Socio-Economic and Profitability of Fisheries Enterprises the Case of Fincha Amarti Nashe Reservoir of Oromia State, Horo Guduru Wollega zone, Ethiopia

Mr.Bikila Keno   Amanuel Zewdie

Department of Agricultural Economics, Wollega University, Oromia State, Ethiopia

Abstract

The study focused on the analysis of value chain- The case of Fincha Amarti Nashe reservoir of Oromia state, Horo Guduru Wollega zone, Ethiopia. The socio-economic characteristics of the stake holders along the fisheries enterprises and Analyses of market performance were employed to analyze marketing profit and profit margin of the chain actors. Marketing margin was calculated by taking the difference between fisher men and retail prices. Analyses of fish value chain performance were done using market share and gross margin analysis. The chain is governed by wholesalers and retailers who have capital advantage over the other chain actors. Therefore, fisher men are forced to capture a lower share of profit margin. The constraints were also described and the factors that influence consumer preferences in the study area were identified. The data were collected from both primary and secondary sources. The primary data for this study were collected from 122 selected by Multi-stage random sampled fisher men, 6 traders and 30 consumers through structured questionnaires and checklist. Descriptive statistics and econometric analysis were used to analyze the qualitative data collected from fish producers, traders and consumers by using multinomial logit model. The data which was collected from the sample fisher men, consumers were and traders were analyzed using descriptive statistics which include mean, standard deviation, chi-square, t-test, frequency table, and percentiles were used to analyze the data collected. Fishing was found to be male dominated (75.25 %), while processing was found to be female dominated (10.75 %) in the three selected kebeles of the district. The Other constraints experienced by fishermen were lack of market, low price of product, lack of transport, lack of market information, distance to the market and Perishability. Consumers also face high cost of fish, deterioration of fish and poor sanitary condition problems. In conclusion, therefore, fisher men are forced to capture a lower share of profit margin. Thus, strategic plan at improves extension services on training of local fisheries, entrepreneurial with management skills and assembly of marketing team provided to the concerning stakeholders, women's empowerment and gender equity, launch credit access for the fisheries sector & Introducing improved fishing inputs and accessing market with facilitating means of usual transport, strengthening the supportive activities such as market information centers would also lift up fish supply, NGO`s , research centers and gov`t concerned sectors attentions are recommended to speed up the chain's development. Therefore Government should provide loan scheme for the proper increase and boasting of fisher men and processors activities.

Keywords: Socio-economics, Fishermen, Fish Consumers, Constraints, Value chain analysis, Fish, Actors, Marketing margin, Market outlet, Multinomial logit Model

1. INTRODUCTION

Fish is an important source of protein to the teeming population in Ethiopia. Fish could be regarded as one of the major sources of animal protein in the country. In Ethiopia, fishing is carried out on almost all water bodies, with commercial production concentrated in the Rift Valley Lakes of Chamo, Ziway and Tana. According to FAO (2008), the total number of fishermen is estimated at 15,000 of which about 5,000 are active and the remaining being part-time or occasional fishermen.

There are 180 different species of fish in Ethiopia and 30 of those are native to the country (Ethiopian Embassy London, 2012). The total area of the lakes and reservoirs stands at about 7000 to 8000 km2 and the important rivers stretch over 7000 km in the country (Mebrat, 1993). Fishing contribution for country's GDP is very low. Fish production potential of the country's estimated 51,000 tones. Fresh fish are consumed in the vicinity of the Great Rift Valley lakes. Outside these areas, the domestic market for fish is small (FAO, 1993).

With regards to employment creation, the number of people directly employed in fisheries and aquaculture is conservatively estimated at 38 million, of which over 90 percent are small-scale fishers (FAO, 2005). In addition to those directly employed in fishing, there are "forward linkages" to other economic activities generated by the supply of fish (trade, processing, transport, retail, etc.) and "backward linkages" to supporting activities (boat building, net making, engine manufacture and repair, supply of services to fishermen and fuel to fishing boats, etc.). Taking into account these other activities, over 200 million people are thought to be dependent on small-scale fishing in developing countries (FAO, 2006).

Fisheries are often available in remote and rural areas where other economic activities are limited and can thus be important engines for economic growth and livelihoods in rural areas with few other economic activities

(FAO, 2005).Hussein(2010) noted that in Ethiopia the total annual fish production from rivers, small and large reservoirs was estimated to be 13,000 tons, however the total annual production potential from different water bodies was predicted in the range of 41,000 to 49,000 tones and in some lakes, the production is rapidly declining, while the demand for fish is increasing, especially in the big cities.

Different fish species were introduced to Fincha reservoir for different purposes in the past time, along which Nile Tilapia (O. Niloticus), Common carp (cyprinuscarpio) and grass carp (Ctenopharyngodonidellus) were introduced into the reservoir in 1980`s.The former two species and Tilapia zillii were reported to be well established in the reservoir in 1998 (Fasil and Gashaw, 2012).

Nile tilapia is currently the most demanded species by the local consumers and traders. The local people are using different methods to catch the fish in the reservoir. Some fishermen use gill net, beach seine and other uses spears for fishing. There are traders (legal and illegal) who collect the fish from the local people with lower prices and take it to central markets since 1998. Some of the fish catch is also being consumed by the local people. The fishing gears should be checked for its standard size and the reservoirs carrying capacity limit (Assefa, 2013).

In Fincha Amarti Nashe reservoir there is a good enough fish resources. The reservoir has out flow called river Fincha and Nashe which generates the electric power and also used for irrigation (Fincha Sugar Factory). Amarti-Nashe reservoir is the virgin lake the fish resources are not efficiently utilized; mean that commercial fishing is not practiced over there. The current fish utilization is not monitored by the government concerned office. There is no rule and regulation for the utilization of the fish resources. This may cause over exploitation of the fish stock. There is no reference for the registered fish stock and utilization of the fish on the reservoir. There are many problems challenge the fish value chain system that fisher men faced through their fishing activities. Fish marketing is an important source of income and employment in the study areas. Being the center of production and marketing of fish, in the study areas have a great problem of access to domestic markets. Therefore, the main aim of the research was to investigate factors affecting volume of fish supplied, performance of actors in the fish value chain activities and problems on the chain with identifying decisions of choice channels.

Artisanal freshwater fishery is one of the most important economic activities in Ethiopia, (FAO, 2012). Improvements in fishery sector would contribute to poverty alleviation and environmental sustainability in Ethiopia (Global Fish Alliance, 2010). Value chain analysis is essential to understand relationships and linkages among buyers and suppliers and a range of market actors in between (Wenz and Bokelmann, 2011). Value chain analysis is essential to explain the connection between all the actors in a particular chain of production and distribution and it shows who adds value and where, along the chain. It helps to identify pressure points and make improvements in weaker links where returns are low (Schmitz, 2005). In spite of the fact that markets are crucial in the process of agricultural commercialization, transaction costs and other causes of market imperfections could limit the participation of farm households in different markets (Sadoulet and de Janvry, 1995 as cited in Moti, 2007). This implies that markets could be physically available but not accessible to some of the farm households. The ultimate consumers have to depend on an effective marketing system to be able to purchase fish at reasonable prices.

With regard to the fish population at the global level, of the stocks with a known status, 77% are at a level where there is no room for further expansion. These stocks fall into the following categories: 52% are fully exploited, at or close to the maximum sustainable production limit, 17% are over-exploited, 7% are depleted, and 1% is recovering. Only 3% of the known stocks are underexploited. An additional 20% are moderately exploited with some potential for further expansion (Freitas et al., 2008). Similarly, from the 600 marine fish stocks monitored by FAO (2006) 3% are underexploited, 20% are moderately exploited, 52% are fully exploited, 17% are overexploited, 7% are depleted and 1% are recovering from depletion.

However, their exploitation and consequently their contributions to food security and growth in the country are minimal despite the technologies capable of resolving the problems of livestock and fisheries production. Fishes experiences both over and under exploitation in the country in that fishery production is overexploited due to inappropriate fishing practice and on the other side, fish production is under-exploited as can be seen from the current demand exceeding the supply by about four-fold. Lack of governance and a regulatory fisheries management framework is the hindrance along the fish value chain. Lack of market information is one of the constraints delaying fishermen for earning a fair return from the sale of their products in Ethiopia. The lack of systematic procedures for information collection, analysis, storage and diffusion of market information has also been one of the major problems in fish marketing along the value chain. Generally, the potential of fish is underdeveloped and the management rule and regulation at federal level and regional level to control the devastation has been very poor (Assefa, 2013).

Fish marketing is a critical stage as it tends to be greatly affected by preservation technology. As Study at Lake Ziway results revealed that the majority (92.9%) of the fish catch is sold whole fresh partly due to lack of fish preservation equipment like refrigerated facilities which has been a great impediment as fishermen are forced to sale their fish as soon as they land for fear that they go bad. Access to adequate infrastructure facilities like transportation, electricity facility in many rural areas around the Lake is one of the most essential factors affecting

livelihood security of fishers. Another aspect which tends to impinge on the activity of the fisher men is the seasonality of the fish market. On Lake Ziway, the largest amount of fish landing occurs between January and March while the minimum is during the summer season (June to September). The highest fish harvest season coincides with the highest demand period which happens to be the fasting season of Ethiopian Orthodox religion followers who consume mostly fish meals. It was further revealed that some of the fisher men go for fishing only during these fasting months. This seasonality of harvest and demand creates challenges to secure their livelihoods from the resource (Ignatius Mberengwa1 and Zelalem Bacha, 2011).

In Ethiopia the major problems that were identified by the stakeholders (the producers, consumers and hotel owners) involved in the fishing activities face problems such as lack of proper fishing gears ; most of them use hook for fishing, Poor post-harvest handling and lack of proper fish processing and storage facilities, low price of fish as a result of low bargaining power of producers, lack of awareness, lack of transportation facilities, Poor culture of eating fish in the community, lack of enough boat in the area, lack of permanent fish market places or shops (EFASA,2011). With increased marketing efforts and increase in supply, the demand for the fish product could be tremendously increased from the current level.

Aim and Objectives of the Study: In line with the study, the research broad objective is to analyze the socio economic and profitability of fisheries.

The specific objectives are to:-
i). Describe the socio-economic characteristics of the stakeholders.
ii). Estimate the profit level of stakeholders along the fisheries and actors.
iii). Determine the consumer preferences to fish in the study area.
iv). Identify the major constraints faced by the stakeholders in the study area.

2. METHODOLOGY
Description of the study area
This study based on the analysis of fish value chain among the fisheries around Fincha Amarti Nashe reservoir rural household in area of Horro district. Horro district is one of the 10 districts of Horro Guduru Wollega Zone, and is located at 314 km North West of Addis Ababa. It is bordered by Abay Commen district in the south east, by Jardega Jarte in the North West and Jima Ganati district in the south west. It is located between 9°34′00″ N and 37°06′00″ E and at an Elevation of 2576 m above sea level. The total land area of the district is 87,111.485 hectares and out of these 34,696.85 hectares of land was under cultivation (HWARDO, 2015)

Based on National Regional Government of Oromia Statistical Abstract 13th edition the total population of the district is estimated at 88,267. The total number of the rural population is 83,551 and out of the total rural population 43,907 are male and 44,359 are female. The majority of the inhabitants observed Ethiopian Orthodox Christianity, with 50.32% reporting that as their religion, while 38.24% were Protestants, and 9% were Moslem. (BOFED, 2014). The total number of shambu town is 14,996, of them 7,757 were male and 7,239 were female (CSA, 2010).

Cultivable and grazing land covers 61.6% and 8.0% of the district respectively. About 11.1% of the land area of the district is covered by forests and shrubs, while the remaining 19.3% covers swampy, mountainous or otherwise unusable land. Horro district has 27 fisher men associations with 21,138 member fisher men (9.3% females). About 13,974 fisher men (7.8% females) were also members of the 15 Service Cooperatives in the district. The district is divided into three agro ecology zones; that is, dega 49.8%, (11 Kebele) wainadega 48.96 % (10 Kebele) and kola 1.24 % (1 Kebele) respectively. The district has the potential for both crop and livestock production, which is mainly undertaken by small holder fisher men. The agro ecology of the district is best suited for diverse agricultural production.

There are a number of rivers being used for irrigated agriculture, particularly for horticultural crop production. The important crops grown in the district are teff, wheat, barley, maize, millet, oats and sorghum from cereals, horse beans and peas from pulses, and Niger seed, falx and rape seed from oil seed from oil crops. Livestock is an integral part of the production system. The largest forest available in Horro Guduru Wollega is called Chato ('Bosona Caatoo' in Afan Oromo). Rivers include the Geber, Gembo, Deneba, and Abjar Rivers.

Development of infrastructure and appropriate institutional support are an engine for economic development is less. The district is endowed with all-weather roads, potable water supply, not well organized and equipped markets, communication (telecommunication, postal services, hospital electricity, banks and credit facility, extension advice, school and health center. About 11.7% of the district‟s population had access to potable water supply. The district had three banks (Commercial Bank, Oromia International Bank, Awash International Bank including insurance service and Development Bank). Also there are micro finance services provided by banks like Oromia credit and saving Share Company, Wasasa micro finance institution (HWARDO, 2015).

Population, Sampling techniques, procedure and sample size
Before deciding on the survey areas, discussions were held with the district fish experts of the Livestock Resource and Health Protection office as well as with fisher men's, about the value chain analysis of fish and also about the

current value chain systems of fish in Horro District. Primarily, reconnaissance survey was undertaken to prepare sample frame of the households in kebeles around the reservoir who participate on fishing.

Multi-stage random and purposive sampling procedures were employed to select the district, kebeles, fisher men households and chain actors, respectively. In the first stage Horro district was selected purposively based on proximity to the reservoir.   Then at the second stage three kebeles Didibe Kistana, Doyo Bariso and Ashaya Igu were also selected purposively selected by their proximity to the reservoir and live in fishing. Sample size in each kebeles was determined based on proportion to size of the household. Accordingly, from 1112 of the total house holds of the three selected kebeles 176 fisher men cooperative members. In the second stage 122 sampled fisher men were randomly selected with proportion to size of the kebeles household. 30 Consumers were being randomly selected with convenience to the required information and from fish traders 3 wholesalers and 3 retailers, were selected at district level purposefully for they are alone to explore value chain of fish production. Sample sizes of households were determined using a simplified formula provided by Yamane (1967) as follows.

$$n = \frac{N}{1 + N(e)^2}$$

Where, n= sample size, N= population size,
e = level of precision. The level of precision is the range in which the true value of the population is estimated to be; it is expressed in percentage points (0.05); based on this sample size on this study were 122.

Table .1. Sample size distribution in the sample rural kebeles

Name of District	Name of selected kebeles	Total number of households in kebeles	No of fisher men	Number of sample households
Horro	Didibe Kistana	452	65	41
	Doyo Bariso	482	61	39
	Ashaya Igu	178	50	42
Total		1112	176	122

Source: Own computation from OoARD and kebele administration data

Types and Source of data
Both secondary and primary data basically used in this study. Secondary data was collected from various sources such as government reports, research publications, technical and working papers, scientific and consultancy reports of relevant institutions including Central Statistical Authority (CSA), Fish For All NGO Fincha Project Shambu Coordination office, ACP Fish II Manual on Value Chain Analysis and Promotion, Horro Guduru Wollega zone Livestock, Fishery Resource and Health Protection Office and other sources.

Primary data was taken from two sources: first from 1) from fish producers 2) from important market participants and database created through fisheries production under Horro Guduru Wollega zone Livestock, Fishery Resource and Health Protection Office in Fishery and Aquatic department which consist of both quantitative and qualitative data.

The field survey was conducted with: -
1. Key Informant Persons (KIP): Heads of villages and communes, provincial fisheries administration officers and other experienced stakeholders in the selected study areas was individually interviewed through a semi-structured questionnaire;
2. Focus Group Discussion (FGD): Local authorities and other related stakeholders in the appointed study areas were grouped and asked to share some information relevant to fish value chain using semi-structured questionnaires;
3. Fish trader household (including Wholesalers, / Retailers): Only traders of the two key freshwater fish species were mainly chosen for individual interview using structured questionnaires.

The study used information on different variables such as data on fish production, fish marketed, prices of fish supplied, and distance to weather road, age of the household head, extension service, educational status of the household head, access to market information, credit facility, and type of sellers and buyers.

Analytical tools:
The tools of analysis used for this study are:
 Descriptive Statistics,
 Analysis of fish value chain performance, and
 Market outlet choice of econometric model .
The data which was collected from the sample fisher men, consumers were and traders were analyzed using descriptive statistics which include mean, standard deviation, chi-square, t-test, frequency table, and percentiles.

Analysis of fish value chain performance

Estimates of the marketing margins are the best tools to analyze performance of market. Marketing margin was calculated by taking the difference between fisher men and retail prices. Analyses of fish value chain performance were done using market share and gross margin analysis. The producers' share is the commonly employed ratio calculated mathematically as, the ratio of producers' price to consumers' price.

Mathematically, producers' share can be expressed as:

$$Ps = \frac{Pp}{Pc} = 1 - \frac{MM}{Cp} \tag{1}$$

Where: PS= Producer's share

Pp= Producer's price

Cp = Consumer price

MM = marketing margin

Marketing Margin (MM) was calculated at each marketing node along the fish value chain. The following mathematical relationship was employed.

$$MM = \frac{Gross\ marketing\ margin - Marketing\ Cost}{Consumer\ Price} \times 100 \tag{2}$$

Calculating the total marketing margin was done by using the following formula. Computing the Total Gross Marketing Margin (TGMM) is always related to the final price paid by the end buyer and is expressed as a percentage (Mendoza, 1995)

$$TGMM - \frac{Consumer\ price - Producer\ price}{Consumer\ price} \times 10 \tag{3}$$

Where, TGMM=Total gross marketing margin.

Net Marketing Margin (NMM) is the percentage over the final price earned by the intermediary as his net income once his marketing costs are deducted. The equation tells us that a higher marketing margin diminishes the producer's share and vice-versa. It also provides an indication of welfare distribution among production and marketing agents.

$$NMM = \frac{Gross\ Marketing\ Margin - Marketing\ Cost}{Consumer\ price} \times 100 \tag{4}$$

From this measure, it is possible to see the allocative efficiency of markets. Higher NMM or profit of the marketing intermediaries reflects reduced downward and unfair income distribution, which depresses market participation of smallholders. An efficient marketing system is where the net margin is near to reasonable profit.

To find the benefit share of each actor the same concept was applied with some adjustments. In analyzing margins, first the Total Gross Marketing Margin (TGMM) was calculated. This is the difference between producer's (fisher men) price and consumer's price (price paid by final consumer) i.e.

TGMM = Consumer's price – Fisher men's price

Then, marketing margin at a given stage 'i' (GMMi) was computed as:

$$GMMi = \frac{SPi - PPI}{TGMM} \times 10 \tag{5}$$

Where, SPi is selling price at i[th] link and PPi is purchase price at i[th] link.

Total gross profit margin also computed as:

TGPM=TGMM-TOE   (6)

Where, TGPM is total gross profit margin, TGMM is total gross marketing margin and TOE is total operating expense.

Similar concept of profit margin that deducts operating expense from marketing margin was done by Dawit (2010) and Marshal (2011).

Then profit margin at stage "i" is given as:

$$GPMi = \frac{GMMi - OEi}{TGPM} \times 100 \tag{7}$$

Where, GPMi =Gross profit margin at i[th] link

GMMi =Gross marketing margin at i[th] link

OEi =Operating expense at i[th] link

TGPM=Total gross profit margin

Market outlet choice model

A multinomial logit (MNL) model was applied to explain inter cooperatives variation in the choice of a specific marketing outlet. The concept of utility as applied to farm households suggests that if a household is faced with different alternatives j it tries to maximize utility given constraints. The decision that a household makes to either increase the volume of sales or to make outlet choice, depends on marginal utility. The analytical model is constructed based on the concept of utility maximization which is built on the condition that if a given household has different set of alternatives (market outlets) j to choose from, where j = 0, 1, 2, 3… from the decision maker's perspective, the best alternative is simply the one that maximizes net private benefit at the margin. In other words, household i is choose marketing outlet j if and only if Uij>Uik.

Based on McFadden (1978), a household's utility function from using alternative j can then be expressed as follows:

$$U \text{ (Choice of j for household i)} = U_{ij} = V_{ij} + \varepsilon_{ij} \qquad (4)$$

Where, U_{ij} is the overall utility,

V_{ij} is an indirect utility function and ε_{ij} is a random error term.

The probability that household i select alternative j can be specified as:

$$P_{ij} = \Pr(V_{ij} + \sum ij > V_{ik} + \sum ik) \qquad (5)$$

$$P_{ij} = \Pr(\sum ik < \sum ij + V_{ij} - V_{ik}, \forall k \neq j) \qquad (6)$$

Assuming that the error terms are identically and independently distributed with type i extreme value distribution, the probability that a household chooses alternative j can be explained by a multinomial logit model (Greene, 2000) as follow:

$$P_{ij} = \frac{\exp(\beta j X_{ij}}{\sum_{j=0}^{j} \exp(\beta j X_{ij})} \qquad (7)$$

Where, X_{ij} is a vector of household of the ith respondent facing alternative j

βj is a vector of regression parameter estimates associated with alternative j.

Following equation above, we can adapt the MNL model fitting to this study as follow:

$$P(\text{CHOICE}_{ij} = j) = \frac{\text{Exp}(\beta jxi)}{\sum_{j=1}^{j} \text{Exp}(\beta jxi)} \qquad (8)$$

Where, i represents i[th] farm household, and i=1, 2, 3… 122. , j represents different marketing outlets, j=0 for sale to wholesalers, j=1 for sale to retailers and j=2 for sale to consumers. P represents the probability of fishes marketing outlet j to be chosen by fishery household i; Choice = j means that fishes marketing outlet j is chosen by farm household i; Xi is independent variables.

It is a common practice in econometric specification of the MNL model to normalize equation (11) by one of the response categories such that $\beta j = 0$. In this regard, the MNL model can alternatively be specified as follow:

The market outlet choice of households is modeled by a multinomial logit model. The underlying assumption is that; a household selects its outlet according to a latent utility function y* defined as:

$$P_{ij} = \frac{exp(\beta j X_{ij})}{\sum_{j-1}^{j-1} exp(\beta j X_{ij})} \qquad (9)$$

The coefficients of explanatory variables on the omitted or base category are assumed to be zero. The probability that a base category be chosen can be calculated as follows:

$$P_{ij} = \frac{1}{1 + \sum_{j-1}^{j-1} exp(\beta j X_{ij})} \qquad (10)$$

The marginal effects of the attributes on probability of choice are determined by differentiating equation (11):

$$\delta J = \frac{\partial P J}{\partial X i} = \frac{P}{J} = P J[\beta j - \sum_{j}^{J} 0 \, (P J)], for j \, 1,2 \dots J \qquad (11)$$

Where,

P_j is the probability that fisher men choose market outlet j

βj is a vector of regression parameter estimates associated with alternative *j*.

In the case of this study, fisher men have three market outlets to sell most of their Fish produce, *J* = 3, and the alternatives *j* = 1, 2, 3, represent sale outlets to wholesalers, to retailers and to consumers respectively. The dependent variables (the marketing outlet (CHOICE) chosen) in the analysis are measured by the probability of selling fish to either of these markets. According to the survey result, three main different marketing outlets were identified. These include sales to wholesalers (0=Wholesaler); sales to Retailers (1= Retailers) and sales to Consumers (2= Consumers).

The model predicts the relative probability that a producer would choose one of the three categories based on the nature of the explanatory variables. For this analysis, the market outlet Wholesaler was used as comparison base because this outlet was chosen by the majority of fish selling fisher men in trading their fish. Econometric analysis of the data was done with Stata 12 software.

3. RESULT
Socio-economic characteristic of fisheries stakeholders in Fincha Amarti Nashe reservoir:
The study examined the socio – economic characteristics of the respondents; such as age, sex, marital status, educational status, livelihood activities, year of experience, and trend of fish production, family size and benefits derived from association.

Demographic and socioeconomic characteristics of the sample respondents Presented under Table 2 and table 3. The total sample size of farm respondents handled during the survey was 122. Of the total sample respondents, 75.25 % were male-headed households and only 10.75 % were female-headed in the three selected kebeles of the district. Marital status of the three sampled kebeles 86 % were married and 14 % of them was not married.

Religion distribution of the district in the study area is 91 % of respondents are protestant, orthodox 10 %, wakefata 18 % and Muslim 3 %. Religion of the sample respondent restricts eating tradition of the fish in some religion of the inhabitants.

Average household heads age was 38.2 of Didibe kistana, doyo bariso and ashaya households of Horro district. Age of the household head in the district has significant difference at 1 percent significance level. With regards to educational status of the selected kebeles is 32.7 % of the districts are illiterate. The average family size of the total sample respondents was 2.16 persons in Didibe kistana, Doyo Bariso and Ashaya kebeles of Horro district respectively. Family size also showed variation at 1 percent significance level.

Production overview
From total respondents of 122 fishermen production are 7439 kg in total. From this total production 5584 kg tilapia and1190 kg common carp were produced by sample respondents with average of 45.7 kg tilapia and 9.7 kg common carp per household in the selected kebeles of Horro district household's production of fish. In those of the three kebeles almost all of sample households produce fish (100%).

Means of livelihood
The respondents depend on different means of income generation strategies were 98.5 % fishing, 79.2 % livestock rearing and 53.4 % that the respondents earned their living income. Fish farming and livestock rearing were major sources of income for the majority of the households in the selected kebeles of Horro district. Fish farming is considered as the first major means of livelihood in the selected kebeles of Horro district. Similarly, grain trades, honey trading and other trading activities account 13.8 % .

Value Chain Analysis
Value chain map of fisher men around the reservoir
According to McCormick and Schmitz (2002), value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors. It also helps to identify the different actors involved in the fish value chain, and to understand their roles and linkages. Consequently, the current value chain map of fish value chain in Horro district is depicted below.
Figure.1. Value chain map of fish
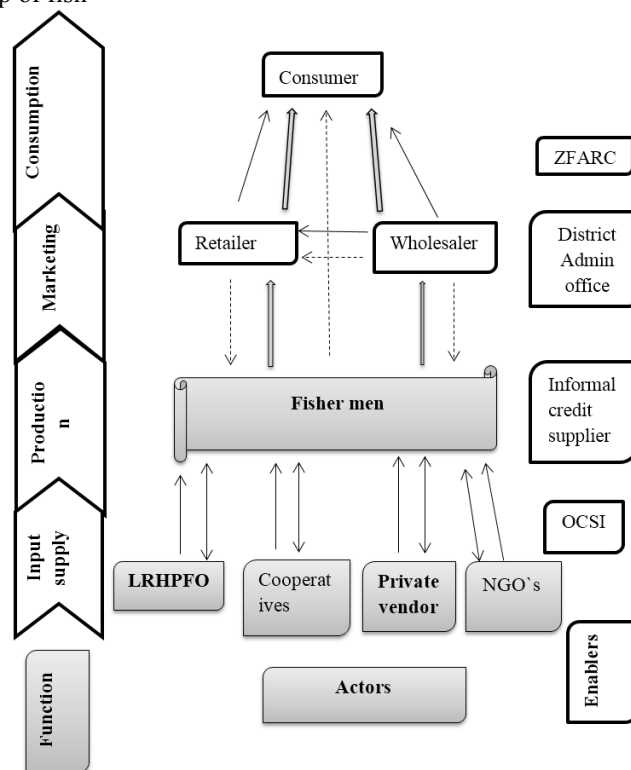
Source: Own sketch from survey result, 2015
———————▷ Represents physical flow of inputs and products
◄————————▷ Represents two-way flow of information and technologies
- - - - - -▷ Represents one-way flow of information
══════▷ Represents the flow of much of products

Actors and their role in fish value chain

The value chain map highlighted the involvement of diverse actors who are participated directly or indirectly in the value chain. According to KIT *et al.* (2006), the direct actors are those involved in commercial activities in the chain (input suppliers, producers, traders, consumers) and indirect actors are those that provide financial or non-financial support services, such as credit agencies, business service providers, government, NGOs, cooperatives, researchers and extension agents.

Primary actors

The primary actors in fish value chain in Horro district were the fisher men, fish input suppliers, traders and consumers. Each of these actors adds value in the process of changing product title. Some functions or roles are performed by more than one actor, and some actors perform more than one role.

Input Suppliers

At this stage of the value chain, there are many actors who are involved directly or indirectly in agricultural input supply in the study area. Currently NGO, primary cooperatives/ union and private input suppliers are the main source of input supply. (FFA) Fish for All Ethiopia local NGO is also participated in providing fish farming inputs in Horro district. All such actors are responsible to supply agricultural inputs like fishing boats, fishing gears (nets), refrigerator which is essential inputs at the production stage. Private vendors also supply some materials of fishing materials.

Producers

Fisher men are the major actors who perform most of the value chain functions right from reservoir inputs preparation on their fishing activities or procurement of the inputs from other sources to facilitate the fishing activities and marketing. The major value chain functions that fisher men perform harvesting, cleaning, washing, scaling, filleting, packing and post-harvest handling.

In the selected three kebeles of Horro district 33% of the sample fisher men get inputs for fishing and post-harvest loss protection or management inputs from NGO`s at 33.6 % and other fisher men of 65.9 % were taken as rent from traders of the fisher men as rent. Those of 33 % of the sample fisher men were get Refrigerator, Gillnets, long line /hooks, fishing boats/wooden, Transport steal boat fishing equipment's from Fish For All local NGO as gift and also sometimes they also bought from input suppliers. But those else sample fisher men got Refrigerator, Gillnets, Long line /hooks, fishing boats/wooden, as rent of 50 % share of the fish harvested by the fisher men.

Accessibility of fishing materials for the fisher men make those 41 sample fishermen are highly cost-effective and competitive, and provide vast opportunities in study area. Unfortunately, these opportunities have not been exploited by the fishermen due to the lower price they receive for their product in the markets, as well as bearing the cost of post-harvest losses. Fish harvesting in those three kebeles need access to road and market.

Wholesalers

Wholesalers are mainly involved in buying fish from the fishermen directly in larger volume than any other actors and supplying them to retailers and consumers. They have a refrigerated vehicle and they simply transport to the central market in Addis Ababa. Survey result indicates that wholesale markets are the main assembly centres for fish in their respective surrounding areas. They have better storage, transport and communication access than other traders. Almost all wholesalers take from warehouse of the fisher men. They are located in Addis Ababa, Fincha and Guduru.

Retailers

Retailer involvement in the chain includes buying of fishes, transport to retail shops, grading, displaying and selling to consumers. Retailers are key actors in fish value chain in selected kebeles of Horro district. They are the last link between producers and consumers. They mostly buy from wholesalers and sell to urban consumers. Sometimes they could also directly buy from the fisher men. Consumers usually buy the product from retailers as they offer according to requirement and purchasing power of the buyers. Retailers were come from areas and sell to urban consumers.

Fish consumers

Consumers are those purchasing the products for consumption. Two types of fish consumers were identified: households and restaurants. Average income of 30 consumer respondents is 29,712 birr per annum. The private consumers are employees, urban and rural residents who purchase and consume fish with an average of 1.8 % of their income per annum and purchase fish by 7.6 % of their incomes per month in Fincha town of Abay chomen district and Shambu town of Horro district. Private consumers purchase fish directly from producers, retailers and

wholesalers though most of the consumers purchase from retailers. Fisher men also make important segment of the rural consumers since they consume part of their products. The survey result also showed that 6773 kg of fish was harvested. From this 5584 kg Tilapia and 1190 kg Common carp were sold in 2014/15.

Consumers prefer a well sanitized, washed and well fileted fresh fish in 100 %. In general consumers have their own quality criteria to purchase fish those criteria are freshness of the fish, sometimes preference of the fish type and its quality on fileting.

Supporting actors
Such actors are those who provide supportive services including training and extension, information, financial and research services. According to Martin *et al*. (2007), access to information or knowledge, technology and finance determines the state of success of value chain actors. NGO`s, OoARD livestock division, primary cooperatives, micro finance Banks are main supporting actors who play a central role in the provision of such services.

1.   Training and Extension Services
NGOs and OoARD were the main sources of fish harvesting training in Didibe Kistana of the three selected kebeles of Horro district. The survey result revealed that 42.6 % of the respondents got training from Fish For All local NGO with DA and Government Livestock resource and health protection office and 57.3 % of sample respondents weren't got training. Those 42.6 % fisher men accessed with the training were trained on fish processing, fish stock management, fish marketing, fish harvesting techniques and fish record keeping. From 122 of respondents 41 fisher men from Didibe kistana and 11 from Doyo bariso kebeles were participated in the training that were organized in 2009 for five days and 70 respondents of the two kebeles got training for three days. Regarding extension service, among the total sample Fisher men 42.62 % of them got extension service as they need and 57.38 % of respondents lack extension service in the district.

2.   Financial services
In the study area, cooperatives support in supervision and cooperation. Fishermen got fishing equipment from trader as rent in addition to this Oromia Credit and Saving Institution (OCSI) supports them in providing saving services. The survey result showed that 26.2 % of the sample respondents from Horro district got credit access but they weren`t take credit from the bank of credit and saving banks nearby them. Most of the respondents' reasons for they denied not participating in credit market were case of processing bureaucracy and distance of the service to get credit service. Sources of credit for traders are also the same as producers except some big traders get credit from banks.

With regard to credit source for those fisher men were local micro finance called wasasa microfinance bank and Oromia credit and save Share Company. Those 41 fisher men of Didibe kistana kebele took fishing equipment from local NGO called Fish For All as gift and support. In addition to this they also get credit from OCSI.

Marketing Channels and Performance Analysis
Marketing channels
A marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler and Armstrong, 2003). The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin (producer) to the final destination (consumer). Since the channels to different fish species were different the analysis was done on common carp and tilapia the solitary fish species avail in those reservoirs in the study area.

Tilapia marketing channel
Four main alternative channels were identified for tilapia marketing. It was estimated that 5584 Kg of tilapia were marketed in Addis Ababa and Shambu markets in 2014/15. The total quantity of tilapia was marketed or supplied by sample respondents. The main marketing channels identified from the point of production until the product reaches the final consumer through different intermediaries were depicted in Figure 2.

As can be understood from Figure 2 the main receivers from producers were wholesalers, retailers and consumers with an estimated percentage share of 51.6 %, 17.2 % and 31.1 %, respectively.

I. Producers ➝ Consumers (tilapia soled 914 kg and 333 common carp)
II. Producers ➝ Retailers ➝ Consumers (1728 kg tilapia and 538 kg common carp)
III. Producers ➝ Whole seller ➝ Consumers (4810 kg tilapia and 982 kg Common carp)
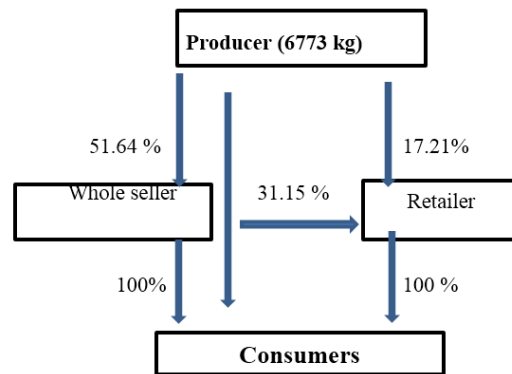IV. Producers ➝ Whole seller ➝ Retailers ➝ Consumers (5624 kg tilapia and 1187 kg Common carp)

Figure 2. Tilapia market channel

Common carp marketing channel

Two main alternative channels were identified for common carp marketing. It was estimated that 1190 kg of common carp were marketed in at Shambu markets in 2014/15. The total quantity of common carp was marketed or supplied by sample respondents. The main marketing channels identified from the point of production until the product reaches the final consumer through different intermediaries were depicted in Figure 3.

As can be understood from Figure 3 the main receivers from producers were whole sellers, retailers and consumers with an estimated percentage share of 41.7 %, 28.8 % and 29.5 %, respectively.

I. Producers ➞ Consumers (564 kg)
II. Producers ➞ Retailers ➞ Consumers (300 kg)
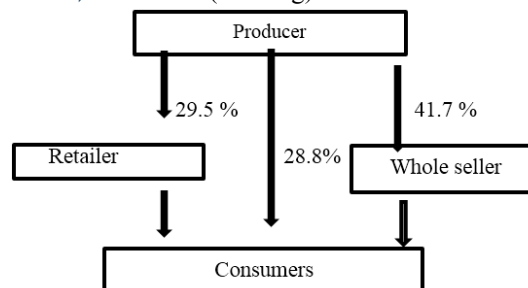III. Producer ➞ Whole seller ➞ Consumer (1096 kg)

Figure 3. Common carp market channel

Performance of fish market

The performance of fish market was evaluated by considering associated costs, returns and marketing margins. The methods employed for analysis of performance were marketing margin. The analysis of marketing channels was intended to provide a systematic knowledge of the flow of goods and services from its origin of production to final destination (ultimate consumers). The estimated volume of production of both fish tilapia and common carp were about 7439 kg.

The distribution of costs and gross income at different levels is important in the business of fish. Being highly perishable, fresh fish require greater attention during harvesting, fileting, freezing, packaging and transporting from the point of production to the final market. The marketing cost of the fish mainly involves the cost of post-harvest activities incurred before reaching the consumer. This includes cost of post harvesting (material costs), handling (cleaning, fileting and packing). Generally, these components constitute a large share in the total margin between the final retailer price and the cost of production. The margin calculation is done to show the distribution throughout the various actors as fish move from production to wholesalers, retail markets, and finally to consumers. Marketing margin can be used to measure the share of the final selling price that is captured by a particular agent in the value chain. The relative size of various market participants' gross margins can indicate where in the marketing chain value is added and/or profits are made. In order to calculate the marketing margin of an agent, the average price of fish for that particular agent was taken. For instance, the buying price of consumers was obtained by taking the average purchasing price of consumers. In order to measure the market, share of each agent, the marketing channel where all agents have participated was selected. Marketing margins, associated costs and benefit share of value chain actors and marketing margins through different main channels was presented below.

Tilapia market performance

The arrangement of marketing cost revealed that perishability loss is the highest cost for each marketing agents.

This is due to the perishable nature of fish. Thus, the cost of loss is the highest amount followed by packing material cost.

Cost and profitability analysis of tilapia for fisher men
This section of the study focused on activities related to fish harvesting at land site. This shows a signal about the performance for fish market. Thus, the packing material cost and cost of loss is the highest costs in the marketing cost. Average costs and sales prices of the producers were used.

Cost and profitability analysis of tilapia for 2007 E.C production year in the study area was as much as possible not satisfactory regarding its profitability. This shows that fisher men with 55.5 average annual productions of tilapia fish with average market price of tilapia 26.68 Birr at landing site were generate profit margin of ETB 24.64 /kg. With regarding to the cost items, packing cost shares the highest (29.90 %) followed by loss cost (22.29 %). This might be in case of accessibility of fish packing material and for the case of lack of extension education on post-harvest loss.

Cost and profitability analysis of tilapia for whole sellers
Whole sellers were acquired 42.4 birr per kg profit of fish. This indicates that the performance of marketing of tilapia for the specified year 2007 E.C was showing a good profit when we compare with that of fish retailers. Marketing cost labor cost incur the highest cost of 1.09 % for keeping quality of the fish and perishability is the second cost incurred due to post-harvest loss is 0.90 %.

Cost and profitability of tilapia fish for retailers
Concern to cost and profitability analysis of the sample tilapia retailer's in the sample traders, retailers were profitable. This indicates that a retailer can obtain a profit of ETB 10.44 per kg at retail level which was lower when compared to whole sellers by 42.4. Relating to cost of operation of retailers', rent for retail shop is the highest (7.89 %) followed by transportation cost (0.67%).

Marketing margins
Marketing margins are the difference between prices at two market levels. The term market margin is most commonly used to refer to the difference between producer prices of an equivalent quantity and quality of a commodity. However, it may also describe price differences between other points in the marketing chain, for example, between producer and wholesale, or wholesale and retail, prices (Spencer, 1971). Therefore, for this section of the study by considering the average sales prices of different participants in fish value channel (fisher men, whole seller and retailer.

TGMM (Complete distribution channel) 84.21% GMM (tilapia retailers) = 13.32 % GMM (whole sellers) = 43.32%
GMMP (producer's participation) 100% -84.21%
$\qquad$ =15.79 %

84.21 % of total gross marketing margin was added to fish price when it reaches consumer at the Finfine, Shambu and Fincha marketing centers by retailers and whole sellers. Out of the total gross marketing margin 43.32 % was gross margin of whole sellers, while 13.32% was that of retailers.

Common carp market performance
The arrangement of marketing cost shown that perishability is the maximum cost for producers. This is due to the perishable nature of the fish. Thus, the cost of loss is the highest amount followed by packing material cost.

Cost and profitability of common carp for fisher men
The cost for perishability and of the fish is the highest costs in the marketing cost.

Marketing costs and benefit shares of actors in common carp value chain
Cost and profitability analysis of common carp for 2007 E.C production year in the study area was not satisfactory as regards to its profitability. This shows that fisher men with 9.75 kg average annual productions of common carp fish with average market price of tilapia 10 Birr at landing site were generate profit margin of ETB 7.06 /kg. With regarding to the cost items, loss cost (32.43 %) followed by packing cost shares (23.60 %). This is for the case of lack of extension education on post-harvest loss and accessibility of fish packing material.

Cost and profitability of common carp for whole sellers
Whole sellers were achieved 9.18 birr per kg profit of common carp fish. This describes that the performance of marketing of common carp for the specified year 2007 E.C was show less profit when we compare with that of fish retailers. From marketing cost other costs incur the highest cost of 2.34 % and 1.87 % for transportation cost and profitability analysis of common carp fish for whole sellers. Average costs and sale prices of whole sellers

also were undertaken.

Cost and profitability of common carp value chain for retailers
Regarding cost and profitability analysis of common carp retailers were profitable. This indicates that a retailer can obtain a profit of ETB 12.13 per kg at retail level which was higher when compared to whole sellers by 9.18 birr. Concerning to cost of operation of retailers', rent for retail shop is the highest (18.10 %) followed by transportation cost (1.55%).

Marketing Margins :- Marketing margins is the variance of prices at two market levels. The term market margin is most commonly used to refer to the difference between producer prices of an equivalent quantity and quality of a commodity. However, it may also describe price differences between other points in the marketing chain, for example, between producer and wholesale, or wholesale and retail, prices (Spencer, 1971).

TGMM (Complete distribution channel) 32.06% GMM (tilapia retailers) = 15 % GMM (whole sellers) = 10 %
GMMP (producers' participation) 100% -32.06%

= 67.94 %

32.06 % of total gross marketing margin was added to fish price when it reaches consumer at the Finfine, Shambu and Fincha marketing centers by retailers and whole sellers. Out of the total gross marketing margin 10 % was gross margin of whole sellers, while 15 % was that of retailers.

Challenges and Opportunities in fisheries and stakeholders were lack of market low price of product, lack of transport, Lack of market information, distance to the market and Perishability.

There are factors that hinder the production of fish harvests in the study area. Particularly the majority of the sample fisher men indicated lack of fishing materials like refrigerator, fishing boat, fishing gear and transporting material to protect post-harvest loss in harvesting fish were major problems of fisher men.

3. Result and discussion

Of the 122-interviewed fish producing households, 75.25 % were male-headed households and only 10.75 % were female-headed households in the selected three kebeles of Horro district. The average ages of the sampled respondents were 38.2. The average family size was 2.16.

Fish value chain analysis of the study area discovered that the main value chain actors are fish producing fisher men, wholesalers, retailers and consumers. Fisher men, LRHPO, and Fish For All Ethiopia were the main actors involved in the production and input supply activities. Wholesalers purchase fish from fisher men and sell to consumers. In addition to this the consumer also directly bought from the fisher men. Retailers purchase fish from producers and sell to consumers. There are also governmental and nongovernmental supportive actors who support fish value chain directly or indirectly. Value chain supporters or enablers provide facilitation tasks like creating awareness, facilitating joint strategy building and action and, the coordination of support. The main supporters of the fish value chain in the study areas are office of agricultural and rural development (LRHPO), Office of trade and industry (OoTI), District administrations, Oromia saving and credit institution, Wasasa Microfinance banks.

Constraints impeding the development of fish value chain are found in all the stages of the chain. At the fishing, fisher men are faced with lack of modern input supply and on marketing side; limited access to market, low price of product, lack of market information, lack of transport, low quality of product and lack of policy framework to control the illegal traders and fisher men are the major problems.

Fish harvested in this area passes through several intermediaries, *i.e.* wholesalers and retailers, with little value being added before reaching the end-users. The intermediate buyers obtain the fish from the fisher men at a lower price and they sell to the consumers at a higher price. The average price that sample respondents received for a kilogram of tilapia was reported to be 30 Br/kg and 10 Br/kg for common carp whereas the price that consumers paid was 70-90 Br/kg, respectively. The research result also indicated the absence of organized institution and system group marketing, and lack of processing activities have made traders in a better position to dominate the roost in pricing. Fish is highly perishable product and has to reach the consumer as fast as possible. This hands the power to buyers and due to this its governance is buyer driven. The study indicates that traders' operating expense for tilapia and common carp were 62.51% and 28.89 % of total value chain expense but their profit margin is almost 77.37 % and 16.09 % of the total profit margin.

The results of the study show a slight difference between total production and marketable surplus; making fish a market oriented product. The result of the multiple regression model indicates that marketable supply of fish is significantly affected by gender, access to market, distance to nearest market, size of gear. Therefore, these variables require special attention if marketable supply is to be increased.

Fisher men in the study areas supply their produce through different market outlets. Fisher men were classified into three categories according to their outlet choice decision: those who have supplied most of their fish to wholesalers (51.64%), 17.21 % supply to retailers and 31.15 % of fisher men supply to consumers. The multinomial logit model was run to identify factors determining Fisher men market outlet choice decision. The

model results indicated that the probability to choose the retailer outlet was significantly affected by age of the fisher men, educational level of the fisher men, volume of fish soled, and distance to the nearest market determined as the selection of retailers as market options. In addition to this sex of the fisher men, harvesting time, type of fish soled and size of gear and distance to the market affect that of retailers. Access to market, harvesting time, type of fish soled and size of gear is determining choice of consumer outlet. In addition to this distance to the market considered as continuous and affect the choice of consumer outlet access to extension service, volume, access to market information, size of gear, credit access and type of fish soled compared to wholesale outlet. Similarly, the probability of choosing consumer marketing outlet was affected by age, volume of fish sell, access to extension services and size of gear compared to wholesale outlet. Therefore, these variables require special attention if fisher men's margin from fishing is to be increased.

Recommendations

It is likely that marketing organizations should solve other problems such as the problem of bad fish handling through providing more transparency in pricing and assistance to fisherman to improve the handling. In the same way, the marketing organization need to offer facilities to cool and preserve fish better than it is done today. It is therefore important that this marketing organization focuses on problems that have been identified in the problem and objective analysis and work on, for example, the following issues:

Training of local fisheries staff and assembly of marketing team: Basic hygiene, fish handling and preservation, processing and packaging innovations, including new equipment and technology, and improved preservation and distribution skills, is good if the training is provided to the fisher men to introduce appropriate technologies for reducing fish spoilage (especially for small-scale fisheries). Training activities need not only be theoretical sessions but also include practices, and exchange visits between communities in the business area and other parts of the activities in the country where levels structuring and efficiency of the sector-fishing are higher. In the training sessions, awareness lessons learned by communities with success skills need to be shared.

Build a logistic unit equipped to treat freshly caught fish at reservoir by fishermen: This cover places selling fresh fish to supply markets and to the central market. And it should be located at the fishing port and include the following elements:

- A space for receiving fish.
- A treatment room should be used for cleaning, sorting and packing fish. This activity need entrusted to women's involved in the marketing of fish.
- A cold room and also some freezers to store fish.
- Establish a system of drainage cleaning. Quarantine conditions need to be established to promote hygienic and eliminate all forms of contamination.

Acquisition of refrigerated trucks for the transportation of fish to the nearest markets and to central market: It is noted that a canter isothermal cooling must be available in order to avoid deterioration of the fish by the distance travelled and the heat during transport products to supermarkets and restaurant chains.

Women's empowerment and gender equity: A priority action is to promote the equal participation of men and women in decision-making, in associations and at the completion of activities foreseen in the cooperative including awareness, preservation and marketing of fish. Training and workshops on gender equity need to be organized with associations to develop an organizational policy in gender equity that promotes greater participation and involvement of women in community development and organized spaces. It is vital to promote women's' participation in the quality and quantity fishing activities trainings, skill exchange visits.

The other thing that needs to establish is credit access for the fisheries sector in order to allow fishermen and distributors to acquire the means of production and marketing more efficiently and sustainably, allowing them to increase their range and gain more money, and also allowing small merchants to increase their capital.

The existing extension services must be improved to provide adequate support to stakeholders in product development, fish handling and preservation of fish, up-grading of existing fishing boats, demonstration of new fishing techniques, exploration of new entrepreneurial skill in fishing, processing, marketing, business management skills, project facilitation (one stop shop) and mentoring. Local leadership and community based management capabilities have to be included in local fisher community to ascertain their active participation in voluntary compliance to the fisheries, fish handling and preservation practices and shared management of fisheries infrastructure.

The recommendations or policy implications to be drawn from this study are based on the significant variables from the analysis of present study. To start with, diffusion of modern input technologies is vital in increasing the production effectiveness of fishing. Given that farmers are small-scale and unorganized in the study area; this state of businesses clearly needs strong government intervention. Not only does it require providing input facilities, but also their diffusion to ensure finest access. Effort should also be made to strengthen farmers' cooperative and encourage collective action of farmers to lower transaction costs to access inputs.

First, retailer outlet choice is negatively and significantly affected by sex, type of fish soled, and size of

gear relative to wholesale outlet. Therefore, these factors must be encouraged by developing farmers' awareness on the way to empower females to improve quality of the fish post-harvest loss, creating awareness on preference of fish and provide training on using size of the gear to protect over exploitation of fish and supply marketable size of the fish on the market with providing extension advice on the volume of fish to gain high income and improve sanitation problems on types of fish sold by the cooperatives.

Finally, consumer outlet choice is significantly and positively affected by sex, access to transport, access to extension service, access to market information and access to credit. Therefore, empowering women towards fishing to make the fish preferred in keeping quality of the fish as preferred, facilitating transportation access, improving access to extension service of the fisher men is essential to make fish market efficient by providing extension advise to increasing amount of fish supplied to the market and provide market information to the fisher men to prefer channel choice to get a good income and access fisher men with credit access as they can fulfill their input for fishing. In addition, government should give special attention to fishery development sector since it is highly perishable.

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