caught catfish. Farmed fish does have a softer texture and cooks more quickly. However, it would seem that the taste issue is more a question of personal perception and local tastes. Consumers believed that wild caught fish was superior, but on the whole restaurateurs thought there was little difference – a feeling echoed by retailers in the SW who mainly sold farmed product.

5.3. Market Chains

5.3.1. Existing Market Chains

The diagram below indicates the major marketing channels in Nigeria and their relative importance within the three regions in this study. The width of the arrows gives an indication of the relative volume moving through the different channels.

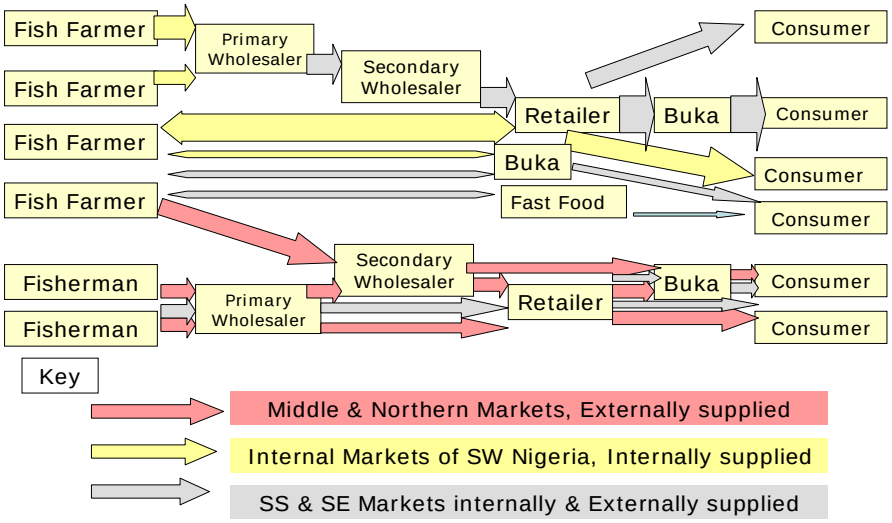
In the major fish farming zones around Ibadan, primary wholesalers dominate the purchase of large volumes of catfish at the larger farms. They either organize the delivery of live catfish to secondary wholesalers based at the terminal market location or merely use their privileged position to purchase fish directly then sell to secondary wholesalers at the terminal market. Secondary wholesalers sell fish to retailers, and often are themselves retailers. Retailers then sell product to bukas and the smaller restaurants, as well as to the household level.

In Lagos, and to an extent in the S-S and SE, retailers will, if at all possible, buy fish directly at the fish farms. They then sell on to consumers and bukas. Fast food companies sometimes buy directly at fish farms. This trade is however very minor compared with the volume sold through bukas.

In the Middle belt and Northern markets, wild caught fish is an important element of the value chain and is generally delivered to the terminal markets by trucker/traders. Wild caught fish is also shipped into the market in the Middle belt from Ibadan, and, to a lesser extent, from Lagos. In these Northern and Middle belt markets farmed catfish faces competition from wild caught fish.

Figure 40

Fresh Catfish Marketing Chain



5.3.2. Likely future channels

Over time, two competing marketing channels will likely emerge. Production from existing large-scale farms in the SW will increasing move into new markets in relatively underdeveloped areas throughout Nigeria (e.g. the Northern belt, but most especially SS and SE markets). In these Southern areas there will emerge a cadre of local fish farms that will be able to sell a fresher product directly to existing retailers. This will cut out middle men and lower costs. Both systems will compete against one another, the outcome being lower prices and, likely lower profit margins for catfish farmers.

The fast food sector will look to make buying arrangements with the better organized, intensive farming operations for specific fish sizes conforming to specific quality standards.

5.4. Value Chain Analysis

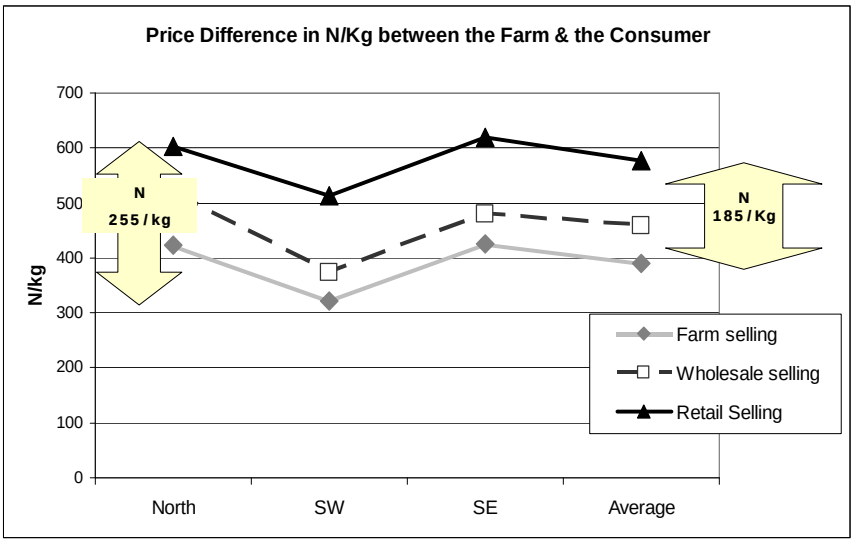
Most fish are initially purchased based on gross weight then sold by the piece. As part of our investigation, in order to verify prices, the product was weighed to obtain accurate prices per kg at the different points in the market chain. Prices reflect the loss in weight along the market chain. Weight loss was generally 10% to 20%. Although traders and retailers sell by piece, they will judge by eye the price each fish will need to bring to provide them with their necessary margin. This was always done with considerable skill. Although they may only put a 20% margin on the purchase price of a fish, due to the weight loss the price per kg will have increased considerably more[10].

The graph below demonstrates the range between farm gate and retail prices by region. Worth noting is the increased retail price (N70/kg) of fish transported from the SW to markets in the Middle belt or South-East & South-South regions versus fish sold within the SW.

[10] If a 1 kg fish is purchased at N 350, by the time of sale it might only weigh 800 g, a notional 20% margin will make the price for the fish of N 420, but as it now weighs 800 g the price per kg will be N 525.

Figure 41

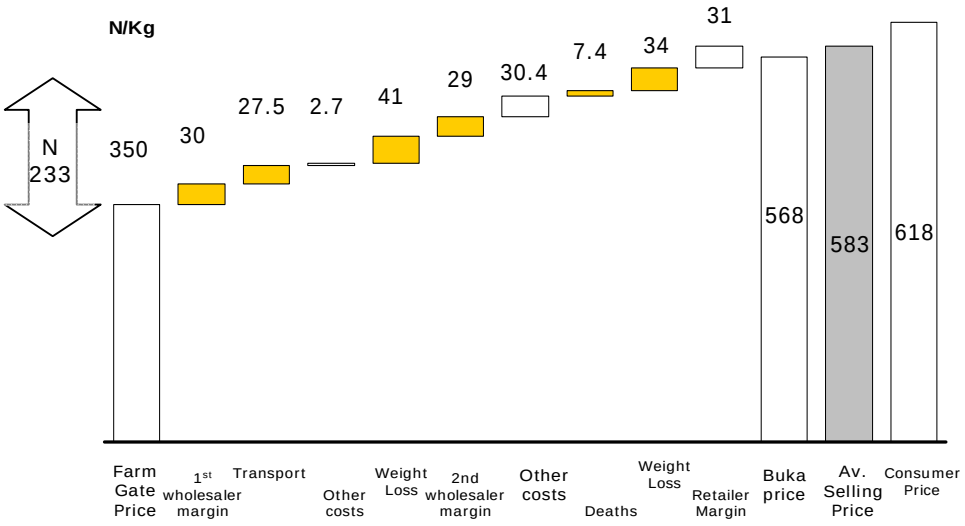
For sales within regions, the difference between the farm gate price & the retail price is typically about N 185/Kg. When catfish is taken from the SW into SS-SE and N-M the price differential increase to N 240-270/kg.



The graph below shows the different elements contributing to the escalation of farm gate to the retail prices. Weight loss and fish death contribute the highest cost (N82/kg of a total N233/kg). (n.b. in these calculations we have estimated the reduction in average sale price from bulk sales to bukas). Additional transportation costs as well as the primary and possibly secondary wholesalers' margins might be eliminated through increased direct marketing.

Figure 42

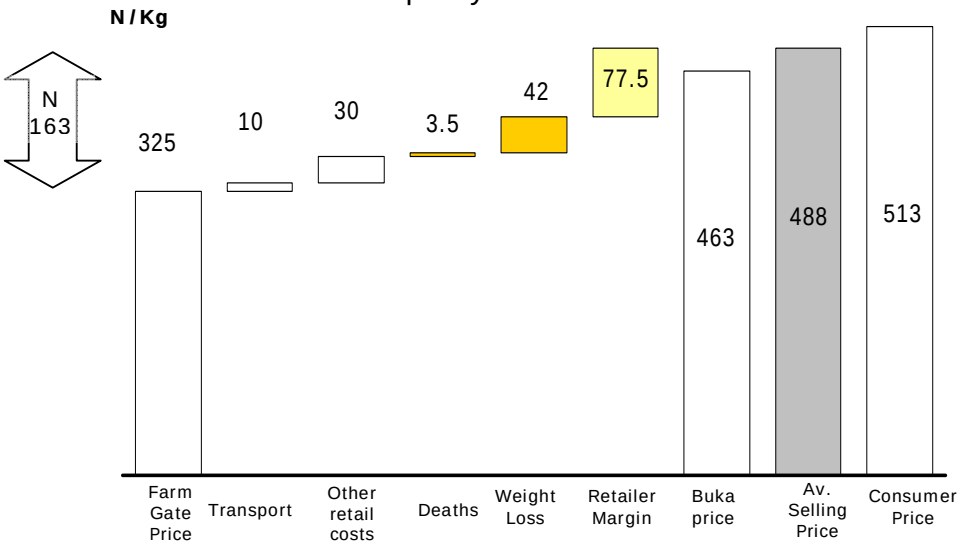
Value chain for Production in the SW being sold in SS-SE markets. Costs in colour could be reduced



This graph illustrates the breakdown in costs and margins when retailers buy direct from farms. Note that opportunity costs are not included – typically retailers buy from farms during the late morning, most retail sales are made in the evening and the morning. Post harvest losses (N45/kg) again account for considerable price increases and offer the best point of intervention in removing unnecessary costs along the value chain.

Figure 43

Value chain for sales of catfish for producers in the SW selling directly to Retailers in the SW, costs in colour have the greatest capacity for reduction



The above figures clearly demonstrate that market chains with local production and direct purchasing by retailers results in lower retail prices and higher retailer margins. Clearly the expansion of fish farming in the emerging markets of the South-South, South-east and Middle belts, will have a strong competitive advantage in terms of reduced marketing costs.

6. Pro-Market Interventions

6.1. Overview – Fresh Catfish

The findings of the aquaculture sector market study in Nigeria reflect a strongly positive attitude toward the market's potential.

All the opinions (including consumers, traders, retailers and restaurants owners) reflected the belief that the market could effectively absorb a higher volume of Nigerian farmed catfish. Fresh catfish is a popular and culturally important food item (being the key ingredient in the popular pepper soups). We believe that rapidly growing urban populations (i.e. 3%/yr), falling prices (N75/kg or 14-20%), sustained demand and an increasingly wide range of available sizes (especially smaller whole fish targeting the home consumer) will contribute to a considerable increase in sales, particularly through increases in home preparation and cooking. Growth in sales will also occur through new catering outlets and restaurant options. Catfish stews and soups are proving popular in fast food outlets[11], and new recipes are emerging[12].

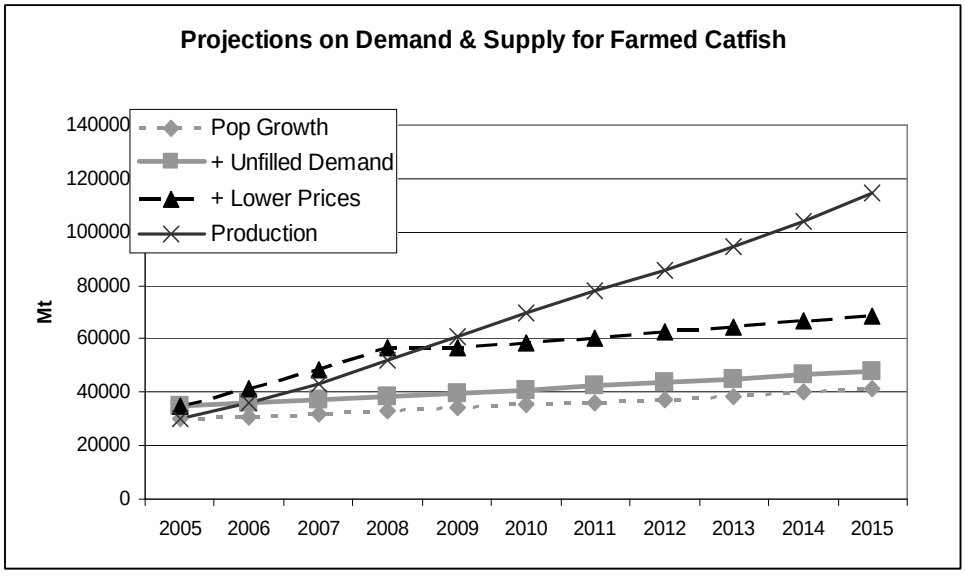
[11] Catfish dishes are among the most popular items on any fast food menu.

We believe that the components of demand can be divided into the following categories:

- Current unmet demand (i.e. demand that can be met by additional supply without impacting price). We believe that this might be between 10- 20% of current supplies (i.e. 3000 to 6000 Mt)
- Growth in urban demand due to urban drift and general population growth (+ 3.23%/yr.)
- Additional demand and sales generated by price reductions. We assume typical retail prices will fall from about N585 to N500. Coupled with price elasticity of demand of + 3.5%[13], this 15% price drop could lift sales by over 50%
- Income elasticity. Rising incomes will drive increased consumption of luxury products, however this impact has not been computed
- Impact of additional outlets and markets (fast food, smoked catfish in the South) on sales has also not be computed

Currently the catfish industry is growing at 25-35% per year. We assume the industry will continue to grow at 20% per year for the next 3 years, before slowing to a 10%/yr. growth rate by 2015. The graph below illustrates how, without a corresponding drop in prices, the expected increased production will be difficult for the market to absorb. A 15% retail price reduction would offset this market crunch until about 2009. A far more satisfactory and sustainable outcome would be to eliminate inefficiencies and unnecessary costs within market chain, promote sales, and encourage diversification and better organization within the marketplace.

Figure 44

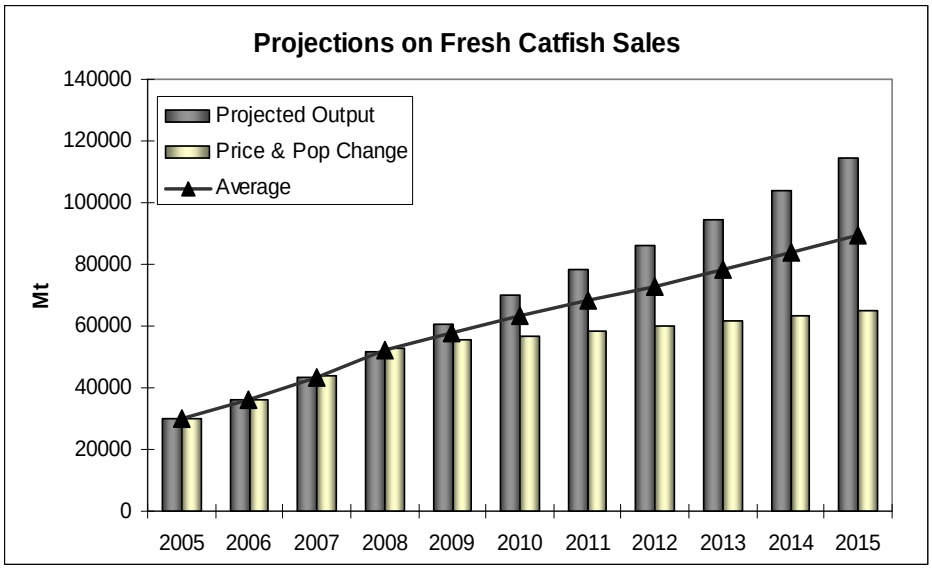


[12] Among the most promising new recipes is that of steaming/roasting catfish in foil. Currently this technique is mainly used for whole fish, however it is envisaged that this technique will emerge as a fast food product in the form of 300 – 350 g pieces individually wrapped and cooked in foil.

[13] We have used a price elasticity of + 3.5% (broadly in line with other luxury fish like salmon). Effectively this means that for every 1% fall in price will lead to an increase in sales of 3.5%.

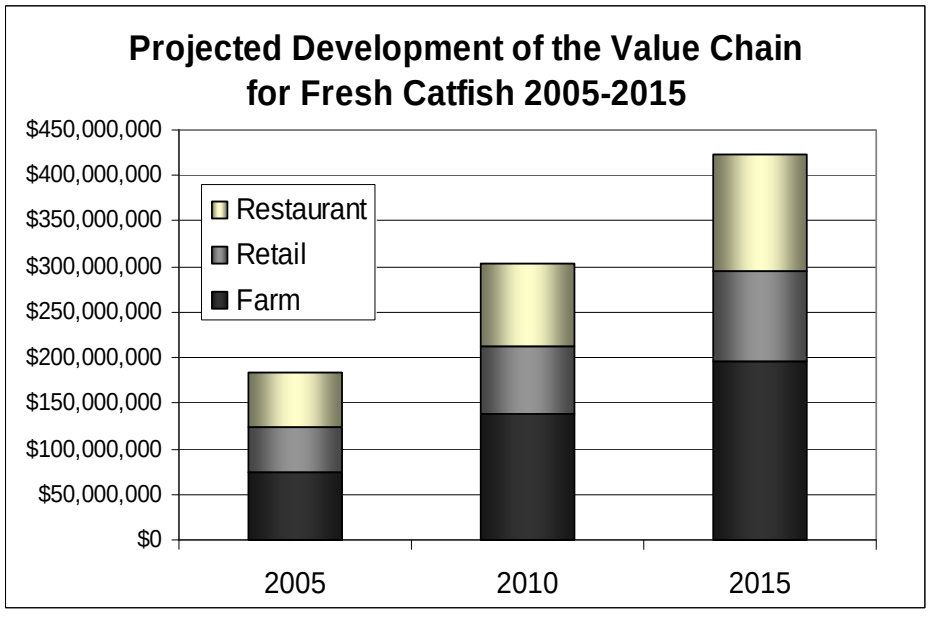
In order to illustrate the potential size of the farmed catfish sector and its impact on the national economy, we have based our estimates of future production on the projected output (110,000 Mt) over the next decade, as well as the impact of price reductions and population growth on sales. Data suggest that by 2015 sales nationwide will level off to approximately 90,000 Mt per year.

Figure 45



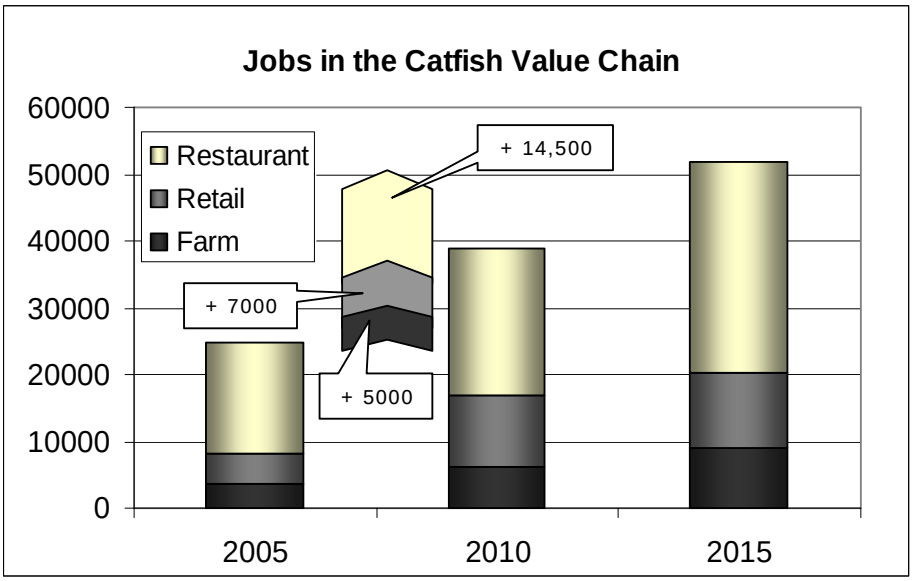
The value of catfish sales at the end consumer level is expected to rise from about $180 m in 2005 to $300 m in 2010 and is projected to reach $425 m in 2015. The farm gate value is currently believed to be approximately $75 m. By 2010 this may reach over $140 m and grow to $200 m in 2015.

Figure 46



The potential growth of the farmed catfish sector could lift the number of jobs created by over 25,000 to 52,000 by 2015. Most of these jobs (est. 31,000) will be within the restaurant industry.

Figure 47



6.2. Overview – Smoked Catfish

Currently the vast majority of smoked catfish in the marketplace originates as wild caught fish from the extreme NE of Nigeria and even Chad (Maiduguri and beyond). Drying and smoking catfish is meant to preserve value and does not specifically add value. Purchase prices for the smoked product are typically N750 to N1000/kg, which imply a fresh catfish input cost of N200 to 250/kg. Given transportation costs and strong demand in the south of the country, it does appear that there is an opportunity to promote local production of smoked catfish in the extreme southern regions. The interview team witnessed farmed catfish near Lagos being purchased by small scale smokers who then sell their product to retailers in the major markets of Lagos. A combination of farm gate prices in the range of N300/kg, focused production on larger fish and direct sales to retailers, could produce a sustainable positive profit margin. As prices for fresh fish fall, we would expect to see an increase in the number of profitable fish smoking enterprises in the extreme South of Nigeria.

It was not possible to accurately estimate the size of the smoked catfish market. Our best guess is that in the Northern half of the country, smoked catfish remains an important product, with sales 2-3 times that of fresh catfish. In the Southern half of the country, there appeared to be approximately the same number of retailers (suggesting a business of equivalent turnover), however in this region smoked catfish represents only about 30% of the smoked fish sold.

The table below illustrates the breakdown of catfish utilization in the N/M, SW and the SS-SE regions. The reader should be aware that these figures are meant to indicate the *likely* scale of these sectors; they are not intended as precise figures. The graph below suggests that farmed catfish comprises 20-25% of total usage. Figures suggest that the volume of fresh fish required to supply the Southern Nigerian smoked catfish market could amount to 20,000 Mt/yr. Local smoking enterprises could supply 25–33% of this demand (5,000–6,000 Mt/yr.).

Table 2 Breakdown in Mt of the Utilization of Fresh Catfish in Nigeria

	Fresh Catfish			Fresh Catfish for Drying			
	Farmed	**Caught**	**Total**	**Farmed**	**Caught**	**Total**	**TOTALS**
N-M	3000	9000	12,000		34,848	34,848	46,848
SW	15500	9000	24,500	500	10,780	11,280	35,780
SS-SE	10500	10500	21,000		9,240	9,240	30,240
Sub Totals	29,000	28,500	57,500	500	54,868	55,368	**112,868**
	Mt						
Farmed	29,500						
Caught	83,368						

6.3. Overview – Tilapia

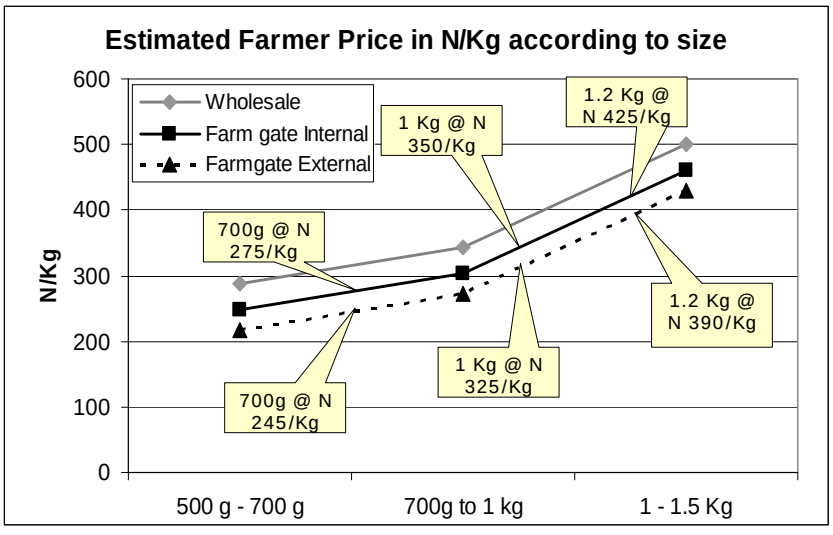
There are positive market signals for tilapia. In Jos, where tilapia was actively promoted as a grilling fish, it holds about half the fresh fish market. Here, street grilling of tilapia is now common, and could indicate how sales might develop elsewhere. Fast food chains were keen to link to an organized tilapia supply chain. In addition, there are consumers who actively prefer fish with scales; for them tilapia has the advantage of being a lower cost product than other scale fish[14].

Tilapia farming will represent a new sector, and questions remain as to how to produce the fish profitably and especially how the fish can be efficiently transported. Important lessons can be learned from the way wild caught tilapia is transported and marketed. The market is clearly looking for larger sized tilapia than is currently available. Individual sizes need to be 600 g and above.

The graph below provides some guidance for tilapia fish farmers as to the possible farm gate price for fish in the 700g to 1.5 kg size range.

Figure 48

Using caught wholesale tilapia prices & estimates of marketing costs likely farmer prices per kg for different sized fishes have been computed.



[14] Tilapia is an herbivorous fish. As such feed prices are lower which in turn should result in a lower cost product. The downside of tilapia production is its lower output. It is less likely to be suited for intensive production, and more likely to be a pond produced product.

6.4 Opportunities

6.4.1. Fresh Catfish

As noted previously, as producers significantly expand their production, larger volumes of catfish will hit the market. Initially this will satisfy current unmet demand. For the next one or two years there will be few problems for the market in terms of absorbing the increased production. However, key problems will start to emerge as supply and demand become more closely aligned. When this happens prices will start to fall at all points along the value chain[15].

The aim of any fresh catfish market support program must be to help the market absorb additional supplies. This can be achieved by:

* **Eliminating unnecessary costs in the market chain**, so that producer margins can be maintained (as far as possible), while allowing consumer prices to fall, stimulating higher levels of purchase.

* **Actively encouraging increased usage** through product promotion, market linkages, and the development of new business linkages.

6.4.2. Smoked Catfish

The focus of the smoked catfish program should be to promote the emerging market opportunity for processing farmed catfish (especially the smaller sized fish) into a smoked/dried product in the Southern parts of Nigeria.

6.4.3. Tilapia

The strategy of a tilapia promotion program should be to work with emerging tilapia farmers and their trading partners to forge business linkages. Also it will be extremely important to develop an appropriate post harvest handling system for tilapia (likely comprising insulated boxes and crushed ice) and educate producers, transporters and retailers.

In particular, this support will involve the formation of stable supply chains in order to satisfy the emerging demand from the fast food sectors (primarily around Lagos). Without an assured supply, this market outlet will likely not engage in entrepreneurial activities such as recipe development or active product promotion. If a steady supply to restaurateurs can be assured there is likely to be a ripple effect throughout the market as consumers will likely show a growing interest in the new product.

6.5 Potential Interventions & Activities

6.5.1 Fresh Catfish

The diagram below illustrates potential activities to stimulate greater consumption through lowering the cost of fish.

[15] Markets are typically highly sensitive to under and over supply. Small shortfalls in supply often provoke disproportionate increases in prices, and visa versa.

Figure 49

The key focus for the fresh catfish sector should be on lowering costs & promoting sales – COST REDUCTION

Objective	Focus/Action
Lower Production cost	Feed, formula, competition, local production, standards
Lower Transport costs	Trucks & tanks, improved systems Increased Production in SS & SE, & Middle belt
Reduce PH losses	Development & dissemination of best practical PH practices, Weight Loss (10-20%), Death (1-2%), Skin Damage
Market Transparency	Communication (data bases etc) Wholesale/Auctions (in Urban markets or on farm)

Fish feed amounts to nearly 30% of the end market retail price for farmed catfish. There is a definitely an opportunity to promote local production of fish feed (especially floating feed). MARKETS support for the Nigerian feed industry is currently under discussion.

Transportation amounts to 5% of final retail costs. Promotion of local fish farms could likely reduce this cost by about 65%. However, as some fish will inevitably continue to be transported long distances there are opportunities to lower transportation costs through consolidation. Reduced transportation cost and lower post harvest losses could be achieved through the use of larger water tanks. With correct tank design (insulated, light limiting, lower fish density), and improved post harvest practices (more frequent water changes, insulated and shaded basins to hold fish at the retail and restaurant level), post harvest weight loss, skin damage and fish deaths would be reduced. We have estimated that post harvest weight loss adds about 15% to retail prices; fish deaths and skin damage add a further 1.3%. Much of the weight loss is inevitable, but a target for loss reduction could be 1/3 of the 15% of added retail costs. Post harvest losses are lower for locally farmed fish (amounting to about 9% of the retail price). A realistic target would be a 20% reduction in this figure. It is obvious that there is an immediate need to develop practical and appropriate post harvest methods and to disseminate best practices to the retail, trading and restaurant sectors.

When shipped over long distances, trader and retailer margins amount to about 15% of the retail price for catfish. This figure remains about the same for locally produced and harvested fish, partly because the retailer takes on more of the transport and trade financing roles and also because of the lower marketing costs for local fish as compared with product trucked in from other regions. In the long distance marketing channels, options exist for direct buying by secondary wholesalers. Selling prices from secondary wholesalers to retailers can almost certainly be kept more honest if the retailer has better insight into costs and prices. Currently there is a distinct lack of pricing transparency in the market chain. Increased direct sales, better market intelligence, more transparent pricing and lower costs could be achieved by developing databases of contacts,

farmers, traders and retailers and disseminating this information so that the various players can better contact and trade with one another (n.b. telephone contacts like this will also help rationalize feed and fingerling supply). Effective local marketing is currently compromised due to the inefficient timing of ''on farm" fish sales. There exists an opportunity for fish farmers to work cooperatively to reduce competition and better coordinate the timing of farm sales[16].

Figure 50

The key focus for the fresh catfish sector should be on lowering costs & promoting sales - INCREASING SALES

Objective	Focus/Action
Lower Prices	Happening + previous diagram
Increased Availability	Output is growing, production can be promoted in SS-SE & the Middle belt
Product Promotion	Active Sales by producers
	New Recipes
	Health issues
	Creative product mareksting
New Outlets	Links & Contracts to Fast Food
	Drying of fish
Support Bukas	Advocacy protection from closure
	Training on improving shelf life
Improve Trade Finance	Credit for retailers & bukas

While the health benefits of a fish rich diet are increasingly important influences on consumer buying choices, effectively motivating health professionals to disseminate the message that catfish is a healthy dietary choice may prove difficult.

6.5.2. Smoked Catfish

We believe that the smoking of farmed catfish represents a new and potentially profitable enterprise activity (especially for women's micro-enterprises), initially in the SW. Currently, there are large numbers of smokers producing a range of smoked products (bonga, iced fish etc.). Utilizing farmed catfish represents a diversification opportunity for them. The economics of catfish smoking needs to better understood, so its profitability potential can be verified and lessons learned about how the enterprise can be improved. For example, the 'Chokor' smoking system (widely in Ghana, Benin and other parts of West Africa) has lower fuel requirements and might prove more profitable[17]. In addition, smoking is a way that small sized catfish, non-premium grades, and dead fish can be efficiently utilized.

[16] In India for example villages' coordinate their weekly markets so that they occur of different days of the week.

[17] Chokor has higher throughputs, and the end product is less carbonized. However consumer acceptance will need to factored into any introduction program.

Figure 51

Smoking of Catfish presents opportunities, especially in the Southern parts of Nigeria.

Enterprise opportunities exist for:

- fish farmers, to absorb small sizes, unwell fish and fish that don't find a market
- small scale processors, to buy from farms/retail outlets & process fish (mainly existing smoker/dryer enterprises)

The scale of the opportunity 5,000 Mt of fresh catfish:

- Focus on producing dried catfish weighing 100 g to 200 g (i.e. 300 to 600 g of fresh fish.)
- Value of the market at retail $ 15 mn (N 2 Bn)

Possible Interventions:

- **Feasibility study**
- **Training in drying for farmers**
- **Linkages between dryers and farmers**

6.5.3. Tilapia

This report has given some indication of the likely farm prices for tilapia of different sizes. We have provided important basic numbers with which to conduct a feasibility study of the potential profitability of farmed tilapia. Verifying that tilapia farming could become a profitable enterprise for Nigerian farmers is an important next step. We believe that there is some small scale pilot production of tilapia already underway in Nigeria. The important question is how this current production can be most effectively used to create the foundation for a strong emerging aquaculture sector.

Currently farmed fish could be used to develop appropriate post harvest handling systems. This could be achieved by results orientated research, where the challenge would be to partner with the private sector[18] to develop a cost effective transport system for tilapia. Developing an effective post harvest system among a few influential traders would likely speed acceptance of the system by the rest of the trade.

[18] For example: Traders/Wholesalers, ice producers, cool box manufactures such as 'Eleganzer', and suppliers of insulation.

Figure 52

Tilapia is a longer term opportunity, providing opportunities for a lower cost fresh fish & significant value added activities for grilling & catering outlets

Aim is to:

- Support the emergence of a tilapia as a fast food product through close supply chain relationship between the fast food chains & the better organised fish farms – aim for ripple effect to create larger demand in Nigeria
- Develop & embed an appropriate PH system for tilapia e.g. crushed ice and insulated fish boxes – 'best practices' to disseminate thru sector

Possible Interventions

- Facilitate the process of stable supply relationships between producers & leading fast food sector
- Develop practically through field trails, and in conjunction with ice manufactures, insulated box manufactures and traders an appropriate post harvest handling system to take tilapia from the farm to the restaurants/traders refrigerator

Fast food companies are interested in developing recipes based on tilapia; however the product must be competitive with croaker in term of price and reliability of supply. These chains could become effective partners in building the sector by both fueling sales and promoting new markets. However, they will only do this if they are guaranteed a secure and reliable supply of tilapia (quantity, quality, size, deliver time etc). Developing an improved post harvest system would form the basis for ensuring this supply. Developing effective linkages between tilapia producers and restaurants, along with the necessary levels of organization and ability to deliver sufficient product volumes would encourage fast food chains committed to the product (e.g. Mr. Biggs, Mama Cass) and would bolster the development of this market.

May 1st 2006

Annex 1

Summary of Fast Food Outlets Attitude to Catfish and Tilapia

The Fast Food Sector

The fast food sector is rapidly expanding in Nigeria. The following section focuses on this sector and the current level of interest in catfish and tilapia.

Mr. Biggs/UAC has 170 outlets nation-wide and expects to open 50 more outlets in 2006. Currently, Mr. Biggs is only using croaker at a rate of 5 tons/week. They would like to include tilapia alongside croaker if the results of their tilapia testing are positive. Mr. Biggs is currently developing an African menu concept which will start in mid 2006. The revised menu will include catfish and smoked fish along with Ofada rice. Mr. Biggs's tilapia requirement will be whole fish of 500 grams or larger, or fish cut into chunks of 500 grams. Croaker is presently supplied at N275.00/kg., and an indicative tilapia price of N350.00/kg. appears acceptable.

The Managing Director of the **Tetrazzini** fast food chain is Princess R. D. Okonkwo. They have are 6 outlets in Lagos and 1 in Abuja. New outlets are planned for Port Harcourt and Abuja (a second outlet for Abuja will start operations in April 2006). Tetrazzini buys catfish from CHI farms on ad hoc basis. There are no supply contracts in place and supply of fish to the Abuja unit is not satisfactory. Because Tetrazzini prefers to purchase live catfish (which they believe is not currently available in Abuja), they airfreight ½ ton of catfish from Lagos twice weekly. This adds logistical difficulty to their operations and cost to the final product. Tetrazzini would like to use tilapia on their menu if a regular supply of good quality fish can be found.

Sweet Sensation has 14 outlets in Nigeria, and is planning another 10 outlets in 2006. Currently they buy both croaker and catfish. Each outlet buys product individually, but suppliers need to be accredited by the R&D department in Ikeja. The preferred purchase catfish size is 1 – 1.2 kg, and the fish needs to be alive. The price of catfish needs to be competitive with croaker (currently N 350/kg).

Tantalizer has 30 outlets, of which 19 are located in Lagos. These are mainly operated as franchises. Purchases are made centrally from their Festac Town offices, although in the case of live catfish, the deliveries are generally made direct to the franchises. Currently they buy direct from fish farms, at the rate of around 1.5 tons per month. The current size purchased is 800-1000 g however they would prefer larger fish (1.2 kg). Their purchase price is N 360 at the farm gate.

Mama Cass has 8 outlets, plus 2 catering companies. Purchases are organized centrally and delivered locally. They clientele are primarily middle and upper class. Their catfish stew is popular, possibly the second best selling item on the current menu. There are new fish recipes in development. Weekly purchases are about 400 kg per outlet. Purchase price for catfish is about N 350/kg as compared with N 330/kg for croaker. They see catfish as more of a working class product and will not attempt to compete with the buka, or beer and pepper soup culture. They are extremely interested in developing a range of menus around tilapia, which they believe has much greater potential. They would like to develop supply chain relationships with tilapia fish farmers so that they can develop new menus on the foundation of a guaranteed supply.

Annex 2

Summary of Industry Comments made at Report Presentation May 2nd at Ibadan University.

- There had been a period of growth in the fish farming sector previously in Nigeria, particularly in the SE. Subsequently, many of these farms closed. There maybe useful lessons from this experience for today's aquaculture sector.

- Many believed the SS region was not interested in fish farming, and that fish would have to continue to be shipped from the SW to satisfy that regional demand.

- Limited access to competent technical advice and fish feed are felt in the SS-SE region, and was restricting the development of the sector in this area.

- There was general agreement that post harvest handling practices needed to be improved through the establishment and dissemination of best practices.

- True differences between region tastes and preferences (fish type and size) needed to be better understood.

- Participants felt that tilapia might not be significantly cheaper to produce that catfish, due to its slower growth rate. There was concern that this limitation may offset any potential market growth.

- People voiced preference for smoked fish produced in the South because of the slower burning of the wood used and the finer flavor it imparts.

- The FAO is planning to test a 'Chokor' smoking system for use in Nigeria.

- A debate was held about the relative importance of primary wholesalers and whether their exclusion was to the adavantge of the industry. It was agreed that he gender of the gender of the wholesaler was irrelevant, rather the questions became did they add value or unnecessary costs into the market chain? The general belief was that while they generally created opaqueness in the market chain due to their motivation to maximize profits, they also demonstrated great skill in moving product around the country and in finding and developing markets. It was agreed that these skills needed to be utilized in order to promote tilapia as a new aquaculture product.

- Better communication the Netherlands, had an appreciable effect on improving prices.