

Determinants of Performance of Fish Value Chain: Evidences from Gamo Gofa Zone, Ethiopia

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Abstract Fishery sector plays a significant role in the economic development of a country in terms of employment, income and provision of principal protein to the diet. The major objective of the study was to identify the determinant factors which affect the performance of fish value chain in case of Gamo Gofa zone Lake Abaya and Chamo. Explanatory research was designed to investigate what variables contribute to the effectiveness/ineffectiveness of fish value chain and how much these variables are determining it. For the purpose of the study the researcher used only primary data collected through questionnaire from 170 fish value chain actors (fisheries, processors, fish retailers, small dining room operators and well-known hotels and restaurants in handling fish). Thus, 170 respondents were selected using probability sampling techniques. Participants from fisheries were selected using proportional stratified simple random sampling from the members of 12 fisheries associations located at both lakes: Lake Abaya and Lake Chamo. The inferential statistical output shows that, source of finance, availability of facilities and market structure have a significant effect on the fish value chain performance which was tested at 5% level of significance. The performance of fish value chain is highly affected by those specific factors. It can be recommended that facilities at domestic fish markets and knowledge of fisher's on finance and business management is poor or minimal in order to fill such gap governmental bodies (lower to higher officials) better to work together with other stakeholders in designing strategies and arranging training and capacity building programs for developing attitudes and upgrading knowledge and skills towards the natural resource utilization, environmental protection and conservation, business development and management and arranging marketing infrastructure, like cold storage, ice and transport facilities to attract investors.

Keywords Fish, Determinants, Value chain, Performance, Gamo Gofa Zone

1. Introduction

Fisheries and aquaculture contribute to livelihoods for 800 million people and provide 3.1 billion people with 20% of their animal protein [1], as well as micronutrients and essential fatty acids critical to cognitive and physical development [2]. Fish is often the cheapest and most accessible animal-source food [3]. To meet future demand for fish, particularly in developing countries, production will need to double by 2030 [4].

The fishery sector in African countries, comprising marine and inland capture fisheries and aquaculture, generates a variety of benefits, including nutrition and food security, livelihoods, employment, exports and foreign currency and conservation and biodiversity values that are of global significance. These high level commitments to the

development of the fish sector has resulted in positive fisheries performance indicators. A total of 19.7 million tons of fish is produced every year (10.6 million from marine and 6.2 million from inland fisheries and 2.9 million from aquaculture). And the sector creates jobs for 7.1 million fishers (2.7 million in marine fisheries and 3.4 million in inland fisheries and 1 million in aquaculture); and over 59% of these people are women [5]. Fish and fishery products are valuable sources of protein and essential micronutrients for balanced nutrition and good health. In Kenya, farmed fish is an integral nutrition, income earning and employment commodity for rural households. In 2010, the Government of Kenya initiated Economic stimulus program to encourage fish farming. Farmers took up the activity as a source of food and income. Fish production provides a source of income for the small holder farmer as well as an important source of food security for the people of Kenya [6].

FAO states that "food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" [7]. Direct consumption of fish for food provides a vital source of protein and a variety of essential fatty acids and

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micronutrients, such as iron, zinc, vitamin A and others. These micronutrients are particularly rich in smaller sized fish that are often more readily available to low income, at risk populations due to cheap cost and abundant availability. Fish are an especially important source of food and nutrients due to the fact their seasonal availability is often different from crops, meaning that fish can help to reduce seasonal vulnerability, particularly in rural communities [8].

Ethiopia, with its different geological formations and climatic conditions, is endowed with considerable water resources and wetland ecosystems, including river basins, major lakes, many swamps, floodplains and man-made reservoirs. Hence, the water bodies support a diverse aquatic life including more than 200 fish species of which about 40 are endemic [9]. Almost all the fish consumed in Ethiopia are collected from the wild using artisanal methods. The current total fish production potential of the country is estimated to be around 51,481 tons annually for the main water bodies, of which only around 38,400 were exploited very recently. According to Brook Lemma, cited in Lemma, 2016 although there are some form of fisheries practiced in most freshwater bodies in Ethiopia, commercial fishery is concentrated at Lakes Tana, Chamo, Ziway, Abaya, Koka, Langan, Hawassa and Turkana. The major fish supply to the major cities and towns in Ethiopia are captured from the Rift Valley lakes (40%) and Lake Tana (50.2%) in the north [10] and the remaining percentage going to riverine fisheries. For instance, the rivers and floodplains in Gambela Region are estimated to have annual fish yield potentials of 15,000 to 17,000 tons [11], while the rivers and floodplains in Benishangul Gumuz Region are estimated to have potentials of 2,400 tons per year [12]. However, there are constraints that related to age-old fishing methods, economic backwardness, open access to the resources and poor fish preservation and marketing traditions.

Fishing in Ethiopia is constrained by lack of efficient infrastructure and marketing network. The infrastructure at fishing sites is undeveloped and inadequate and is devoid of transport facilities to link remote water bodies with major consuming areas. Harvesting and processing technologies are not accessible, thus limiting the scope of marketing to the nearest local outlets where fish can be sold fresh immediately after catching. Inadequate extension services and lack of credit for the purchase of fishing tools have constrained the production capacity of fishermen. Apart from these, traditional fishing methods, loss of post-harvest production, disease, preservation and transportation, and absence of fish trading habits and an inefficient marketing network [13]. The study area, Gamo Gofa Zone, Arba Minch, Ethiopia, is well known by fish resources of its Abaya (600tons/year) and Chamo (4500 tons/year) lakes. Lake Chamo is the second largest lake of fish production potential in Ethiopia next to Lake Tana (10,000 tons/year). Despite its potential and contribution to vast employment opportunities, nutrition for local communities, and contribute to the production potential of the country, these lakes are facing the same problems [14]. Therefore, it is sound to study the

factors that might have influences the effectiveness of the overall fish value chain. The value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production and delivery to final consumers [15]. The current research used to identify the factors affecting the success of actors in the fish value chain and determine the changes happened in value chain performance due to change in individual factor the evidences from Chamo and Abaya lakes fish value chain of Gamo Gofa Zone, Southern Ethiopia were considered. Finally, the researcher was tested the following hypotheses;

1. Ho: There is a significant relationship between source of finance and fish value chain performance.
2. Ho: There is a significant relationship between market structure and fish value chain performance.
3. Ho: There is a significant relationship between technical Knowledge & skills and fish value chain performance.
4. Ho: There is a significant relationship between availability of facility and fish value chain performance.

2. Related Literature Review

Factors Affecting Fish Value Chain

Problems have identified regarding Africa's fishery; high gap between increasing demand and decreasing supply, lower contribution to world fish supply, and underdeveloped production. Despite the absence of conservation, prevailing overexploitations and unsustainable fishing, result in decreasing of fish resources in the fish stocks. Illegal unreported and unregulated fishing and traditional fishing are another problem of the sector. Management problems, communities, traditional attitude towards fish consumption and low or lack of government support disturb the improvement of the sector even put its sustainability under question [16].

Fishery Management Organization, Policy and regulations

The value chain of a product needs coordinated and collaborated system, where separated companies of entities works together for a shared purpose, working or acting together toward a common end or purpose, being compliant, or as working with someone toward a common goal (Moharana et al, 2012). Value chains are concerned with what the market will pay for a good or service offered for sale. Moreover market considerations differ from country to country, region to region and having close connection with food habits and consumption pattern of the people. The main objectives of value chain management are to maximize gross revenue and sustain it over time. Integrated system allows the actors to commonly make decision, share important information, and provides supports on technical and management aspects. The business regulating policy and regulations are important infrastructure for integrated value

chain system. Business activities like natural resource utilization, employment, contract agreement, trading, pricing, promotion, and technology usage requires enforcement of governing, rules and regulating body. On the other hand systematic and integrated chain helps in reduction of wastes, reduction of inventory and provides a basis for more efficient production and delivery processes [17].

In Ethiopia, the purpose of fishery management is optimal exploitation of the fishery, though compliance and enforcement are far from being satisfactory. The artisanal fishery is undeveloped as a result of low economic performance, ineffective administration set-up and lack of expertise. The principal legal instrument for the management of fisheries in Ethiopia is Proclamation No. 315/2003 Fisheries Development and Utilization Proclamation. The law imposes regulations against fishing malpractices and gives guidelines on the recovery of fish stocks. At the federal level, the fishery management legislation, Proclamation No. 315/2003, provides broad guidelines relating to resource conservation, food safety, and aquaculture. It also lays strong emphasis on fishing regulation, fishing permits and the need for fishery inspection, just as it reflects the necessity for fish products to conform to prescribed standards [18].

However, Sime reported the problems observed on fisheries of Lake Abaya as catching young fish, absence of spatial and temporal restrictions on fishing activities, lack of control on mesh size and awareness creation activities [19]. Other researchers found that uselessness in licensing as non-licensed also involve in the fish trade, lack of government focus for better packaging and processing [20]. In addition to these, illegal fishery practices prevailing around each fish landing sites have implausible impact on the success of the legal actors. For instance, illegal fishers are widely selling dead fish in different road sides and marketplaces of Arba Minch town without bothering for the quality of the fish and health of the community (thus, they are observed using inappropriate place, materials, and process).

Level of technical knowledge and skills

Ahmedova [21] suggested five important factors of competitiveness of the value chain of the firm; facilitated access to finance is to be combined with measures for best practice implementation, stimulation of innovation, registering of intellectual property and increasing the level of internationalization. Research conducted in Tanzania showed that Tanzania's fish lacks organized and integrated system where supplies and products flow effectively and efficiently. Fishers collect fingerlings from sources that have no efficient production of fingerlings and produce feeds by themselves without ensuring its quality. It was found that lack of appropriate technology in pond size determination, species and fingerling sex identification, preparation of improved feeds and storage facilities hinder the fishing sector of Tanzania [22].

Due to focus on internal aspects and low level of knowledge of value chain, lack of trust on partnership and

immature buyer-supplier relationship affects the chain performance of small-scale enterprises [23]. Value chain member relationship has positive impact on the overall performance of the chain; good or strong member relationship enhances smooth information flow, understanding of common objectives and avoids role interruption. Relationship is essential to shorten product development time, inventory management for improving productivity [24].

Distance and Infrastructure

The performance of the supply chain can also be affected by the distance in between supplier and the end customer. The distance can be determined by accessibility of the enterprise location, availability of transportation services, product distribution speed, the size of the order, degree of relationship and intensity of information sharing. The more closely the actors, the faster the information and material flow [25]. The distance between the actors also refers to the geographical gap between entities along the chain and the length of time it takes to transfer a product from one entity to the other. Distance between actors will be narrowed, and the speed of product transfer increased/decreased by the type of the distribution channel and the availability of infrastructure. The nature and types of distribution channel by itself depend on the level of economic development. In economically developed markets, distribution channels are described by well organize distributors (wholesalers, retailers and agents) supported by technology, integrated information system, informed customers and sophisticated logistics and infrastructure. In contrary, developing markets characterized by channels consists of unorganized stakeholders, small and independent retailers and wholesalers, many actors in the chain, less knowledge, skills and usage of technology and poor business regulation implementation [26].

Infrastructure development has been a major factor in reducing trade costs and there by facilitating trade expansion [27]. Expansion or improvement in quality of infrastructure services lowers marginal costs, raising the minimum efficient scale of production, transportation, or marketing [28]. Lower costs and greater economies of scale raise the potential for increased or new sales in export markets, as well as domestically, as efforts to take advantage of economies of scale in production, procurement, or marketing lead firms to look beyond national borders for both trade and investment opportunities [29].

Availability of facilities

Reliable temperature maintenance is the key important feature in fish and fishery product transport. All people involved in the handling and transporting of perishable commodities are responsible for their part in the cool chain. Breaks in the cool chain can result in irreversible damage to the quality of foods. In the transport of perishable products into remote regions ideal procedures may not always be possible and so in these instances early planning will allow products to be delivered as efficiently as possible. Distributors and transporters need to be able to manage

frozen, chilled and odour producing foods, as well as ethylene producing and ethylene sensitive products [30]. Many developing countries are lacking such facilities and post-harvest losses are very high. A large portion of the harvest is discarding without marketing. In one hand this is threat to the resources base and on the other hand leading to poverty. This means important decisions relating to storage facilities, truck design and capacity as well as supply patterns will be required to meet food safety regulations. Maintaining the cool chain is essential to minimise product deterioration and achieve maximum shelf life for the product [31]. Many potential problems in the supply chain can be avoided or effectively managed by understanding the critical handling issues and carefully planning each load. In general, in Mexico fishes are traded in domestic markets in fresh, un-gutted, whole and without adding ice. The travel duration between primary markets and retail for urban markets is usually less than 12 hours. Moreover, if the transportation time is less than 6 hours from primary market to retail point, the fish is not iced; it is not done properly (Ahmed, 2005). Facilities at domestic fish markets are minimal, with poor hygiene and sanitation and common among most developing country markets. There are no standard practices for handling, washing, sorting, grading, cleaning and icing of fish.

Finance in the value chains

Fisher's knowledge and experience on finance and management is poor and which hinders the success of the industry. Only the industrial fishermen focus more attention on finance function and other management aspects and earn healthier profits. Common features among developing country fishers are Enormous cash flows, low financial literacy levels, low savings culture, largely operate outside the formal financial systems, weak financial functions, heavily depend on informal financial sources which are unreliable, inadequate and highly expensive, poor business management skills, weak community organization with high levels of political interventions, and Vertical power imbalances (governance) [32].

Market structure

Capture fishery plays an important role of supplying fish to cater for consumer demands. To keep increasing fish supply, aquaculture is becoming an important occupation while bridging the gap between demand and supply. Supply chain of the marine capture fishery would comprise of several stakeholders such as producer, wholesaler, dealers, middlemen, retailer, processor and consumer. Supply side of the fish and fishery products affects different factors, market demand, prices, season, climatic conditions, population dynamics, economics status, fuel prices, policy and legal environment. etc. Perishable nature of fish requires special attention on handling, grading and packing and the market price reflect the quality of fish. Fifty percent of fish supplies come from developing country destinations where market infrastructure facilities are minimal. Huge post-harvest losses and poor infrastructure make them away from high

level of value addition and earn healthy export earnings. Most of the developing country fish suppliers act as raw material suppliers to the industrial nations, which they earn little profit from valuable natural resources [33].

The benefits of value chain are high quality of products, lowest costs, better customer service, and lowered risk. If small enterprises are integrated as supplier, distributor, producer and customer to form well managed value chain, it will provides them better competitive power through increasing the influences of each member in the system, sharing of technical know-how and knowledge, information, and shortening product development [34] (Thakkar et al, 2013). However, in developing nations these enterprises are not organized in a systematic manner and even it seems as neglected sector by the local officials. Managers of these enterprises thought as success of their firm come from their individual efforts. Abdul Malik [35] et al (2014) concluded that equipment failure have strong impact to the supply chain performance than shortage of supply and buying power.

3. Methods and Materials

Explanatory research was designed to investigate what variables contribute to the effectiveness/ineffectiveness of fish value chain and how much these variables are determining it. For the purpose of the study the researcher used only primary data collected from 159 fisheries, 3 processors, 8 fish retailers and 8 well-known hotels in handling fish. Thus, 178 respondents were selected using probability sampling techniques. Participants from fisheries were selected using proportional stratified simple random sampling from the members of 12 fisheries associations located at both lakes: Lake Abaya and Lake Chamo.

The data collection technique used was structured questionnaire consisting of both closed-ended and open ended questions. The consistency of the variables is checked with the help of Cronbach's alpha statistics. Cronbach's alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct" [36]. According to McKinley [37] state that for comparing groups, Cronbach's alpha values of 0.7 to 0.8 are regarded as satisfactory, though lower thresholds are sometimes used in literature. Nunnaly [38] has stated that 0.5 is a sufficient value, while 0.7 is a more reasonable Cronbach's alpha. Therefore the following table shows that the reliability tests result of the variables.

Table 1. Reliability Test

No.	Dimensions	Cronbach Alpha	No of items
1	Access to finance	0.774	5
2	Technical Knowledge & skills	0.935	5
3	Market structure	0.767	7
4	Available Facilities	0.850	5
5	Value chain performance	0.812	5
6	Overall	0.860	28

Source: (Survey, 2017)

Regression Model for Population Parameter

$$VCP = \beta_0 + \beta_1AF + \beta_2TKS + \beta_3MStr + \beta_4AVf + \mu$$

Where,

AF = Access to Finance,

TKS = Technical Knowledge & skills,

MStr =Market Structure,

Avf = Availability of finance

VCP = Value chain performance

$\beta_0, \beta_1, \beta_2, \beta_3, \& \beta_4$ are parameters representing population values to be estimate

$\mu = residual \ or \ randum \ error$

The unbiased estimator for population parameter is the sample statistic, which can be determined from estimated value using the following model.

$$\in (VCP) = b_0 + b_1AF + b_2TKS + b_3Mstr + b_4Avf + \varepsilon$$

$b_0, b_1, b_2, b_3 \& b_4$ are the unbiased estimators of their corresponding population parameter

$\beta_0, \beta_1, \beta_2, \beta_3, \& \beta_4, respectively.$

4. Discussion and Results

The response rate of the distributed questionnaire was 95.5%. Out of 178 questionnaires distributed only 8

questionnaires were found invalid for analysis. The researcher presented and analyzed the data after editing and coding it into the appropriate analysis tools. Hence, the discussions and results were presented in this section as follow.

Profiles of the Respondents

The respondent’s profile was described by gender, education and age. Demographic variables were used to know the groups of the community those engaged and being benefited from the fisheries sector.

Gender

The role of gender study in any business assumed to be very important due to the proportional composition and different roles that each group can contribute to the success of the business in particular and to the development of the nation as a whole. However, studies showed that female participation in different economic sector is low. In with regard to fisheries and aquaculture, 59.6 million people worldwide were engaged as of 2016. From this number, women participation remains low which was only 14% [39]. In the current study area no fisher women observed or reported during the data collection.

Table 2. Gender variation in fish marketing

Gender	Primary fishing Activities	Secondary Fishing Activities			
	Fisherman	Retailer	Hotels and Restaurants	Small Dining	Local Processing
Male	150	4	4	2	3
Female	0	0	3	4	0
Total	150	4	7	6	3

Source: (Survey, 2017)

Accordingly, the observation made on the members of fisheries cooperatives showed that all respondents (100%) engaged in the primary fishing activity were male and no female engaged in catching activities and fisherman supporting activities. However, there are opportunities for female in secondary fishing activities such as hotel and restaurants (43%), and small fish dining rooms (66.67%). This might be due to the remoteness of the site (lake-side) and the related physical risks.

Fishery sector has noticed as a source of income and livelihood. It has been contributing many in reducing unemployment, which is one of prolonged problems all over the world [40]. Unemployment might occur at different age levels dominantly productive working age group. In this section fishery sector employment creation for different age groups were presented. The age of the respondent first divided into age category: early working age (15- 24), primary working age (25-54), and late working age (55-65).

Age of the Respondents

Table 3. Age of the respondents

Respondent Age	Fisherman		Retailer		Hotels and Restaurants		Small Dining		Processor	
	Fr	%	Fr	%	Fr	%	Fr	%	Fr	%
15-24	28	18.7	-	-	-	-	3	50	-	-
25-54	121	81	4	100	7	100	2	33	3	100
55-65	1	0.007	-	-	-	-	1	17	-	-
Total	150	100	4	100	7	100	6	100	3	100

Source: (Survey, 2017)

Table 3 shows the age of the fishermen, fish retailers, and fish processing enterprises owners. 81% of the sampled fishermen were aged from 25 to 54, followed by 18.7% lied in the age range of 15-24 and majority (50%) of small dining room owners lied in the age range of 15-24. All fish retailers and processing enterprises owners were replied that their age lied between ages of 25 to 54. This indicates that the fishery sectors in the zone attract more productive working age than early and late working age. It can be concluded that fishery

sector provides job opportunity for all working age groups and can contribute to the reduction of unemployment rate.

Education Status of the Respondents

In theory, like other economic sector the bases for the success of fishery sector are better knowledge, skills, attitude and experiences. However, in practice the reverse occurred. Most of the fishermen reported that the start fishing activities because due to their failure in education.

Table 4. Education profile of the respondents

Education level	Fishermen		Hotels & restaurants		Small dining rooms		Retailer		Processing	
	Fr	%	Fr	%	Fr	%	Fr	%	Fr	%
Writing & Reading	34	23	-	-	-	-	-	-	-	-
Elementary School (1-8)	93	62	2	28	2	33	3	75	-	-
Secondary & Preparatory (9-12)	23	15	3	44	4	67	1	25	2	67
Diploma	-	-	2	28	-	-	-	-	-	-
3 rd degree	-	-	-	-	-	-	-	-	1	33
Total	150	100	7	100	6	100	4	100	3	100

Source: (Survey, 2017)

Table 4 shows that 62% of fishermen were followed elementary school, 23% can only write and read without formal education. From retailers respondent 75% were quit their education at elementary school level, 67% of processing firm owners were quit at secondary and preparatory school level. From this it can be concluded that the fishing sector of the area was based on the traditional knowledge and skills. This affects the marketing of fish many ways including technology adoption or adaptation, production improvement and communication.

Description of determinants of fish value chain performance

Table 5. Determinants of fish value chain performance

Factors	N	Mean	Std. Deviation
Source of Finance	170	1.92	0.27
Technical knowledge and Skill	170	2.14	0.36
Availability of facility	170	2.16	0.41
Market structure	170	2.06	0.61

Source: (Survey, 2017)

As shown in table 5 above, Availability of facility such as (quality of equipment used, appropriate transportation facilities, appropriate storage facilities, availability of electric power, availability of clean water) and technical Knowledge and skill such as (method of production, experience in processing fish, post-harvest care & safety, proper record of expenses, market knowledge) are the two most important determinant factors which affects the performance of fish value chain; their mean score of 2.16 and 2.14 with standard deviation of 0.41 and 0.36 respectively. The third most important factor that moderately affects the performance of fish value chain is market structure such as fast and reliable market information sharing regarding demand, price, quality among the actors, sufficient demand

and supply of fish in the market, and fairness of price of fish product were low. This is justified by the calculated means of 2.06 with standard deviations of 0.61. Whereas source of finance is the least determinant factor on the performance of fish value chain as compare to the rest of three factors with means score of 1.92 and 0.27.

Pearson's Product Moment Correlation Coefficient

Table 6. The Relationship b/n Independent Variables and Fish Value Chain performance

Independent variable		VCP
Source of Finance	Pearson Correlation	0.244**
	Sig. (2-tailed)	0.001
	N	170
Technical Knowledge & skills	Pearson Correlation	0.307**
	Sig. (2-tailed)	0.00
	N	170
Market structure	Pearson Correlation	-0.134
	Sig. (2-tailed)	0.081
	N	170
Available facilities	Pearson Correlation	0.544**
	Sig. (2-tailed)	0.00
	N	170
**. Correlation is significant at the 0.01 level (2-tailed).		

Source: (Survey, 2017)

In this study Pearson's Product Moment Correlation Coefficient was used to determine whether there is significant relationship between source of finance, technical knowledge and Skill, availability of facility and market structure variable with fish value chain performance. The following section presents the results of Pearson's Product Moment Correlation on the relationship between independent variables and dependent variable. The table

above indicates that the correlation coefficients for the relationships between fish value chain performance and its independent variables are linear and positive ranging from substantial to strong correlation coefficients.

As it is clearly indicated in the above table 6; at a 1% level of significance a number of strong relationships can be identified. There is a significance correlation was found between availability of facilities and fish value chain performance ($r = 0.544$, $p < 0.01$), technical Knowledge & skills and fish value chain performance ($r = 0.307$, $p < 0.01$), and source of finance and fish value chain performance ($r = 0.244$, $p < 0.01$), which are statistically significant at 99%

confidence level. This implies that at a 1% level of significance it was discovered that the availability of facilities, technical Knowledge & skills and source of finance plays a significant role in determining the effectiveness of fish value chain.

Regressions Analysis

For the purposes of determining the extent to which the explanatory variables explain the variance in the explained variable, regression analysis was employed. The results of such analysis are narrated under the table below:

Table 7. Regression output

Model summary	R	R square	Adjusted R square	Std. Error of the Estimate		Sig.
		0.754 ^a	0.568	0.550	0.22877	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	
	Variables	B	Std. Error	Beta		Sig.
	Constant	2.895	0.355		8.162	0.000
	Sources of finance	-0.832	0.235	-0.504	-3.538	0.001
	Techniquial knowledge and skill	-0.110	0.076	-0.184	-1.455	0.149
	Market structure	-0.240	0.104	-0.216	-2.320	0.022
	Available facilities	0.717	0.074	1.272	9.639	0.000

Predictors: (Constant), available facilities, market structure, Techniquial knowledge and skill, Sources of finance

Source: (Survey, 2017)

Table 7 above displays the estimates of the multiple regression of fish value chain performance against its variables for the sample of 170 participants. Finance is the back bone for any types of organization; as the above table 7 shown that sources of finance had a negative and significant or direct effect ($p < 0.05$) on fish production or fish value chain performance, indicating that as access to finance decreases fish value chain performance also decreases. Furthermore, the regression results indicate as sources/access of finance for fish production decrease by one unit their amount of production would also decrease by 0.5kg.

Availability of facilities for fish production purpose such as quality of equipment used, appropriate transportation facilities, appropriate storage facilities, availability of electric power, availability of clean water had a positive and significant effect ($p < 0.05$) on fish production, indicating that as the quality of production facility increases fish production also increases. In addition to this, the regression result shows that; as the availability of fish production facility increase by one unit; their amount of production or fish value chain performance would also increase by 1.27.

Market structure such as fast and reliable market information sharing regarding demand, price, quality among the actors, sufficient demand and supply of fish in the market, and fairness of price of fish product also had a direct and significant ($p < 0.05$) impact on fish production. The estimation result revealed that as the demand and supply of

fish product in the market decreased by one unit, their amount of production or fish value chain performance would also decreased by 0.23. According to Kariuki [41], to promote production and to ensure enough supplies of fish to the consumers at reasonable prices, quantities and with high quality, an efficient fish marketing system would be required. Furthermore, according to Njagi [42], which stats fishers harvest is directly related with access to market. Techniquial knowledge and skill is the other variable which was found to be statistically insignificant and does not create a significant difference on fish value chain performance.

The hypothesis which states that the determinant factors such as source of finance, availability of facilities, techniquial knowledge and skill and market structure have a significant effect on the fish value chain performance were tested at a 5% level of significance, it was discovered that the determinant factors such as source of finance, availability of facilities and market structure have a significant effect on the fish value chain performance. Therefore, the null hypothesis of the study was failed to reject. But techniquial knowledge and skill have no significant effect on the fish value chain performance; therefore, the null hypothesis of the study was rejected and the alternative hypothesis of the study accepted.

Finally, the given R Square value is 0.568, it may be realized that 56.8 percent of the variation in performance can be explained by the independent variables. The remaining 43.2 percent of the variance is explained by other variables not included in this study.

Analysis of Variance

The researchers have also tested whether the model used for this study fits the data or not and the following output has been obtained.

Table 8. ANOVA

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.542	4	1.635	31.250	0.000 ^b
Residual	4.972	95	0.052		
Total	11.514	99			

a. Dependent Variable: value chain performance
b. Predictors: (Constant), available facilities, market structure, Techniquial knowledge and skill, Sources of finance

Here the significance level being less than the standard 0.05 indicated that F is large enough to prove that the model fits the data and the intended measure.

5. Conclusions

Now a day, one of the global challenges is the growing demand for food. To make it balance between demand and supply of consumer goods it is mandatory to arrange alternative sources of food; for such seafood play a key role in filling the nutritional requirements of human beings. Fishery is an activity practiced in different parts of the world in different forms. In Ethiopia fishing activities are practiced at different water bodies both by individual fisherman and fishermen cooperatives; however, the activity is practiced by in traditional form and did not aid by modernized technology due to various problems like poor implementation of policies and regulations, irresponsible fishing activities, poor coordination and management of the resources and stakeholders, and lack of fishing facilities and infrastructures.

In the case study area, primary fishing activities were handled by male; no female engaged in catching activities and fisherman supporting activities. This might be due to the remoteness of the site (lake-side) and the related physical risks. However, few females were engaged in secondary fishing activities like small dining room operation, hotel and restaurants. Most of the fishermen reported that the start fishing activities because their failure in education. Due to this, fishing sector of the area was based on the traditional knowledge and skills. This affects the marketing of fish many ways including technology adoption or adaptation, production improvement and communication. The regression results indicated that access to finance, availability of facilities and market structure were major problems that face the actors along the value chain. Fisher's knowledge and experience on finance and management is poor and which hinders the success of the sector. Only the processors are focusing more attention on finance function and other management aspects and earn healthier profits.

But those fishermen and retailers are subject to such problems like huge cash flows, low financial literacy levels, low savings culture, largely operate outside the formal financial systems, weak financial functions, heavily depend on informal financial sources which are unreliable, inadequate and highly expensive and poor business management skills [43]. The inferential statistical output shows that, source of finance, availability of facilities and market structure have a significant effect on the fish value chain performance $p < 0.05$.

6. Recommendations

The researcher suggested that; it is better to increase women beneficial from fishery sector. This can be achieved by initiating and engaging them in both primary and secondary fishing activities. In primary fishing activities women, particularly rural women can engaged in aquaculture fishing at their living areas in scientifically prepared artificial ponds so that dangers or risks involved can be managed. All actors or stakeholders of the value chain better to concentrate on competitiveness and productivity with considering the quality of fish products. Facilities at domestic fish markets are minimal, with poor hygiene and sanitation and there is no standard practice for handling, washing, sorting, grading, cleaning and icing of fish. This is highly affecting the quality of fish product; therefore, governmental bodies (lower to higher officials) better to work together with other stakeholders by designing strategies for the way of arranging marketing infrastructure, like cold storage, ice and transport facilities to attract investors.

Fisher's knowledge and experience on finance and business management is poor; this hinders the success of the sector. In order to fill such gap governmental bodies (lower to higher officials) better to work together with other stakeholders in designing strategies and arranging training and capacity building programs for developing attitudes and upgrading knowledge and skills towards the natural resource utilization, environmental protection and conservation, business development and management (proper record of cost and gain, working capital management, pricing, setting goal, objectives, role and responsibility, managing activities and relationship, quality control, self-audit mechanisms), conflict management, aquaculture and its development, fisheries cooperative management and members relationship, risk management and illegal fishing management).

7. Limitation and Future Research Implication

The current research addressed only the specific factors which affect the performance of fish value chain like source of financial, availability of facilities, market structure and techniquial knowledge and skill but fail to discuss the general factors which affect the performance of fish value chain like

political factors, economical factors, sociological factors, technological factors, legal factors and environmental factors. The regression output indicates that 56.8 percent of the variation in performance of fish value chain can be explained by the affirminshied specific independent variables. The remaining 43.2 percent of the variance is explained by other variables not included in this study. Therefore, the title is still open for further study.

REFERENCES

- [1] FAO. Fishery and Aquaculture Country Profile. The Federal Democratic Republic of Ethiopia, 2015. Retrieved from <http://www.fao.org/fishery/facp/ETH/en>.
- [2] HLPE. Sustainable fisheries and aquaculture for food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2014. [Online] Available: <http://www.fao.org/3/a-i3844e.pdf>.
- [3] Belton, B., and Thilsted, S.H., Fisheries in transition: Food and nutrition security implication for global food security 3, 59 – 66, 2014.
- [4] FAO. Fishery and Aquaculture Country Profiles. Ethiopia Country Profile Fact Sheets. In: FAO Fisheries and Aquaculture Department 2014. [Online]. Rome. <http://www.fao.org/fishery/facp/ETH/en>.
- [5] CAMFA. Concept Note for the Second Conference of African Ministers of Fisheries and Aquaculture (CAMFA), to be held in Entebbe, Uganda, from 14th to 18th March 2014.
- [6] John Nyaga, Rose N. Nyikal and John R. Busienei: Factors influencing the choice of marketing channel by fish farmers in Kirinyaga County, Invited poster presented at the 5th International Conference of the African Association of Agricultural Economists, September 23-26, 2016, Addis Ababa, Ethiopia.
- [7] FAO. Fishery and Aquaculture Country Profiles Ethiopia. Fisheries and Aquaculture department, 2012.
- [8] Kawarazuka. The contribution of fish intake, aquaculture, and small-scale fisheries to improving nutrition: A literature review. The World Fish Center Working Paper No.2106. The World Fish Center, Penang, Malaysia, p. 44, 2010.
- [9] Lemma Abera Hirpo: Fisheries production system scenario in Ethiopia, 2016.
- [10] Tesfaye W. Biology and management of fish stocks in Bahir Dar Gulf, Lake Tana, Ethiopia, Ph.D. Dissertation, Department of Fish culture and Fisheries, Wageningen Agricultural University, 1998.
- [11] Hussien A. National aquaculture development strategies of Ethiopia: A road map to building a healthy and dynamic aquaculture sub-sector. In: "Management of shallow water bodies for improved productivity and peoples' livelihoods in Ethiopia", the Proceedings of the Ethiopian Fisheries and Aquatic Sciences Association (EFASA),. Editors: Seyoum Mengistou and Brook Lemma, Addis Ababa University Press, Addis Ababa, Ethiopia. 2010, 31-39.
- [12] Alayu Y. Survey on fish diversity, resource potential and current production level of major rivers in the Benishangul Gumuz Region; Ethiopia. In: The role of aquatic resources for food security in Ethiopia, Proceedings of the 4th Annual Conference of the Ethiopian Fisheries and Aquatic Sciences Association (EFASA), Hawassa, 2012.
- [13] Abera, LFDP, Giudicelli M, Ames, Geoff, Ivor, Susan. Proceedings of the National Fisheries seminar, Ziway, November 1996 Lake Fishery Development Project Working paper No.27. The Ethiopian Fisheries: Situations, development needs and opportunities. In FAO Field document No. 1. Rome, FAO, 1984, 58. Ames K, Geoff A, Ivor C, Susan S. Post-harvest losses of fish in the tropics, 1991, 1-22, Netherlands.
- [14] Daniel Tekle. Fish Consumption Pattern and Marketing Efforts in Arba Minch Town, Gamo Gofa Zone, Ethiopia, 2019.
- [15] Porter, M.E., Kapilinsky, R., and Morris, M. Value Chain Analysis. Oxford Press Ltd. London and A Handbook for Value Chain Research, International Development research Center (IDRC), Canada, 1980 and 2000.
- [16] ILRI. International Livestock Research Institute 2011.
- [17] David H. Taylor, Andrew Fearn. "Demand management in fresh food value chains: a framework for analysis and improvement", Supply Chain Management: An International Journal, Vol. 14 Issue: 5, pp.379-392, 2009. <https://doi.org/10.1108/13598540910980297>.
- [18] FAO. The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals. Rome. Licence: CC BY-NC-SA 3.0 IGO.
- [19] Sime, S. D. The socioeconomics of small scale fisheries based on Eastern side of Lake Abaya, Ethiopia. International Journal of Fisheries and Aquatic Studies, 2(6), 87-93, 2015.
- [20] Amare D, Endalew M, Debas T, Demissew A, Temesgen K, et al. Fishing Condition and Fishers Income: The case of Lake Tana, Ethiopia. Int J Aquac Fish Sci 4(1): 006-009, 2018. DOI: <http://doi.org/10.17352/2455-8400.000035>.
- [21] Ahmedova, S. Factors for Increasing the Competitiveness of Small and Medium- Sized Enterprises (SMEs) in Bulgaria. Procedia - Social and Behavioral Sciences, 195, 1104–1112, 2015. <https://doi:10.1016/j.sbspro.2015.06.155>
- [22] Mwaijande, F. A., & Lugendo, P. Fish-farming value chain analysis: Policy implications for transformations and robust growth in Tanzania. The Journal of Rural and Community Development, 10(2), 47-62, 2015.
- [23] Jitesh Thakkar, Arun Kanda & S.G. Deshmukh Supply chain issues in SMEs: select insights from cases of Indian origin, Production Planning & Control, 24:1, 47-71, 2013. <https://DOI:10.1080/09537287.2011.599119>.
- [24] Awheda, M. Rahman, R. Ramli, and H. Arshad, "Factors related to supply chain network members in SMEs", Journal of Manufacturing Technology Management, Vol. 27 Issue: 2, pp.312-335, 2016. <https://doi.org/10.1108/JMTM-01-2015-0005>.
- [25] Awheda, M. Rahman, R. Ramli, and H. Arshad. "Factors related to supply chain network members in SMEs", Journal of Manufacturing Technology Management, Vol. 27 Issue: 2, pp.312-335, 2016.

- <https://doi.org/10.1108/JMTM-01-2015-0005>.
- [26] Coelho, F., & Easingwood, C. An exploratory study into the drivers of channel change. *European Journal of Marketing*, 42(9/10), 1005–1022, 2008. Available online at doi: <http://10.1108/03090560810891118>.
- [27] Brooks D.H. and Hummels D. *Infrastructure's Role in Lowering Asia's Trade Costs: Building for Trade*. Cheltenham, UK: Edward Elgar Publishing, 2009.
- [28] Brook L. *Introduction to Lake Ecology, Aquaculture and Fisheries in Ethiopia*. Haramaya University, Haramaya, Addis Ababa University Printing Press, Addis Ababa, Ethiopia. 2008, 416. www.adbi.org/workingpaper/2008/12/04/2762.regional.cooperation.infrastructure.trade.costs/.
- [29] Brook L. *Introduction to Lake Ecology, Aquaculture and Fisheries in Ethiopia*. Haramaya University, Haramaya, Addis Ababa University Printing Press, Addis Ababa, Ethiopia. 2008, 416. www.adbi.org/workingpaper/2008/12/04/2762.regional.cooperation.infrastructure.trade.costs/.
- [30] De Silva D.A.M. Value chain of fish and fishery products: origin, functions and application in developed and developing country markets, Value chain project, Food and Agriculture Organization, 2011.
- [31] De Silva D.A.M. Value chain of fish and fishery products: origin, functions and application in developed and developing country markets, Value chain project, Food and Agriculture Organization, 2011.
- [32] Ardjosoediro I. and Neven D. The Kenya capture fisheries value chain: An AMAP-FSKG value chain finance case study, United States Agency for International Development (USAID). USA, 2008.
- [33] De Silva D.A.M. Value chain of fish and fishery products: origin, functions and application in developed and developing country markets, Value chain project, Food and Agriculture Organization, 2011.
- [34] Jitesh Thakkar, Arun Kanda & S.G. Deshmukh Supply chain issues in SMEs: select insights from cases of Indian origin, *Production Planning & Control*, 24:1, 47-71, 2013). <https://DOI:10.1080/09537287.2011.599119>.
- [35] Abdul Malik et al. The Factors Influencing Supply Chain Disruptions on Supply Chain Performance in Small and Medium Enterprises; *Journal of Technology Management and Technopreneurship*, Vol. 2 No. 2, 2014. ISSN: 2231-7996.
- [36] Nunnally, J.C. *Psychometric theory* 2nd edition, New York: McGraw-Hill, 1978.
- [37] McKinley, C. Event studies in finance and economics. *Journal of economic literature*, 35, 13-39, 1997.
- [38] Nunnally, J.C. *Psychometric theory* 2nd edition, New York: McGraw-Hill, 1978.
- [39] FAO. *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals*. Rome. Licence: CC BY-NC-SA 3.0 IGO.
- [40] FAO. *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals*. Rome. Licence: CC BY-NC-SA 3.0 IGO.
- [41] Kariuki, m.j. *Analysis of market performance: a case of "omena" fish in selected outlets in Kenya*. Egerton University, 2011.
- [42] Njagi, K.A., Njati, I.C. & S, G.H. Factors Affecting Profitability of Fish Farming Under Economic Stimulus Programme in Tigania East District, Meru County, Kenya. *IOSR Journal of Business and Management*, 15(3), pp.25–36, 2013.
- [43] Ardjosoediro I. and Neven D. The Kenya capture fisheries value chain: An AMAP-FSKG value chain finance case study, United States Agency for International Development (USAID). USA, 2008.
- [44] Brook Lemma. Paper Presentation on workshop of fishery management: Ziway, Ethiopia, 2014.
- [45] Janet Howieson, Meredith Lawley, Kathleen Hastings. "Value chain analysis: an iterative and relational approach for agri-food chains", *Supply Chain Management: An International Journal*, Vol. 21 Issue: 3, pp.352-362, 2016. <https://doi.org/10.1108/SCM-06-2015-0220>.
- [46] Lemma A. Integrated poultry, Fish and horticulture In: Trends in the conservation and utilization of Aquatic resources of the Ethiopian Rift valley, paper presented at the 5th Annual Conference of the Ethiopian Fisheries and Aquatic Sciences Association (EFASA), Hawassa, Editors: Brook Lemma, Seyoum Mengistou, Elias Dadebo (EFASA Editor), Zenebe Tadesse and Tadesse Fetahi. 2013b, 178-204.