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Economics of Fish Marketing in Central Uganda: A Preliminary Analysis

James O. Bukenya¹, Theodora Hyuha², Julius Twinamasiko² and Joseph Molnar³

¹Department of Finance, Agribusiness & Economics, Alabama A&M University, Normal Alabama

²Department of Agribusiness and Natural Resources, Makerere University, Uganda

³Office of International Agriculture, Auburn University, Auburn Alabama.

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Abstract

The paper examines profitability and market performance of small-scale fish traders selected randomly from a cross-section of nine fish markets in four districts in Central Uganda. Data were collected through a structured questionnaire which was designed to solicit information on traders' socio-economic characteristics, marketing characteristics, operating costs and returns, and problems associated with fish marketing in the study area. Percentages were used to describe the socio-economic characteristics, market characteristic and problems associated with fish marketing while gross profit and marketing performance models were used to determine profitability, marketing margin and operational efficiency, respectively. The results suggest that fish trade is carried out by both men and women. More men are involved in the trade of fresh fish while more women are involved in the processed (sundried/smoked) fish trade. Some traders dealt in more than one species of fish although a majority sold exclusively in one species. Gross profit was estimated at USh358.40/kg and USh234.73/kg for wholesalers and retailers, respectively, with marketing margins of 19.32% and 16.67% for wholesalers and retailers, respectively. The market operational efficiency was 279.27 percent, implying high efficiency in fish marketing in the study area. The major pressing concerns which included high supply cost, low prices, low fish supply and increased arrests for selling immature fish were common to both retail and wholesale marketing channels.

Key words: Fish marketing, survey data, gross profit, market margin, operational efficiency, Uganda

Introduction

The Ugandan fisheries industry is currently based on inland capture fisheries mainly from five major lakes: Victoria, Albert, Edward, George and Kyoga. Lake Victoria, which supplies about 50% of the catch, is the most important source, both in terms of commercial value and absolute quantity (FAO, 2011; NARO/MAAIF, 2000; Ogutu-ohwayo, 2000). The Nile perch (*Lates niloticus*) has dominated the country's fisheries over the past two decades accounting for 60% of the catches by volume (MAAIF 2001). Other major species harvested include mukene (*Rastrineobola argentea*) at 20%, the Nile Tilapia (*Oreochromis niloticus*) at 10% and other species (of the genera *Bagrus*, *Clarias*, *Protopterus*, *Barbus*, *Synodontis*, *Momyrus*, *Alestes* and *Labeo*) accounting for the remaining 10% (MAAIF 2001). Although the fisheries industry is largely artisanal, with the majority of the participants operating on a small-scale at all stages of production – catching, processing and marketing, the sector is one of the most important sectors in Uganda's economy; contributing to a number of socio-economic areas including industry employment, livelihoods, food security and foreign exchange earnings (UBOS, 2005; Keizire, 2003; Banks, 2003; Keizire, 2006). For instance, it employed over 1.3 million people and earned the country approximately US\$143 million in 2005 of foreign exchange (UBOS, 2005; Keizire, 2003; Banks, 2003). Fish is also an important source of animal protein available to the national population. The average per capita consumption is estimated at 10 kg, accounting for over 50% of the protein intake for an average Ugandan (MAAIF 2001).

Given its importance in promoting food security and advancing rural economic development, Uganda's fisheries sector has recently benefited from increased funding from the various international development agencies [such as Food and Agriculture Organization (FAO), United States Agency for International Development (USAID), United Nations Industrial Development Organization (UNIDO)] and advanced research institutes (such as Oregon State University, Auburn University) which have increasingly promoted aquaculture technology within the context of integrated agriculture and have begun addressing socio-

cultural and economic factors that have in the past stalled aquaculture development in the country (FAO, 2010; Auburn University, 1999; USAID-FISH, 2009; USAID-AQUAFISH, 2009; UNIDO, 2009; Oregon State University, 2007). One area that has not attracted similar attention is the distribution system. Uganda's marketing system is quite complex involving fairly wide geographical areas, an assortment of products, and a large number of traders and processors who supply the consumer in ways that may be direct or indirect, formal or informal.

Although the operation of the local marketing system has been the subject of previous studies (Crutchfield, 1958; TDRI, 1984; Kirema-Mukasa and Reynolds, 1993; SEDAWOG, 1999) and whilst informative and useful, earlier studies are relatively out dated and thus not reflective of the recent transformations in the distribution system. Over the last fifteen years domestic fish distribution has improved with increased channels involving middle agents/boat traders that supply to fish factories involved in industrial fish processing and export to international premium markets (Keizire, 2006), and fish traders that supply to rural and urban markets (Keizire, 2006). Thus, this study was conducted in part to update the current information base and to investigate the structure of fish marketing in the study area. The specific objectives were to conduct profitability and market performance analyses and identify areas where small-scale traders can make improvements. This was accomplished through primary data collected through a survey questionnaire. The structure of the questionnaire and the data are described in the section that follows.

Data Description

The data for the study were collected in four districts (Kampala, Mpigi, Mukono and Wakiso) in Central Uganda, an area defined for a two-year small-scale aquaculture project funded by USAID-AquaFish Collaborative Research Program (CRSP). Respondents were drawn from a cross-section of wholesale and retail fish traders operating in nine markets (Kasubi, Busega, Mpigi, Mukono, Bwise, Kawempe, Nsangi,

Nansana and Wekembe) located in the four districts alluded to earlier. Although data collection was limited to marketing areas in Central Uganda (i.e., the target fisheries regions of the Project), the areas covered are those places where most people are concentrated and marketing activity is most intense in the country.

Prior to administering the questionnaire, the instrument was pre-tested at Kajjansi fish market in Wakiso district. Responses from the pre-test were used to develop the final questionnaire. The pre-survey activities included reconnaissance for the pilot survey, revision of survey instrument and preparation of the sampling frame. Survey data were collected in July 2011 with traders selected randomly across the nine markets. Survey enumerators were university students who were trained by social scientists (from Makerere and Alabama A&M Universities), thus were knowledgeable about primary data collection methodology. The interviews, lasting about 30 minutes, solicited information which included traders' socio-economic and market characteristics, costs and returns and problems associated with fish marketing in the study area. The final sample (74 fish traders) was distributed among the four districts as follows: 40.54% from Kampala district, 22.97% from Wakiso district, 20.27% from Mukono district and 16.22% from Mpingi district. The data were analyzed using descriptive statistics and performance models as described in the sections that follow, but first a description of the respondents and market characteristics is presented in the immediate section.

Description of Respondents and Market Characteristics

Table 1 presents the socio-economic profiles of fish traders in the study area. Based on the descriptive statistics, it appears that most of the small-scale fish traders in the sample are relatively young. In the nine markets surveyed, approximately 70% of the respondents who answered the age question were under 40 years old. The gender proportions were closely matched with men representing 55% of the sample while female closed in at 45%. Mostly, the respondents operated in urban markets (60%) and a significant

number (36.49%) indicated operating roadside stalls along major roads leading to urban areas, where business is active enough to warrant a full-time commitment. About 30 percent operated at Busega market followed by Mukono (20%), Mpigi (16%) and Kasubi (11%) markets. The other markets including Bwaise, Kawempe, Nansana, Nsagi and Wekembe represented 23% of the sample.. The bulk of the traders (66 percent) were married with generally low levels of education (7 to 8 years of schooling).

Fish trading was the sole occupation for the majority of the respondents (86.49%). It was also revealed that farming and shop keeping frequently supplement fish mongering and processing as sources of income for less than 9% of the sample. Such occupations as transporting, brewing, brick making and civil service work also figure to some extent as additional means of livelihood for a small section of fish traders in the sample. Survey data revealed also that small-scale fish traders in the study area do not seem very inclined to join together in trade-related associations or co-operative societies, with only 20% of all traders enumerated reporting to have group/association membership. It was found that in some of the large urban markets of Kampala and Mukono, vendors' associations are emerging as represented by the 20% who indicated membership to trade related associations. These are specific to each of the markets where they occur. The associations serve as forums for traders to exchange views about conditions and problems in their respective markets, and as a means to represent their interests to municipal market administrators and other authorities.

Evidence from the markets where associations do exist suggests that fish traders can and do work together in informal ways to help one another. When supplies are scarce, for example, traders may agree to conduct their purchasing from landing sites on a rotational, day-on, day-off basis. Similarly, extension of daily or overnight credit privileges to fellow traders was revealed to be a common practice among collaborating traders. Overall, the low aggregate level of membership in fish trade associations may be related to their

ineffective performance in the past (Kirema-Mukasa and Reynolds, 1991). The majority of the traders (70.27%) were retail operators while over 84 percent were business owners who used personal funds (not loans) to finance their fish trading businesses. Access to credit is another obstacle faced by the small-scale fish marketing operators and this is partly due to lack of collateral necessary to secure credit. It is not surprising therefore, that 92% of all traders enumerated did not have access to credit. Over 68 percent of the respondents have been operating their business for more than 5 years.

----- **Table 1 about here** -----

We were interested in knowing whether farmed fish was available on the local market and thus included a question asking traders to indicate if they sold farmed fish on top of capture fish. Almost all responded (92%) were not selling farmed fish and when asked why they did not sale farmed fish, the most frequent response was lack of supply (scarcity of farmed fish) followed by fish size (Figure 1). These results have serious policy implications for the emerging aquaculture sector in Uganda. If fish farming is expected to make-up for the fish shortages due to declining stock of capture fisheries in Uganda's rivers and lakes, then fish farmers and all stakeholders should pay attention to these among other issues affecting the quality and quantity of farmed fish in the region.

----- **Figure 1 about here** -----

Some traders dealt in more than one species of fish although a majority sold exclusively one species. Tilapia and Nile perch were the most traded species (78.38% and 68.92%, respectively) and over 40% of the respondents indicated selling live/fresh fish while 28% indicated selling dried and or smoked fish. A close examination of the data revealed that more men were involved in the trade of fresh/live fish while

more women were involved in the processed (sundried/smoked) fish trade. The majority of the traders (82%) lived closer (within 7 miles) to the market where they operate and refrigeration, drying and or smoking were the most common methods used to preserve unsold fish.

Local Fish Marketing Channels

Figure 2 highlights the different channels through which fish may ultimately reach the consumer, directly or indirectly, formally or informally. The distribution of fish and fish products in Uganda takes place through a series of stages run by a set of intermediaries. Usually the primary stage occurs at landing sites, when fishing vessels return from the fishing grounds and discharge their catches to households at canoe landing points on lakes or rivers, sale to households via head load or bicycle traders that buy fish from fishermen at landing points, wholesalers that collect fish with trucks in fairly large quantities delivering it to retailers, and processors that undertake basic processing such as salting and then sell to traders or consumers directly (Kirema-Mukasa, 1993).

----- **Figure 2 about here** -----

Marketing Costs

As noted by Kirema-Mukasa and Reynolds (1993), marketing costs vary widely between the different channels of fish trading operations. A bicycle hawker working in a rural area lacking formal markets may only have to be concerned about the original cost of the load purchased at the landing site, investment and maintenance costs of the bicycle and the box or basket in which the fish is carried, plus the cost of a fishmonger's license from the local government authority. The wholesaler operating in and out of a major urban market, on the other hand, might have to worry about the original cost of the fish consignment, the cost of hiring a vehicle every day, the cost of the required trading license from the Fisheries Department, the local dues at the landing, the dues in the market where the fish is sold, and payment for loading and

offloading. A retailer operating in a formally established marketplace mainly incurs marketing costs in the form of investment, depreciation outlays on tables or stalls and on market dues and storage of unsold products. In our sample the major market channels were wholesale and retail channels. In the wholesale channel, fish was bought from both fishermen at the landing site and from local collectors. In the retail channel, fish was bought from wholesalers and in some instances from collectors at the landing sites.

The major costs revealed by traders in our sample are depicted in Figure 3. As shown in the figure, there are four major cost categories observed for the two dominant marketing channels in the study area. The marketing costs are higher in the retail channel (US\$284.73/kg) compared to the wholesale marketing channel (US\$235.52/kg), which is not surprising considering the fact that retailers usually sell in small quantity at a point in time, hence prolonging the time spent and expenditures on the various marketing functions. Particularly, storage costs represent a substantial amount of the cost in both wholesale (US\$155/kg) and retail (US\$146/kg) marketing channels, followed by transportation of fish from the landing sites to the markets at US\$110/kg in the retail channel and loading/offloading at US\$51/kg in the wholesale channel. The least cost component of the marketing chain for fish retailers was packaging (US\$8/kg) while transportation (US\$13/kg) was shown to be the least cost in the wholesale channel.

----- **Figure 3 about here** -----

Profitability Analysis

The general expression for estimating profit of the intermediaries in the marketing process is given as:
Intermediaries profit = Sale price – Purchase price (cost price) – Cost of marketing. Thus, for the wholesaler net marketing profit is given mathematically as:

$$\pi_W = (P_W - P_{FM}) - (C_W) \quad (1)$$

where,

π_W = Net profit of the wholesaler (Uganda Shillings (USh)/kilogram (kg))

P_W = The wholesalers' selling price or purchase price of retailer (USh/kg)

P_{FM} = The gross price received by fishermen or wholesale price received by the fishermen (USh/kg)

C_W = The cost incurred by the wholesalers during marketing (USh/kg)

Similarly, net marketing profit of the retailer is given by:

$$\pi_R = (P_R - P_W) - (C_R) \quad (2)$$

where,

π_R = Net margin of the retailer (USh/kg)

P_R = Price at the retail market or purchase price of the consumers (USh/kg)

C_R = The cost incurred by the retailers during marketing (USh/kg).

The first bracketed term in Equations (1) and (2) indicates the gross return, while the second bracketed term indicate the cost at different stages of marketing. Thus, the total marketing profit of the market intermediaries (π) is calculated as:

$$\pi = [(P_W - P_{FM}) - (C_W)] + [(P_R - P_W) - (C_R)] \quad (3)$$

Also, total marketing cost (MC) incurred by the market intermediaries is calculated as:

$$MC = [C_W + C_R] \quad (4)$$

It should be noted that the choice of gross profit model was as a result of assuming negligible fixed costs.

Performance Measures

Market Margin and Market Efficiency Analysis

Consumer food expenditure or food bill comprise of marketing components and farm components. Changes in these marketing and farm 'shares' of the food bill indicates the trends in costs, profits and services provided by farmers (fishermen in this case) and traders as well as the performance of the farm (fisheries) sector compared to the food (fish) marketing sector. The proportion of the consumer expenditure that goes to the traders is referred to as marketing margin. Theoretically, a marketing margin is simply the difference between the primary and derived demand curves for a particular product. Primary demand is determined by the response of the ultimate consumers and this is usually based on the retail price and quantity purchased by consumers. Primary demand is in some sense a joint demand for all the inputs in the final product. Thus a food product at the retail (i.e. the primary demand) may be divided into two inputs: the farm-based components and the processing-marketing components. This relationship is presented in Figure 4.

-----Figure 4 about here -----

As depicted in the figure, the derived demand for fish and fish products can be obtained by subtracting the costs of all marketing components from the primary demand (i.e. $D_D = P_D - M_C$). It can therefore be seen that the primary supply (P_S) represents the derived demand for fish (D_D). Thus the derived demand is based on price-quantity relations that exist either at the point where fish leaves the landing site or at intermediate point, where fish is purchased by wholesalers or processors. The primary supply (P_S) represents the price-quantity relationship at the fishermen level. The derived supply (D_S) at the retail level is derived from the primary supply (P_S) by adding an appropriate margin. Thus, a retail price is established at

the point where the primary demand (P_D) intersects the derived supply (D_S) as shown in the figure. The fishermen-level price is based on derived demand (D_D) and primary supply (P_S). The difference in the two prices ($P_C - P_F$) is the marketing margin.

Following previous studies (Olukosi and Isitor, 1990; Gaya, Mohammed and Bawa, 2007), market margin analysis is used to determine the deference between the price paid by fish consumers and that received by fish traders as:

$$\text{Market Margin} = \left[\frac{\text{Consumer Price} - \text{Supply Price}}{\text{Consumer Price}} \right] * 100 \quad (5)$$

On the other hand, market efficiency is computed using the value added concept as:

$$\text{Market Efficiency} = \left[\frac{\text{Value added through marketing}}{\text{Cost of marketing services}} \right] * 100 \quad (6)$$

In equation 6, the value added through marketing is estimated by subtracting the total cost price of fish as it follows through the market from the total selling price. The cost of marketing services was obtained from the total cost of providing marketing functions such as transportation, storage, packaging, loading/offloading and license charges.

Estimated Results

Gross profit, marketing margin and market efficiency were used respectively to determine profit and market performance. The results (Table 2) show that profits made in both market channels (wholesalers and retailers) were positive, however, wholesalers realized higher profits compared to retailers, though the difference in profit between the two market channels was not statistically significant. As indicated in the table, gross profit per kilogram (kg) of fish sold by wholesalers and retailers were US\$358.40 and

US\$234.73 respectively, with overall market profit for the total sample estimated at US\$262.96/kg. The marketing margins were estimated at 19.32 and 16.67 percent for the wholesalers and retailers respectively, with overall marketing margin for the total sample of 17.23 percent. Similarly, the market operational efficiency was 279.27 percent for the entire market, implying high efficiency in the fish marketing business operated by small-scale traders in the study area.

----- **Table 2 about here** -----

Socio-Economic and Market Characteristics

We further explored the influence of traders' socioeconomic and market characteristics on market performance. This was accomplished by estimating equations 3 and 4 with the data arranged based on the selected socioeconomic and market characteristics. To establish a basis for statistical inference, we used the estimated total market parameters reported in Table 2 to compute the differences of means between the overall market estimates and estimates for the socioeconomic and market characteristics. The estimated results are reported in Table 3 with the t-statistics based on the difference of means test. As shown in the table, five of the ten examined characteristics are statistically significant at the conventional levels (1%, 5% and 10%) including age of the respondents, experience as measured by number of years the respondent has been selling fish, ownership of the business, the district where the market in which the respondent's fish business is located and access to credit. Each of these variables is discussed in turn starting with the respondents' age.

First, the age variable was examined using three categories representing young traders (less than 31 years old), middle-aged traders (between 31 and 40 years old) and older traders (above 40 years old). Under the profitability model, only the estimate for middle-age traders was statistically significant at the conventional

levels but negative (-US\$366), implying that fish marketing enterprises operated by middle-aged traders are significantly associated with operating unprofitable enterprises compared to the average market operators (US\$262.9) as estimated in the overall model. Similarly, under the marketing margin model, the estimates for middle-aged and older fish traders are statistically significant, implying that the difference between the prices paid by consumers and prices received by middle-aged traders (older traders) is lower (higher) compared to the average trader as estimated in the overall model.

The results for the experience variable (as measured by the number of years the respondent has been selling fish) is organized into four categories representing traders who have been in the business for less than 6 years, 6 to 10 years, 11 to 20 years and more than 20 years. For the profitability model, the results suggest that there are no significant differences in gross profit between the different experience levels and the average operator. To the contrary, the marketing margin model suggests the existence of significant differences in the prices paid by consumers and prices received by traders. Particularly, traders with 6 to 10 years of experience are shown to post higher margins (22.5%) compared to the average operator as estimated in the overall model (17.2%). To the contrary, traders with 11 to 20 years of experience correspond to lower margin (13.4%) compared to the average operator, as estimated in the overall model.

----- Table 3 about here -----

We also investigate the influence of market location (district variable) on profitability and market performance. It is plausible to assume that traders operating in markets located in districts that are densely populated and/or with highly educated population and high incomes are likely to post higher profit margins, everything else constant. The results for the profitability model are somewhat in line with this reasoning, showing statistically significant negative gross profit (-US\$220 and -US\$399) for traders in the less urban

and less income districts of Wakiso and Mpigi, respectively, implying that traders in these districts performed worse than the overall profitability model. On the other hand, the marketing margin model results show that only traders in Mukono district performed better than the overall market margin model.

The variable for business ownership shows no significant difference under the profitability model but does under the marketing margin model, implying that traders who use other employees to perform the selling functions of their fish businesses register high market margin (22.4%) compared to the overall model (17.2%). Finally, accessibility to credit has a crucial role for elimination of traders' financial constraints to invest in marketing activities and improved technologies. Generally, credit accessibility is important for improvement of quality and quantity of fish products and thus profitability. This is reflected in both profitability and market performance models. The results for the profitability model show high statistically significant gross profit (US\$805) for traders who had access to credit in comparison to the overall model (US\$263). Similarly, the marketing margin model shows significantly higher marketing margin (28.8%) for participants who had access to credit.

Major Constraints

Previous studies have highlighted several factors constraining the development of processing and trading food and agricultural products in Uganda including limited access to resources, insufficient credit facilities, inadequate transport means, bad roads, poor processing and marketing facilities to name a few. To ascertain the extent to which these among other factors are of concern to fish traders in the study area, the questionnaire asked traders to indicate what they perceive to be the major concerns in the fish marketing business. A tally of their responses is summarized in Table 4, representing the proportions of the total sample that identified a particular issue to be of major concern. As shown in the table, the most pressing concerns are common to both retailers and wholesalers, including high fish supply cost (21.62%), low sales

price (16.22%), low fish supplies (12.16%) and arrests for selling immature fish (18.92%). When looked at within the marketing channels, the results reveals that high supply cost (22.2%), low fish prices (18.5%) and arrests for selling immature fish (16.7%) are the major concerns highlighted by the retailers in the sample. On the other hand, unreliable fish supply (20%) in addition to high supply cost (20%) and arrests for selling immature fish (25%) ranked higher among wholesalers.

----- **Table 4 about here** -----

The major concerns highlighted by fish traders in the study area are not surprising given the reported increased decline of fish stock in Lake Victoria due to over exploitation and illegal fishing activities. Indeed, the practice of fishing, trading and consuming immature fish is hampering Uganda's hitherto lucrative fishing sector. To ensure continued business the existing laws for the protection of immature fish should be better enforced by increasing the personnel and material resources of the fisheries department and by combating corruption among the fisheries officers, an area that was also mentioned by the traders. Finally, although not ranked high by traders other factors including inadequate market facilities, such as lack of ice plants, containers with aerating devices, processing facilities and protected (cold) storage facilities also limit the development of trading enterprises. Strategies to overcome these among other constraints for fish marketing would benefit both traders and consumers in the study area.

Conclusion

The objectives of the paper were to conduct profitability and market performance analyses of small-scale fish traders in Central Uganda. Traders were selected through a system of random sampling from a cross-section of nine fish markets—Busega, Mukono, Mpigi, Bwaise, Kawempe, Nansana, Nsagi and Wekembe markets operating in four districts—Kampala, Mpigi, Mukono and Wakiso. The data were collected through

a structured questionnaire focusing on traders' socio-economic and marketing characteristics, operating costs and returns, and problems associated with fish marketing in the study area. Percentages were used to describe the socio-economic and market characteristic variables and problems associated with fish marketing while gross profit and marketing performance models were used to determine profitability, marketing margin and operational efficiency, respectively. The results suggested that fish trade is carried out by both men and women. More men are involved in the trade of fresh fish while more women are involved in the processed (sundried/smoked) fish trade. Some traders deal in more than one species of fish although a majority deals exclusively in one species.

Gross profit was estimated at US\$358.40/kg and US\$234.73/kg for wholesalers and retailers, respectively, with marketing margins of 19.32% and 16.67% for wholesalers and retailers, respectively. The market operational efficiency was 279.27 percent, implying high efficiency in fish marketing in the study area. The major pressing concerns were common to retailers and wholesalers and included high supply cost, low prices, low fish supply and increased arrests for selling immature fish. In closing, while the findings of this study highlight some significant variables in the fish marketing channels, some limitations must be considered. First, we have examined an industry which is prevalent with market imperfections at the harvesting, processing, and marketing levels. Second, the common-property characteristic of the basic resource is well known. Finally, the small sample size of our data set warrant some caution when drawing conclusions from the results.

Table 1. Descriptive Statistics

Variable	Frequency	Percent
Gender (Male)	41.00	55.41
Age <40	52.00	70.26
Marital Status (Married)	49.00	66.22
Education (7+ years of schooling)	46.00	60.16
Business Ownership (Owner)	62.00	83.78
Group Membership		
Yes	15.00	20.27
No	59.00	79.73
Type of Business		
Retailer	52.00	70.27
Wholesaler	15.00	20.27
Wholesaler & Retailer	6.00	8.11
Market Location		
Kasubi	8.00	10.81
Busega	22.00	29.73
Mpigi	12.00	16.22
Mukono	15.00	20.27
Other	17.00	22.97
Other Occupation		
Yes	10.00	13.51
No	64.00	86.49
Type of Market		
Urban market	44.00	59.46
Roadside market	27.00	36.49
Other markets	3.00	4.05
Experience (5+ years)	51	68.92
Traded Species*		
Tilapia	58.00	78.38
Nile perch	51.00	68.92
Other species	16.00	21.62
Product Form*		
Live/Fresh fish	30.00	40.54
Dry/Smoked fish	21.00	28.38
Distance to market (<8 miles)	61.00	82.41
Preservation Methods*		
Refrigerate	24.00	32.43
Smoke	35.00	47.30
Access to Credit		
Yes	6.00	8.11
No	68.00	91.89

*Percentages do not add up to 100 due to missing data or because the responses fell in more than one category.

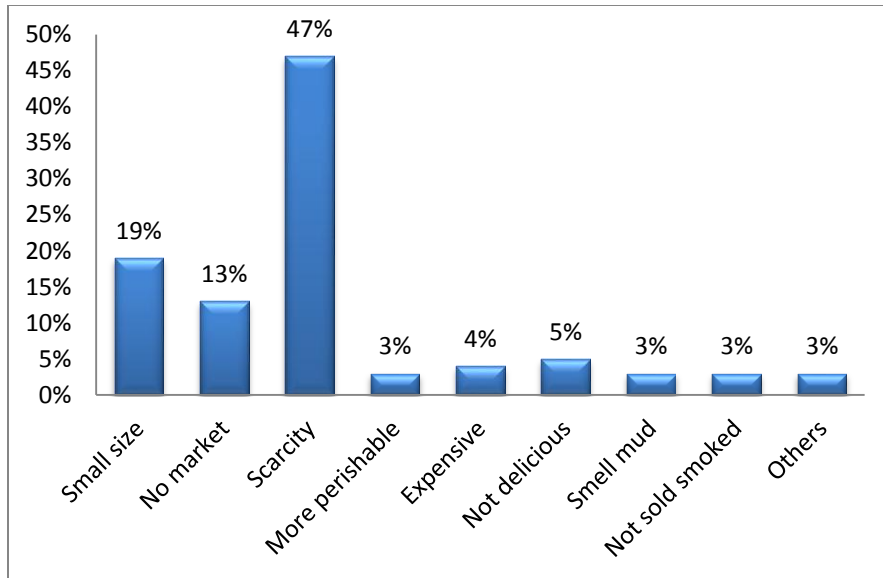


Figure 1. Reasons why traders do not sale farmed fish

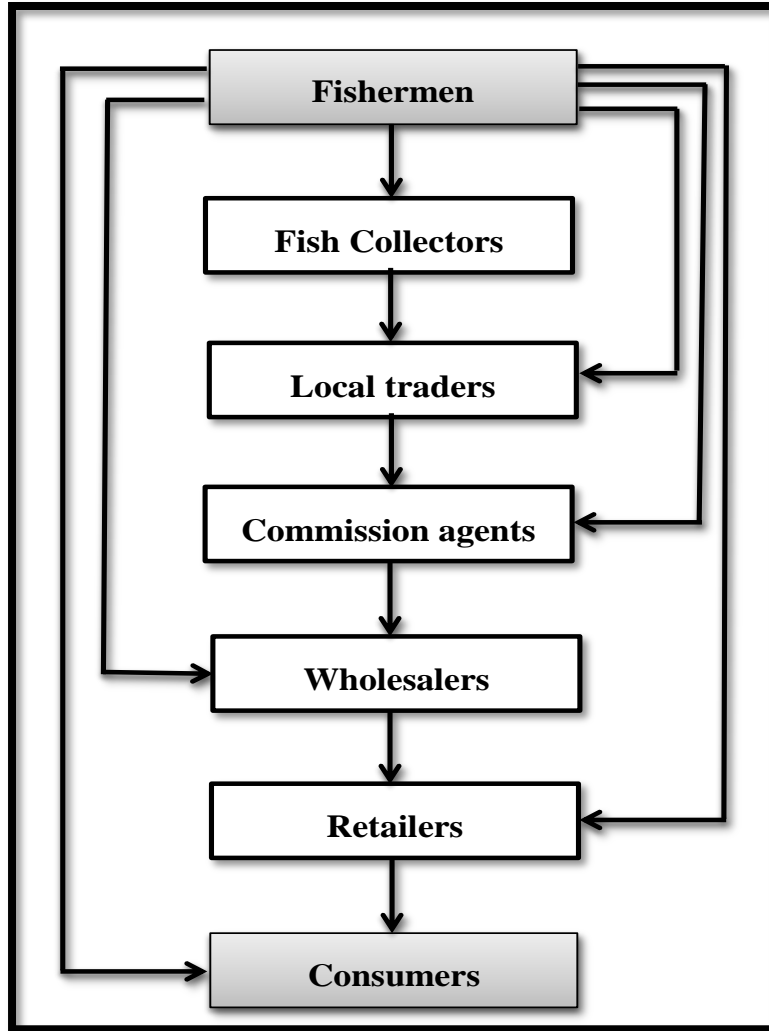


Figure 2. Fish Marketing Channels in Uganda

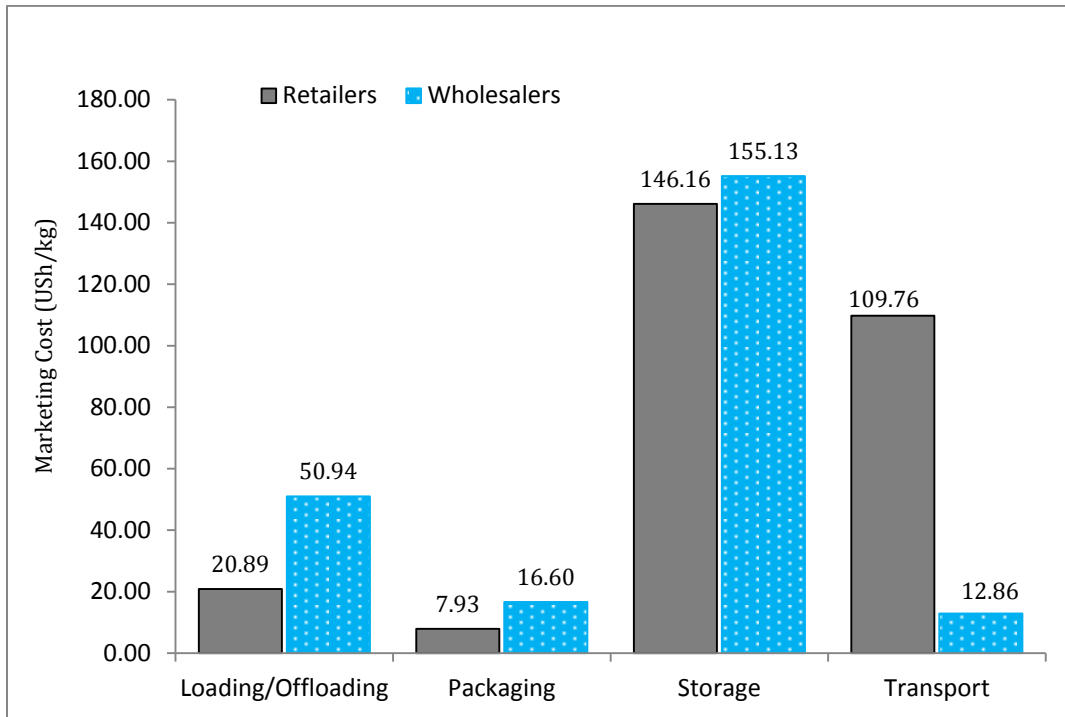


Figure 3. Cost of Marketing Fish in Central Uganda (US\$/kg)

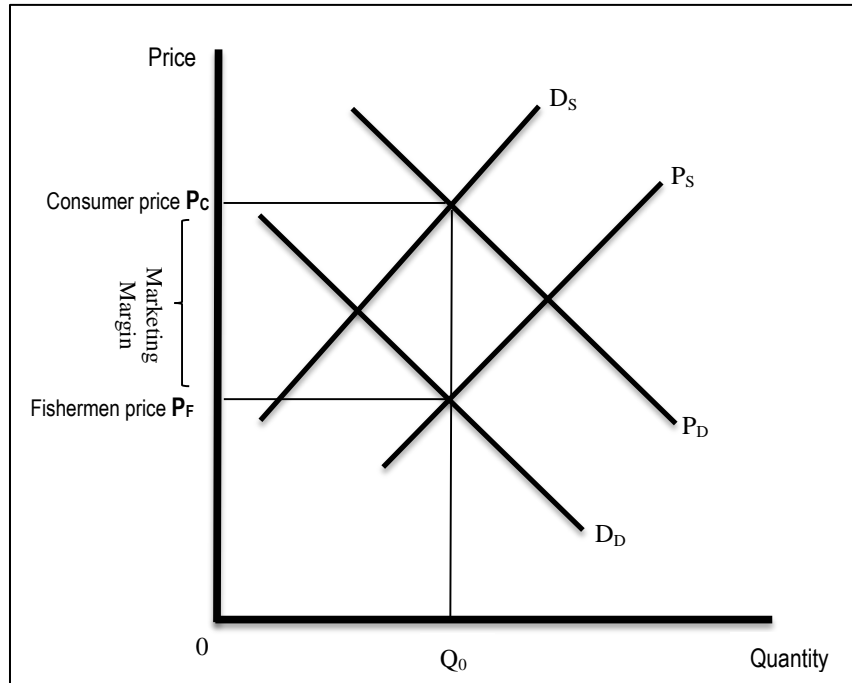


Figure 4. Marketing Margin

Table 2. Estimated gross profit, marketing margin and efficiency for fish traders in Central Uganda

Market Channel	Gross Profit (US\$/kg)	Market Margin	Market Efficiency
Wholesale	358.40	19.32%	187.14%
Retailer	234.73	16.67%	319.27%
Total Market	262.96	17.23%	279.27%

Table 3. Estimated Market Profit and Margin by socio-Economic and Market Characteristics

Variable Name	Profit (US\$/kg)	t-Stat.	Market Margin	t-Stat.
Gender:				
Female	-130.03	1.377	16.73%	0.156
Male	146.90	-0.573	17.55%	-0.126
Age:				
30 years and below	525.11	-0.601	16.26%	0.334
31 to 40 years	-366.20*	1.796	12.22%**	1.961
41 years and above	367.86	-0.326	24.18%***	-2.623
Education:				
Less than 6 years	346.94	-0.252	13.14%	1.356
Primary School	308.86	-0.103	19.13%	-0.808
Above Primary School	-167.06	1.480	21.07%	-1.020
Marital Status:				
Single	461.13	-0.405	18.30%	-0.296
Married	176.59	0.252	16.76%	0.179
Experience:				
< 6 Years	147.27	0.328	14.83%	0.763
6 to 10 Years	857.65	-1.246	22.51%**	-1.949
11 to 20 Years	-86.63	0.919	13.44%*	1.751
> 20 Years	-148.68	1.225	19.35%	-0.964
Salesperson:				
Owner	215.58	0.120	16.60%	0.221
Employee	657.87	-1.115	22.44%**	-2.10
Districts:				
Kampala	768.12	-1.063	17.22%	0.003
Wakiso	-220.34*	1.590	13.34%	1.154
Mpigi	-399.81**	2.030	16.94%	0.130
Mukono	392.22	-0.420	22.60%**	-2.352
Distance to Market:				
< 5 miles	-43.91	0.929	17.31%	-0.028
5 to 7 miles	934.19	-1.267	13.58%	1.086
> 7 miles	299.93	-0.103	20.70%	-1.545
Membership:				
Not Member	419.88	-0.40	17.54%	-0.104
Member	-256.03	1.37	16.21%	0.447
Access to Credit:				
No	209.85	0.134	16.09%	0.418
Yes	804.81*	-1.812	28.82%***	-3.504

*, **, *** denotes significance at the 10%, 5% and 1% levels, respectively for the differences of means test

Table 4. Major problems faced by fish traders in Central Uganda

Problem	Retailers	Wholesalers	Overall Market
Corrupt officials	11.11%	---	8.11%
High supply cost	22.22%	20.00%	21.62%
Transportation	5.56%	10.00%	6.76%
Limited capital	5.56%	---	4.05%
Low prices	18.52%	10.00%	16.22%
Low and unreliable supply	9.26%	20.00%	12.16%
Post-harvest loses	11.11%	5.00%	9.21%
High taxes/license fees	---	10.00%	2.70%
Arrests for selling immature fish	16.67%	25.00%	18.92%

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