

Analysis of Fish Market Chain: The Case of Abobo District, Agnwua Zone, Gambella, Ethiopia

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Abstract

The study was conducted in Abobo district, Agnwua zone in Gambella, Ethiopia. The study aim at analysis of fish market chain. Despite some study were carried out in different regions of the country which provided empirical evidence for the improvement of the fish market chain, no study was undertaken in the study area. As a result, there is strong need to study market chain in the study area. Therefore multistage samplings were used to select district from the zone, producer and traders. Thus primary were collected from randomly selected 124 producer using semi structure interviews. Then 30 fish trader were selected purposively. Thus, Primary data were collected by using semi structure interviews, key informant, focus group discussion and field observation for both fish producer and trader. Descriptive statistics were used to characterizing fish producer, traders, market performance. Econometric model were used to identify factors determining fish supply. Fish producer are confronted with seasonality and weather, lack motorized boat, lack of government support, fishing net theft and crocodile attack problem. While in marketing, price fluctuation, lack of market information, lack of transport, poor linkage with traders, perishability and lack of proper storage facility are the major problems. MLR result confirmed that, family size, distance to market, access to off farm are the factors determining quantity of fish marketed and exceptional to total quantity of fish produced other variable affected negative. The top four fish traders controlled 66.49% of fish trading. Therefore fish markets are strong oligopoly market. Thus, market performances are inefficient in channels IV and V. Thus, wholesalers marketing margin share is highest while producer is lowest from TGMM. To enhance the ability of fish producer to produce market structure government has develop cooperative to enhance the bargain power it believed to be way to improve it structure. Based on finding the following recommendations are forwarded. Therefore, government, and stakeholder has to play crucial role in addressing problem determining quantity fresh fish marketed and to enhance quantity of fish supply to market by fish producer.

Keywords: Fisheries, Abobo, Market performance, multiple linear regression.

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1. INTRODUCTION

1.1. Background of the study

Fish has been the world's major commodity traded for more than a thousand years and has influenced living conditions for just as long (Abebe, 2016). Fisheries, especially in developing countries it contribute to livelihoods in range of ways: directly as food as a source of income and through other social benefit, such as reduced vulnerability to poverty (USAID, 2016). For instance, in Africa fisheries and aquaculture sector plays an important role in terms of employment. It employed 12.3 million people Mastulah *et al.*, (2018). In east Africa Particularly in Ethiopia, fish as a source of human diet has a long history and is one of the most important economic activities (FAO, 2012). Thus, there are 180 different species of fish and 30 species of those are native to the country (Ethiopia Embassy London, 2012).

Ethiopia is the largest landlocked country and second most populous nations. Thus is home to fisheries sectors whose principal distinguishing characteristics are low level of exploitation and the inadequacy of vital infrastructure. Inland waters covers a total surface area of 8,800Km², comprising about 7,400m of the lake, reservoirs 7000km of rivers and about 275m of minor aquatic habit, all of which subsistence and artisanal fishery are predominately undertaken. Country has no marine coastline their fisheries are inland and conducted in rivers, lakes and reservoirs (FAO, 2014a).

Ethiopian economy is largely dependent on agricultural which accounted 49 percentage of GDP and more than 80 percentage of total employment. Then, fishery and aquaculture sector can be considered a marginal sector in terms of the aggregated economic output in Ethiopia. It is estimated that the sector accounts for about 0.1 percent of the national GDP (FAO, 2014). Despite this low contribution at the aggregate level, the fishery sector in Ethiopia play an appreciated role in terms of providing employment and income at local level and contributing to food supply at the national level. Thus, Fisheries is acknowledge as important strategy in the driving for poverty reductions and also promote great economic development. Thus, USD 14 million from captured fishery and the total employment generated by fisheries is about 14,200 while a total of 40,000 people's livelihood are positively impacted upon by the fishery sectors (FAO,2016).

Thus fish productions are practiced in rivers, lake and reservoirs and recently aquacultures being practiced.

Thus fish regarded as the important component of the nutritional rich diet. However, the consumption pattern varies according to its availability. As a result, more fish are consumed in areas where the product is available, such as in the vicinity of the great valley, Bahir dar, south Addis Ababa and Gambella.

Thus the per capita fish supply is 200g considerably below 2kg per capita per year for the East Africa sub regions. The contributions of fishery to the national are expected to grow as the local and international demand for fish and fisheries is growing. For instance, the national demand for fish in 2015 and 2016 are estimated to be 95,000 to 118,000 tons respectively (Janko *et al.*, 2014). Fish landings in Ethiopia were estimated by the ministry of agriculture at approximately 29,000 tons, the bulk of which 79 percent originated from the six main lakes (Tana, Ziway, Langano, Awassa, Abaya and Chamo) and a further 21 percent from other water bodies (Ibid). Thus, fish production is a primary economic activity that involves harvesting of fish resources from nature. Then, it is known to be one of the oldest human activities still fish production is widely spread economic activity both in primitive and modern societies. The country has an estimated fish production potential of 51,481 tons per annum (FAO, 2014).

Then the water bodies in the district are Chiiro and Alwero mainly. Thus, Alwero reservoir has great production potential per year with an area of 74 Km^2 and it has a potential of 394 tons per year (FAO, 2014b). Then, in the study area fish production is carried out in the dry seasons and is an important means of supplying protein in the diet. Then in these seasons the water levels decreased and fish returned to the main streams and they take advantage at these seasons. Thus, fish production has various contributions. For instance, in terms of economic, food security, employment opportunity and as a means of income generation (Ochan *et al.*, 2016).

Marketing is the answer to the underdevelopment of the developing countries when adopted and practiced will help the developing nation to provide for the needs of the people and increase their standard of living, create job opportunities, wealth for the entrepreneurs, a means toward affording education and employment of the leisure (Ewah and Ekeng, 2009). Therefore, by aggregating demand and supply across actors at different spatial and well-functioning markets underpin an important opportunity at the micro level for the welfare improvement that aggregates into sustainable macro level growth (Barrette *et al.*, 2007). Marketing of fish passes through several market participants and exchange points before they reach the final consumers. Therefore, the marketing system and structure is one of the main circumstances of the socio-economic condition of the local people and production systems of any area (Alam *et al.*, 2010).

1.2. Statement of the problem

Markets are vital for economic growth and sustainable development of a given country. Therefore, a development policy in agrarian countries has usually been placed on increasing agricultural production to serve as a base for rural development (ibid). In addition, agricultural marketing is the main driving force of economic development and has a guiding and motivating impact on production and distribution of agricultural produce (ibid).

Similarly, the agricultural marketing system takes on increasing importance as a traditional agrarian society is transformed into a modern industry society. Thus, the increasing proportion of the population living in urban centers and the increasing level of income requires more highly organized chains and distributing channels (Wolday and Eleni, 2005; Abebe Cheffo, 2016).

Despite the contributions of marketing to economic growth, development and its importance in transforming the traditional agrarian into modern industry. Thus, the absence of well-functioning markets have experienced several drawbacks in agricultural production (Belay, 2009). Therefore, agricultural production and productivity is very low and the growth in agricultural output has hardly kept pace with the growth in population (Pender *et al.*, 2004; Abebe, 2016). As many other countries confronted in the world by population rise, urbanization, agricultural development, industrialization and the water resource development activities has resulted in a decrease in fish production (Dereje *et al.*, 2014). According to the previous research, a number of factors explained the low production potential and variability in Ethiopia.

Therefore, factors hindering the fish production potential in the country is not that much deviated from which are encountered in other parts of the world their similar ways they may be related. Thus, this has resulted in underutilization of the available production potential in the country. Fish production is undeveloped due to a low level of economy, lack of fisheries legislation implementation, ineffective administration setup and lack of expertise affected stock of fish production (Bikila *et al.*, 2016). Similarly, EFASA, (2012), clarified that several factors affected fish production at the national level for instance, recognition of the fishery sectors were still unorganized, lack of university giving training in the area, lack of trained manpower, poor coordination among stakeholders, weak extension service, poor enforcement of the decree and poor linkage as the major factors affecting the fishery sectors. On the other hand, lack of harvesting technology, processing inadequate extension service and lack of credit for the purchasing of fishing tools has constrained the production capacity, limited quantity and this has resulted in the scope of marketing to the nearest local market outlet where fish can be sold fresh immediately after catching (FAO, 2014).

In the study area fish production is carried out in the dry seasons and is an important means of supplying

proteins in the diet. Thus, in the dry seasons waters levels decreased and fish returned to the main streams and they take advantageous (Ochan *et al.*, 2016). Therefore, a Fish production has various contributions. For instant in terms of economic, food security, employment opportunity and as means of income generation.

The Abobo alwero reservoir has great production potential per years and has area squares of 74 Km^2 and it has potential 394 tons per years (FAO, 2014b). Although the important of the fish production potential in the district are widely recognized, it still along away from meeting it present productions potential. Therefore, the current productions potential are opposing to the estimated productions potential (Hussein, et al., 2010). Therefore one may surprise the paradox (high potential for fish production against low produced) it natural and rational thinking to posing question as why the fish production is not as expect for fish producer?

Therefore based on the personal information obtained from the Abobo district trade and marketing office, Animal production and fishery development office, fish market in the district is characterized by inefficient market, even if there is increasing trend in the production of fresh fish for one season. It has been constrained with lot of problem such as storage facility, lack of transportation, poor linkage with traders and other factor need to be further investigated carefully and another solution need to be put forward and applied so as to benefit producer and other market agent involved.

Previous studies conduct in the fisheries sectors in the study area did not studied fish market chain. For instant Ochan *et al.*, (2016); Gnigwo *et al.*, (2016), they deal with the cooperative members participations in fisheries and Ojulu *et al.*, (2018), deal with fish productions exclusively and factors considered to be important determining the volume of fish productions. Although analysis of fish market chain is important, there is a limited empirical research done so far in Abobo particularly on fish market chain in the district. Understanding the fish market chain and their determinant variable, identifications of production constraint at producer levels, and knowing the market performance. Properly functioning market chain for agricultural product is generally perceived as the best organizational structure to achieve more efficiency production, in terms of quantity, quality, and consumption decision (Abebe, 2011). As result the increasing proportions of the population living in the urban and increasing the demand for the fish require more organized market chains. Thus, in developing marketing strategy is considerable to assess it market chain to visualize how the product passes from farm gate to the final consumers.

Furthermore, such knowledge may help policies makers to design appropriate policies to improve the fish market chain and to expand it scope of marketing chain. Therefore this study aimed to take step toward filling the above noticeable knowledge gap and geographical through collecting the cross sectional data from the selected fish producers and traders in the Abobo district.

1.3. Research Questions

In this regard, this study attempted to answers the following research questions:

1. What are the major constraint and opportunity of fresh fish productions and market?
2. What factors determining the quantity of fresh fish marketable in the study area?
3. Who gets most of the market margin from the fresh fish market of the study area?

1.4. Objective of the study

1.4.1. General objective of the study

The overall objective of this study was to generate empirical information on fresh fish market chains in Abobo district, Agnwaa zone, GNRS, Ethiopia.

1.4.2. Specific objective of the study

1. To identify the factors that determining quantity of fresh fish supplied to the market.
2. To measure the market performance along the fresh fish market chain in the district.
3. To identify the major constraints and opportunities along fresh fish market chain.

1.5. The Scope and limitation of the study

Attempting to analyze the entire fish market chain in Agnwua zone are an impossible actions given the limited time and budget. Thus, the research was narrowed down to concentrated on the productions area Abobo district only from Agnwua zone. In this sections there are three delimitation needed to be addressed. Thus, the first related to the selections of the fresh fish market chain. In the second sections are related to the study objective and particularly the specific objectives. Thus focused on market chain, analyzing factors determining quantity of fish marketed, examining the fish market performances and productions and marketing constraint and opportunity in Abobo district in Agnwua zone in Gambella Ethiopia. In third sections is related to the geographical coverage.

This study cover only one district from five available districts in Agnwua zone in Gambella Ethiopia that is due to the available time and budgets allocated for the study. Then the other limitations are on data type and methods of data collected and data used. Thus the study are mainly based on the information obtained from the sample household during time of the survey in one productions season which is 2011/2019 only by using cross sections data because of the budget allocated.

1.6. Significance of the study

The main significance of this study result is to all actors in the fish marketing system. Analysis of entire marketing chain. Therefore, identifying the factors determined fish supply to market by fish producers, constraints along marketing, identifying the existed fresh fish channels and identifying highest marketing margin and market structure would benefit policy maker and implementer in indicating interventions area to progress the market chain. Then would show the advantageous area for entering or would tell what should be done to progress the fish market. To formulate fresh fish market development program, project and guideline for interventions that desired in advance efficiency of the fish market system. Similarly, would benefit who looking forward of it significant as a source for the further studies.

Moreover, research finding should be made available to the community engage in the sectors the through in printed form or through trainings with the help collaboration of different stakeholder. In conclusion, the study generated important information for the researcher and development organizations, extension service providers, government and non-governmental organizations.

3. RESEARCH METHODOLOGY

3.1. Descriptions of the study area

Gambella people regional state (GPRNS) is in the southwest Ethiopia between geographical coordinate $6^{\circ} 38' 28''$ to $8^{\circ} 34'$ North latitude and to 33° to $35^{\circ} 11' 11''$ East longitude which covers area of about 34,063 and about 35% of the nations. Gambella is nine among another regional state in the country, which constitute Federal democratic republic of Ethiopia, (GPRNS, 2011). Then it is at distance of 766 km from capita city of Ethiopia, Addis Ababa. It also located in south west of Ethiopia lowland border with Oromia regional state from east and north, SNNPRS from east south and Republic of South Sudan from west.

The administrations of the regions is divided in to three zonal along the major ethics group, zone one belong to Agnwua (Anyuak Zone), zone two Nuer and zone three belong to Majang and these three zonal is divided in twelve district and one special district (woreda). Then, from this twelve district in Gambella regional state, five districts belong to Agnwua zone. Thus, are Gambella zuria, Abobo, Gog, Jor and Dimma. Then, according to latest census, Gambella has total populations of 306,916 which is the smallest regions after Harrar regional state. Then the regions is the home to five endogenous ethnics group namely, Agnwua, Opo, Majang, Kummo and Nuer. Despite all this are Nilo Saharan linguistic, they did not form homogenous identity and ethnic boundaries these among this groups are constructed along linguistic, cultural political tradition and their subsistence Economy system. For instance, Agnwaa people are pre-cultivator in combinations of fishing, Majang combined shift cultivations with hunting and Nuer are pastoralists (Evans-Pritchard, 1940 and b; Stauder, 1971).

Abobo woreda is one among five woreda in Agnwua (Anyuak zone) from the Gambella regional state and it town is called Abobo. The terrain of Abobo is dominated by comparative high ground extending to southwest to northwest axis; the elevations range from 400-600meter sea above level. Then based on the 2014 census conducted by CSA, the total household was about 15,714, with area of 3,116.17 square kilometers and population density of 5.05 which the greater than square kilometer. Followed to this the CSA, survey reported that about 4090 or 25.98% are urban inhabitants. Then about, 3867 were counted per person in household and 3668 housing units. Then the major populations were protestant which is about 71.47% while, 10.77 were orthodox and about 6.12 were Muslim (CSA, 2014). Gambella regional state is endowed with large volume and several inland waters resources including rivers, lake, reservoirs, ponds and huge flood plain area Ochan *et al.*, (2016).

Abobo district is bordered to north by Gambella zuria district, to west by Jor and Jikawo district and to east by Mengeshi district and Oromia regional state (Kijak *et al.*, 2013). Thus, district has sixteen rural administrative rural Keble and three urban Keble with area square of 3,116.17 kilometer square. Thus, Abobo district has two Agro-climatic zone; these are woina dega (10%) and kola (90%). Accordingly, mean annual minimums and maximum temperature range between 18° and 39° respectively. Then the annual average rainfall range from 900mm to 920mm and the rainy season in the district is mid-April to the end of the October (NMSA-Gambellabranh, 2012). Therefore, Abobo district economies are predominantly agriculture. Thus, they are mainly dependent on crop production such as maize and sorghum with fishing and hunting are used as supplementary dietary and source of income. Then, recession agriculture are commonly practices by the people along the Alwuoro River. Therefore the major water bodies in Abobo district are, chiiru and Alwuoro. They are polygamous society and favors living in extended family group in settlement established here and there in isolated and in front of their agricultural farm land. Thus a grass roofed main hut for living, a small versions for grain storage and chicken coops.

Figure 1. Map of the Abobo district

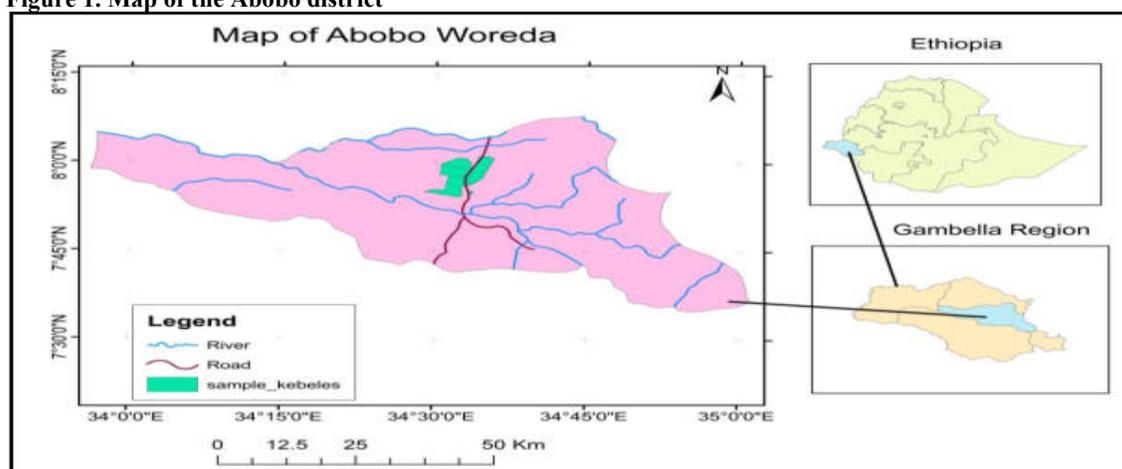


Figure 1: Map of the study area (Source: Redrawn from Ethio-GIS data base (1994).

3.2. Sampling Procedure and Sample Size Determination

3.2.1. Fish producer sampling Procedure

For this study multi-stage sampling technique was used to select Abobo district from Zone based on its great fish production potential per year (FAO, 2014). In the first stage, Key informant interviews were used to get preliminary information regarding the fish producing kebeles from sixteen rural kebeles in the study area. Therefore, seven rural kebeles were selected from sixteen rural kebeles purposively based on their proximity to the reservoirs and for their participation in the production.

Then in the second stage, from the selected seven rural kebeles five rural kebeles were selected by using simple random sampling by employing Lottery methods. Thus, In the third stage by considering only fish producers. Thus, from each rural kebeles fish producers were listed out with the help of development agents assigned by the government to each rural kebeles. Therefore, the available list of fish producing population they were selected by systematic randomly based on their probability proportional to their size. Finally, only 124 fish producers were selected from 344 using systematic randomly as representative sample size. Thus it skip interval were determined by dividing the total populations of fish producing from five selected divided by the sample size. Hence, the study used cross-sectional survey and also the population are known formula given by (Kothari,2004) used for this study.

Table 23 Name list of the selected sample kebeles in the district

List of kebeles	Total population	Producer	Sample Fish producer
Tegni	1262	70	70*124/344=25
Abaaro	3870	78	78*124/344=28
Gedeeb	1460	85	85*124/344=30
Perbung Omanga	570	38	38*124/344=14
Chwubo kiir	1310	73	74*124/344=27
Total	8472	344	124

Source; Abobo office of Agricultural and rural development, 2019.

$$n = \frac{Z^2 \cdot p \cdot q \cdot N}{e^2(N-1) + z^2 \cdot p \cdot q} \dots \dots \dots (1)$$

Whereas; N= Size of the population, p = sample proportions n = sample size q =1-p
 z = value of the standard variation at specific confidence interval
 e = accepted error (precision)

Thus, N=346 p=0.02 z=2.005 e=0.02

$$n = \frac{(2.005)^2 \cdot (0.02) \cdot (0.98) \cdot (344)}{(0.02)^2(344-1) + (2.005)^2 \cdot (0.02) \cdot (0.98)} = 124 \dots \dots \dots (2)$$

3.2.2. Sampling procedure for the trader

District trade and industry office were consulted to get preliminary information regarding market agent found in the district market of fresh fish.

Then, a few numbers of the legal trader name list were obtained with help of district trade and industry experts. For this reason, sixty three fish traders name lists were obtained from respective office. Therefore purposive sampling techniques were used for this study objective. Thus, only thirty fish traders were selected purposively.

Finally, three market place were found in Abobo district town. This are, Abaaro kebeles, Amelamele, and Atut Catholic are where fish marketing take place.

Table 0:24. Distribution of fish trader

No/	Name of the kebeles	Total population	Sample of fish trader
1	Abaaro	-	16
2	Amelamele	—	6
3	Atut Catholic	—	8
Total			30

Source; "Own survey, 2019.

3.3. Data of types and Source of data

This study data was based on cross-section survey. Thus, both qualitative (focus group discussion, key informant interview using checklists, and field observation) and quantitative using semi-structure interview schedule were collected. To collect required data both primary and secondary data were used for this study.

3.4. Methods of Data Collection

Primary data were collected using semi-structure, focus group discussion and key informant guided by checklists and field observation were used. Then, the informal survey using key informant using checklists was used to get preliminary information on the fish producing rural kebeles and fish market agents in the district. Then, the formal survey, such as semi structure interview was used for both fish producers and fish traders. Finally, the secondary data were collected from different sources such as followed, central statistical agency (CSA), Bureau of Animals productions and fishery developments, online, published journal, article, thesis papers, and conference paper.

3.5. Method of Data analysis

The information gathered from different sources was compiled. The quantitative data were entered in STATA version 12 and SPSS version 20 statistics tools for analysis. The result of the data was interpreted and discussed using descriptive statistics and econometric models. The data obtained from focus group discussion and key informant interviews were analyzed by qualitative.

3.5.1. Descriptive Analysis

Descriptive statistics such as; percentage, mean, minimum and maximum, frequency and standard deviations were used in the process of examining and describing market chain participants characteristics.

3.6. The Structure, Conduct, and Performance (SCP) model

3.6.1. Measure of structure

Market structure can be measured with CR, HHI, and Gini Coefficients. Thus study, concentration ratios measures (CR) were used to analyze the degree of the trader concentration in the market place those performing the exchange function. The structure of the market is an important element determining the nature of competition and consequently of market conduct and performance.

Concentrations ratio: it reveals the relative size of the K-large firms in relation to their industry as a whole. It shows whether an industry is dominated by a few large or many small firms.

Market concentration ratio will be calculated as follow;

$$CR = \sum_{i=1}^{i=K} Pi \dots \dots \dots (2)$$

Where, CR= Concentration ratio, Pi =the percentage market share of the ith firm and k = the number of largest firms for which the ratio is going to be calculated (four for this study). Kohl's and Uhl (1990) suggest that as a rule of thumb, a four largest enterprise concentration ratio of 50% or more is an indication of a strongly oligopolistic industry, 33-50% shows weak oligopoly, and less than 33% shows unconcentrated industry.

3.6.2. Measure of conduct

There are no agreed-upon procedures for analyzing market conduct (ibid). Thus, market conduct was measured by using pricing strategy of market actors and terms of payment they used. In measuring market conduct, pricing role of market actors and mechanism of pricing was assessed.

For instance, Johann du Pisanie, (2013), explained that Term of payment include in form of cash, credit, advance was given and both. Therefore, in this study pricing strategy (selling price setting and purchasing prices), and terms of payment was used to analyze the fish market conduct.

3.6.3.. Measure of performance

3.6.4. Marketing margin

To evaluate market chain performance cost and price information are very important and is used to construct marketing expense, margin and profit. Then assessing marketing cost, market margin, and net returns along the

market chain are vital to evaluate performance of the market. Accordingly, to evaluate the market performance in the market chain, marketing margin; total gross marketing margin (TGMM), producers share (GMMp), marketing margin at a given stage “i” (GMMi), estimating cost of the market chain actors were calculated. Therefore in this study, market margin was used to judge the performance of the fish market chain. Hence, the fish producers did not used farm recording, it will be difficult to quantify all the cost encured in production and also marketing. Therefore it possible for them remembers at what price they sold. as result this market margin is good measure to know the efficiency of the fish marketing system in the study area.

Total gross marketing margin (TGMM); is the final price of the product paid by the end consumers minus producers’ price divided by consumers’ price and expressed in a percentage.

$$TGMM = \frac{\text{consumers price} - \text{producers price}}{\text{the price paid by consumers}} * 100 \dots \dots \dots (3)$$

TGMM, Total gross marketing margin

Producers gross marketing margin (GMMp) which is the portion of the price paid by the consumers that go to the producers.

The producer’s margin is calculated as;

$$GMMp = \frac{\text{Consumer price} - \text{Total gross market margin}}{\text{Price paid by consumer}} * 100 \dots \dots \dots (5)$$

Whereas GMMp is Gross marketing margin of the producers

$$GMMi = \frac{SPi - PPi}{TGMM} * 100 \dots \dots \dots (6)$$

Whereas the Spi is the selling price at i the chain and Ppi is purchasing price at “i” the chain. The structure conduct and performance model are important element to examine the functioning of the agricultural marketing. Thus can applied to examine used in the market by the participant, to evaluate the market competitions from the norms of perfect competitive market and examine whether the market are efficiency, equity. Therefore in this study both conduct and structure were examine because their result in the market performance functioning. Therefore, market margin were used because farm recording is not intensively used by the fish producers. Therefore it will be difficult to costly their cost, so it is suggest to used margin because it possible remembers at what cost do traders purchase them in the productions.

3.7. Econometric Analysis

The data full fill the assumptions of the OLS or if the all the fish producer participate in selling their fish to the market OLS will be used to analyze the factors which affect the fish marketed supply to the market. Econometric model (Greene, 2003), specification in matrix notations is given as followed relationship.

$$Yi = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots + \beta_kx_k + Ui \dots \dots \dots (1)$$

Where

Yi= quantity of fish supplied to the market

β0= the constant intercept

βi=a vector of estimated coefficient of the explanatory variable

Xi= a vector of explanatory variables Ui= disturbance term

3.8. Variable definitions and Hypothesis

3.8.1. Dependent variable

Quantity of fish supplied to the market (QUN-SOLD) 2010/2011: Continuous dependent variable represents the amount of fish supply to the market by fish producers in terms of the years of 2018/2019. Most fish selling and buying was done by counting of fish. Thus, fish having average length of 35cm are agreed to 500gram and they counted two as one kilogram.

3.8.2. Independent variable

Quantity of fish produced (Qu_fipr); it is a continuous variable that was measured in the Kilogram by estimating that fish having a size 30cm as one Kg which was produced in 2018/2019 by fish producer. The variable was expected to have a positive significant effect on the market supply of fish.

An increase in volume of production has a significant effect on market supply and motivates farmers to increase the supply of commodity to the market. Abraham (2013), found that the amount produced significantly and positively affected quantity supplied to market.

Household Age (Hh_age); It is a continuous variable that refers to the age of the household head it will be measured in years. Aged household heads are believed to be wise in resource use, and it is expected to have a positive effect on marketable surplus of fish. According to Abraham (2013) also proved that aged farmers provide more of their product to market.

Education level (Edu); It is the dummy variable measured in terms of whether the household has a formal education or not which take value one if fish producer has formal education and zero otherwise. Education is believed to improve the knowledge of the household to increase the quantity of production and supply to the

market. Then Grover *et al.*, (2012) found that level of education affected the marketed surplus positively and significantly. Therefore in this study it was expected to affect the quantity of fresh fish supply to market significantly and positively.

Access to market information (Mrk_Info): It is a dummy variable with a value of one if a household head has access to market information and zero otherwise. Congruently, Access to market information was expected to have a positive impact on the marketable supply of fishes. The study by Abraham (2013) indicated that access to market information affected marketed supply of potato and tomato positively and significantly.

Access to extensions service (Ace_Ext): it is the dummy variable measured in terms of whether the fish producers obtained has accessed to extension service or not. It is expected that access to extension service would widen the household's knowledge about the use of improved technologies and which will have positive impact on fish sell volume. Ayelech Tadese, (2011) found that if fruit producer gets access to the extension service the quantity of fruit supplied to the market increases. Thus, was expected to have a positive impact on the quantity of fresh fish supply to the market.

Distance to the market (Mrt_Dst): It is the distance of the fish's producer households from the nearest market and was measured in hours of walking time. In this study, the distance to the nearest market was expected to affect volume of fish sell negatively. Indicated that distance from market discourages producers from selling high volumes of products. The closer the market, the lesser would be the transportation charges, reduced walking time, and reduced other marketing costs, better access to market information and facilities (Nega *et al.*, 2015).

Family size (F_Sze): the Household size of a respondent is a continuous variable it was measured in terms of number of family members in the household involved in fishing and related activities. As fish production is labor-intensive activity is function of labor. Thus, fish producers with more families members tend to have more labor that would in turn increases fish production. On the other hand, family size also decreases market supply because high proportion of the product would be for home consumption (Ojulu *et al.*, 2015).

Fishing experiences (FIS_Expr): A continuous variable was measured in years, which refers to the number of years the fisher engaged in fishing activity, having cumulative knowledge on how to keep fish. It is expected to have a positive effect on the amount of fish supply to the market (Ojulu *et al.*, 2015).

Access to credit (ac_crd): it is dummy variable measured in terms of whether the household fish producers obtained has accessed credit service or not. It is one of the fish producers have obtained the service from formal credit institutions and zero otherwise. If the producer gets access to the credit service, the volume of the product supplied to market increased (Alemnewu, 2010; Mohammed, 2011).

Off-farm (of_farm): it is dummy variable measured in terms of whether the household fish producers have participated in of farm or not. It is one if fish producers involved in off-farm activities and zero otherwise. It was expected to positive relationship with quantity. if fisher producers have off-farm activities fish supply increased (Taye *et al.*, 2018; Almaz, 2018).

Access to modern transport service (TR_Hh); it is the dummy variable measured in terms of whether the fish producer household has accessed the modern transportation service or not. It is one if fish producer has access to modern transport and zero otherwise (traditional transport). This was expected to have a positive impact on the quantity of fish supply to market if the fish producers have accessed. Access to the modern transport facility can affect the quantity of fish supply to the market significantly and positively Gnigwo (*et al.*, 2018).

4. RESULT AND DISCUSSIONS

As in Table.(4), The sex of the fish producers from the total sample respondent 98.4 percent of them was male-headed and the remaining 1.6 percent of them were female. This implies that fish productions in the study area are highly dominated by male-headed and it were considered to be male activities this. This study result is in line with Mecki *et al.*, (2014), found that woman focus on swallows waters closed to shore and mainly without using canoes. As result to this fish productions continuous to be dominated by men. As in Table. (3), marital statuses of the fish producers, 30.6 percent were single, 66.1 percent of them are married and the remaining 1 percent of them were widows/widower. Thus implied that fish productions play a great contribution to household income and livelihoods in the study area. In Table. (4), Religions of the fish producer, above 87.1 percent were protestant, 8.9 percent were catholic and the remaining of them were non-members of the religions. This study result is in line with the finding of Ojulu *et al.*, (2018) founded that majority fish productions are religious followers because it was the first introduced religion in the study.

Table 25. Demographic characteristics Fish producers

Variable	Numbers of respondent	Percentage
Male	122	98.4
Female	2	1.6
Single	38	30.6
Married	82	66.1
Divorce	1	0.8
Protestant	108	87.1
Catholics	11	8.9

Source, own survey, 2019.

4.2. Fishproducer's characteristics (Continuous variable).

Table 26. Characteristics of the sample fish producers (Continuous variable).

Continuous variable	No.	Min	Max	Mean	SD
Age of the household	124	15	41	28.85	6.26
Family size	124	1	12	5.72	2.06
Quantity harvest	124	390	2500	1017	424
Quantity sold	124	150	2100	767	382
Distance to the market	124	0.15	6.12	1.79	2.11
Distance to the landing sit (Rivers)	124	5.00	30	11.66	5.96
Experience	124	1	20	6.65	4.22

Source, own survey, 2019.

In table (5).The age of fish producers ranged from 15 years young to 41years older with an average age of the fish producers was 28.85 years. Then, family size of fish producers range from minimum of 1 to maximum of 12 family members with an average 5.72 family size. Therefore, this indicated that fish producers are living within extended family size. Thus, study result is in line with DRDIP (2016),found that majority of the people are living in extended family size. Then, the fish producer has average fishing experience of 6.65 years with 1 years minimum and 20 years maximum. Thus, Quantity of fish produced range from 390kg to 2500kg maximum with an average of 1017kg. Then, fish producer's travels minimum of 0.15min to maximum of 6.12 hours with an average of 1.79 hours to reach the market. Thus, fish producer they travel an average of 11.66 minute and it range from 5.00 minimum to 30 minute maximum. Then, this indicated that they are settled near to the water bodies. Thus, this study is in line with DRIDP (2016), found that majority of Agnwua people they settled along rivers bank or near to water bodies.

4.5. Market structure conduct and performance of Fish market

The market structure consists of the characteristics of the organization of which seems to influences strategically the nature of the competitions and pricing with in the market (Abaynehel *et al.*, 2018). Then the structure of fresh fish market was characterized by employing the following indicators: Market concentrations, market transparency (market information's), and market entry conditions.

4.5.1.Barrier to entry in fish productions and fish trading

Table 0:27. Fish trading experience

Variable	SD	Average	Mini	Max
Trading experience	1.07	1.90	0.80	4.00
Initial capital	2162.229	1555	200	10000

Source: own survey, 2019.

Fish trading experience were 1.90 year average with range from 4 years to 0.80 years maximum in fish trading business. Therefore, indicating that other new traders are entering to fish trading business. Hence, the absence of widens ranges of trading experience years indicate that fish trading experience is not a barrier to enter in fish trading business. Finally, regarding the initial capital the fish trader's have an average 1555birr starting up capital with 200 birr minimum and 10,000birr maximum. This indicated that capital is not a barrier to enters in fish trading. As a result the starting capital is lowest as compare to others business and it can be started by owned, borrowed and load capital.

Based on the field observations and focus group discussion with fish producers, rural Keble administrators, elders and Agricultural development agent and Key informant from district office of livestock and fishery in the district. Then they reported that there is no barrier to entry in the production and also regarding licensing procedure and this study, agree with, (Abebe, 2013; Melkam, 2016).For this reason, this is hold true open access resource in which there is no ownership right for anyone and no one would be exclude from the benefit of the resources. Though, licensing were seen to be the trading entry barriers used by government as procedure to monitors fish

trade market. This because they don't pay the tax to the government for fish trading and despite this, regulation was minimal not strong some unlicensed fish traders were found in the business.

Table 0:28. Traders' Educational level and Access to trading license

Variable	Percentage
1-4 primary	16.7
5-8 secondary	36.7
9-12 high school Certificate	46
	20
License owners	
User of license	53.3
Non license user	46.7

Source; own survey, 2019.

4.5.2. Market information (Degree of market transparency)

Although media such as, Television and radio plays the greatest provisions of market in formations to the producers in others part of country in different commodity in the study area there is no such in place to spreads the information. Hence, all traders have accessed market information through different sources. These were 43.3%, 20.1% and 36.6% through, phone calling, other traders and personal market visit respectively. Then about, 33.9% of fish producers have accessed the market information and the remaining 66.1 % have not accessed the market information. Hence their source was fellow fish producer, market visit and phone calling, 77%, 20% and 13% respectively. It was observed that the majority of fish producers has limited market information. In this case market information was the main problem in the fish market. This implied that there is no established system spreading market information in the district. As a result to this, the market information was not transparent among the sample fish traders and fish producer in the study area.

4.5.3. Market concentrations Ratio

The concentration ratios have been used by several researchers to determine the market structure for Agricultural commodity. For instance, Assefa M.J. *et al.*, 2015 and Melkam, (2016), assessed the fish market chain in different regional state in the country. Then founded a concentrations ratio about 17.98% which implied the fish market is un concentrated in the some waters bodies in *Oromia regional state*. Similarly, Melkam, (2016), assessed the fish market structure in *Lake Tana in Amhara regional state*.

Then found that the concentrations of 27 percent which also implied that market is unconcentrated in the study. The result of this study is different to the above researcher finding. Therefore based on the estimation of the concentrations ratio it was found to be 66.49% which can be categorized as strong oligopoly market structure. Then the result of this study is similar to (Abebe, 2013). This show that market structure can be different from place to place or from commodity to commodity. According to Kohl's and Uhl (1985) Market concentration, the portion of the industry sales made by the largest firm is another source of imperfect competition. It can be concluded that fish trade market in the district are operated in non competitive market, where only few trader control a large share of supply of fresh fish the district. This shows the existences of imperfect competition in the market among the traders.

Table 0:29. Fish trader market concentrations ratios in the study area.

Number of trader	Cumulative frequency of traders	Percentage share of traders	Cumulative percentage share of trader	Quantity purchase in Kg	Total quantity purchase in Kg	Share of purchase	Cumulative share
5	5	16.66	16.66	200	1000	4.55	4.55
1	6	3.33	19.99	250	250	1.13	5.68
1	7	3.33	23.32	300	300	1.36	7.04
4	11	13.33	36.65	400	1600	7.29	14.32
6	17	20	56.65	500	3000	13.66	27.98
2	19	6.66	63.31	600	1200	5.46	33.44
1	20	3.33	66.64	800	800	3.64	37.08
1	21	3.33	69.97	900	900	4.10	41.18
6	27	20	89.97	1000	6000	27.33	68.51
1	28	3.33	93.33	1300	1300	5.92	74.43
1	29	3.33	96.63	2500	2500	11.39	85.81
1	30	3.33	100	3100	3100	14.12	99.93
30					21,950	100	100

Source; own survey, 2019.

4.6. Fish marketing conduct

4.6.1. Market Conduct of fish producer

In this study, conduct of the fish market was analyzed in terms of the fresh fish producers and fresh fish traders' price setting, purchasing and selling strategies.

4.6.2. Price setting strategy for fish producers

The survey result confirmed that, about 62.9 % of fresh fish producer faced problem of buyer after they took their fresh fish to the market and the remaining 37.1 have not faced the problem of buyer in the market. Thus, about 17.4% of fish producers reported that they took their product back to home, neighbor borrow it to pay in the next day and about 72.2 % fresh fish producer sold their fresh fish with existing price. Then, finally the remaining 10.4 % they took it back to home and then cured the fishes. Cures fishes are preserved for the wet season when the productions decline due to the high pressure of river or reservoir and mostly for both consumption and market. Thus, widely used cured method are drying, fried drying and smoking. Drying is one of the traditional preservation methods that reduce weight (due to lose of the moisture content) and prolongs shelf life based on the information obtained from key informant and focus group discussions with both fish producers and traders.

Table 30. Price setting strategy of fish producers to market the product

Who set fish price in the market	Total number	Percentage
Myself	12	9.67
Negotiations	23	18.54
Set by demand and supply	89	71.77
Total	124	100

Source; own survey, 2019.

The selling strategy of fresh fish the open to any buyer available. Due to this all the fish producers sell their fish catches to anybody as they offer better price without the regardless of relations or the other thing based. The survey result revealed that, about 71.77 percent of the fish producer reported that the price of the fish was set by demand and supply, 18.54 percent of the fish producers reported that price of fish were set through negotiation between the buyers and seller. The remaining 9.69 percent of the sample respondent reported that they were price setter rather than price taker.

Therefore this shows that there are no prices policies by the government and other participant in the market in fixing the selling price. Further reason, when there is decrease in the production and supplier of the fresh fish will also decrease at this time fish producer take advantage. This study result are consistence to the finding of Melkam, (2016) found that when the fish supplier number are less that the producers are beneficial and also got high profit. As result, lack of modern post-harvest handling, lack of market information, lack of modern storage (refrigerators) and perish-ability nature of the fish were the factors affecting the selling price setting of the fish producers. Then, this study result agreed with (Melkam, 2016).

Table 31. Information source, types and price setting of fish producers

Particular	Percentage
Market information access	
Yes	66.1
No	33.9
Source of information	
Fellow Fish producers	77
Visiting market	20
Phone calling	13
Types of information	
Price information	17
Buyers information	21
Market place information	62

Source: own 2019.

The result of this study revealed that 33.9 percent of the Fish producers had market information before they sale their fish to market but it was informally and 66.1 percent did not accessed the informations. Thus, about 77 percent their source of information were from their colleague fish producers, 20 percent, and 13 percent of the fish producers were through direct market visit, asking and calling trader respectively. Then types of information obtained were, 17 percent Price information, 21 percent buyer's information and 62 percent market place information was the type of information obtained.

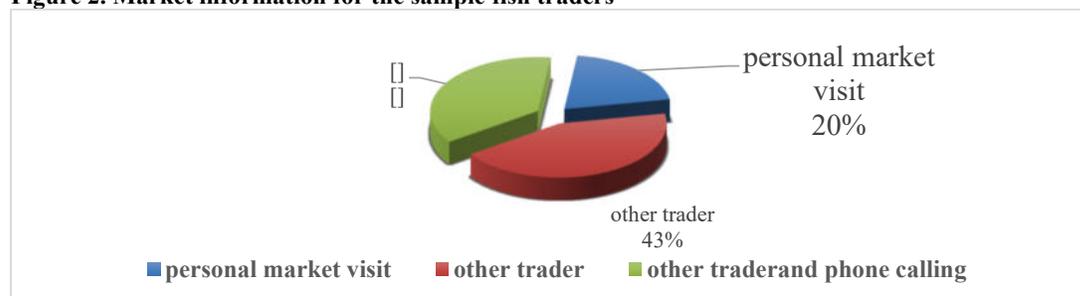
4.7. Conduct of the Fish Traders

4.7.1. Market information of the sample traders

Market information's; Market information play a crucial role for the traders because it affect the quantity of fish

product, price of the purchasing and selling, and time of selling. According to the result of this study, it revealed that the fish traders has accessed to the market information before they sell or buy in the market but it was through informally in Figure (5). Above 43.3 percent source of the market information were from other trade, 20.1 percent were through personal market visit and the remaining 36.6 percent source of the market information were through phone calling and other traders. In the study area purchasing using broker is not practiced by fresh fish traders they directly purchased fresh fish from the fish producers at landing site or in the market.

Figure 2. Market information for the sample fish traders



Source; own survey, 2019.

4.7.2. Purchasing price strategy employed by sample fish traders.

As the survey result revealed in Table (17) That from the total sample traders, regarding the purchasing price setting 10 percent were set by fish traders, 66.7 percent were by demand and supply and 23.3 percent were set by negotiations. Then this study result agreed with (Assefa M.J. *et al.*, 2015) who argued that the purchase price of fish as determined by demand and supply. Then, in the study area trader purchase fish directly from the fish producer or others trader either through phone calling or contact face to face exchange. Then, purchasing using the middle is not practiced by the sample traders according to their report. The traders used the brokers for renting or looking after the transport like renting the motors to supply fish to the market.

Table 32. Purchasing price strategy employed by sample fish traders.

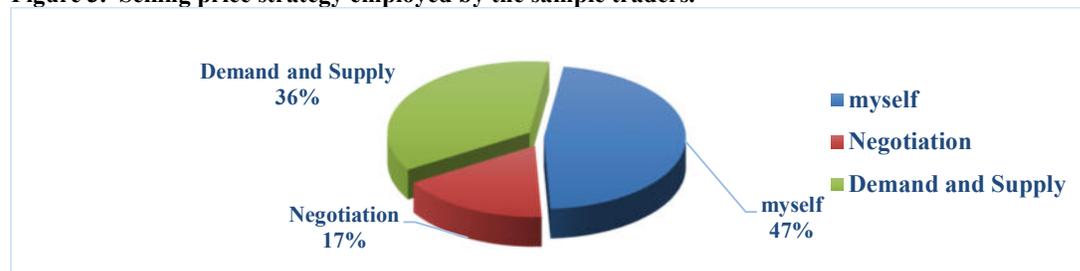
Variable	Percentage
Myself	10
Demand and Supply	66.7
Negotiations	23.3

Source; own survey, 2019.

4.7.3. Selling price strategy employed by the sample traders.

As the survey result revealed in the below Fig.7. Regarding the selling price setting, from the total sample trader’s 47percent were set by seller, 36 percent were set by demand and supply and the remaining 17 percent were set through negotiations between the buyers and sellers. Fish traders reported that market force, marketing cost, preference taste, seasons and freshness were considered to fixing the selling price of fish. According to the study result, it revealed that fish traders used different methods to attract their suppliers. Accordingly, 56.7 percent and 30 percent of the sample traders attracted their suppliers by paying them better price and by visiting them and the remaining 13.3 percent attracted their supplier to borrow when they in shortage of capital Table in Appendix.1.

Figure 3. Selling price strategy employed by the sample traders.



Source; own survey, 2019.

4.8. Fish market Actors and their roles in the Fish market chain

Fish producer; they are the first link actors who produce or harvest the Fish and supply it to the market. They are known for their fish production all the year in the productions of fish or harvesting the fish product from the river in the study area. Then, family labors are mostly for the production or catching fish from the river. Thus, their fish catch per day may vary from the fisher to fisher and may ranges from several to hundred kilograms and above.

Figure 4. Fishing gears used and fishing time by the fish producers

Time of fishing	Frequency	Percent	Fishing equipment used by sample fish producer	
			Long line and Gill net	Beach seine
Morning	40	32.2	32.2	11.8
Day time	28	22.6	22.6	68.2
Night	56	45.2	45.2	20
Total	124	100	100	100

Source: own survey, 2019.

As depicted in the Table 10. About 32.2 Percent of them preferred day time fishing to the morning, 22.6 percent of the fish producers they preferred day time fishing and the remaining 45.2 percent preferred fishing in night. Then majority of the fish producers those who used beach seine they did their fishing activities at during night time, those who used gillnet did their fishing activities in the early morning and long line in the night. In additions to this, the time of fishing it depends on the nature of fishing equipment being used by the fishermen. Then Beach seine is active fishing equipment, this means that it can be moved easily in order to catch the fish. The gillnet and long line are passive fishing equipment which is kept in water near to the water bank or in somewhere in the water by using to pole. Thus, fish is catch when they try to pass through the net sets and it the long line (Appendix1).Larger quantity of their fish produced they sell it to the wholesaler. Due to the lack of adequate, reliable and timely information and infrastructures such as transportation, fish producers are forced to sell their fish product with in limited time.

Table 0:33. Fish producers Market Outlet

Agent	Annual quantity(Kg)	Volume (%)
Wholesalers	46,300kg	48.67
Retailers	26,300kg	27.65
Consumers	19,600kg	20.60
Restaurant/Hotel	2682kg	2.82
Total	95,113Kg	100%

Source; own survey, 2019.

Wholesaler; they are known for purchase of the large volume of the fish product with better financials and information capacity.

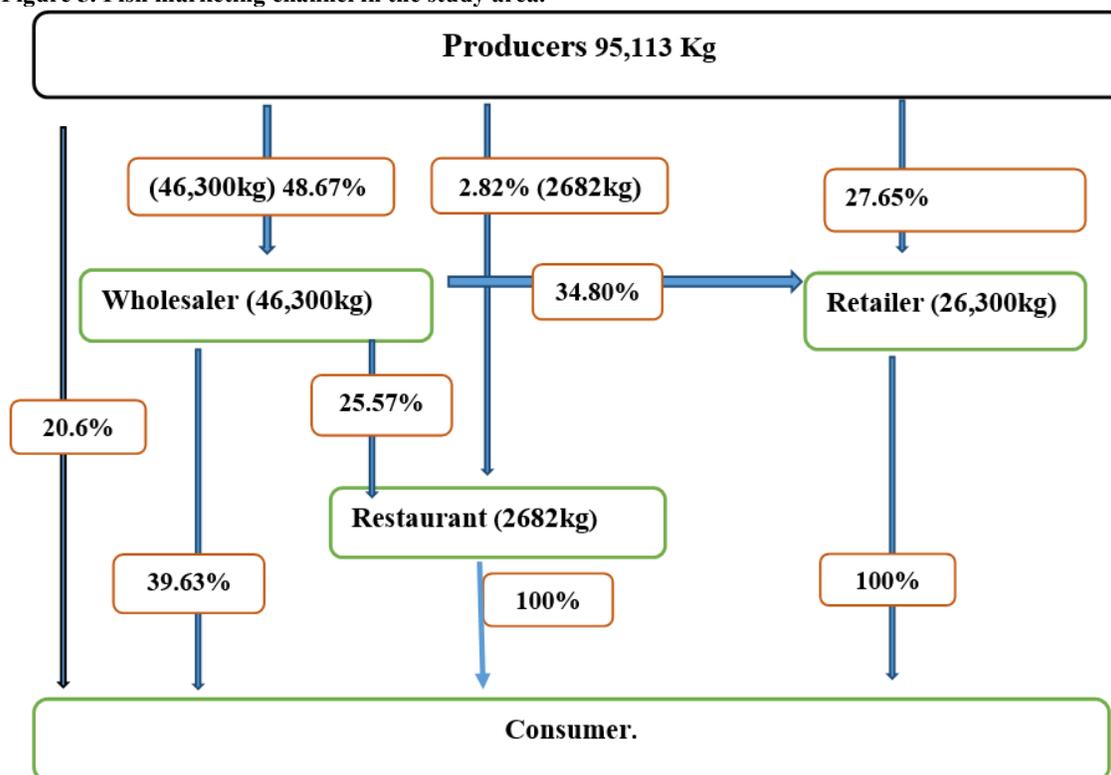
They purchase fish from the landing site in larger volume of Kg or quantity than any others marketing chain actors does. Then, this study result agrees with (Abebe, 2016). They spent all their full time in wholesale through the years in the Abobo district. In district, by buying through brokers is not practices and there is no commission. The wholesaler buys about (46,300kg) 48.67 percent of the fish product from fish producers at the landing site. Thus it in line with Abebe (2016), found that in the dodota woreda large quantity sold to wholesalers that was because risky and to avoid marketing cost.

Retailers; the main function of the retailer is to buy from, producers or wholesalers and resell to consumers at convenient locations, times and quantities. In urban centers, retailers often buy from producers, wholesaler and resell to domestic consumers. They are the last link of the market chain those who delivered fish to the consumers and with limited financials. Follow to this, most of them are female and operating without having licenses; they were unable to supply large quantity to the market. Then, their main function was to buy fish from the producers or wholesaler then sells it to the consumers. The producers sell (26,300kg) 27.65 percent of the fish product to the Retailer.

4.6. Fish marketing channel in the study area

The analysis of marketing channels was intended to know the alternative routes that the fish product follows from the point of production to final consumer. Therefore, the result of this study revealed that there are five main alternative channels for fish marketing in the study area. However, the result of this differ with Assefa *et al.*, (2015) found that fish marketing channels in some water of Oromia have six fish marketing channels. This, possible because fish market participant are selling fish without using cool storage facility and any post harvest technology. Therefore the fish trading in the area dominated by traditional methods.

Figure 5. Fish marketing channel in the study area.



Source; own survey, 2019.

Channel I. Producer –consumer (19,600kg), fish producer sell their fresh fish produced directly to the consumer. This is especially done at the landing site, where is near to the river where fishing take place. This channel is obviously beneficial to both producer and consumer. It is the direct channel where fish producer and consumer can meet face to face in the transactions and they can negotiate on the price.

Channel II. Producer – Wholesaler- consumer (18,348.69kg). In this channel producer sell their fish produced to the wholesaler directly without any interference. In this channel the wholesaler are being used as the bridge between producer and consumers and producer sold their whole fish to them because they fear the risk of product perishability and because the wholesaler can buy them whole the fish they produced once. Therefore these channels are dominant from the available channels. Thus, is in terms of risks and marketing cost and quantity handled. Therefore, these channels are beneficial for both traders and producers in the study area. This study result is different from the finding of Melkam, (2015), found that channel V has the dominant channel in terms of quantity in Bahir dar city which consist of producer, urban collectors, processors and consumer. Thus, this is because in the study most both fish producers and traders they did not use cool storage. Then, as the fish market channels increase the fish would be deteriorated.

Channel III. Producer – Wholesaler –Retailer- Consumer (16112.4kg). In this channel the wholesaler has been used as the bridge between producer and retail. Thus retailer is also used as the bridge between the producer and consumer. Therefore, in this channel the transaction cost higher as compared to other channel in the district because of the involvement of retailers.

Channel IV.Producer – Retailer – Consumer (26,300kg). In channel retailer buy fish directly from the fish producer directly without any intermediary and resell it directly to the consumer which means that they are bridge between the producer and consumer. this where seen during the survey period in the district.

Channel V. Producer –Wholesaler – Processor –consumer (11,838kg). In this channel wholesaler buy the fish directly from the fish producers and then resell restaurant in this channel wholesaler is being used as the bridge between producer and processor in the district.

4.8. Analysis of performance fish market chain participant in Abobo district.

Fish producers sold their fish produced immediately after they catches in fresh form so that cost were estimated in that form. In the study area the price of fresh fish may vary across the channel, season and quantity of purchase per kilo gram or quantity and it can vary from landing site also.

4.8.1. Analysis of the fish marketing margin and gross profit in the study area

In table (17), marketing margin along the different channel such as, I, II, III, IV and V was analyzed using average selling and purchasing cost in Birr/Kg. Thus, several factors, the average price and marketing cost of the fish were used to analyze the profitability of the fish productions and marketing for both fish producers and traders. Therefore, In the channel (I), the consumer price and fish producers are equal to consumer price paid. This study result agree with, (Melkam, 2016; Assefa M.J. *et al.*, 2015; Abebe, 2013), this is possible because the fish producers sold their fish produced directly to the consumers without any intermediary or bridge in the study area. The total marketing margin (TGMM), is increasing as the fresh fish market chain increased. This simply implied that the average price charged from the consumer will be higher or may change across chains. Thus, marketing channels in IV and V charged the consumers with higher price as compared to the other available market channels this are 62.68%, and 74.78% respectively. The fish producers share from the price paid by the consumers is highest in channel II and III which accounted about 41.58% and 57.32% respectively. The result of this study revealed that producer selling price in channel I, II, III, V and V, 10.60birr, 12.61birr, 12.61birr and 13.61 birr per kg. Thus, it selling price per Kg is lowest in the study area as compared to other regional state in the country. For instance, Melkam, (2016) found that fish selling prices in Lake Tana in Amhara regional state as followed in different channels, I,II,III,V and IV, as 65birr/kg, 45birr/kg, 45birr/kg, 45birr/kg and 65birr respectively. This implied that the price of the fresh fish in the study as cheapest due to the several reasons or factors. Thus, in the study area fish are seller as fresh and also there is no any preparation done to the fish. For instant, felted, gutted and skinned, there is brokers and also marketing cost lowest.

Table 0:34. Fish marketing margin and profitability in the study area

Analysis of the fish marketing margin and profitability Birr/Kg						
Agent	Items	I	II	III	IV	V
Producers	Production cost	3.12	3.12	3.12	3.12	3.12
	Marketing cost	---	---	1.2	---	---
	Purchase price	---	---	---	---	---
	Selling price	10.60	12.61	12.61	13.1	12.61
	Gross profit	7.48	9.49	8.29	9.98	9.49
	GMMp (%)	100%	41.58%	57.32%	37.32%	25.22%
wholesalers	Production cost	---	---	---	---	---
	Marketing cost	---	3.4	4	---	3.32
	Purchase price	---	12.61	12.61	---	12.61
	Selling price	---	18.50	22	---	30
	Gross profit	---	2.49	5.39	---	14.07
	GMMws (%)	---	31.83%	42.68%	---	34.78%
Retailers	Production cost	---	---	---	---	---
	Marketing cost	---	2.3	---	2.5	--
	Purchase price	---	18.50	---	13.1	--
	Selling price	---	25.2	---	35.1	--
	Gross profit	---	4.4	---	19.5	
	GMMrt(%)	---	26.59%		62.67%	
Processor (Restaurants)	Production cost	---	---	---	---	---
	Marketing cost	---	---	---	---	5.3
	Purchase price	---	---	---	---	30
	Selling price	---	---	---	---	50
	Gross profit	---	---	---	---	14.7
	GMMprs (%)	---	---	---	---	40%
TGMM		100%	58.42%	42.68%	62.68%	74.78%

Source; own survey, 2019.

As shown in Table (17), above 58.42 percent, 42.68 percent, 62.68 percent and 74.78 percent of the total gross marketing margin were added to the fish price when reached to the final consumer across the different fish marketing channel, II, III, IV and V respectively in the study area. In channels IV and V producers share of marketing margin from total gross marketing margin are lowest while wholesalers marketing margin is highest that are 37.32% and 2522% for fish producers. Thus wholesalers are advantageous whereas fish producers are disadvantageous. Thus, fish markets are poor performing in the study area. Therefore the fish market in the study area inefficiency characterized by highest market margin to wholesalers while lowest marketing margin to the fish producers.

4.9. Factors determining the fresh fish supply to the market at producer levels

Then hypothesized explanatory variables were checked for existence of multicollinearity, variance, and heteroscedasticity. **Test of multicollinearity:** All VIF values are less than 10. This indicates absence of serious multicollinearity problem among independent variables (Appendix Table1). As result, if there is presence of multicollinearity between independent variables, it will be impossible to separate the effect of each parameter estimate in the dependent variables. It's essential to test multicollinearity between explanatory variables. As result, in this study variance inflations factor used to check multicollinearity among continuous variable were employed. Consequently, the mean value of VIF value was less than 10 indicate the non-existence of multicollinearity. The mean value of VIF of this study is 1.24 indicate there is no serious multicollinearity problem (Appendix 1). The contingency coefficient was also employed to check for the present of multicollinearity among the discrete variables.

Test of heteroscedasticity: if there is heteroscedasticity problem in the data set then parameter estimates of the coefficients of the independent variables cannot be BLUE. Then, Bruesch-Pagan/cook-Weisberg test were employed to test for the problem of heteroscedaticity. Then, result revealed that there is problem of heteroscedasticity which was significant at 0.0470. Therefore, Robust OLS analysis with heteroscedasticity consistent covariance matrix was estimated to overcome the problem of the heteroscedasticity. From the survey result, the variance of the (Dependent variable) quantity of fresh fish supplied to market was found to be high. Therefore, Logarithmic transformation was used to reduce the variance or to make them same. Test for omitted variable bias was tested; with Ramsey RESET test .Thus null that there is no omitted variable in the model was accepted suggesting that the model has no problem of omitted variable bias.

Table 0:35. Econometric result for the quantity of fresh fish supplied to the market

Log quant-Sold	Coef.	Robust Std. Err.	T- ratio
Age of household	-0.261	.0380574	-0.69
Educational level	0.153	.0167639	0.92
Family size	-0.330	.0112835	-2.93 **
Distant market	-0.613	.0126372	-4.85***
Total harvest(productivity)	0.011	.0000702	16.70***
Experience in fishing	0.050	.0054383	0.93
Access to extension service	-0.086	.0643327	-0.13
Access to information	-0.308	.0508576	-0.61
Access to credit	-0.583	.0471257	-1.24
Access to transportations	0.016	.0454396	0.04
Non-fishing activities	-0.769	.0459311	-1.68*
Cont.	5.695	.20459311	27.90***

Prob >F = 0.0000* R- squared=0.81 No Obs =124**

Note: Dependent variable is fish marketed surplus in Qtr. (transformed to logarithm), ***, ** and * show the values statistically significant at 1%, 5% and 10% significance level respectively.

Source: own survey, 2019.

F-test show that the model were significant at 1 percent showing that the overall model is good fitted and p value is too small Prob >F = 0.000. Then the calculated value areis higher than tabulated value at one percent significant level. Therefore goodness of fit under null hypothesis that all parameters are zero can be rejected. Hence our data fit MLR model very well. Thus,the adjusted R was computed to be 81 percent implying that 81 percent of the variation in the dependent variable was explained by the explanatory variables under consideration.

Family size: the number of family size that the household head had significantly affected the quantity of fish supplied to the market at 5 percent level of significance and negatively. This implied that the number of family size of household head hold increase by one person, the quantity of fish supplied to the market decreased by 33 percent, keeping all other explanatory constant. Therefore, the reasons behind is obvious a fish producer who has more family size has more proportion of the product would be used for the consumptions; hence those fish producers who has large family size are likely to decrease market supply. This result is in consistence with (Abebe, 2016; Asseffa *et al.*, 2015), found that as household with larger family size tend to supply less fish harvested to the market.

Total quantity of fish produced: As hypothesized the regression coefficient of the quantity of fish harvested was positively and significant related with quantity of fish supply to market at 1% significant level. Then relationship between the variable Implied that total quantity of fish harvested is very important variable affecting household head quantity of supply to the market. This indicated that an increase in the total quantity of fish harvested by 1kg will result in increase in fish producer's household level marketed surplus of fish by 11percentkeeping other explanatory variable constant. This study result is in line with Almaz *et al.*,(2018) found that the amount of pineapple and onion significantly and positively affected quantity supply to the market.

Distant to the market: It affect fresh fish marketable surplus negatively and significantly at less than 1% significance level as expected. Therefore, indicate as the distance from the nearest market increased by one feet hour the quantity of fresh fish marketed perishability increased and will decrease by 61 percent keeping other explanatory variable constant. This is may be due to the reason, as the distance to the market center increase deterioration of the fish increase. Hence fish is highly perishable and bulky product. This study result is line with (Bikila *et al.*, 2016; Mukundi, 2013), found that road infrastructure had influence on quantity of sweet potato sold in Kenya because of the existing road infrastructure that link major production areas with the major consumptions site is the important factor of sale volume like as proximity to market. When producer is near to the all-weather road will be able to supply easily without incurring substantial cost.

Off farm (off-farm): this variable was significant at 10% and negatively affected the household head quantity of fish supplied to the market. This just a contrary to the hypothesis set earlier. This result coefficient showed that access to non/off farm, if fish producer get access to off farm quantity of fresh fish supply will decrease by 76 percent keeping other explanatory variable constant. Thus, this study result is also contrary to the finding of (Abebe, 2016; Asseffa *et al.*, 2015), found that the fish producers who has alternative of off farm can cover their home consumption from the available alternative of off farm. In addition to this, Melkamu (2016), found that as one unit additional increase off farm income it will also increase the quantity of potato supply to market positively. It is in line with Rehima (2006) found that the amount of pepper supplied to the market decreases as pepper producer have engaged on non-farm income. Finally based on the key informant and group discussions, that the major of the fish producer that are they participate in the off farm activities particularly in activities like mining, specifically gold panning. Thus, income they get form off farm they might neglected the fish production. Therefore shifting some labor to other off farm activities could have negative contributions to quantity of fish marketed because their overlapping.

4.10. Marketing constraint and opportunity along fresh fish market chain.

Recognizing the constraints hindering the fish productions potential and market development, realizing the sub sectors could play an important role in the poverty reductions and economic growth. Thus especially in the rural populations, through provisions of high food protein, creating jobs and generating incomes in the study area.

4.10.1. The productions constraint faced by the fish producers

Table 0:36. Productions related constraint

Productions constraint	Frequency	Percentage
Seasonality and weather related problem	89	72
Lack of motorized boat	30	24.2
Lack of government support	83	66.9
Security related problem	40	32.3
Theft of fishing equipment	46	37.1
Crocodile attacks problem	25	20.2

Source: own survey, 2019.

Theft of fishing equipment

The user of long line and gillnet fish producer, reported that they are victim of the fishing equipment in the reservoirs. This is possible depending on the nature of the fishing equipment used. For instance, most of the time this equipment are set at the bottom of water bank or in middle of the river on the surface or making it floating on the surface of the water which will be available until next day in the river and it will have a probability to stolen by theft at night time.

4.10.2. The constraint of fresh fish marketing faced fish producer

Lack of modern transport facility: Access to modern transport facilities by fish producers can play a significant role inability to access markets. Therefore transport could determine quantity and purity. Thus with change of time, fish will rapidly deteriorated. Thus it value will decreased as the market take too much time to transport from vanity.

Therefore traditional means of transporting used by fish producers are head load, plastic and baskets are involved whereas all are the scientifically recommended for the fish handling. Most of the fish produced reached the market by traditional means of transportations without any preservations facilities being used by the fish producer. As result, the mode transportations used lead to the deterioration due to sunlight and distant they traveled. Therefore this influenced them to sold to the trader around them at available price. Followed to this, as fish is highly perishable, there is a sense of urgency in selling the fish products as quickly and efficiently as possible in order to maintain their quality.

About 66.1 percent of the fish producers did not access to the modern transportation systems like vehicle, motorcycle, bicycle to transport their fish product to the market so due to this problem they are forced to sell the fish at landing sit by lowers price for their fearing the fish for the rotting. This implied that major of the fish

producer used traditional methods of transportation to supply their fresh fish to the market like handling on their head. Furthermore, based on information from both key informant interviews and FGD, they argued that, transportations in the summer season it is difficult due to the inaccessibility of the road and vehicle cannot reach to the landing site the fish producers they used to travel about few minute to reach the roadside where the motor or vehicle can reach.

Table 37. The constraint of fish marketing related

Fresh fish marketing constraint	Total number	Percentage
Price fluctuations	78	63
Lack of modern transport facility	82	66.1
Poor linkage with market chain actors	74	56.7
Lack of market information	82	66.1
Perishability of the product	92	74.2
Lack of proper storage facility	90	72.5

Source: own survey, 2019.

Price fluctuations: About, 63 percent of the sample fish producer reported that the price fluctuations of the fish product are among the main problem of the fish marketing in the study area. Thus, Lack of market information: marketing constraint confronted the quantity of fish supply to the market. About 66.1 percent of the fish producer reported they lack market information of fresh fish price, demand and supply and as well as best place to sell and time it needed. Therefore, due to lack of proper storage facilities system are largely responsible high post harvest losses which in turn the indirect effect on fish marketed.

4.11. Marketing and productions opportunity at fish producer level in Abobo districts

The availability of the Alwuro in the district play crucial role in changing the livelihood of the community and generating income. It is cash income source or livelihood consumption, increasing numbers of population and it continuous demand in the market were some the opportunity of the fish productions to the fish producers in the rural kebeles in the district.

The presences of Alwuro reservoir and fish marketing have contributed to economic growth by providing employment opportunities throughout the supply to the markets. As result, compared to who live in the urban area fish producers are advantageous than other. The fish productions it means lot to them such as, means of income, livelihood, source of employments and it was recognized as alternative of addressing food insecurity. Thus, the rising numbers of the buyers and the rise in populations' numbers and present of the market demand throughout the years as allowed them to stay in the production.

Fish is one of the major protein sources for fish producer. In additions to this maize and sorghum are staple foods for fish producer and the existing food culture in the district depend on the pre dominantly on fish and they strongly desired fish for daily consumption. Fish is used in daily consumption and while as occasionally are the opportunity existed for the fish producers. Finally, become a means of employment for who did not get employment, it become means income generating and create opportunity to expand the business and also own their own motors bicycles.

4.12.1. Marketing constraint faced by fresh fish traders

The constraint identified by traders in the market chain in the Table.16 perishability of the product, lack of cool storage facility, price fluctuations, lack of the government support, unfair taxations, lack of the adequate transportation, Lacks of fish producer cooperative and lack of the organized market place. Lack of cool storage facility and product perishability sample fish trader reported as the main problem in fish trading in the study area, about 80 percent, 66.6 percent which resulted in the low price and loss. Thus, product perishability, lack of organized market place and credit service are the major factors confronted the fish trading of the fresh fish trader. Finally, the markets are not satisfactory with the regard to, space or market place, shade, sanitations and water supply.

Unfair tax

The study result revealed that, about 53.3 percent of the sample fish traders that they reported that they were taxed in the market of fish which was not uniform. Thus the approach used for collecting tax were by simply counting the number of fish delivered to the market and it were set as one birr per fresh fish.

Table 0:38. Response for the marketing problems at the Traders levels.

Traders marketing constraints	Response	Percentage
price fluctuations	17	56.6
Competitions with unlicensed	14	46.6
perishability of the product	20	66.6
Credit service	19	63.3
Absence of storage facility	24	80
Unfair tax	16	53.3
Lack of organized market place	18	60

Source; own, survey, 2019.

4.12.2. Marketing opportunity for the fish trader

The fish traders marketing opportunity were identified through group discussion, key informant and field observations. Thus the existence of rivers like alwero and its suitability for the fish production through the years and support of different Governmental and NGO project like (LFSDP, Microfinance institution) have played great for the fish traders through different way like providing training and financial support. However, the Abobo district town is the crossing way to the different districts such Godere district, Gog and Jor district. As result to this it created a great opportunity for the fish trader to sell their fish to the passenger along the road side. Finally, the culture for consuming fish by the community and the available fish demand throughout were considered to be opportunity enjoyed by the fish trader and also as means livelihood, source of income and employment.

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