OPEN ACCESS Freely available online

Journal of Nutrition & Food Sciences

Research Article

Value Chain Analysis of Usipa (*Engraulicypris sardella*) of Lake Malawi

Robert Bob Tsutsu[1]*, Wales Singini[2]

[1]Department of Fisheries and Aquaculture Sciences Mzuzu, University, Malawi; [2]Research Supervisor and Lecturer, Mzuzu University Director of Research, Malawi

ABSTRACT

Usipa (*Engraulicypris sardella*) has been classified as social important species from Lake Malawi but not economically important and has thus improved food and nutrition security and livelihoods of the local communities. A study was carried to analyse the value chain of Usipa (*Engraulicypris sardella*) of Lake Malawi for improving economic, social and environment performance and sustainable management of natural resources. The study objectives were: to map out Usipa value chain actors and to measure performance of Usipa (*Engraulicypris sardella*) value chain of Lake Malawi. The study was conducted at Mwawa beach, M'baluku, Mwawa and Mangochi markets in Mangochi district. The study adopted design for all of the objectives as research was in the form of a survey. The type of sampling was simple random sampling and sample size was 39. Data was collected by conducting interviews with fishers, wholesalers and retailers through questionnaires. Four actors were identified through mapping out value chain. On gross income fishers get USD 23.04, whole salers get USD 36.64 and retailers get USD 17.66. Gross margin fishers get 21.55%, wholesalers get 33.68% and retailer gets 44.90%. In value added fishers USD 4.28, wholesalers USD 3.38 and retailers USD 5.53. In terms of value share fishers get 32.44%, wholesalers 25.64% and retailers 41.92%. Fishers and retailers were dominated with males while wholesalers were dominated with females. Wholesalers and retailers of Usipa had high level of education while fishers had low level of education. Fishers and wholesalers highly dependence on forestry product compared to retailers. Usipa (*Engraulicypris sardella*) value chain on short run is profitable, social unbalance and does not promote green sustainability, sanitation and hygiene. DoF and stakeholders should participate in sustainable management of natural resources, implementation of solar tent dryer and enhanced marketing facility for fresh fish and promotes women entrepreneurship for improving Usipa (*Engraulicypris sardella*) value chain.

Keywords: Mwawa; Fishery; *Engraulicypris sardella*

INTRODUCTION

The value chain describes the full range of activities required to bring a product or service from conception, through the different phases of production (involving combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use [1]. Therefore, fisheries value chain can be described as the full range fisheries activities required to bring fishery products from conception through different phases or nodes of production (involving a combination of physical transformation and the input of various producer services) delivery to final consumer. Value actors in fisheries include fishers and crewmembers, beach-based middlemen, wholesalers, and town-based middlemen, retailers and consumers [2]. According to Pomeroy et al. [3], the concept of value chain includes issues of governance and coordination and the strategies for linkages and trust between actors in the chain.

Value chain analysis is a process were firm identifies its primary and support activities that add value to its final product and then analyze these activities to reduce cost or increases differentiation. According to Singini [4], the value chain analysis identifies chain weakness and strengths, assessed fishery in terms of economic, social and environmental outcomes and expose root cause underperformance, describe how value chain stakeholders and the activities economic, social and natural environment in terms of fishery commercial behavior and how the commercialization is performed and end market structured. The value chain analysis of different fish species of in the particular area was analyzed (from inputs, through primary production to marketing). In VCA, includes all aspects of analysis of social, economic and environment, based on the overall economic importance and contribution to the total catches of species. Narrow value chain analysis is limited due to cost of conducting the study and very specific on fish species special those have potential in extinction and economic

Correspondence to: Robert Bob Tsutsu, Department of Fisheries and Aquaculture Sciences Mzuzu, University, Malawi, E-mail: bobtsutsu@gmail.com

Received: August 17, 2020, **Accepted:** January 28, 2021, **Published:** February 04, 2021

Citation: Tsutsu RB, Singini W (2021) Value Chain Analysis of Usipa (*Engraulicypris sardella*) of Lake Malawi. J Nutr Food Sci.11:790.

benefits. Product value chain analysis provide better insights into the organizational structures and strategies of different actors and understanding of economic, social and environment performances at national level or community level.

Scope of Usipa (*Engraulicypris sardella*) of Lake Malawi value chain analysis study

The value chain analysis for Usipa adopted a three-phase approach as per FAO Developing Sustainable Value Chain Guiding Principles which including; (a) Measuring Performance, (b) Understanding Performance and (c) Developing Proposal for Improving Performance. According to Singini et al. [4], FAO sustainable food value chain is the full range of farms and firms and their successive coordinated value-adding activities that produce particular raw agricultural products and transformation them into. Particular products that are sold to final consumers and disposed after use, in a manner that is profitable throughout, has broad-based benefits for society, and does not permanently deplete natural resources.

MATERIALS AND METHODS

Study area, research design, sampling procedure, data collection and data analysis

The value chain analysis for Usipa of Lake Malawi was conducted in Mangochi. This research adopted a qualitative design and also employed simple random sampling procedure. This study adopted qualitative design for all of the objectives as there search was in the form of a survey. In this approach, surveys involve emerging questions and procedures. Data is collected in participant's setting. The sampling procedure was simple random sampling technique. In random sampling every participant in Usipa value chain had an equal chance of being selected. Sample size of Usipa value chain was 39, composed with 8 fishers, 10 wholesalers and 21 retailers. Qualitative and quantitative data was collected for fishers, wholesalers and retailers at Mwawa and M'baluku, Mangochi and Mwawa Markets. For fishermen and wholesalers, data was collected at Mwawa landing sites, while for the Usipa retailer's data were collected at Mwawa, Mangochi and M'baluku Markets. Data were collected from 8 fishermen, 10 wholesalers and 21 retailers. The study also collected information from some key informants. According to Bernard (2002), key informants are observant, reflective members of the community of interest who know much about the area of interest and are both able and willing to share their knowledge. Information was collected using a semi-structured questionnaire. Semi-structured questionnaire was especially advantageous to this study because it enables the researcher to follow a topic guide while at the same time it allowed for follow up points. In this study, the Mwawa BVC Chairperson and members was the key in formants. Data from value chain actors was a combination of both males and females and each link, a good number of interviewed to avoid gender biasness. Furthermore, data on parameters such as demography, fishing cost, cost for fish processing and transport, quantities, marketing strategies, purchase price, total revenues, market tax and challenges faced was collected as very useful for mapping out value chain, measuring performances (economic, social and environmental), understanding performances and proposals for improving value chain for Usipa. The data analysis was based on three phase approach sustainable food value chain concepts of FAO. Qualitative and quantitative variables were used for data analysis in Statistical Packages for Social Scientists (SPSS) for value chain performance of Usipa. Frequency analys is with the use of tables, graphs and charts were for social and environmental performances. Some of qualitative data was collectedthroughkeyinformants'interviewsanddirectobservationswasnarratedandsummarizedtoidentify the challenges faced by value chain actors, roles played by value chain actors in environmental management, participation in participatory fisheries approach and activities conducted for sanitation, hygiene and food safety by value chain actors.

Mapping out value chain actors of Usipa (*Engraulicypris sardella*) of Lake Malawi

A value chain map identifies the main value chain actors in the firm. According to Amosi [5], a value chain mapped out was developed to describe the actors and map out the relationship. Value chain map out illustrated and describes relationship between actors with influence of external and internal factors [4].

Measuring performance of value chain of Usipa (*Engraulicypris sardella*) of Lake Malawi

Economic data on quantities, units' price, marketing strategy, current capital, purchasing price, selling price, variable cost, gross income, gross margin and value shared of Usipa value chain. Both data for fixed costs and variable cost were collected by researchers from actors, but variable cost costs in this study encompassed all the costs that were changing according to the produce handled such as transport, fuel, hiring processing materials, labour, marketing, storage and other. Total Revenue was estimated using the following equation.

$$TR = TQ * UP \quad \text{(Equation: 1)}$$

Where, TR is Total Revenue TQ is Total Quantity UP is Unit Price.

Total variable cost was achieved by use of the following equation:

$$TVC = AVC * Q \quad \text{(Equation: 2)}$$

Where, TVC is Total Variable Cost; AVC is Average Variable Cost; Q is Quantity

Gross Income was calculated by deducting total variable costs for total revenues

$$GI = TR - TVC \quad \text{(Equation: 3)}$$

Where, GI is Gross Income; TR is Total Revenue; TVC is Total Variable Cost

Gross Margin is the gross income per unit of produce, calculated by dividing the gross income by total revenue then multiply by 100 to give a percentage.

$$GM = (GI/ TR) *100 \quad \text{(Equation: 4)}$$

Where, GM is the Gross Margin (%); GI is the Gross Income; TR is the Total Revenue

Based on selling and buy price, added value was calculated. AV is the amount of value that each actor in chain adds. It is the difference between the price the actor pays for the produce and the price she or he sells it for.

$$AV = PRA - PPA \quad \text{(Equation: 5)}$$

Where, AV is Added Value; PRA is Price Received by Actor; PPA is Price Paid by Actor

Value share is the percentage of the final, retail price that the actors earn and is calculated as the added value divided by the final retail price then multiply by 100 to get a percentage.

VS = (AV/ FRP) * 100 (Equation: 6)

Where, VS is Value Share; AV is Added Value; FRP is Final Retailer Price

RESULTS

Mapping out value chain actors of Usipa (*Engraulicypris sardella*) of Lake Malawi

The identified main Usipa (*Engraulicypris sardella*) value chain actors in Lake Malawi are depicted in Figure 1. These are fishers, wholesalers, retailers (processed and fresh Usipa retailers) and consumers.

Fishers of Usipa (*Engraulicypris sardella*) of Lake Malawi at Mwawa

In this study, the fishing activity for Usipa involves 11 crewmembers. At Mwawa 100% are male crewmembers who involve in fishing. Gear owners do not go out in the Lake fishing Usipa but they are assisted by Heads (readers among crewmembers). In this study, the fishing activity for Usipa involves 11 crewmembers. At Mwawa 100% are male crewmembers who involve in fishing. Gear owners do not go out in the Lake fishing Usipa but they are assisted by Heads (readers among crewmembers). Usipa fisher uses 4 fishing vessels; 1 engine boat and 3 dugout canoes. The engine boat is used carry catches of Usipa, Chilimira and 3 dugout canoes when before and after fishing at the Lake. 1 dugout is used for carrying LED bulbs during fishing and it has 1 crewmember that operates. They always go fish at 7-8pm and back at 3-5 am. Fishers use Chilimira nets to catch Usipa. The main challenges Usipa fishers face to benefit better from existing markets and value chains are: (1) High fishing operational costs and (2) Unstable catches due to weather that made Usipa fishery unreliable source of income.

Wholesalers of Usipa (*Engraulicypris sardella*) of Lake Malawi at Mwawa

Wholesaling involves two categories of people including; 40% males and 60% females. Usipa wholesaling at Mwawa is dominated by females. These wholesalers come from different districts; 40% Mangochi, 20% Balaka, 10% Machinga, 10% Phalombe and 10% Thyolo. These wholesalers involved in Usipa selling at Markets and also processing. Usipa processing methods used by wholesalers at Mwawa fish landing site; Sun drying 30%, Sun drying and Smoking 30%, Sun drying, Para-boiling 20% and Sun drying and Frying 20%. Wholesalers are supported by small-scale business associations (MICRO Finance and Village Banks) and BVC. The main challenges Usipa wholesalers face to benefit better from the existing markets and value chains are: (1) Usipa prices are not stable because of unstable catches of Usipa by the fishers, (2) Post-harvest losses occurring at the beach and markets due to lack of improved facilities for handling, processing and storage e.g. solar tent dryer and (3) Scarcity of enough firewood for fish processing methods e.g. smoking, fry and wood for construction of dry racks.

Retailers of Usipa (*Engraulicypris sardella*) of Lake Malawi at Mangochi, M'baluku and Mwawa markets

There are three main types of Usipa retailers operating at Mangochi, M'baluku and Mwawa markets; (1) Fresh Usipa Retailers, (2) Processed Usipa Retailers and (3) Fresh and Processed Usipa Retailers. Types of Usipa sold to consumers by retailers; Fresh Usipa 15%, Processed Usipa 80% (Sun dried 20%, Para-boiled 10%, Sun dried and Para Boiled 25%, Smoked 10% and Sun dried and Smoked 15%) and Both Fresh and Processed Usipa 5% (Fresh Usipa, Sun Dried and Smoked Usipa). Usipa retailer from Mangochi, M'baluku and Mwawa markets is dominated by males 60% and Females 40%. Retailers are supported by market Authorities, Market Committee and Small-scale loan associations (MICRO Finance and Village Banks). The main challenges Usipa retailers face to benefit better from the existing markets and value chains are: (1) Unstable price from Usipa wholesaler and fishers, (2) Lack of knowledge and skills in conducting fish business and (3) Lack of improved selling and storage facility for fresh fish at Markets.

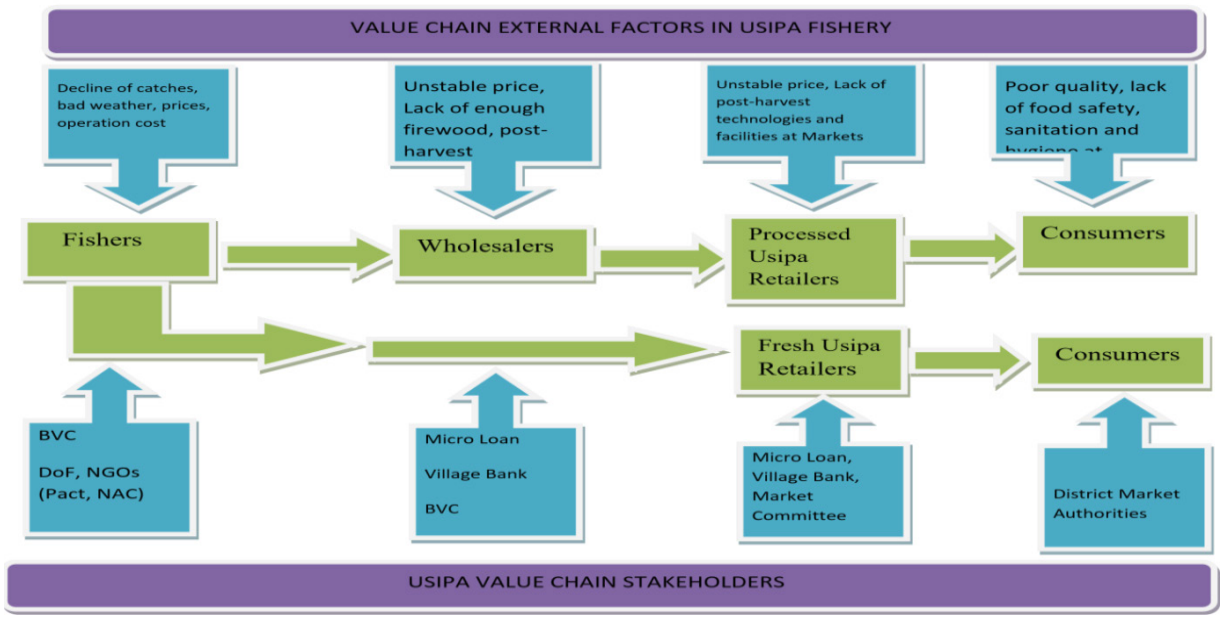

Figure 1: Map out of USIPA value chains of Lake Malawi.

Measuring performance of value chain of Usipa (*Engraulicypris sardella*) of Lake Malawi

The economic performance includes; market strategy, gross margin, value added and distribution benefits. The results in Table 1 revealed that retailers had highest gross margin of 44.90%, wholesalers had gross margin of 33.68% and fishers had gross margin of 21.55%. The results in Table 2 show that wholesalers had lowest added value USD 3.38 while fishers had USD

4.28 added value and retailers had USD 5.53. The results in Table 3 show that the wholesaler gets 25.64% which was the lowest percentage of final selling price of the Usipa. On other hand, fishers get 32.44% and retailers gets 41.92% of the final selling price of the Usipa.

Social performance of Usipa value chain from Lake Malawi

Social performance of Usipa value chains were based on gender and education level of the actors in Usipa fishery. There is absent of female's participation in fishing activities while in wholesalers were 40% males and 60% females at Mwawa beach. The retailers were 35% females and 65% males at Markets (M'baluku, Mwawa and Mangochi). The results from Figure 1 show that largest group in involve wholesalers are 60% females and 40% males. The results in Figure 1 show that fishers have 75% primary level and 25% secondary level of education. The results in Figure 1 show that there 50% primary and 50% secondary level of Wholesalers education levels. Lastly, results in Figure 1 show that there 70% secondary level and 30% primary level of Retailers education level.

DISCUSSION

Mapping out value chain actors of Usipa (*Engraulicypris sardella*) of Lake Malawi

Different actors involved in Usipa (*Engraulicypris sardella*) value chains were identified in this study in fishing Usipa from Lake Malawi to the final consumer. These were the actors; fishers, wholesalers, retailers and consumers. These actors play different roles such as fishing, fish handling, fish processing, storing, packaging and selling of the products. Usipa value chains, fishers are actors that own fishing gears (Chilimira) and fishing crafts (3 dugout canoes and 1 engine boat) for catching fish, Usipa wholesalers are actors engaged in buying Usipa from fishers then processed for sale to Usipa retailers and Usipa retailers are divided into two; those buy processed Usipa from Wholesalers and those buy fresh Usipa from fishers in order to sell to fish consumers. The first actors to enter the Usipa value chains of Lake Malawi are fishers. Usipa fishing uses Chilimira fishing gear and 3 dugout canoes and 1 engine boat. Usipa fishing at Mwawa only involves males. Mostly fishers do not involve in fishing activities, they just use crewmembers led by fishing head. Crew members composed of a team of 11 members; 1 head leading fishing activities, 1 member involve in Usipa handling and the least 9 members involve in catching Usipa at Lake Malawi. The catches of Usipa at Mwawa landing site are sold in bulk to wholesaler and small quantities to fresh Usipa retailers from Mangochi town and Mwawa Markets. Fishers benefits from Usipa business as source of income and source of employment to crewmembers. Fishers are able to support their families, building house, investments other business and sending children to school and South Africa. Despite Usipa business contributed to livelihood of fishers and their local communities, it should be noted that it was observed that their challenges faced by fishers. The main challenges faced by fishers are high fishing cost and unstable catches of Usipa resulting into unreliable business. As reported by Singini et al. [4], the general main challenges face to benefit better from the existing markets and value chains are high cost of gear and craft maintenances, declining of fish catches and business is generally unreliable. Wholesalers involving in buying Usipa from fishers, then processing and selling to retailers. Unlike the fishing of Usipa activities which is dominated by males, Usipa wholesalers has large number of females. Singini et al. [4], reported about good representation of female wholesalers in fishery value chain. It was also observed that majority of these wholesalers are within Mangochi while others from Balaka, Machinga, Phalombe and Thyolo. The method used for processing Usipa are Sun drying, Smoking, Frying and Para boiling. Despite having processing materials for drying, frying and smoking, they supply poor quality of Usipa at local markets due to lack good facility and value chain techniques at Mwawa

Table 1: Gross margin.

Variables	Fishers	Wholesaler	Retailers
Total Revenue	106.92	108.8	39.33
Total Variable Costs	83.88	72.16	21.67
Gross Income	23.04	36.64	17.66

Table 2: Added value of USIPA value chains.

Variables	Fishers	Wholesalers	Retailers
Received Price (USD)	4.28	7.67	13.20
Paid Price (USD)	0.00	4.28	7.67
Added Value(AV)(MK)	4.28	3.38	5.53

Table 3: Distribution benefits from USIPA trade along the value chain.

Variables	Fishers	Wholesalers	Retailers
Added Value (USD)	4.28	3.38	5.53
Final Retailers Price (USD)	13.20	13.20	13.20
Value Share (AV/FRP) × 100(%)	32.44	25.64	41.92

landing site. The wholesalers are supported by BVCs provide new training and security at landing site, Small-scale business village banks and Micro finance which provide loans. The main challenges faced by wholesalers in Usipa value chains are Usipa price are not stable due to unstable Usipa catches, post-harvest losses due lack of improved facilities for fish handling, processing and storage at Mwawa landing site and Markets and scarcity of enough firewood for fish processing methods e.g. smoking and para-boiling. Usipa retailers bought processed Usipa from wholesalers while other others brought fresh Usipa direct from fishersand sold to consumers. There are three main types of Usipa retailers operating in Mangochi. These are Fresh Usipa Retailers, Processed Usipa Retailers and Fresh and Processed Usipa Retailers. Fresh Usipa Retailers these are those retailers who bought fresh Usipa direct from fishers. Processed Usipa Retailers these are those retailers who bought processed Usipa from wholesalers while fresh and processed Usipa retailer brought processed Usipa from wholesalers and fresh Usipa from fishers. The majority of Usipa retailers is consists of processed Usipa retailers then fresh Usipa retailers and fresh and processed Usipa retailers in Mangochi. Retailers are supported by market Authorities, Market Committee and Small-scale loan associations (MICRO Finance and Village Banks). Market Authorities are responsible for collecting market tax and providing cleanness and security. Market committee is responsible for price determination and voice out issues affecting retailers' even consumers at Markets. MICRO Finance and Village Banks provide loans to the retailers. The main challenges Usipa retailers face to benefit better from the existing markets and value chains are unstable price from Usipa wholesaler and fishers, lack of knowledge and skills in conducting fish business and lack of improved selling and storage facility for fresh fish at Markets. Furthermore, marketing operation are irregular, facilities are inadequate and selling Usipa not at hygienic environments.

Economic performance

The marketing strategies the Usipa value chain actors use at the beach are in two-fold and these are direct selling and auctioning. Direct Usipa selling was observed at Markets. Phiri et al. [2] reported that direct selling mostly takes place when there are few buyers to the extent that they don't need to struggle to buy the fish and the fish quantities being sold are not enormous. Usipa auctioning whereby fish selling is done through auction observed at Mwawa landing site. Fishers marketing strategy was fish auctioning to the Usipa wholesalers was observed at Mwawa landing site. Once they land their Usipa catches and as they are approaching the landing beach they leave some of catches in boats away from the beach and come to the landing beach with just part of their catch. They don't want the wholesalers to know the exact Usipa quantities that have been caught as that may affect Usipa pricing. According to Phiri et al. [2] the intention of doing this is to control the Usipa supply in order for them to have their Usipa catches sold at good prices. Gross margin for Usipa value chain was based on total average variable costs and total average revenues while Value added based on received price and paid price. Value share was based on added value and final retailer price. Despite Usipa wholesalers having the highest gross income than any other along the chain, it should be noted that they are the ones receiving a small value share than the rest of the actors. The reason behind wholesalers getting highest gross margin is because they lower average variable cost. In terms of gross margin, fishers get lowest gross margin along the value chain. The retailers getting the highest value share amongst all the actors. The reasons for retailers receiving highest value share along the chain is attributed to not only fact that they sell products with added value but also due to have knowledge and skills in fish business. Usipa retailer is type of business does not require any big investments in the form of fixed and variable costs.

Social performance environmental performance

The study found that the Usipa value chain is dominated with males and less females. The majority of the Usipa value chain is composed of retailers which are dominated by males. The fisher composed only with males, absent of females due to that high fixed cost discourages them. Wholesalers dominated by females whilst fishers and retailers dominated by males. FAO [6] reported that women in particular experience more difficulties compared to men in accessing productive resources and in participating in and benefiting equally from agri-food value chain. The Usipa retailers having the highest literacy rate along the chain. The low levels of literacy amongst the fishers resulted impede the social economic development of fishery sector while moderate levels of literacy amongst wholesalers. The low literacy rate has contributed to unstable catches, economic losses, post-harvest losses, poor sanitation and gender imbalance along value chain. The fishers and wholesalers highly depend on the use of forestry products for boat and canoes by fishers while wholesalers use it for Usipa processing methods (para-boiling, sun drying, frying and smoking) at Mwawa beach. Some of processed Usipa retailers use forest product for construction of selling bench and bango baskets for storage while fresh Usipa retailers uses bango baskets for selling Usipa in Mangochi township. Singini et al. [4] reported that use of firewood (forestry product) for processing fish has contributed to deforestation of forests is the fishing communities resulting into excess siltation in Lake

Currently, Singini et al. [4], Usipa (*Engraulicypris sardella*) has been classified as socially important but not economically important and has thus improve food and nutrition security and livelihoods of the local communities. The study was carried out to map out value chain actors and measure performances of Usipa from Lake Malawi. Four categories of actors in Usipa were identified in this study namely; fishers, wholesalers, retailers and consumers. Usipa value chain is also composed of beach village committee, department of fisheries, non-governmental organizations (NAC, CISER), village banks, market committee and the activities of actors in value chain were influenced by the external factors; unstable catches and pricing, bad weather, high operation cost, scarcity of firewood, lack of improved post-harvest technologies and facilities at beach and markets. The measured performance was based on economic, social and environmental performances along the Usipa (*Engraulicypris sardella*) value chain. Usipa value chain performance acts as a frame around performance economic (gross margin, value added and value-added share), performance social in terms of gender and education level and performance environmental in forestry products. The economic performance is varied along the Usipa value chain from fishers to wholesalers and retailers.

CONCLUSION

Usipa value chain operates on daily income not long-term benefits because of low variable costs and high fixed costs. Despite being unprofitable, the value chain is able to create jobs for local people as crewmembers and processor at Mwawa landsite and provide financial support to their families. The value chain is not social eq-

uitably distribution in terms gender and education level, although majority of actors come from within Mangochi. It is dominated by males comparing females and low literacy rate along the value chain. Fishers and wholesalers do not promote green sustainable due highly demand on forestry products.

RECOMMENDATIONS

Despite that Usipa is social important species not economical important, but value chain can be improved with appropriate interventions both fishing communities, fisheries governance e.g. BVC, DC and fisheries authorizes, fisheries NGOs and other government departments e.g. water, forest etc. Specifically, the following recommendations were need to be explored as potential for upgrading the value chain: (1) The Department of Fisheries, Department of Forest, Beech Village Committee and Value Chain Actors should participate in sustainable management of natural resources. Usipa value chain high depend on forestry products for processing, handling and boat construction, (2) The Department of Fisheries and other stakeholders should support the sector through implement of solar tent dryer at Mwawa beach and an enhanced marketing facility for fresh fish in local markets but with consideration that is timber product. There is high post-harvest losses of fresh Usipa and lack of organized markets due poor markets design which was no built accord to the FAO recommendations on fresh fish market structures and (3) The Department of Fisheries and other stakeholders should encourage participation females in Usipa value chain as one way of promoting women entrepreneurship under the thematic area of gender and capacity building in the Malawi Growth Development Strategy II.

REFERENCES

1. Kaplinsky R, Morris M. A handbook for value chain research. International Development Research Center, Ottawa, Canada. 2001.
2. Phiri LY, Dzanja J, Kakota T, Hara M. Value chain analysis of Lake Malawi Fish: A case study of Oreochromis spp. (Chambo). Int J Bus Soc Sci. 2013;4(2):170-181.
3. Pomeroy R, Navy H, Ferrer AJ, Purnomo AH. Linkages and trust in the value chain for small- scale aquaculture in Asia. 2017;48(4):542-554.
4. Singini W, Msiska O, Mattson N, Hladka B, Vasco S. FAO-TCP Project (TCP/MLW/3504). Lake Malombe Fisheries Value Chain Analysis. Food Agri Org. 2017.
5. Amosi N, Kasulo V, Singini W, Munthali C. Value chain analysis of baobab products for improved marketing and sustainability of their trade in Malawi. Faculty of Environmental Science. Mzuzu University. 2017.
6. Lem A, Tietze U, Ruckes E, Anrooy R. Fish marketing and credit in Vietnam. Food and Agriculture Organization of the United Nations, Rome. 2004;468:1-187.