OPPORTUNITIES AND CHALLENGES OF FISH MARKETING AT GELGEL GIBE DAM IN ETHIOPIA

Abebe Cheffo[1], Hiwot Teshome[2] and Genanaw Tesfaye[3]

Abstract

The inland fishery of Africa is estimated to produce 2.1 million tons of fish, representing 24% of the total global production from inland waters. The inland water body of Ethiopia is estimated to encompass about 7,400 km^2 of lake area and a total river length of about 7,000 km. Gelgel gibe reservoir is located in Jimma Zone of Oromia regional state in Ethiopia, 260 km South-West of Addis Ababa, and has an altitude of 1640 m.a.s.l. The objectives of this research were to identify the main fish marketing channels and to assess opportunities and challenges in fish marketing as well as the price differences at various markets. Data were collected from sample fishers, retailers and wholesalers. Sample sizes were 50 from fishers and 15 from fish traders in Deneba, Sekoru and Jimma towns. Descriptive statistics and Ordinary Least square (OLS) measure of estimation was used for econometric analysis of determinants for the supply of fish to market and STATA software was used for analysis. The mean age of fishers and traders in the area were 20 and 40 years, respectively. The mean education level of fishers' was grade 3 and average family size of households was 5. Storage and transportation were major costs in fish marketing. Lack of refrigerators, poor fishing gears and limited boat service, as well as, low fish price and lack of cold storage chains were the major production and marketing constraints. Fisher's engagement in other farming businesses and shortage of means of transportation were significantly affecting the household's marketable supply of fish.

Key words: Gelgel gibe, fish, market, price, kilogram

[1,2,3] EIAR, National fishery and other Aquatic life research center, P.O.Box 64,Sebeta, contact author < felkacheffo@gmail.com >

Introduction

It is estimated that the inland fisheries of Africa produce 2.1 million tons of fish, representing 24% of the total global production from inland waters (FAO, 2004). The inland water body of Ethiopia is estimated to encompass about 7,400 km^2 of lake area and a total river length of about 7,000 km. Population rise, urbanization, agricultural development, industrialization and other water resource development ventures have contributed to the decrease in the species diversity of freshwater fish (Dereje,2014).

Fish marketing and distribution is an integral aspect of fish production because it is only when the fish gets to the final destination (consumers) that production can be complete. Marketing has been defined as all processes involved starting from the production of a commodity until it gets to the final consumer (Crammer *et al.* 2001). These processes ascertain that the right product is available at the right place, at the right price and at the right time to fully satisfy the consumer (Beierlein and Woolverton, 1991; Okoh *et al* . 2008).

Following Eritrea's secession from Ethiopia in 1993 and the consequent loss of its coastline, fishery in Ethiopia is based only on inland freshwater capture fisheries. The inland capture fishery comprises: Rift Valley lakes (eg lakes Chamo, Abaya and Ziway and the northern part of Lake Turkana), Lake Tana, and reservoirs such as Koka and Fincha Dams. Though significant fishing engagement has been observed in the water bodies mentioned above, commercial scale fishing was dominantly practiced in Lakes Ziway, Hawassa, Chamo and Tana. In addition, Koka Dam water reservoir is also used for commercial fishing (Ann Gordon *etal*, 2007).

In Ethiopia, an estimated total area of 857 km^2 of water reservoir is available and an estimated amount of fish, close to 38,000 tonnes, is harvested per year (MOA, 2013). The main factors for inefficient fish resource production in the country include poor fishing gears and vessels, poor infrastructure development - such as road, marketing centers, and shortage of electric power services in major landing sites, poor market linkages and telecommunication services (Abebe *et al*, 2013).

The main objective of this paper was, therefore, to present a study undertaken to identify the fish marketing channel, to characterize the main opportunities and challenges in fish marketing, and to assess the price differences at various markets in the locality.

Materials and Methods

The Gelgel Gibe Dam is located in Jimma Zone of Oromia regional state in Ethiopia, 260 km South-West of Addis Ababa and 70km North- East of Jimma (7^o5^0'N, 37^o 20'E) at an altitude of 1640 m.a.s.l. (Gelgel Gibe Hydroelectric project, Environmental Impact Assessment, November 1997). The reservoir has an area of about 51square kilometers at the maximum normal level. The catchment area is 4,225 squre kilometers with an average depth of 20 meters (Ethiopian Electric Power Corporation, February 2004). Three fish species, namely, *Barbus intermediacy, Oreochromis niloticus and Labeo barbus* are adapted well in the reservoir. However, the dominant fish species were *Oreochromis niloticus and Labeo barbus* and comprised 38% and 62%, respectively (Eskedar T, *etal*, 2008). The primary data were collected through questionnaire administration, interviews, discussions, and personal observation in the field. Data were collected from fishers and traders. The secondary data were obtained from documents of related

studies. A representative sample was drawn from the fish marketing population with a sample size of 50 fishers and 15 fish traders at Deneba, Sekoru and Jimma towns. The selection was done using proportionate sampling techniques. Data were mainly analyzed using descriptive statistics – means and percentages. Ordinary Least Square (OLS) was used as measure of econometric determinants of fish supply to market and STATA software was used for data analysis.

Results and Discussion

Demographic characteristics of fishers

The mean age of fishers in the study area was 20 years, indicating that the majority of the respondents were young. The education level of the respondents mainly lie at the primary level of formal education and on average most them were at grade 3 level. The majority of the respondents live with their parents and the average family size of a household was 5 (Table 1). The average amount of fish harvested per day/per person was 8 kilograms with a price ranging between Birr 15 and 32 and between Birr 17 and 35 per kilogram for filleted Barbus and Tilapia, respectively.

Table 1. Data of different parameters obtained from respondents

Parameters	Mean value of the Parameter	Range of sample size	Standard deviation
Age of fishers	20	17-59	4.250
Education(grade)	3	1-9	5.505
Family size	5	2-10	5.221
Average amount of fish harvested per day(kg)	8	5-21	6.021
Price of Barbus (filleted) in birr per kilogram at landing sites	20	15-32	5.146
Price of Tilapia (filleted) in birr per kilogram at landing sites	25	17-35	3.810

Source: Own study

Fish marketing chain and distribution channel

The complex market linkage established for coffee marketing has not been observed for fish marketing in Gelgel gibe area. According to Elias (2005), the present coffee domestic marketing structure of Ethiopia comprises individual farmers and former state coffee farms (now organized under Coffee Plantations Development Enterprise-(CPDE) on the production side and by service cooperatives, primarily coffee collectors and wholesale coffee suppliers, the Coffee Purchase and Sale Enterprise (now called the Ethiopian Coffee Export Enterprise-ECEE) and the huller operator on the processing and marketing side.. The distribution chain of fresh fish (figure 1) is relatively short as compared to coffee due to the nature of the product and poor storage/preservation methods. Fishers in most cases sell their catch to retailers in the locality to minimize the loss of fish due to spoilage.

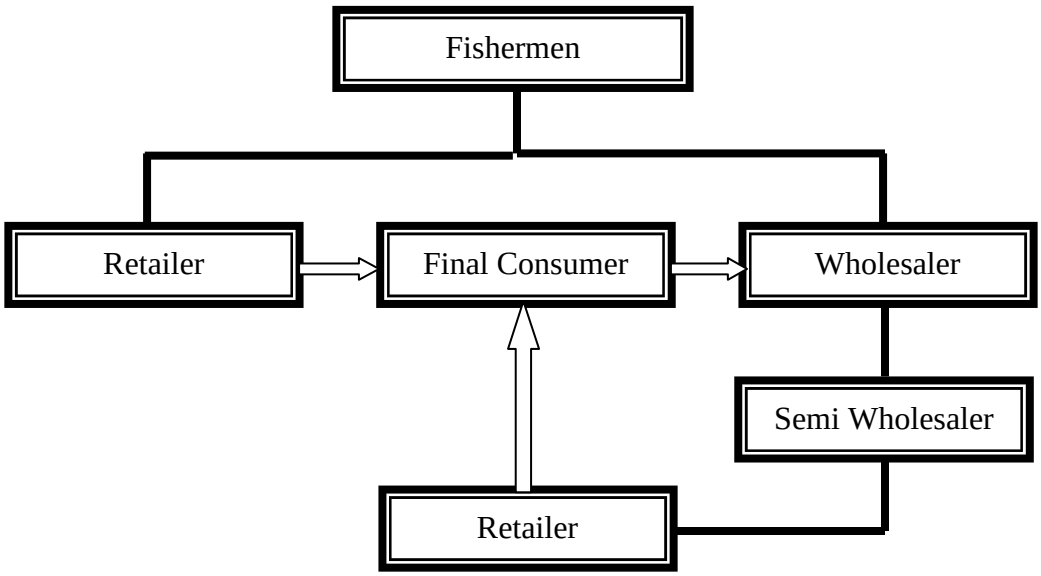

Figure 1: Diagram showing fish marketing channel from Gelgel Gibe Reservoir

The major distributing channels of fish were:

Channel I: Gibe ⇨ Consumers

Channel II: Gibe ⇨ Sokoru ⇨ Consumers

Channel III: Gibe ⇨ Addis Ababa⇨ Consumers

Channel IV: Gibe⇨Deneba ⇨ Jimma⇨ Consumers

There are four channels of fish marketing in the study area. The first channel is directly connecting fishers with consumers. It is mainly performed at the landing site and the price ranges Birr 15 to 20 and 17 to 24 per kilogram for filleted Carp and Tilapia, respectively. The marketing strategy is selling the fish right after escaping from the water. The second channel manly concentrated at Sokoru town (nearby town) targeting local inhabitants and travelers. At this stage, based on the process the product has undergone price differences was observed. For the gutted fish without removing the

flesh the average price was Birr 14/ kilogram. For the second type, which was filleted and packed with plastic bag, the price was Birr 25/ kilogram. In the third distribution channel, wholesalers from Addis Ababa directly purchase the fish from fishers in bulk. There is no price range in this channel and the traders buy as much as possible without considering fish size and freshness. In most cases, illicit trading was practiced and transporting the fish was done at night. The fourth channel is the Jimma market. This channel is characterized by selling whole and plastic packed, filleted or filleted fish to local suppliers in Jimma town. There was a wide range of price differences based on the product type. The average price was set at Birr 14, 18 and 25/ kilogram of whole, filleted and packed-filleted fish, respectively.

Fish traders and marketing characteristics

Most of the small-scale fish traders were relatively young. In the four markets surveyed, 68% of the respondents were under 40 years old. The gender composition represented 95% and 5% of male and female groups, respectively. Respondents operated mostly (61%) in urban markets and 39% operate along road side stalls on major roads leading to urban areas. The bulk of traders (75%) was married and has formal education level of grade 7.

Fish trading was the sole means of income for the majority of the respondents (93%). Such occupations as transporting, brick making and civil service work also figure to some extent as additional means of livelihood for a small section of fish traders. The fish trading businesses were financed from personal source (not loans) as responded by 84% of traders. Access to credit is another obstacle faced by the small-scale fish

marketing operators and this is partly due to lack of collateral necessary to secure credit. Thus, almost all traders interviewed did not have access to credit. Over 95 percent of the respondents have been on fishery business for more than a year. The majority of the traders (73%) reside farther out (outside of 2 kilometer zone) from the market where they operate. Refrigeration was the most common method used to preserve unsold fish (Table 2).

Marketing Costs

As noted by Kirema-Mukasa and Reynolds (1993), marketing costs vary widely between the different channels of fish trading operations. A retailer operating in a formally established market incurs marketing costs mainly in storage of unsold products. In the wholesale channel, fish was bought from fishermen at the landing site and from local suppliers. Storage costs represent a substantial amount of the cost in both wholesale (0ne birr/kg) and retail (seventy five cents/kg), respectively. In addition to this, transportation of fish from the landing sites to the markets costs substantially.

Table 2. Demographics and other characteristics of traders

Variable	Frequency	Percent
Gender (male)	14	95
Age<40years	10	68
Marital Status(Married)	11	75
Education (5+years of Schooling)	15	100
Group Membership		
Yes	3	20
No	12	80
Type of Business		
Retailer	12	80
Wholesaler	1	7
Wholesaler & Retailer	2	13
Market Location		
Deneba	2	13
Sekoru	2	13
Jimma	11	74
Other Occupation		
Yes	1	7
No	14	93
Type of Market		
Urban Market	11	74
Roadside Market	3	20
Other markets	1	6
Experience(1+years)	14	95
Traded species*		
Tilapia	14	95
Other species	1	5
Distance to market (<2 kilometers)	4	27
Preservation Methods*		
Refrigeration	5	33
Other Methods	6	40
Access to Credit		
Yes	0	0
No	15	100

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

Infrastructures

In Ethiopia, fishing techniques are tremendously artisan, with very few motorized boats (a very small number on Lake Tana and on some of southern lakes). Gill nets are the most common, but there is also some use of beach seines, cast nets and line-fishing (the latter for Nile perch) (Bereuil, 1995). Similarly, the main fishing gears used by fishers in the reservoir were mainly gillnets and hooks and the lines. The spoiling rate of fish is very high due to warm weather and lack of cold storage. Thus, the daily catch of fishermen is very low as compared to water bodies of other rift valley lakes, as well as reservoir of Koka Dam (Abebe *etal*, 2013). This is due to using improper fishing gears, poor boat services and to some extent low culture of fish eating habit in the vicinity.

Production and marketing constraints

The constraints of fish production from Gelgel Gibe Dam was assessed by fishers and ranked them based on the importance of the problems (Table 3). Lack of refrigerator, poor fishing gears and boat service were the main ones hindering production.

Table 3. Major production constraints and their rated value by fishers

Constraints	Frequency	Percent	Cumulative
Poor fishing gear	14	28	28
Poor boat service	7	14	42
Poor fishing gear & boat service	8	16	58
Poor post harvest handling	1	2	60
Lack of value adding facilities	1	2	62
Lack of cold storage (refrigerator)	15	30	92
Lack of raw material for gear making	4	8	100
Total	50	100	

With regard to fish marketing constraints, low prices of fish at landing sites and lack of storage facilities take the lion's share of the problems (Table 3). The price of filleted fish at landing site ranges from Birr 18.00 to 25.00/ kilogram, while it commands Birr 50.00 at city markets. This wide range of price differences indicates that middle men are very much in control of the market. Thus, fishery cooperatives should be sought to alleviate the problems in production and marketing of fish products.

Table 4. Marketing constraints and their rated values by fishers

Marketing constraints	Frequency	Percent	Cumulative
Poor road accesses	3	6	6
Low prices of fish at landing sites	29	58	54
Poor linkage between fishers and traders	2	4	68
Dominancy of middlemen	3	6	74
Hot weather condition	11	22	96
Sanitary problems in market places	1	2	98
Conflict between buyers and sellers	1	2	100
Total	50	100	

Source: Own survey

Opportunities of fishing in Gelgel gibe Dam

The existence of water reservoir had created many opportunities for local people residing in the vicinity. Fish production in the reservoir, in addition to becoming an alternative source of protein for residents living in nearby towns and villages, it had created a job opportunity for youngsters. Farmers with marginal land can involve in fishing business to support their subsistence livelihood. The fish trading activity creates many job opportunities along the value chain.

Fig.1 Cultural method of storing fish until marketing

Econometric analysis

Nine explanatory variables were hypothesized to determine household level marketable supply of fish. Among these only four variables i.e., Farm size (FARMSIZE), means of transportation (TRANSMEAN), availability of off fishing activity (AVOFFAR) and marketing constraints (MARCONS) were found to be significantly affecting the household's marketable supply of fish (Table 5).

Farm size (FARMSIZE): Availability of farm land was negatively and significantly related to the supply of fish in the study area. As fishers own more farming land, the time spent on fishing activity becomes short and as a consequence the amount of fish supply to market becomes small.

Means of transport (TRANSMEAN): This variable is positively and significantly affects the amount of fish supplied to market. Fishers who have accesses to animal driven cart or live animal transport facility can deliver more fish than those who do not have.

Availability of off fishing activity (AVOFFAR): This activity positively affects the amount of fish delivery to market. This is because fishers who do

have other means of income can easily buy or maintain fishing equipments as compared to fishers who do not have such accesses.

Marketing constraints (MARCONS): Marketing activities are very crucial for fish harvesting. If fishers are confident enough to have market for their catch, they can spend more time on fishing and harvest more fish. Marketing constraints are negatively and significantly affects the amount of fish delivered to markets.

Table 5. Determinants of fish supply by fishers (OLS result)

Variables	Coef.	Std. Err	P value
AGE	0.4213	0.3407	0.22
EDUCT	-0.3440	0.2983	0.26
FAMILYSIZE	0.5092	0.3899	0.20
FARMSIZE	-5.1420	2.9035	0.08*
FISGIRAV	-2.3363	2.0015	0.29
TRANSMEAN	0.6601	0.3335	0.04**
AVOFFAR	0.3652	0.1265	0.08*
PROCONS	-6.4200	3.8547	0.11
MARCONS	-5.3259	2.9855	0.09*
R SQUEAR	0.6944		
P value	0.0003		
Cons	13.7565	7.1718	0.06

* and ** indicate the variables are significant at 10 and 5 percent respectively.

4. Conclusion

The Gelgel Gibe Dam has created conducive environment for fish production and along with it for creating job opportunity for localities in harvesting and marketing several types of fish. Because of its location, some distance away from main markets, problems in harvesting, processing, storage and transportation facilities, fish products at the site did not command better price. Middle men in the marketing system seem to benefit more than the fishermen.

The venture seem to have a potential for larger fish production providing that modern techniques in fishery are introduced, accompanied with training fishers in handling fish products, and by promoting the shelf-life through cold storage system in order to attract better price in the market. Most of all, organizing fishermen into cooperatives may prove to be the prospect for future development of fishery at the site.

References

1. Abebe Cheffo, Lemma Zemedu and Endrias Geta (2013). Market chain analysis of Koka reservoir fish in Ethiopia. Msc thesis in Agricultural Economics, Haramaya University, PP_{5-12}

2. Ann Gordon, Sewmehon Demissie Tegegne and Melaka Tadesse, 2007. Marketing systems for fish from Lake Tana, Ethiopia: Opportunities for marketing and livelihoods.p5.

3. Beierlein, J.G. and M.W. Wooverton (1991). *Agribusiness Marketing: The Management Perspective.* Prentice Hall New Jersey, U.S.A.

4. Breuil C. 1995. Review of the Fisheries and Aquaculture Sector: Ethiopia. FAO (Food and Agriculture Organization of the United Nations), Rome, Italy.

5. Crammer, G.L.; C.W. Jensen and D.D. Southgate (Jr) 2001). *Agricultural Economics and Agribusiness* (Eight Editions) John Wiley and Sons, Inc., New York, U.S.

6. Dereje , T.K(2004). Spatial and temporal distributions and some biological aspects of commercially important fish species of lake Tana, Ethiopia:*J. Coastal Life Med. 2(8):589-595*

7. Elias Abebe, 2005. Economics of Coffee Bean Marketing: A Case study of Goma district in Jimma zone of Ethiopia. Msc. Thesis, Alemaya University. PP 15-16.

8. Food and Agriculture Organization (2004). The statues of World Fisheries and Aquaculture Report.

9. Kirema – Makasa, C.T., and J.Eric Reynolds. 1993. Marketing and consumption of fish in Uganda, in Marketing and consumption of fish in eastern and southern Africa: Selected country studies, FAO Fisheries Technical Paper No. 332, Rome: Food and Agriculture Organization of the United Nations, 1993.

10. Nicolas D.C., Francis, M., Guido, P (2012). Food production and consumption trends in Sub-Saharan Africa: Prospects for the transformation of the Agricultural Sector.