

Determinants of Choice of Distribution Channels by Fish Farmers in Ughelli North Local Government Area of Delta State, Nigeria

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ABSTRACT---- *The study examined the factors influencing fish farmers' choice of distribution channels in the marketing of their fish in Ughelli North Local Government Area of Delta State, Nigeria. A two stage sampling procedure was adopted for the study. One hundred and twenty fish farmers were sampled for the study. Descriptive statistics was used to summarize the results of socio-economic characteristics. The logit regression model was used to estimate the parameters of the hypothesized determinants of choice of marketing channels. Four channel levels of fish distributions were identified. Fifteen percent fish production was found to be distributed by channel one, 65 percent in channel two, 18 percent in channel three and 2 percent in channel four. The study showed that age, level of education, farm size, access to information, distance to market and output price were the significant determinants of channel choice by fish farmers. The study recommended the provision of market infrastructure and technical supports in the form of information technology to farmers for the sustainability of the fish farming industry.*

Keywords---- Distribution channel, fish farming and channel choice.

1. INTRODUCTION

The Nigerian fisheries are crucial to the Nigerian economy, contributing 5.4% of the Gross Domestic Production in 2002 (FDF, 2005). They are significant to the nation's economy in terms of food security, income, employment, poverty alleviation, foreign exchange and provision of raw materials (protein source) for animal feed industries. Fish is the commonest and cheapest source of protein for the teeming Nigeria's poor estimated to between 65 – 70% of the entire population. Fish proteins, like other animal proteins contains most of the essential amino acids, in particular the three that are lacking in protein of plant origin, namely Lysine, Methionine and Tryptophan, and for this reason, fish protein is described as first class protein.

It is estimated that over 10 million Nigerians are engaged in primary and secondary fisheries activities as fishers, fish farmers, fish processor, marketers, fish boat builders, gear fabricators and menders, operators of industrial fishing fleet, terminal/jettier operators, in and out board engines repairs and a host of other ancillary actors that derive their livelihood from the fisheries (Ikomi, 2012).

However, the potentials for fisheries to contribute towards sustainable agriculture has remained unexploited because little attention has been paid to it. An important argument by researchers is that to tap the potential in agriculture, we need to set the markets right. One of the most important aspects of marketing is channel selection. According to Lanchester (2000), distribution arrangements tend to be long term and hence distribution channel choices are usually classified as strategic rather than tactical or operational. This is because channel choices have a direct effect on the rest of the firms marketing activities and also, once established, channel systems may be difficult to change especially in the short run. Although this may be less true of small holder farmers, marketing channel decisions are still among the most critical decisions facing any organization or farmer and the chosen channels decisions (Berry, 2010).

Fish farming just like most agriculture production, are likely to be faced with a multi-channel marketing system. The complexities of a multi-channel system can be daunting and seems to exponentially increase the variables that a marketer must consider (Yahisky, 2000). In increasing producer market participation, these variables and overall farm objectives that influence the fish farmer's choice of marketing channel must be identified.

1.1 Statement of Problem

Wise and Baumgartner (1999) pointed out that production, the traditional role of producers in supply chain has become less and less attractive because value and profits are moving down to the downstream, at which point channel actors seems to enjoy more profits. Thus producers (including fish farmers) have inadequate knowledge of the final

demand for their products and are increasingly finding it difficult to develop their marketing strategy. This derives from the fact that intermediaries are not so active in sending messages about markets to upstream partners. Intermediaries often blind upstream firms to changing market conditions, which hinders the ability of these firms to develop fully customer-oriented market-driven strategy.

Again, the changing business environment, characterized by progress of globalization, rapid technology change and the saturation of markets, has challenged many producers to achieve sustainable advantages through collaborative relationships with their channel partners (Cousins and Spekman, 2003). The ability of suppliers to provide superior value to their customers would constitute competitive advantages that are rare, valuable and difficult to imitate (Simpson et al, 2001). However, according to Simpson et al, (2001), almost no research has been conducted to examine how value is created for a channel partner, or the consequences that accrue to channel members. In addition, Lepak et al, (2007) argued that there is little consensus about what value is or how it can be achieved. The ability of value creation to affect competitive advantage has led some academics to call for research that focuses on channel partner value creation (Simpson et al, 2001) and channel choice (Ulaga, 2001).

The purpose of this paper is therefore to identify determinants of fish farmers' choice of distribution channels in Ughelli North Local Government Area of Delta State, Nigeria. Understanding the factors influencing the fish producers' choice of marketing channels is important for the growth and development of the fishery industry and enhancement of producer's income.

2. LITERATURE REVIEW

Channel of distribution is defined as an organized network of agencies and institutions which, in combination, perform all the activities required to link producers with users to accomplish the marketing task (Lake, 2007). Distribution is the physical flow of goods through channels. Channels are comprised of a coordinated group of individuals or firms that performs functions adding utility to a product or service. The major types of channel utility are place (the availability of a product or service in a location that is convenient to a potential customer); time (the availability of a product or service when desired by a customer); form (the product is processed, prepared and ready to use, and in proper condition); and information (answers to questions and general communication about useful product features and benefits are available). Since these utilities can be a basic source of competitive advantage and product value, choosing a channel strategy is one of the key policy decisions marketing management must make.

In agriculture, distribution channels, therefore, move agriculture products (fish) from farmers to consumers and to other businesses and consist of a set of interdependent organizations such as wholesalers, retailers, gatherers or collectors, and sales agents called intermediaries who are involved in making a product available for use or consumption.

2.1 Channel Functions

From the economic system's point of view, the role of marketing intermediaries is to transform the assortments of products made by producers into the assortments wanted by consumers. Producers make narrow assortments of products in large quantities, but consumers want broad assortments of products in small quantities. Marketing channel members buy large quantities from many producers and break them down into the small quantities and broader assortments wanted by consumers.

In making products and services available to consumers, channel members add value by bridging the major time, place and possession gaps that separate goods and services from those who would use them. Kotler et al, (2008) listed eight key functions performed by members of the marketing channel:-

- **Information:** Gathering and distributing market research and intelligence information about actors and forces in the marketing environment needed for planning and aiding exchange.
- **Promotion:** Development and spreading persuasive communications about an offer.
- **Contact:** Finding and communicating with prospective buyers.
- **Matching:** Shaping and fitting the offer to the buyer's needs, including activities such as manufacturing, grading, assembling, and packaging.
- **Negotiation:** Reaching an agreement on price and other terms of the offer so that ownership or possession can be transferred.
- **Physical distribution:** Transporting and storing goods.
- **Financing:** Acquiring and using funds to cover the costs of the channel work.
- **Risk taking:** Assuming the risks of carrying out the channel work.

The question is not whether these functions need to be performed but rather who will perform them. To the extent that the producer performs these functions, its costs go up and its prices become higher. When some of these functions are shifted to intermediaries, the producer's costs and prices may be lower, but the intermediaries must charge

more to cover the costs of their work. In dividing the work of the channel, the various functions should be assigned to the channel members who can add the most value for the cost.

These channel members comprise agents, wholesalers and retailers who perform a variety of distributional tasks and play significant role in the flow of products from producers to consumers and enterprise profitability.

2.2 Distribution Channel formation

Various researchers and authors have suggested models for channel formation. Kotler et al, (2003) present the following sequence of marketing channel formation:-

- Analysis of consumer needs.
- Objectives and restrictions of a marketing channel.
- Definition of marketing channel alternatives.
- Evaluation of channel alternatives.
- Selection, evaluation and control of marketing channel members.

Kotler and Keller (2007) provide almost analogous formation process for marketing channels (analysis of consumer needs, definition of objectives and restrictions of the channel, definition of alternative channels, evaluation of alternatives; selection, motivation and evaluation of intermediaries).

Consoli and Neves (2008) suggest a 5-step sequence:-

- i. Environmental analysis for marketing channel new opportunities.
- ii. Benchmark and competitor analysis in new marketing channels.
- iii. Decisions on the structure of marketing channel.
- iv. Marketing channels flow description and allocation of responsibility.
- v. Implementing and monitoring the performance on the new channel.

2.3 Distributional Channel Levels

Distributional channels are more than single collection of firms tied together by various flows. They are complex behavioral systems in which people and companies (firms) interact to accomplish individual, company and channel goals, Kotler et al, (2008). Some channel systems consist only of organized firms. Others consist of formal interaction guided by strong organizational structures.

Companies (firms) can design their distributional channels in different levels. Kotler et al, (2008) defined channel level as a layer of intermediaries that perform some work in bringing the product and its ownership closer to the final buyer. Because the producer and the final consumer both perform some work, they are part of every channel.

The number of intermediary levels indicates the length of a channel. Figure 1 shows several consumer distribution channels of different lengths.

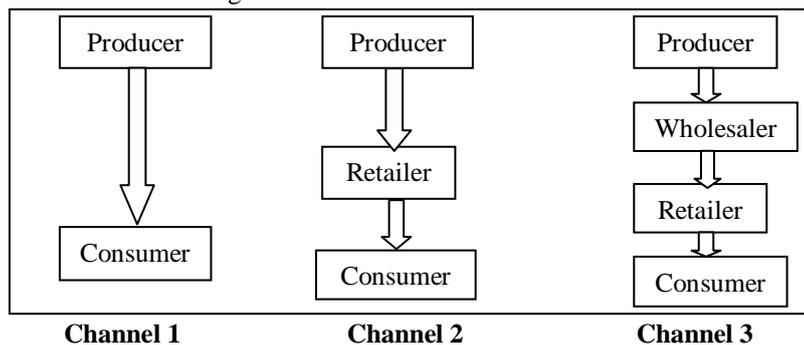


Figure 1: Consumer marketing channels

Channel 1, called a direct marketing channel, has no intermediary levels, the producer sells directly to consumers. The remaining channels containing one or more intermediaries. From the producer's point of view, a greater number of levels means less control and greater channel complexity. Moreover, all of the institutions in the channel are connected by several types of flows:- these include the physical flow of products, the flow of ownership, the payment flow, the information flow and the promotion flow. These flows can make even channels with only one or a few levels complex.

2.4 Marketing Channel Management

Marketing channel management refers to the process of analyzing, planning, organizing and controlling a firm's market channels. Stern et al (1996). It comprises seven decision areas: (1) formulating channel strategy, (2)

designing marketing channels, (3) selecting channel members, (4) motivating channel members, (5) coordinating channel strategy with channels members, (6) assessing channel member performance, and (7) managing channel conflict, Rosenbloom (1987), (1999). All seven areas are critical to superior market performance and long-term customer loyalty, Mehta et al, (2000).

2.5 Determinants of the choice of marketing channel

Channel strategy decisions involve the selection (choice) of the most effective distribution channel, the most appreciate level of distribution intensity and the degree of channel integration. Studies have identified the factors which influence the choice of marketing channels used by producers to include institutional factors, market factors, competitive factors and producer factors.

According to Nyaupane et al (2010), farmers choose a market outlet considering its convenience and economic profitability. Farmers will therefore choose the channel that is most convenient and that offers the highest returns. The survey results of the factors influencing producers' marketing decisions in the Louisiana Crawfish Industry showed that most farmers choose wholesale markets compared to selling directly to consumers, retailers and producers. Farmers have a choice of whether to sell through direct or indirect marketing channels. Demographics farm characteristics (farm size and diversification) and premarket characteristics had significant influences on market choice. The choice of channel therefore also depends on the farmer's demographics such as age, gender, marital status and education level as well as on the farm characteristics.

A study by Jari (2009) provides an insight into the institutional and technical factors that influence agricultural marketing channel choices among smallholder and emerging farmers in Kat River Valley. The institutional factors that influence agricultural marketing channel choices include transaction costs, market information flow and the institutional environment which encompasses formal and/or informal rules, the use of grades and standards, organization in the markets and the legal environment. An appropriate institutional environment reduces transaction costs for traders. Mburu et al (2007) found that the institutional factors that were significant in the study of the determinants of smallholder dairy farmers' adoption of various milk marketing channels in Kenya highlands included credit availability, dairy cooperatives, policy related interventions such as government extension agent as a source of government extension information and finally, membership to agricultural farmer's group.

According to Gong (2007), in his study of transaction costs and cattle farmers choice of marketing channel in china, a farmer's choice of cattle marketing channel is influenced by a number of transaction cost variables, but may also be influenced by the socio-economic characteristics of the farmer or farm. The transaction costs in this study were divided into information costs (price fluctuation, information access and quality inspection), negotiation costs (payment delay and influence on agreement) as well as monitoring costs (grade uncertainty and farm service).

Organization in markets is important for the collective action of producers. Usually, small scale farmers do not tend to be organized and hence lack the collective action in markets. Market coordination for agricultural products also critically depends on the fundamental attributes of production, processing, and the market actors (Gebre-Madhin, 2009). Individual marketing of small quantities of produce weakens smallholder farmer's bargaining positions and often exposes them to price exploitations by traders. Furthermore, Lack of facilitation in the formation of producers associations or other partnership arrangements make it more difficult for smallholder farmers in the supply chain. Through organization, small scale farmers are able to sell to more lucrative markets that can only be used by commercial farmers.

Legal institutions influence the activities performed on the market and the costs of exchange. Thus, if trade laws were transparent, agreements can be legally enforced leading to information accessibility and lower costs. The formal institutional development of a society has a considerable influence on transaction costs. An appropriate legal framework may prompt farmers to sell produce to both formal and informal markets to reduce the risk of loss. On the other hand, the technical factors which affect choice of marketing channel include technical changes in agricultural marketing, physical infrastructure constraints, storage facilities, market infrastructure, road infrastructure, market transport and value addition.

Technical changes in marketing can be viewed as those transformations that allow goods to be available on the market at lower costs and in a more diversified set of markets. In Agriculture production and marketing, small scale farmers tend to be lagging in the use of improved technology. While commercial farmers may take advantage of new technologies and sell their produce at lower costs, smallholder farmers may not enjoy the benefits of lower costs due to lack of new technology and may therefore not be competitive in making their goods available to markets. This will affect their choice of marketing channel, in that they may choose a channel that is less competitive in terms of new and expensive technological innovations. Physical infrastructure includes communication links, electricity, storage facilities, transportation facilities and roads (Machethe, 2004). Jari (2009) affirms that good roads, transportation and communication links are prerequisites to market access. The fewer the physical infrastructure constraints, the less the transaction cost of taking products to potential end users and this encourages farmer participation in markets. Depending on the nature of products, some products may require storage after harvesting to preserve quality. If storage costs are

high, the transaction costs may be inflated discouraging farmer participation in the market. Notwithstanding this, storage may have added advantages amongst farmers because it increases market flexibility. That is, farmers with proper storage facilities do not need to market their produce at once.

2.6 Conceptual framework

This paper is anchored on utility functions. Utility functions are basically ways of describing choice behaviour: - if a bundle of goods (service) X is chosen when a bundle of goods (service) Y is available, then X must have a higher utility than Y. By examining channel choices fish producers (farmers) make, we can estimate a utility function to describe their behaviour. This idea has been widely applied in economic studies (Hal, 2010). Producers (fish farmers) have a choice between marketing their fish directly or indirectly through market intermediaries. Each of these alternatives can be thought of as representing a bundle of different characteristics: - age of farmer, sex of farmer, level of education, farm size and so on. We could let X_1 be the age of the farmer in each kind of channel, X_2 the sex of farmer for each kind, X_3 the educational level of farmer and so on. If $(X_1, X_2, X_3, \dots, X_n)$ represent the values of n different characteristics of the farmer and $(Y_1, Y_2, Y_3, \dots, Y_n)$ represent the values of choosing the channel, we can consider a model where the producer (fish farmer) decides to sell directly or indirectly depending on whether the prefers one bundle of characteristics to the other. For example, let us suppose that the average fish farmer's preferences for characteristics can be represented by a utility function of the form.

$$U(X_1, X_2, X_3, \dots, X_n) = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3, \dots + \beta_n X_n$$

Where the coefficients $\beta_1, \beta_2, \beta_3, \dots, \beta_n$ are unknown parameters. Any monotonic transformation of this utility function would describe the choice behaviour. Again, suppose now that we observe a number of similar producers making channel choices based on the particular pattern choices there are statistical techniques that can estimate the values of the coefficients β_i for $i=1, \dots, n$ that best fit the observed pattern of choices by a set of producers. Such estimated utility functions can be very valuable for determining whether or not it is worthwhile to make some change in the marketing of farmed fish for the sustainability of fish farming enterprise or business.

3. METHODOLOGY

3.1 Sampling and Sampling procedure

The study was conducted in Ughelli North Local Government Area of Delta State, Nigeria. A two stage sampling procedure was adopted for the study. The first stage involved the random selection of 10 communities, 2 each, from the 5 clans in the local government area. The sample frame consisted of 578 registered fish farmers in the local government area with the State Agricultural Development Programme (ADP). The second stage was a random sampling of 12 fish farmers from each of the selected 10 communities bringing the sample size to 120. However, 117 samples were used for the study as 3 could not be retrieved due to logistic problems.

3.2 Data Collection and Analysis

Primary data was collected from fish farmers through the use of structured questionnaire. Data was collected on the farmer's socio-economic characteristics such as age, sex, level of education, household size, farm size, distance to market, farming experience and output (fish) price.

Descriptive statistical analysis such as frequency distribution was used to summarize results on socio-economic characteristics of farmers. Inferential statistical analysis, the logit regression model was used to estimate the parameters of the hypothesized determinants of the choice of marketing channels by fish farmers in the study area.

3.3 Model Specification

The determinant of the choice of marketing channel is a qualitative decision that is based on probability of either choosing a channel or not (in this case in the choice of direct or indirect marketing channel by fish farmers in Ughelli North of Delta State). The logistic regression model was adopted for this study. This is because the logit model framework has been found to be efficient in explaining such dichotomous decision variables (Wuensch, 2006, Gujarati and Sangeetha, 2007). By using the logistic regression the probability of a result being in one of the response groups (binary response) is modeled as a function of the level of one or more explanatory variables. Thus, the probability whether or not the fish farmer chooses a marketing channel may be modeled as a function of the level of one or more independent variables. For this study, the response variable is 1 when the farmer chooses the direct marketing channel and 0 when the farmer sells using indirect channels.

The functional form is denoted in equation (1)

$$\ln \left(\frac{\phi_i}{1 - \phi_i} \right) = \beta_0 + \sum_{j=1}^K \beta_j X_{ij} + \varepsilon_i \quad (1)$$

Where: **j** is the response category (1 or 0)

i denotes cases (1, 2, 3, 4, ...n)

β₀ is the coefficient of the constant term

β_j is the coefficient of the independent variable

X_{ij} is the matrix of observed values

ε_i is the matrix of unobserved random effects.

The results of the logit regression estimates are also reported on the marginal effects of a change in the exogenous variables, that is, the change in the probability of choice due to a one-unit change in the exogenous variable. The equation (2) used in calculation of marginal probabilities or effects is denoted as follows:-

$$\frac{\partial \phi_i}{\partial x_i} = \phi_i (1 - \phi_i) \beta_j \dots\dots\dots(2)$$

The marginal effects of the discrete variables was calculated by taking the difference of the mean probabilities estimated for the respective discrete variable, $X_i = 0$ and $X_i = 1$.

The independent or explanatory variables and their expected signs are as defined below:-

Independent variables		expected signs	
(i)	Age of fish farmer	(X ₁)	-
(ii)	Sex of fish farmer	(X ₂)	+/-
(iii)	Level of education	(X ₃)	+
(iv)	Membership of association	(X ₄)	+/-
(v)	Household size (number)	(X ₅)	+
(vi)	Farm size (Ha)	(X ₆)	+
(vii)	Access to credit	(X ₇)	+/-
(viii)	Access to information	(X ₈)	+/-
(ix)	Access to transport facility	(X ₉)	+/-
(x)	Distance to market (km)	(X ₁₀)	-
(xi)	Experience in fish farming (years)	(X ₁₁)	+
(xii)	Location of farmer	(X ₁₂)	+/-
(xiii)	Price of fish	(X ₁₃)	-

The implicit form of the regression model used is as follows:-

$$Dc = f(X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 + X_8 + X_9 + X_{10} + X_{11} + X_{12} + X_{13})$$

While the explicit form is given as:-

$$Dc = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + u$$

Where Dc, are the probabilities of distribution channel choices ranging from 0 to 1.

4. RESULTS AND DISCUSSION

4.1 Socio-economic characteristics of Sampled Fish Farmers

The result presented in table 1 shows that there were more males participating in fish production than females. Males constituted 75% of the farmers while females were only 25%. The marked difference in gender could be attributed to the common belief that fishing and fish farming are a man's vocation which is tedious and involves close monitoring and supervision.

The mean age of the farmers was 42 years. The table shows that farmers with age between 18 – 50 years represented 65% of the sampled farmers. From the study, it was observed that 68% of the respondents were full time fish farmers while 32% were part time.

Table 1: Socio-economic characteristics of respondents

Variables	Frequency	Percent (%)
Sex		
Male	88	75
Female	29	25
	117	100
Age (years)		
18 – 28	8	7
29 – 39	22	19
40 – 50	46	39
51 – 60	29	25
61 and above	12	10
	117	100
Level of education		
Primary school	15	13
Secondary school	33	28
Tertiary education	60	51
No formal education	9	8
	117	100
Farming experience (yrs)		
1 – 5	64	55
6 – 10	29	25
11 – 15	14	12
16 – 20	6	5
Above 20	4	3
	117	100
Farm size (Ha)		
0.25 – 0.75	41	35
0.76 – 1.26	32	27
1.27 – 1.77	23	20
1.78 – 2.28	14	12
2.29 and above	7	6
	117	100
Farming status		
Full time	76	65
Part-time	41	35
	117	100
Household size (No)		
1 – 5	33	28
6 – 10	42	36
11 – 15	24	20
16 – 20	12	10
Above 20	6	5
	117	100

Source: survey 2014

A relatively large household size was found in the study with an average 10 persons per household. This large family sizes, may be needed to bridge the gap of labour demand for farming enterprises. The finding collaborates that of Inoni (2006), that most families in the rural area were large providing labour for farming.

Table 1 also shows that 8% of respondents had no formal education, 13% had primary education, 28% secondary education and 51% tertiary education. The result portrays that majority of the farmers were literate enough to express themselves and are well equipped to evaluate market trends and channel partners performance.

The number of year spent in fish farming in the study area ranged between 1 – 20 years with a mean of 6 years. The distributions indicated that many of the farmers were relatively young in the business of fish farming and are, therefore, still in the learning and teething stage.

The results (Table 1) indicate that the farm size was generally small with 82% of the fish farmers have farm between 0.25 and 1.77 hectares. The smallness in size could be attributed to lack of finance, inadequate land or inexperience in pond management.

4.2 Fish Distribution Channel

Fish marketing chain in Ughelli North consists of producers, wholesalers and retailers. These market participants performed the marketing functions. Four channel levels of fish distribution were identified in the area (Fig. 2). The quantity of produce handled by each channel is also indicated. The channels levels numbered 1 – 4 are as follows:-

- Channel 1: Producers → Consumers
- Channel 2: Producers → Retailers → Consumers
- Channel 3: Producers → Wholesalers → Retailers → Consumers
- Channel 4: Producers → Wholesalers → Consumers

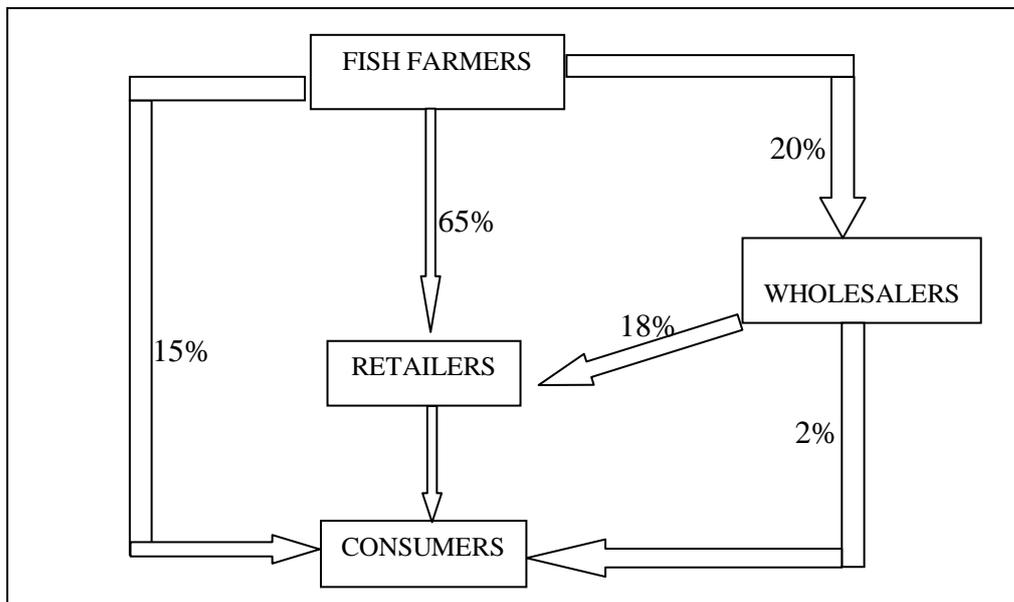


Fig. 2: Farmed Fish marketing Channel in Ughelli North LGA

Channel one: This is the shortest fish distribution channel. Fifteen percent (15%) of fish production was found to be distributed by this channel. This channel excludes the wholesalers and retailers. Fish farmers sell fish directly to the consumers.

Channel two: The bulk of the fish farmers’ output are passed through this channel sixty-five percent (65%) of the total production are sold through this channel. Fish farmers sell to retailers who in turn sell to ultimate consumers. This channel appears to be the most preferred channel of distribution.

Channel three: This is the longest distribution channel. Farmed fish move from the producers to the wholesalers who in turn sell to retailers for onward sale to the consumers. This channel handles 18% of the total fish produced.

Channel four: This channel was found to be the least preferred channel through which fish is distributed within the study area. Produced fish are sold to the wholesalers who in turn sell to consumers. This channel was found to distribute about 2% of total fish production.

4.3 Logistic Regression Estimates of Distribution Channel Choice

Logit regression model was used to estimate the parameters of the factors which influence the choice of distribution channel by fish farmers in Ughelli North Local Government Area of Delta State. The parameters and marginal effects were estimated using SPSS statistical package. The Chi-square value of 83.1435 was highly significant at 1% significant level. This reveals that the explanatory variables included in the model jointly determined farmers' choice of marketing channels. McFadden value was 0.55 and 90.6% of the cases were correctly predicted.

The results of the logistic regression including the marginal effects are presented in table 2. From the results, age, level of education, farm size, access to information, distance to market and price of fish were significant factors determining farmer's choice of marketing channel in the study area.

Age of household was significantly and positively corrected with the choice of distribution channel at 5% significant level. The probability of choosing a marketing channel increases by 26.6% for a year increase in the age of the household head. It is believed that older farmers overtime have gained marketing knowledge and experience and are better able to evaluate market trends and judge channel partner's performance than younger farmers. This finding agrees with that of Amaya and Alwayng (2011) who established a positive relationship between age and marketing channel choice.

Educational level was also significantly and positively related to farmer's choice of marketing channel. The probability of marketing a decision on the choice of marketing channel increases by 9.7% with every additional increase in the educational level of the fish farmer. Education is posited to influence a households understanding of market dynamics and therefore improves decisions about marketing channel formation, design and selection.

Farm size was a significant positive factor influencing fish farmer's choice of marketing channel at 5% significant level. A one hectare increase in farm size, increases the probability of making a decision on channel choice by 39%. This is because farm size plays a crucial role in the production process and is also used as a measure of wealth. Farmers, thus consider channel decision as crucial. This finding is consistent with Zivenge and Karavina (2012) who established a positive relationship between farm size and choice of marketing channel.

Table 2: Logit estimate for the choice of marketing channels by fish farmers in Delta State.

Variables	Coefficient	z	Marginal Effects
Constant	-5.50479	-1.8781	
Age	2.1818062	2.3747**	0.2162347**
Sex	0.541524	1.2776	0.106152
Level of education	0.495069	2.2181**	0.0970458**
Mem. of Association	2.37693e-07	0.1848	4.65937e-08
Household size	0.000760241	0.0046	0.000149026
Farm size	1.86094	2.4595**	0.392249**
Access to credit	0.503411	0.6141	0.0964375
Access to information	2.22743	2.0745**	0.496599**
Access to transport	1.03105	1.2483	0.214342
Distance to market	-0.0494576	-2.1766**	-0.06969493**
Fish farming experience	0.00635652	0.3261	0.00124604
Location of farmer	0.115804	0.1333	0.0226721
Fish price	0.262966	2.6339***	0.4515479***
No. correctly predicted	106 (90.6%)		
Likelihood ratio test : χ^2	83.1435*** [0.0000]		
McFadden R ²	0.55		
No. of observations	117		
Note:			
*** significant at 1%,			
** significant at 5%,			

Source: Survey, 2014

Access to information measured in terms of ownership of cell phone, radio or television was a significant positive determinant of channel choice at 1% significant level. Farmers with these facilities have better access to market information. A one percent increase in the number of fish farmers with access to market information increases the probability of making a decision on channel choice. This finding is consistent with those of Zivenge and Karavina (2012) and Amaya and Alwayng (2011).

Distance to the market was significantly and negatively associated with choice of marketing channel by fish farmers at 5% significant level. The probability of choosing a marketing channel decreases by 6.9% with a one kilometre increase in distance to the market. This is probably because distance acts as a bearer to market entry by imposing transportation costs.

Fish price was a positive significant factor influencing farmers' choice of marketing channel at 1% significant level. The probability of choosing a marketing channel increases by 45% for every additional naira increase in the output price of fish. Farmers' are more responsive to market price relative to the transaction cost. Output price of fish serves as a motivation for farmers to produce as well as determine the choice of marketing channel. This finding is also consistent with that of Zivenge and Karavina (2012).

5. CONCLUSION

The study examined the factors influencing fish farmers' choice of distribution channel in Ughelli North Local Government Area of Delta State. The study revealed that age, level of education, farm size, access to information, distance to market and output price were the significant determinants of channel choice by fish farmers. Output (fish) price was the major determinant of market channel choice among fish farmers. Better price is fundamental to offsetting production and transactions costs. It is also important for the profitability of the fish farming business. Developed market infrastructure and improved information technology have great potentials for enhancing the marketability of produced fish. The study therefore recommends the provision of market infrastructure and technical supports in the form of information technology to farmers for the sustainability of the fish farming industry.

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