



## 5th International Conference of AAAE

23 - 26 September 2016, United Nations Conference Centre,  
Addis Ababa - Ethiopia

Transforming Smallholder Agriculture in Africa:  
The Role of Policy and Governance



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*Invited poster presented at the 5<sup>th</sup> International Conference of the African Association  
of Agricultural Economists, September 23-26, 2016, Addis Ababa, Ethiopia*

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## **Factors influencing the choice of marketing channel by fish farmers in Kirinyaga County**

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A paper submitted for oral presentation at the fifth Conference of the African Association of Agricultural Economists (5<sup>th</sup> CAAAE) to be held at the United Nations Conference Centre - Addis Ababa, Ethiopia, September 23-26<sup>th</sup>, 2016

### **Abstract**

Fish and fishery products are valuable sources of protein and essential micronutrients for balanced nutrition and good health. In Kenya, farmed fish is an integral nutrition, income earning and employment commodity for rural households. In 2010, the Government of Kenya initiated Economic stimulus program to encourage fish farming. Farmers took up the activity as a source of food and income. However, where adopted as business there were little returns (Kimathi et., al 2013). Farmers used diverse marketing channels that apparently posted different profit margins.

Descriptive research design involving 147 fish farmers within Kirinyaga County, in 5 sub counties was used and data analyzed using multinomial logit model. It characterized market channels for fish farmers and analyzed the determinants of choice of marketing channel by farmers.

The study identified 3 main channels; neighbors, direct market, traders and accounting for 49 percent, 29 percent, and 22 percent respectively. Gender of the household head, distance to market; marketing cost, land tenure, number of fish ponds owned, access to extension services, cost of marketing, membership to a fish farming group, access to inputs, household income, price of fish and type of fish reared had significant influence on farmers' choice of market channel.

Despite the government support, farmers faced challenges of predators, inadequate extension services and access to information. The conclusion is that county Governments and other stakeholders need to facilitate vibrant extension services and market support to the practicing farmers in their localities.

**Key words:** Fish farming, Fish Marketing, Marketing channels, Kirinyaga County

## **1. Introduction**

Fish production provides a source of income for the small holder farmer as well as an important source of food security for the people of Kenya, thereby reinforcing the overall development of poverty reduction goals in Kenya's Vision 2030 (G.o.K 2007). Enhancing the ability of fish farmers to reach markets and actively engage in the markets is a key challenge affecting fish production in Kenya. In the year 2008/2009, the Government of Kenya (GoK) launched an Economic Stimulus Program (ESP) targeting long term investment as a solution to the challenge of food security, unexploited economic opportunities and unemployment in the rural areas. Among other economic activities the program targeted to promote production and improve fish farming under the flagship of Fish Farming Enterprise Productivity Program (FFEPP).

However, the program was directed more into production aspect of farmed fish rather than the whole fish value chain (Charo et al., 2010). The apparent neglect or omission of the marketing step in FFEPP has not been without consequence; farmers in central Kenya, for instance tend to harvest their fish in large batches and without proper marketing and value addition systems. This reduces their incentive to participate in economic transactions and result in subsistence rather than market-oriented production systems.

### **1.1 Fish Production and Marketing Challenges**

Marketing plays a very critical role in meeting the goals of food security, poverty alleviation and sustainable agriculture, particularly among smallholder farmers in developing countries like Kenya (Altshul, 1998; Lyster, 1990). Although marketing is important, smallholder farmers find it difficult to participate in markets, especially when faced with pressures from market liberalization. Generally, few smallholder farmers participate in formal markets; their production often tends to be subsistence in nature, and their commercial activities haphazard.

Fish is a highly perishable product, a factor that has been used by middlemen to exploit fishermen by forcing them to sell their catch at low prices; therefore an efficient and reliable marketing system is of utmost importance to ensure that fish gets to the market while still fresh.

Post-harvest losses have eventually resulted in farmers receiving very low prices for their produce while at the other end the consumers are compelled to pay a highly inflated price for their purchases (Hettige & Senanayake, 1992; Kodithuwakku, 2000). Jaleta (2007) showed that inadequate market channels and poor information regarding price were among factors affecting commercialization of agriculture. direct market

Emana and Gebremedhin (2007) in their study on market chain analysis argued that the marketing of horticultural crops is affected by inadequate local markets, poor pricing system, lack of local markets to absorb supply, low produce prices and poor marketing institutions and coordination of farmers. Emanu and Gebremedhin (2007) further argued that poor handling and packaging of products, poor pricing systems, and information asymmetry affect marketing of vegetables.

Markets tend to be disorganized when farmers and traders who do not fully rely on their fish business for a steady income sell their produce at almost any offered price. Retail agents often encourage this since it provides an opportunity for them to make more profits. In the

long run, this is not good for the industry since it promotes an erratic supply and unrealistic pricing structure. Marketing information is important in assisting growers at crop planning stage before planting and to sell surplus produce. In the absence of such marketing information the retail end of the industry does not respond to supply and demand and pricing is set artificially, and it remains static.

## **1.2 Objective of the Study**

The main purpose of the study was to investigate the choice of fish market channel by smallholder farmers. Specifically the study sought to identify factors influencing the choice of market channel for fish farmers.

## **2. Methodology**

### **2.1 Research Design**

A descriptive cross-sectional research design was employed in the study with the aim of identifying factors influencing the choice of market channel by fish farmers.

### **2.2 Sampling Procedure**

The target population was all farmers engaged in fish farming in Kirinyaga County, Kenya. A list of fish farmers was obtained from the State Department of Fisheries and county fisheries extension officers. A sample of 147 farmers was purposively selected from all the five sub counties of Kirinyaga County. With the number of farmers being selected from each sub county dependent on the total number of fish farmers in the sub county.

### **2.3 Data Collection**

Data were collected through personal interviews with the aid of a structured questionnaire. The questionnaire consisted both open and closed-ended questions. Questionnaires were further pre tested using farmers who were not part of the sample. Responses from the farmers were used to prepare the final questionnaire. Pre testing helped in assessing and evaluating the questions wording and logical flow of the questions and identify any areas that needed to be supplemented or improved.

### **2.4 Data Analysis**

Data were analyzed using Statistical Package for Social Sciences (SPSS-PC Version 20.0) software. Descriptive statistics such as means, percentages, standard deviation and frequencies were used to describe the data. A multinomial logistic regression model was employed to analyze factors influencing the choice of market channel by fish farmers.

## **3. Analytical Framework and Empirical Models**

### **3.1 Determinants of Marketing Channel Choice**

Decisions whether to participate in either formal or informal markets or even not participating signify an individual direction to maximize utility. Multinomial regression was used to analyze farmers' decision to participate in neighbors market, traders market or participate in direct sales and the factors that influenced these choices.

A typical logistic regression model was used in the form of:

$$prob(Y_i = j) = \frac{e^{\beta_j x_i}}{1 + \sum_{k=2}^j e^{\beta_k x_i}} \quad \text{for } j = 2, 3, \dots, J \quad (1)$$

$$prob(Y_i = j) = \frac{1}{1 + \sum_{k=2}^J \ell^{\beta_k x_i}}$$

- $P(Y_i = j)$  is the probability that farmer  $i$  chooses alternative  $j$ ,  $\beta_j$  are parameters to be estimated,  $X_i$  is a vector of explanatory variables

In the model, choice of market channel represented the dependent variable. The choice of market channel described the decision to sell the fish to neighbors market channel, traders market channel or direct sales market channel. It followed that  $P(Y_i = j)$  represented the probability of participating in traders market channel and  $(1-P_i)$  represented either participating in direct sales market channel or neighbors market channel. In other words, the model was used to assess the odds of selling fish to neighbors market channel against selling fish to traders market channel, and selling through direct sales.

Table 1 provides the explanation of the independent variables and their a priori expectations. The variable *Grupmebersp* (household member belonging to a group or association) is a dummy with 1 indicating group membership and 0 indicating non membership to groups. Participation of household to groups increases access to information important both in production and marketing. Groups offer services such as credit and marketing to its members and this in turn positively influences choice of market channel and market participation. Groups also reduce transaction costs that a household is likely to incur on market participation. Berhanu *et al.* (2013) indicated that farmer's group membership had a positive influence on choice of formal marketing channels by the dairy farmers in Wolaita zone, Ethiopia.

Owing to the high perishability of fish, the mode of transport is hypothesized to affect the choice of market channel as availability of own or hired transport is positively related to market participation. Transport owned on the farm may determine whether the farmer will supply directly to the urban centers. If on-farm transport is available, the farmer will incur less cost to transport fish to the market.

*Tdist* (total distance covered to the point of fish sale) is included in the models to capture transaction costs and its role in influencing market participation. Several studies have found distance to influence choice and decisions in market participation. Studies by Berdan *et al.* (2012), Omiti *et al.* (2009) and Ouma *et al.* (2010) noted that long distances reduced market participation and the quantity sold due to increased transaction costs. It is expected that farmers located far from the markets increase travel time and costs which impact negatively on market participation. Therefore, it was hypothesized that this variable would be negatively related to direct market channel choice.

*Tponds* (total number of fish ponds owned) is a continuous variable, the higher the number of fish ponds a farmer has the more likely they are to participate in the market and to have marketable surplus.

*Income* (total income of household) is a continuous variable measured in KES as the annual income from sale of fish. Farmers with high total incomes are likely to participate in markets because they are able to meet transaction costs such as transportation of fish to the market.

Increased income is also likely to enable farmers invest in cold storage facilities, value addition and processing facilities and other input leading to increased production positively influencing market participation.

*Qty\_Produced* (Quantity of fish produced) is the total quantity of fish that a farmer produces. The more the quantity of fish produced, the higher would be the chances of using a particular market channel. Farmers with large production are likely to seek outlets/markets outside the farm-gate as opposed to farmers with little production. In a study by Jari (2009) it was found that small scale farmers find it hard to penetrate the ‘formal markets’ as a result of high transaction costs, high risks, lack of economies of scale, and lack of collective action..

Variable *Fishprc* (Fish price) is a continuous variable. Higher prices act as an incentive to sell and therefore prices are expected to influence choice and participation positively.

*Fish\_Breed* (Breed of fish reared) is a dummy indicating the breed of fish a household rears. Farmers who rear tilapia are expected to participate more in the market as opposed to farmers who rear other breeds. This is because tilapia was the main breed supplied to farmers through the Economic Stimulus programme, this is likely to increase production per household, therefore producing surplus for market.

*Market information* and the source of information that the farmer gets is an important factor when farmers are choosing where to sell. Farmers with market information are expected to make more informed decision; hence the sign for variable information is expected to be significant and positive. Martey et al. (2012) in his study found that the choice of a marketing channel depends on the information available to the participants about that particular channel.

Table 1: Description of the independent variables used in the model

<b>Variables</b>	<b>Coding System</b>	<b>Category</b>	<b>Expected Sign</b>
X <sub>1</sub> =Market Information	1 if yes, otherwise 0	Dummy	+
X <sub>2</sub> =Group Member	1 if member, otherwise 0	Dummy	+
X <sub>3</sub> =Distance to Market	Number of kilometers	Continuous	+
X <sub>4</sub> =Number of Ponds	Number of Ponds by the farmer	Continuous	+
X <sub>5</sub> =Extension Services	(1=Yes, 0 Otherwise)	Dummy	+
X <sub>6</sub> =Household Income	Income of the household	Continuous	+
X <sub>7</sub> =Quantity Produced	Number of Kilograms	Continuous	+
X <sub>8</sub> =Access to Inputs	(1=Yes, 0 Otherwise)	Dummy	+
X <sub>9</sub> =Price Fish	Kenya Shillings/kg	Continuous	+
X <sub>10</sub> =Fish Breed	1 if yes, otherwise 0	Dummy	+
X <sub>11</sub> =Sub-county	Name of Sub-County	Continuous	+
X <sub>12</sub> =Land Tenure	1 if yes, otherwise 0	Dummy	+
X <sub>13</sub> =Cost of Marketing	1 if yes, otherwise 0	Dummy	+
X <sub>14</sub> =Gender of HH Head	1 if male, 0 if female	Dummy	+/-

## 4. Results and Discussion

### 4.1 Factors Influencing the Choice of Market Channel

Table 2 presents Regression results of Multinomial Logit Model to explain determinants of choice of fish marketing channel options. The related Table 3 presents the Marginal effects.

Table 2: Multinomial Regression Results

Variable	Direct Marketing		Traders	
	coefficient	P- Value	Coefficient	P- value
Gender of HH	1.55	(0.121)	0.12	(0.902)
Distance to Market	-2.46	(0.014**)	-1.73	(0.085)
Number of Ponds	0.89	(0.375)	1.82	(0.069**)
Extension Services	0.38	(0.706)	2.18	(0.029**)
Marketing Cost	3.33	(0.001***)	3.49	(0.000***)
Membership to a group	0.30	(0.762)	-1.44	(0.150)
Access to Inputs	0.23	(0.821)	2.57	(0.010**)
Household Income	0.71	(0.476)	3.23	(0.001***)
Price of fish	-1.10	(0.270)	-2.47	(0.014**)
Marketing Information	0.44	(0.661)	0.31	(0.759)
Volume Sales	0.06	(0.950)	1.72	(0.085)
Sub-County	1.41	(0.158)	0.90	(0.370)
Land Tenure	-2.83	(0.005***)	-0.49	(0.626)
Fish Breed	-2.22	(0.026**)	-1.62	(0.106)
Cons	(-1.03)	(0.302)	-1.99	(0.047)

*Source: Survey data, 2014*

*Notes: Figures in parenthesis are p-values.  $R^2 = 0.2707$ ,  $\log \text{likelihood} = -111.80147$  LR  $\chi^2(28) = 83.01$ ,  $\text{Prob} > \chi^2 = 0.0000$  \*10 percent \*\*5 percent \*\*\*1 percent significance level, Neighbors is the option left as the base case outcome, Number of observations is 147.*

Table 3: Marginal effects Dy/Dx of the Multinomial Logistic Regression Model

Independent variables	(Dy/Dx) : Direct Marketing		(Dy/Dx) : Traders	
	Coefficient	P-Value	Coefficient	P-Value
Gender of HH	0.169	(0.014**)	-0.032	(0.842)
Distance to Market	-0.049	(0.029**)	-0.0246	(0.300)
Number of Ponds	0.015	(0.705)	<b>0.081</b>	<b>(0.077**)</b>
Extension Services	-0.195	(0.798)	<b>0.173</b>	<b>(0.024**)</b>
Marketing Cost	0.189	(0.005**)	<b>0.258</b>	<b>(0.001***)</b>
Membership to a group	0.055	(0.378)	<b>0.132</b>	<b>(0.094**)</b>
Access to Inputs	0.910	(0.285)	<b>0.259</b>	<b>(0.001***)</b>
Household Income	-0.000	(0.870)	<b>0.000</b>	<b>(0.001***)</b>
Price of Fish	0.000	(0.723)	<b>0.001</b>	<b>(0.017**)</b>
Market Information	0.030	(0.700)	0.019	(0.839)
Quantity Produced	0.00	(0.616)	0.002	<b>(0.059***)</b>
Sub-county	0.037	(0.213)	0.019	(0.582)
Land Tenure	0.0133	(0.002***)	0.019	(0.679)
Fish Breed	0.042	(0.064**)	0.028	(0.282)

Source: Survey data 2014

Notes: Figures in parenthesis are p-values. \*10 percent \*\*5 percent \*\*\*1 percent significance level, Number of observations is 147, Note: (\*) Dy/Dx is for discrete change of dummy variable from 0 to 1.

## 4. Results and Discussion

### 4.1 Factors Affecting the Choice of Market Channel

#### Gender of the Household

The results indicate that being a male farmer increases the probability of selling fish direct to the market places as opposed to the neighbors. This can be attributed to the fact that men are likely to have more financial resources than women, thus able to move their products from the farm to the market centers. It was also found that in the County, 90.7 percent of the sampled farmers were male while 8.7 percent were female. The level of women participation can be seen to be low in all the divisions. This is an indication that many of the people who control resources in the household are male, thus they are the ones who are involved in fish farming business decision making. The women however, are involved in the daily management of fish mainly in feeding. This notwithstanding, women are restrained in terms of making major decisions like the type of breeds, system of rearing, number of fish ponds to put up and the marketing channel among other critical decisions.

#### Distance to the Market

Distance to market negatively influenced the likelihood that a farmer will choose direct sales to fish mongers, schools and retailers (butchery/hotels) as fish marketing points, relative to neighbors. Farmers who were close to the market places preferred to sell their fish directly to

women in the market places, workers at the government offices, butcheries, fish mongers, hotels and restaurants. These findings concur with Bardhan *et al.* (2012), who established that farmers choose marketing points near the farm as long as they were easily accessible. This implied that with a decrease in distance to market, farmers preferred selling directly to fish mongers, schools, butcheries or hotels, rather than neighbors because of increased benefits such as good prices and cash payment.

### **Number of ponds**

Number of fish ponds owned positively influenced farmers to sell to traders. Owning many fish ponds could translate to harvesting more fish. This could encourage farmers to sell to traders who buy fish in bulk. In the present study, number of fish ponds owned by a farmer was taken as proxy to the wealth.

### **Access to extension services**

Having access to extension services is significantly associated with higher probability of selling to the traders channel as opposed to neighbors. The traders channel buys larger quantity and good quality fish. Only farmers who had gone through training and access extension services were able to attain these quality requirements and information about traders from within and outside the County. The results from the two variables can be attributed to their ability to produce good quality and quantity of fish.

### **Marketing Cost**

Increase in marketing cost has positively influenced farmers to sell to traders relative to neighbors. This is because the traders were buying at farm gate and at good price compared to neighbors. This may be due to a decrease in cost of marketing when traders buy from farm gate.

### **Membership to a group**

Membership to a fish marketing group was associated with increased likelihood of a farmer selling to traders channel as opposed to the neighbor's channel. Being a member of a marketing group increased the probability of a farmer selling to traders relative to neighbors by up to 26 percent. The importance of collective action has been emphasized by most institutional economics authors; Janvry et al (1991); Kirsten et al (2008); Elizabeth and Martin (2012), among others. Farmers in groups have the advantage of bulking hence gaining economies of scale. It is also easier and cheaper for traders to enforce quality and grade requirements through reaching farmers in groups rather than individually. Membership to marketing group was, however, not significant for direct market channel; it is important to note here that farmers selling to the market do not bulk their produce to reduce cost. A similar result was found by Fafchamps and Hill (2005), which the study attributed to lack of trust among the farmers and especially in a climate of changing market prices. "The benefit from pooling sales may thus be outweighed by the cost of peer monitoring", the study notes. In addition to the trust theory, the current study noted that farmers selling to the market were located far apart and harvested fish at different times (unsynchronized) and so collective action may be hampered by these factors.

### **Access to Inputs**

Access to inputs like fishing nets negatively influenced farmers to sell their fish to traders relative to neighbors. This could be due to lack of access to some inputs on need basis but availability. Owing to fish perishability a farmer would sell his catch to the neighbors to avoid loss of the catch. Wealthy farmers are more likely to afford farm inputs which would enable them attain required quality and quantity for urban market.

### **Household Income**

Household income is significantly associated with a higher probability of choosing direct market as compared to selling to neighbors (Village market). The probability of choosing direct market as opposed to selling to neighbors increases for every unit increase in the household income. Similar results were found by Srinivas Tavva (2014) among goat farmers in Afghanistan; that Wealthy goat producers prefer selling to district markets as their choice of market than in the village markets. This is as a result of their increased contacts with traders and butchers operating in the district markets and high market prices compared to village market prices. Wealthy farmers also are more likely to afford farm inputs which would enable them attain required quality and quantity for urban market; alternatively they are able to afford transport to sell their produce in distant markets where prices are high.

### **Market Price for Fish**

Price of fish was statistically significant in determining the factors that influence channel choice decision with a p value of 0.025. A positive sign on its coefficient indicates that an increase in the price of fish increase farmer participation in selling their produce to traders. The sign is consistent with a priori expectation that when price of product increase in a channel an increase in participating in that particular channel occur. According to Arega *et al.*, 2007, marketed supply increases with commodity price, once participation decisions are made. These price differences were significant and were mainly due to difference in the weight of goats sold in both the channels and provinces

Justification for this is as above, in that the higher the price the more profit is made and hence the more it provides an incentive to use a particular channel compared to the other. In comparison with neighbors' channel, farmers are more responsive to sell to traders where their prices are higher.

### **Volume of Sales**

The quantity sold positively influenced a farmer to sell his fish to traders relative to neighbors. Farmer's choice is influenced by farm characteristic as argued by Timothy *et al.* (2006) that amount of output produced influenced the choice of marketing channel. This is because traders bought in large quantities compared to neighbors. Volume sales increased the probability of a farmer selling to traders relative to neighbors by up to 2 percent. Owing to the perishability nature of fish, a farmer would prefer selling his catch as fast as possible since once caught they cannot be returned to the pond. A farmer selling to a trader has the advantage of selling in bulk hence gaining economies of scale.

## **Land Tenure**

Ownership of the land influenced farmers to sell their fish directly to the market relative to neighbors. This is because farmers who own land are likely to invest in long term and high cost projects. Owning land, as opposed to lease increases the ability of a farmer to access credit either in cash or in form of inputs.

## **Breed of fish Reared**

The breed of fish reared by farmers positively influenced farmers to sell their fish through direct marketing relative to neighbors. Farmers were forced to deep fry the small size fish as a form of value addition to be able to sell through this channel.

## **5. Conclusions**

The gender of household head, distance to market, marketing cost, land tenure and breed of fish reared are important predictors of the choice to sell fish through direct marketing channel instead of selling to traders market channel. The choice of farmers to sell fish to the traders market channel instead of selling to other market channels was influenced by number of fish ponds owned by a farmer, access to extension services, cost of marketing fish, group membership by a farmer, access to productive inputs, household income, price of fish and the quantity of fish produced by the farmer. There seems to be an opportunity to improve market channel choice participation by fish farmers if each one of the factors could be improved.

In Kirinyaga County, there is no agency that monitors and provides market information. Price information flows on a personal basis, friends and neighbouring farmers who were the main source of market information. Devendra (1999) argued that lack of knowledge of markets and marketing systems combined with the neglect of linking the production of small ruminant to their marketing have resulted in reduced revenue from small ruminants to farmers and made them unable to respond to demand and supply forces.

## **6. Recommendations**

The results of the study showed that fish farmers were able to access traders markets when they are members in farmer organizations. It is therefore important to promote collective action as an institutional vehicle for linking farmers to agribusiness supply chains. Collective action is encouraged because it strengthens smallholders' market position and bargaining power. Farmers should establish networks since they aid in sharing knowledge and improve production of good quality fish as required by market. Fish farmers should also be encouraged to engage in enforceable contract farming or agreements, since it could be a way of improving farmers' product quality and ensuring market availability. Farmers also need to be supported in accessing good quality inputs in the form of fish feeds to be able to produce good quality fish. This will help improve on the marketability of fish.

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