

potentially unmarketable. Thus, fishers were discouraged on daily economic loss due to these small sized net which has a similar result obtained in Abebe *et al* 2012. The third variable that hinders daily harvest of Tilapia is the low level of price. The price of tilapia at landing sites particularly on whole fish form is very low having a highest price margin. Hence, fishers who forced to sell their catch at landing sites get a discouraging price as compared with secondary and third market places. The fourth variable is overfishing of tilapia from L.Tana which forces fishers to set their harvesting net to distant places. Thus, they are in a great problem of not to deliver their catch as early as possible to nearby market places.

Gender role in fish value adding activities

The roles of women in fishery cooperatives are very vital. Women can collect the harvested fish from boat to processing unit. They sort out the fish based on the size, fish species, physical appearance (healthy or spoil). After that they take the record of weight as well as number targeting for local inhabitants market and whole sellers. In addition to these, they actively involved in value adding activities particularly on filleting. While filleting, the time spent for a kilogram of Tilapia can take an average of 25 minutes better than male who will take 30 minutes per kilogram of similar fish type. After filleting, women actively involved in cleaning the filleted fish by taking maximum care and packed the final product with plastic bags of different weights. The men role in value adding also have a vital role particularly delivering fish early as possible to proximate market places. Moreover, men actively involved on loading and unloading processed fish from original source to different market places.

Women role in fish selling

The fish marketing activity in area around Bahir Dar open market places where dominated by women . The participant women are retailers who directly buy the fish from fishery cooperatives or whole sellers based in Bahir Dar. The market place is very poor in terms of infrastructure which is liable for spoilage. The structure of fish open market in Bahir Dar lacks facilities like unavailability of waste disposal which creates a big problem of bad smell; poor processing facility with no or low water supply in the site; in most cases, retailers sell the whole fish by measuring each unit of fish by visual judgment which forces women to lose much profit; nonexistence of tax collection site which leads the government to lose much amount of money from the sector.

The sale whole fish of tilapia and other species just by visual judgment having irregular price of 45-65 birr per a pile of 4-5 fish near to a kilogram weight. Selling whole fish by visual judgment leads to

uncertainty for both the sellers and buyers. In addition to these, they are forced to sell their fish by lower price if the time goes to afternoon after (after 11:00 PM) since they didn't have cold storage facilities as well as no electrification facility in market places.

Fish export

In the past ten years(2004-2013), international trade patterns moved in favor of trade between developed and developing countries. Developed countries still trade mainly among themselves and, in 2014, in value terms, 78 percent of fishery exports from developed countries were intended for other developed countries. However, in the last three decades, the share of their exports going to developing countries has increased, also owing to their outsourcing the processing of their fisheries production. At the same time, while developed countries remain their main markets, developing countries have increased trade among themselves, and fishery trade between developing countries represented 40 percent of the value of their exports of fish and fishery products in 2014(FAO,2016).

Fishers in areas around Gonder tried to sell their catch to collectors who are collecting for export. The exported fish to Sudan mainly on value added by salting and sun dried methods. In salting, local collectors use a proportion of one kilogram salt (Sodium chloride) for 25 liter water for dressing the filleted Catfish and exposed it to sunlight for 3-6 days and get dried. Local collector packed the fish with very thin sticks for aeration. The wholesalers of dry fish buy the packed fish on kilogram base and it ranges the price from 70 to 95 Ethiopian Birr. In addition to this, wholesalers sell their product by transporting to areas nearby boarder of Ethiopia and Sudan with higher than 3 fold price margin as compared to fishers and local collectors.

Fish Trader Socioeconomic and Market characteristics

Traders around Lake Tana were assessed based on their socioeconomic characteristics (Table 5). The age category of traders range from 22 to 40 years having a mean value of 31.3 years. The average family size of respondents was 3.5 members and the average education level of the respondents was 2.8 (in the category of 7-12 grades).The number of family members who are involved in the business of fish trading were 2 female and 1 male family members.

Table. 5. Traders' socioeconomic characteristics

No.	Economic Variables	Mean	Std. Err	[95% conf. Interval]	
1	Age	31.3	1.591288	27.7476	34.75242
2	Family size	3.5	.4351941	2.542144	4.457856

3	Education level	2.8	.4787136	1.696359	3.803641
4	No.of family member involved in business	1.7	.9639984	-.4550795	3.788413

The average working capital of the traders was 2145 Birr. The average capital including other value adding materials like refrigerators was 91,783 Birr. The amount of fish species appear in the market varies from one landing site to other landing site. The average amount of Tilapia, Catfish and Barbus fish species purchased per day was 54, 22 and 19 kilograms, respectively (Table 6).

Table 6. Traders market characteristics

No.	Economic Variables	Mean	Std. Err	[95% conf. Interval]	
1	The average working capital	2145.8	315.9556	1450.42	2841.247
2	Ownership of Refrigerator	91783.3	38010.89	8121.921	175444.7
3	The average amount of Tilapia	54.2	12.68549	26.24609	82.08725
4	The average amount of Catfish	22.1	5.821145	9.271079	34.89559
5	The average amount of Barbus	19.2	3.684187	11.05783	27.27551

The Econometric Results

The econometric result of liner regression model depicted in Table 7 which sort out variables that determine daily harvest of tilapia. Accordingly, four variables marital status, overfishing of tilapia, Ownership of arable land and expensiveness of fishing inputs were significant at different level of significance. The first two variables were significant at 0.05 level of significance. The marital status of fishers due have a positive impact on daily harvest of tilapia which married fishers can invest much of their time on fishing that help to get more fish for market as well as home consumption. The second variable was overfishing of tilapia from L.Tana. This variable affect the daily harvest of tilapia negatively and it has a 1 percent level of significance. Thus, fishers drive more distance per day to get enough amount of tilapia. The third variable that potentially affect the daily harvest of tilapia was the ownership of arable land. There was a 10 percent level of significance among respondents which affect the daily harvest of tilapia from L.Tana. Fishers having an arable land can participate on fishing occasionally as compared with fishers haven't land. Therefore, off fishing activity like farming potentially affects negatively daily harvest of tilapia from L. Tana. Fishing inputs price can affect the daily harvest of tilapia negatively which states that the more expensive the inputs, the less harvest of tilapia. Fishers are less motivated to harvest fish and it is significant at 0.1 level of significance.

Table 7. Econometric Model result on fish harvested by fishers.

Source	SS	df	MS	
Model	25495.9818	28	910.57078	Number of obs = 91
Residual	45711.7764	62	737.286716	F(20, 62) = 1.24
Total	71207.7582	90	791.197314	Prob > F = 0.2418
				R-squared = 0.3581
				Adj R-squared = 0.0681
				Root MSE = 27.153

Tilapia Harvested per day	Coef.	Std. Err	t	P> t	[95% Conf. Interval
age	-.1247665	.5776884	-0.22	0.830	-1.279549 1.030016
Sex	-2.265478	9.200237	-0.25	0.806	-20.65649 16.12553
Education level	-2.927031	4.071503	-0.72	0.475	-11.06585 5.211788
Marital Status	17.86368	6.163252	2.90	0.005***	5.543514 30.18384
Having arable land	-16.36729	8.938512	-1.83	0.072*	-34.23513 1.500539
Over fishing of Tilapia	-17.42669	8.322767	-2.09	0.004***	-34.06366 -.7897156
Expensiveness of inputs	-16.16863	8.834421	1.83	0.072*	-1.49113 33.82838
_cons	74.5325	70.57442	1.06	0.295	-66.54376 215.6088

Key: *,*** are 10 & 1% level of significance

Conclusions

There are four major fish market outlet from L.Tana. Actors in fish value chain found in young age category which can help for adapting improved technology on the sector. Women have got a remarkable role in value adding but their share on benefit is minimal. There is a huge market margin between price of whole and processed fish at landing sites and secondary market places. In price setup of fish dominated by tilapia followed by Catfish and Barbus. Export of dried fish to Sudan play a significant role on promoting the sector to get foreign currency for the country. Four variables like marital status, overfishing of tilapia, Ownership of arable land and expensiveness of fishing inputs were significant at different level of significance.

Recommendations

- The price margin between landing sites fishers and traders should be narrowed by creating direct linkage between fishers and consumers.
- Women should encourage participating on fish value adding activities.
- Fish exporting activities to Sudan should be encouraged by modern value adding facilities
- Fishery cooperatives should strongly work on value adding activities instead of selling whole fish.
- There should be a strong work for shortening the channel in order to bring onboard fishers and consumers.

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