Value Chain Analysis of Lake Malawi Fish: A Case Study of *Oreochromis spp* (Chambo)

Letson Yoyola Phiri
Department of Aquaculture and Fisheries Science
Lilongwe University of Agriculture and Natural Resources
Bunda College of Agriculture
Lilongwe, Malawi

Joseph Dzanja
Department of Agri-business,
Lilongwe University of Agriculture and Natural Resources
Bunda College of Agriculture
Lilongwe, Malawi

Tasokwa Kakota
Department of Basic Sciences
Lilongwe University of Agriculture and Natural Resources
Bunda College of Agriculture
Lilongwe, Malawi

Mafanizo Hara
Institute of Poverty, Land and Agrarian Studies
School of Government, Faculty of Environment and Management Studies
University of the Western cape
Cape Town, South Africa

Abstract

Chambo has potential of improving fishers' socio-economic status in Malawi. The paper examines Chambo value chain whose findings will improve fish marketing by actors along the chain. Quantitative value chain analysis used, investigated income, profit margins distribution among different actors along the chain and determined marketing channels' efficiency. Daily net incomes of retailer, fisher and wholesaler were MK930.78, MK676.99 and MK485.40 respectively. Marketing margins were MK515.68, MK689.65 and MK1951.70 for fishers, wholesalers and retailers respectively. Income was significantly different among fishers, fish wholesalers and fish retailers. High marketing margins led to marketing inefficiency. Fisher's income and profitability could improve if crewmen were downsized to reduce the wage bill. Fuel availability in fuel pumps could lower fisher's costs. Construction of cold chain facilities half way close to where Chambo is caught to reduce wholesalers' distance to markets would lead to the sharing of transport costs between fish retailers and fish wholesalers.

Keywords: Value chain analysis, marketing efficiency, marketing margin, fish, Crewman, income, wage, Malawi.

1.0 Introduction

Fish and the fisheries sector are of great social and economic importance to Malawi. The sector plays a very significant role as a source of nutrition, income and employment. Fish provides over 60% of the dietary animal protein intake of Malawians and 40% of the total protein supply. Much of the fish is consumed in rural areas thereby contributing significantly to daily nutritional requirements of poor rural masses.

*** Sponsoring Information:** Research sponsored by RUFORUM and Lilongwe University of Agriculture and Natural Resources

The sector is a source of employment, directly employing about 50,000 fishers, and indirectly about 350,000 people who are involved in fish processing, fish marketing, net making, boat building and engine repair. Fish acts as a source of income for the people of Malawi, generating beach price local revenue of about MK2.6 billion (US$24 million) annually, and contributes about 4% to the GDP (GoM, 2007; FAO, 2005). As most of the fish is locally consumed, there is substitution of fish imports. Fishing is undertaken in the four lakes of Malawi and its numerous rivers notably, Lakes Malawi, Chilwa, Malombe, Chiuta and the Shire river.

Both formal and informal fish trade takes place with neighbouring countries. Furthermore, the existence of over 800 endemic fish species in Lake Malawi has created both ecotourism, and an export trade for aquarium fish (Mbuna), bringing into the country foreign exchange earnings for instance in 2010 the exports amounted to 11,781kg generating revenue of MK21, 474,834 (US$113,025) (GoM, 2011) .

The Malawi fisheries is classified into the small-scale commercial sector (often called the traditional or the artisanal sector), and the large-scale commercial sector (with large capital investment). The artisanal fishers contribute over 80% of the total fish catches. Small-scale producers make up the majority of fisheries producers in Malawi. Their production is a vital aspect of food security where the formal sector and formal markets only provide for a portion of the population. Small-scale fishers mainly produce for their own consumption and for local markets as such most of them remain poor and vulnerable to food insecurity. These small scale producers employ many different gears that consist of beach seines (chambo, kambuzi and mosquito nets), open water seine nets (e.g. chilimira), fish traps, gillnets, handlines and longlines. Dugout canoes and plank boats, with or without outboard engines, are the main fishing vessels. The average fish landings are about 45,000 tons/year (GoM, 2007). The fish landed predominantly comprise of small and large cichlids, *Engraulicypris sardella* (Usipa) and catfishes. However, there is a generally decreasing trend in annual catches of this sector.

The large-scale commercial sector is highly mechanized, capital intensive with effort limitations applied. The fishery is operated on an open-access basis, with entry justified with payment of license fees. The fishery consists largely of pair trawlers (wooden boats about 8 m long, with a 20-40 HP inboard engine) and stern trawlers powered by engines of 90-385 HP. All these are confined to the southern part of Lake Malawi which is relatively shallow and most productive. At present there are 14 pair trawlers and five stern trawlers undertaking bottom and pelagic trawling operations, which are restricted to depths between 50 and 100 m. This sector lands about 5,600 tons/yr of predominantly small cichlids (*Lethrinops* and *Copadichromis spp.*) which is approximately 21% of the total annual fish landings from Lake Malawi. Production has been decreasing with the cichlid *Oreochromis spp.* (Chambo) stocks overexploited (GoM, 2007).

2.0 Materials and methods

2.1 Value chain analysis

Value chain is a type of supply chain but the only difference is that with supply chain, there are no binding or sought after formal or informal relationships except where goods, services or financial agreements are transacted (Kit et al., 2006). Kaplinsky and Morris (2000) define value chain as '*a full range of activities that are required to bring a product or service from conception, through different phases of production, delivery to final consumers and final disposal after use'*. Ahmed (2007) refers to it as '*a structure of physical, economic and social transactions between individuals and organizations engaged in raw material transformation into end products'*. Kaplinsky and Morris only mentions about the product going through different phases of production and delivery to final consumers, these processes cannot take place without physical, economic and social transactions as defined by Ahmed. Hence these two definitions refer to the same process.

In Malawi, much attention has always been geared towards increasing volume of output whilst there have been few attempts by policy makers to change the terms of inclusion in downstream value chains. Value chain studies in Malawi have been conducted in agriculture in crops like soy bean, cotton whose main objective was to describe the industry's functioning and the established trade structures (Rates, 2003) and tobacco which aimed at reviewing and analyzing the current structure of tobacco markets in Malawi and characterize the level of competition (and possible collusion) in the industry. The study also examined the differences in the marketing costs of tobacco produced in different regions of Malawi and between estate and smallholder farmers (Koester et al, 2005).

Tchale and Keyser (2010) also did value chain studies for burley tobacco, maize, rice and cotton and the main objectives of these studies were similar which were to determine the private costs and profitability of different stages in the value chain, to understand the cost composition and to measure trade competitiveness. Not much value chain research has been done in fisheries concerning value chain. Friday Njaya and Dick Kachilonda (2008) (unpublished report) did a value chain study for *Engraulicypris sardella* (Usipa) but none has been undertaken on one of the most important fish, Chambo. , in 2010, Malawi's total fish landings were 95,724 tons and Chambo contributed 2,238 tons representing 2.4% of the total fish landings with a beach value of MK469, 959,000 (approx. US$2.9 million) (GoM, 2011). Chambo has been a source of food as it contributes to the total dietary animal protein intake and total protein intake. Much of the fish is consumed in rural areas thereby contributing significantly to daily nutritional requirements of the people. Chambo also contributes to the provision of employment (GoM, 2011).

Basing on the above socio-economic importance of Chambo, it is therefore necessary to undertake this study to examine its value chain. This will assist to improve the fish marketing by small-scale fishers and other actors along the value chain. In view of the above mentioned problem, the study was conducted to achieve the following specific objectives: (i) To investigate the distribution of income, profit margins for different actors along the value chain (ii) To determine the efficiency of the market channels. The hypothesis was that income of different value chain actors such as fishers, fish wholesalers and fish retailers was not the same.

2.2 Marketing efficiency (ME)

Marketing efficiency may be defined as the degree of market performance (Bagchi and Raha (2011). Sheth *et al.* (2000) define marketing efficiency as the maximization of the output to input ratio of the marketing function for individual customers. Charnes et al (1978) define the efficiency as the comparison among firms of the ratio of outcomes over the inputs required to achieve them. All the definitions have similar meanings as they all refer to the ratio of output over input. An efficient marketing system apart from stimulating production also accelerates the pace of economic development and is an important way of raising farmers' income levels as well as consumers' satisfaction levels (Bagchi and Raha, 2011).

2.3 Sampling and data collection

The research was conducted in Lake Malawi, Mangochi district. The district was purposively selected due to the area's productive nature as the lake is shallow. This is where a lot of Chambo is caught since the area provides a good ground for Chambo breeding. For this reason, the district was chosen for this research. The research was conducted in the south-east arm of the lake. Lake Malawi on the Malawi side has over thirty strata. These strata are numerical points from where fisheries data is collected. Mangochi district alone has the following strata: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 and 3.1. The south east arm of the lake has strata 2.1, 2.2, 2.3, 2.4, 2.5 and 2.6. Stratum 2.5 is demarcated into two as stratum 2.5 North and stratum 2.5 South for easy data collection. Data for fishers was collected from strata 2.1, 2.2 and 2.3 which were also purposively selected due to resource limitation and easy accessibility. Data for fish wholesalers and fish retailers were collected from the same strata 2.1, 2.2 and 2.3 as well as from different markets such as Limbe and Mangochi Central Markets. Data for consumers were collected from Mangochi Central Market and M'baluku Market. Stratified random sampling method was used to sample fishers, wholesalers, retailers and consumers. These four groups of actors were identified through value chain mapping process. The total sample size was 125 comprising 30 fish consumers, 30 fishers, 31 fish wholesalers and 34 fish retailers. Primary data was collected by using questionnaires which were pre-tested before the actual interviews were held. The survey was held between April and November, 2011.Apart from conducting individual questionnaire interviews, key informant interviews were also held with 3 fisheries staff, 1 agricultural staff and 2 local fishing community members.

Fishers are the actors that own fishing gears and fishing crafts for catching the fish. Fish wholesalers are the actors engaged in buying the fish from fishers for sale to fish retailers. Fish retailers buy the fish from fish wholesalers in order to sell to fish consumers. Fish consumers are the ones that buy the fish from the fish retailers for own consumption.

2.4 Analytical procedure

A number of analytical approaches were used in the study and they included computation of profitability indices, marketing margins and inequality indices (Gini coefficients).

These performance indicators are described below.

Profitability of fisheries activities was determined by the computation of net income. Net income was computed by the following formula:

$$NI = TR - TC + OC/TSV \quad (1)$$

Whereas

NI = Net income

TR = Total revenue

TC = Total Costs

OC =Own labour costs (Opportunity cost)

TSV = Total sales volume

Average net share of the consumer's price received by each of the actors in the chain

Average net share for actors of the consumer's price = [Purchase price (PP) divide by consumer's price (CP)] * 100 (2)

Marketing margin percent

Marketing margin percent=Net share (preceding actor) –Net share (adjacent actor) (3)

Marketing margin

Marketing margin (MM) = Sale price (SP) – Purchase price (PP) (4)

Marketing profit

Marketing profit = Sale price – [(Purchase price + Marketing costs (MC)] (5)

Marketing efficiency index

To complement the marketing margins, assessment of the degree of efficiency was done using Acharya and Agarwal (2001) marketing efficiency formula.

$$ME = FP/(MC_T + MM_T) \quad (6)$$

Where,

ME = Acharya and Agarwal's marketing efficiency index

FP = [1]Net price received by the producer (MK/dozen)

MC_T = Total marketing cost incurred by the producer and all the intermediaries (MK/dozen)

MM_T = Total marketing margin (MK/dz)

ME greater than one ($ME \geq 1$) indicates efficiency of the marketing channel. The extent by which ME exceeds one indicates greatness in efficiency. If the ME is less than one ($ME < 1$) the marketing channel is inefficient.

Gini coefficient

The gini coefficient developed by "Corrado Gini" in 1912 was used to measure income inequality. The income inequality of individuals in each particular stage of a value chain was measured. Also measured were the income inequalities of individuals in the production stage which were compared with a day's poverty level income of an individual at international price.

$$G = 1 - \sum_{i=1}^{N} (\sigma Y_{i-1} + \sigma Y_i)(\sigma X_{i-1} + \sigma X_i) \quad (7)$$

Where as

G = Gini coefficient

QY = Cumulative percentages of Income

QX = Cumulative percentages of individuals

Y = Average Income

X = Individuals

[1] Farmer's net price is the difference between the sales price (gross price) and the marketing costs (Murthy et al, 2007)

N = Number of elements or observations

The closer the coefficient is to 1, the more unequal the income distribution is, the closer it is to 0 then the more equal the income distribution is.

3.0 Results and discussion

3.1 Income distribution

Income refers to the earnings that accrue to an economic unit during a given period of time (M4P, 2008)**.** Income is also an indicator of economic wellbeing**.** Income comprises the money received from the sale of goods plus the value of self-consumed output minus the costs of production. The costs of production comprise the costs of inputs, depreciation on capital equipment, interest payments and taxes. Income is different from profit in a sense that profit simply refers to the sales minus costs where costs of production include the opportunity cost of own labour while income does not deduct the cost of own labour since this accrues to the enterprise as income from labour. However, the cost of hired labour is deducted as this is a cost to the enterprise (M4P, 2008). Mean net income for fish retailers was the highest (MK930.78) when compared with mean net income for fishers (MK761.95) and fish wholesalers (MK485.40) (appendix 1). Fish retailers had the highest net income because they had lower total costs (MK735, 997.00) than the fish wholesalers which were MK1, 208,438.00) whilst the total costs for fishers were MK170, 715.07. Fish retailers also had lower own labour costs (MK28, 300.00) as compared to the labour costs of fish wholesalers (MK 40, 765.00). Fishers had the lowest total income (MK164, 649.93) though the net income was not lower than that of the fish wholesalers. Mostly, the income of fishers has been affected due to lower total revenue realized and also lower total sales volume as compared to the fish wholesalers and fish retailers. The sales volume differ as fish wholesalers apart from sourcing fish from the fishers that were interviewed were also able to get fish from other sources to increase the fish volume whilst when it came to selling the fish to retailers, these fish wholesalers also had other outlets or markets where they were delivering their fish apart from the fish retailers in the markets.

3.1.1 Comparison of income for fishers, fish wholesalers and fish retailers

Using t-test, income for fishers, fish wholesalers and fish retailers were significantly different at (P=0.000) at 95% confidence interval (appendix 2).

3.2 Gini coefficient

The gini coefficients were used to analyze inequality in income distributions. The gini coefficient index for fishers' income was found to be 1.01 at 99% bootstrap confidence interval (0.782, 1.923) indicating that there was high inequality among fishers in income distribution. This high inequality among fishers was due to the fact that some of them made losses and that affected the net income for some of them. The gini coefficient index for wholesalers was 0.56 at 99% bootstrap confidence interval (0.351, 0.641) while for retailers it was 0.59 at 99% bootstrap confidence interval. The income inequality among wholesalers and retailers is not as high as that of fishers. This indicates that the gap between those who are better off and those that are less privileged is narrow in the case of fish wholesalers and retailers than is the case with fishers.

This might be due to the fact that none of these actors (wholesalers and retailers) experienced any loss as was the case with some fishers hence widening the gap among different individuals. The income range for fish wholesalers (MK550.00 to MK46200.00) was not as wide as that of fish retailers (MK820.00 to MK76020.00) and fishers (-MK475.00 to MK53000.00) that is why the inequality for wholesalers was slightly lower than the rest of the actors (appendix 3). The income range for fish retailers was wider than that of fishers but retailers did not incur any loss that is why the inequality was also lower than that of fishers. Basing on the percentiles as indicated in the same appendix 3, 50% of the distribution of wholesalers fall between first quartile (MK1400.00) and third quartile (MK12501.00) and for fishers its between MK500.00 and MK1950.00 whereas with fish retailers the distribution of income for retailers is between Mk2432.00 and MK7732.00. This indicates that majority of fish wholesalers are better off than majority of both fishers and fish retailers. In the case of fish retailers as compared to fishers, the percentiles of fish retailers show that the distribution of income is slightly above income distribution of fishers.

3.3 Break-even production

The break-even production for a fisher's family basing on the fact that a fisher has a household to look after and if not a family of his own it might be relatives (appendix 4).

It was therefore assumed that a fisher' household has at least 4.6 people including the fisher himself to look after basing on Malawi's current average household size (National Statistical Office and ICF Macro, 2011). It was conceptualized that for every fisher's household to be above the world's official poverty line of US$1.25/person/day, he has to catch not less than 2.0 dozens of Chambo every day. Individually, sometimes fishers catch less than a dozen but sometimes they are able to catch more. The break-even production (BEP) per person was 0.43 dozens and was less than the calculated average production per person of 1.6 dozens per day. This indicates that if fish catches were fairly distributed, the calculated average fish catches for a day would be enough to give fishers income for them to be above the world's official poverty line of US$1.25 per person per day. Although the analysis is able to give such a Break-Even Production point of 2.0 dozens of Chambo per day, the problem is that not all days in a month are conducive for fishing. This is due to the natural causes like unpredictable weather conditions, regulations concerning minimum allowable size for the fish, close season, damages caused to their gears prompt fishers to have special times for fishing gear maintenance and all these exclude them from fishing as they would have required.

Appendix 5 indicates wage income distributions. The wage costs paid by fishers are slightly the same as fishers' profits. These fishers' wage costs (MK126, 088.52) are also higher than the wage costs incurred by fish wholesalers (MK53, 741.41) and retailers (MK39, 073.67) combined. Fishers' total profits (MK127, 758.89) are almost twice lower than the profits made by either fish wholesalers (MK243, 679.33) or fish retailers (MK253, 260.40) and this apart from other costs is attributed to the high wage bill that fishers do have. If all the actors total wage costs and profits amounting to MK218, 903.6 and MK624, 698.62 respectively were all used as household incomes then incomes for a day generated by the chain would amount to MK843, 602.22.

3.4 Net share in consumer's price

Net share of consumer's price is an indicator of market performance. The net share of the consumer's price indicates that retailers had the largest share of 67.84%. The wholesalers and the fishers had the second largest and lowest share of 54.69% and 29.10% respectively (appendix 6).

3.5 Marketing margins and marketing profit

Armstrong and Kotler (2003) refer to the marketing margin as the portion of the consumer's food dollar that goes to business engaged in marketing. Engle and Quagrainie (2006); Jolly and Clonts (1993) simplify the definition of marketing margin as the difference between what the consumer pays for the product and what the farmer receives. The marketing margins were MK515.68 for fishers, MK689.65 for fish wholesalers and MK1, 051.70 for the fish retailers (appendix 6). The marketing margin for fishers is the lowest and this is due to the chain's small size since fishers are in the primary market where they are not required to pay for transport costs. The marketing margins for retailers almost double those of the wholesalers though the marketing costs for retailers are lower than those by wholesalers. Increased marketing margins for fish retailers might be due to the presence of middlemen that are between fish wholesalers and fish retailers as they put mark-ups on top of what is demanded by the fish wholesalers when selling to retailers. The wide marketing margin between retailers and fishers leads to low prices for fish producers which is MK1,467.01 for a dozen whereas consumers are paying high prices which is MK3,270.27 for a dozen fish.

The marketing profit for fishers for a fish dozen is MK455.65 and is greater than MK415.84 for fish wholesalers and this is due to the fact that fishers have low marketing costs as compared to wholesalers. Wholesalers incur high marketing costs in terms of fish transportation to markets and fish preservation using ice relative to fish retailers. Transport costs and fish preservation costs using ice on a dozen of fish for wholesalers were MK533.19 and MK40.27 respectively (appendix 7). The cost for retailers on transport for a dozen of fish was MK54.21 and for ice was MK3.80. The low cost on ice for fish preservation on the part of fish retailers might also due to the fact that they have reliable customers who immediately purchase the fish once bought from fish wholesalers. It is possible that the fish quantities retailers have are lower than what wholesalers have and result in relatively lower fish preservation costs compared to fish wholesalers. Hence, the low marketing costs result in the attainment of high marketing profit as is the case with retailers and fishers.

The marketing efficiency index of the whole chain which includes the fishers, fish wholesalers and the fish retailers is [2]0.46.

Since the index is less than one (ME <1) that indicates that the marketing channel is not efficient. This inefficiency might be due to the high marketing costs incurred by both fish wholesalers and retailers and also because of the high marketing margins which might have been due to the presence of middlemen between fishers and fish wholesalers and also between fish wholesalers and fish retailers. The inefficiency in this case can only be reduced if fish wholesalers and fish retailers aim at reducing the marketing costs which are relatively higher than the marketing costs incurred by fishers. Apart from reducing the marketing costs, all the actors (fishers, fish wholesalers and fish retailers) must strive to reduce the marketing margins. These marketing margins may be reduced by removing the middlemen that are along the chain as they distort the whole chain. Fishers may become more efficient if they may strive to reduce the number of workers involved in each particular fishing fleet.

4.0 Value additions at different market levels and how they impact different value chain actors

4.1 Primary market

At primary market which is the production level where Chambo is caught value additions rarely take place. Small-scale fishers use ordinary boats and canoes that do not have fish preservation facilities such as cooling systems this means that there isn't even quality assurance at this level. Once the fish is caught, it is taken straight to the beach for selling without any value addition. The situation therefore impact on the wholesaler as he/ she is always in a panic to find ways of preventing the fish from going bad. At this level it's either the fisher or the wholesaler who takes the burden of value addition through smoking of the fish. Chambo is mostly sold fresh because of the demand that is there. It is in very rare circumstances that it is smoked since the process is also involving. Mostly, smoked fish is targeted for upland markets where it is considered not feasible to transport fresh fish. In order for smoking to take place the following are required: smoking kiln which is constructed from bricks, gauze wire on which the fish is put while in the smoking kiln, firewood and a drying rack for drying the fish once smoked to remove excess moisture.

4.2 Secondary market

This is the market where the wholesaler is involved in transacting the business with fish retailers. The wholesaler once he buys fresh fish from the fisher, he decides whether to sell the fish while smoked or fresh. In case he/she wants to sell fresh fish then he is required to have ice to prevent fish quality deterioration. The wholesaler also meets the costs for transporting the fish to potential markets. Impact that the fisher faces at this level is the cost for maintaining the fish quality through buying of ice blocks but there is actually no value addition taking place.

4.3 Retail market

The retail market is where retailers interact with consumers. This level just like secondary market does not incur any cost on value addition except on maintenance of fish quality through the use of ice blocks.

5.0 Conclusion

Retailers had slightly lower total fish volume than wholesalers and the net income for the retailers was the highest since their total costs were lower than those of wholesalers. The gini coefficient for wholesalers was the lowest indicating that wholesalers were able to equally share the benefits as compared to fishers and fish retailers. Reducing of costs by all actors in the chain could help to narrow the income inequality gap among different actors. It was also noted that fishers had the highest wage bill which also affected their profits. Retailers were also reaping more of the consumers' price than the rest of the actors (fishers and wholesalers) and wholesalers had the second largest share of the consumer's price. Fishers and fish retailers since they had lower marketing costs than wholesalers resulted in having comparatively better marketing profits. Fishers, income and profitability could improve if crewmen working on fishing fleets were downscaled to reduce the wage bill. Fuel availability in fuel pumps could lead to reduction in fishers' costs.

[2] The marketing efficiency index was derived at by using the Net price (FP) received by the fisher which was found by finding the difference between the fisher's sales price and fishers marketing costs (appendix 6) and the result was divided by the summation of chain's total marketing costs (MC) including those of other intermediaries (wholesalers and retailers) and the total marketing margins (MM)

Sharing of risks between a wholesaler and a retailer may be achieved only if transportation costs were shared and this could be achieved through construction of cold chain facilities half way close to where Chambo is caught. The chain was found to be inefficient due to high marketing costs and increased marketing margins.

6.0 Recommendations

Most of the expenses that fishers incur are on labour and in order for fishers to maximize the benefits; they will need to reduce the labour bill which is the highest among other actors. The only way to achieve maximum efficiency in the case of these fishers is to reduce the number of people operating at each particular fishing gear for instance the labour force required to operate on chilimira is 9 people. If gears were identified that require less people to operate then fishers would make some savings since they would spend less money on the labour force. Much of the costs incurred by fish wholesalers are on transport for transporting the fish from the beaches where they are sourced to the markets which are either in urban or rural centres. These transport costs use a significant amount of money which could have added to their total income. The only way for fish wholesalers to reduce the costs is to adopt the system whereby few individuals may transport the fish belonging to several traders to markets as a mechanism of reducing transportation costs.

7.0 Policy implication

The National Fisheries and Aquaculture Policy (2001) have two goals tilting towards industry development. The first goal is the fish marketing goal which aims at promoting distribution, processing, production and marketing of good quality and safe fish and fish products of Malawi for local and export markets. The second goal is the private sector investment goal which aims at providing guidelines and an enabling environment for private sector participation in the development of the fishing industry.

The fish marketing goal's objectives are to promote post-harvest technologies that ensure improved fish products and the other objective is to develop quality control standards for fish and fish products. The strategies that were developed for ensuring that there are quality standards if put to use may help to develop the industry for instance dissemination of market information, dissemination and development of fish quality standards. The other challenge that the actors face along the value chain is lack of market information and fish spoilage and all these challenges are faced because there are no proper mechanism put in place to see to it that fish quality standards are in place and adhered to by all those involved in fish trade. There are no mechanisms for ensuring that there is market information distribution. Under the private investment goal, one of the objectives is to improve the fish marketing system for fish and fish products through collection and dissemination of market information, facilitation of the involvement of the private sector in the marketing of fish and fish products and encourage the development of fish marketing infrastructure. These can only be possible with large commercial fish industries but for small scale fisheries it may be difficult to have well developed marketing infrastructure unless there is government support to develop such facilities. Our national fisheries and aquaculture policy does not explicitly mention chambo but is only mentioned in chambo restoration strategic plan (Banda et al, 2005) whose objectives were to restore the chambo fisheries of lake Malawi and Malombe to their maximum sustainable yield (MSY) by 2015 and supplement the fishery production and meet food security needs by enhancing the chambo production through aquaculture. The strategies indicated in the fish marketing and private investment goals could only be effective if policy makers could be committing some resources for implementation.

8.0 References

Acharya, S.S. and Agarwal, N.L. (2001). Agricultural Marketing in India. New Delhi: Oxford and IBH Publishing Co.

Ahmed, N. (2007). Value Chain Analysis of Hilsa Marketing in Coastal Bangladesh. Aquaculture News, 33, 18-20. [Online] Available: http://www.aqua.stir.ac.uk/AquaNews/downloads/issue_33/33p18_20 (March 9, 2010)

Armstrong, G. and Kotler, P. (2003). Marketing: An introduction. New Jersey: Upper Saddle River, (Chapter 11)

Bagchi, M. & Raha, S.K. (2011) Post Harvest Loss of Flower and its Impacts on Flower Marketing in Bangladesh. Journal of Economic Affairs, 2(56), 205-211

Banda, M., Jamu, D., Njaya, F., Makuwila, M. & Maluwa, A. (eds) (2005). Chambo Restoration Strategic Plan. Worldfish Center Conference Proceedings 71, p82.

Charnes, A., Cooper, W.W. & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. European Journal of operational Research, 3, 429-444

Engle, C.R. & Quagrainie, K. (2006). Aquaculture Marketing Handbook. Iowa: Blackwell Publishing, (Chapter 3)

FAO, (2005), Fishery Country Profile. Food and Agriculture Organization of the United Nations, FID/CP/MLW [Online] Available: http://www.fao.org/fi/oldsite/FCP/en/MWI/profile.htm (March 10, 2012)

GoM (2011). Annual Economic Report. (2nd budget document). Lilongwe: Ministry of Economic Planning and Development, (Chapter 3).

GoM (2007), Overview of Fish and Fish Trade in ESA Region: The Fisheries Sector and Its Importance in Malawi. [Online] Available: http://www.thecommonwealth.org/shared_asp_files/GFSR.asp?NodeID (January 7, 2013)

Jolly, C.M. & Clonts, H.A. (1993). Economics of Aquaculture. New York: Haworth Press, (Chapter 11).

Kaplinsky, R. & Morris, M. (2000). A Handbook for Value Chain Research. Prepared for International Development Research Centre (IDRC) (Part 1)

KIT, Faida MaLi & IIRR. (2006). Chain Empowerment: Supporting African Farmers to Develop Markets. Amsterdam: Royal Tropical Institute, Arusha; Faida Market Link, and Nairobi: International Institute of Rural Reconstruction, (Chapter 1)

Koester, U., Olney, G., Mataya, C. and Chidzanja, T. (2004) The Status and Prospects of Malawi's Tobacco Industry: A Value Chain Analysis Report. Emergency Drought Recovery Project, Ministry of Agriculture, Malawi, (Chapter 4).

M4P (2008). Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis. (Version 3). Making Markets Work Better for the Poor (M4P) Project, UK Department for International Development (DFID), Phnom Penh: Agricultural Development International, (Part 4).

Murthy, D.S., Gajanana, T.M., Sudha, M. & Dakshinamoorthy, V. (2007). Marketing Losses and their Impact on Marketing Margins: A Case Study of Banana in Karnataka. Journal of Agricultural Economics Research Review, 20, 47-60.

National Statistical Office (NSO) & ICF Macro (2011). Malawi Demographic and Health Survey 2010. Zomba, Malawi and Calverton, Maryland, USA: NSO & ICF Macro, (Chapter 2).

Regional Agricultural Trade Expansion Support Program (RATES) (2008). Cotton-Textile-Apparel Value Chain Report Malawi. Nairobi, Kenya: The Rates Center. [Online] Available: http://www.cottonafrica.com/downloads/Malawi_cotton_VCA.pdf (December 7, 2008)

Sheth, J.N., Sisodia, R.S. & Sharma A. (2000). The Antecedents and Consequences of Customer-Centric Marketing. Journal of the Academy of Marketing Science, 28, 55-66

Tchale, H. & Keyser, J. (2010). Quantitative Value Chain Analysis: An Application to Malawi. World Bank, Policy Research Working Paper 5242.

Appendices

Appendix 1: Daily income distribution for the actors along the value chain

Particulars	Fisher	wholesaler	retailer	Total income (MK)
Total revenue (MK)	317,006.00	1,452,120.00	989,258.00	
Total costs (MK)	170,715.07	1,208,438.00	735,997.00	
Own labour costs (MK)	18,359.00	40,765.00	28,300.00	
Total sales volume (dozen)	216.09	586.00	302.50	
Net income /dozen	761.95	485.40	930.78	
Total income/stage	164,649.93	284,447.00	281,561.00	730,657.93

Source: This study, 2012

Note: *Own labour costs are subtracted from the total costs but inclusive are hired labour costs*

Appendix 2: One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
	Lower	Upper	Lower	Upper	Lower	Upper
whole2	36.698	30	.000	3.66496	3.4610	3.8689
Retailer2	49.670	33	.000	3.65265	3.5030	3.8023
SMEAN(fishers2)	29.401	29	.000	3.36385	3.1299	3.5978

Source: This study, 2012

Appendix 3: Showing percentiles in Malawi kwacha for different value chain actors

		Fisher	Wholesaler	Retailer
No	Valid	30	31	34
Mean		5414	9150	8281
Standard error of mean		1887	1908	2432
Median		1950	5500	4050
Standard deviation		10338	10624	14180
Minimum		-475	550	820
Maximum		53000	46200	76020
Percentiles	10	-84	720	1325
	25	500	1400	2432
	50	1950	5500	4050
	75	5825	12501	7733
	90	11650	24145	16426

Appendix 4: Break-even production of small-scale fishing for a fisher's household

Particulars		PPP=TFY/FSS*AHS	RIPP=TFI*100/(FSS*AHS*136.222*CCR	BEP/person=WOPL*PPP/RIPP	BEP/Household=BEP/person*AHS
Total Fish Yield (TFY)	216.09 dz.	1.6dz./person/day	US$4.5	0.44 dozen	2.02 dz.
Fishers' sample size (FSS)	30				
Average household size (AHS) for Malawi	4.6 persons				
Total fishers income (TFI)	MK146,290.90				
GDP deflator	136.222				
Current conversion rate (CCR) (Malawi kwacha to US dollars)	MK172.00				
World's official poverty line (WOPL)	US$1.25				

Source: This study, 2012

Note: *PPP =production per person in dozens, RIPP= Real income per person*
Conversion rate at the time of writing household interviews 2011

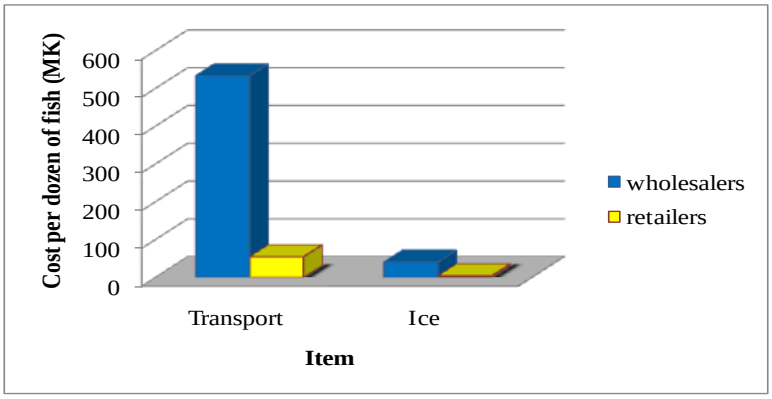
Appendix 5: Daily wage income distribution for fishers, wholesalers and retailers along the chain

Item	MK/dozen	dozen/actor	No. of actors	Total (MK)
Fishers' operating costs	216.81			
Fishers' wage costs	583.50	7.203	30	126,088.52
Fishers' other costs (fixed)	75.47			
Fishers' total costs	875.78			
Fishers' revenue	1,467.01			
Fishers' profit	591.23	7.203	30	127,758.89
Wholesalers' operating costs	1,970.47			
Wholesalers' wage costs	91.71	18.903	31	53,741.41
Wholesalers' total costs	2,062.18			
Wholesalers' revenue	2,478.02			
Wholesalers' profit	415.84	18.903	31	243,679.33
Retailers' operating costs	2,303.87			
Retailers' wage costs	129.17	8.897	34	39,073.67
Retailers' total costs	2,433.04			
Retailers' revenue	3,270.27			
Retailers' profit	837.23	8.897	34	253,260.40

Appendix 6: Net share for different value chain actors of the consumer's price

Actors and Marketing particulars	MK/dozen	Share of consumer's price
Fishers		
Purchase price/dozen	951.33	29.10
Sales price/dozen	1467.01	
Marketing costs/dozen	60.03	
Marketing margin	515.68	
Marketing profit	455.65	
Fish wholesalers		
Purchase price/dozen	1788.37	54.69
Sales price/dozen	2478.02	
Marketing costs/dozen	533.19	
Marketing margin	689.65	
Marketing profit	415.84	
Fish retailers		
Purchase price/dozen	2218.57	67.84
Sales price/dozen	3270.27	
Marketing costs/dozen	214.48	
Marketing margin	1051.70	
Marketing profit	837.22	
Fish consumers		
Purchase price/dozen	3270.27	100.00

Appendix 7: Transport and ice costs for a dozen of fish in Malawi Kwacha



Source: Field interviews, 2012