VALUE CHAIN ANALYSIS OF THE FISHERY IN LAKE LIAMBEZI

BY:

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DECLARATION

I hereby declare that this work is the product of my own research efforts, undertaken under the supervision of Mr. M. Tjipute and has not presented elsewhere for the award of the degree. All the sources have been duly and appropriately acknowledged.

Candidate Signature: ………………………………   Date: ……………………..

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CERTIFICATION

This is to certify that this report has been examined and approved for the award of the degree of Bachelor of Science in Fisheries and Aquatic Science of the University of Namibia.

External Examiner…………………………………………………………………………

Internal Examiner………………………………………………………………………….

Head of Department…………………………………………………………………………

ACKNOWLEDGEMENT

DEDICATION

This work is dedicated to my parents, my late Aunty Hilia Loide Shaanika, my siblings and relatives who supported me during the course of my studies and for being there for me when in need of help. Finally, I would like to give thanks to the Lord for giving me strength and guidance in life up to this point.

Table of Contents

IV.

List of Tables

List of Figures

VI.

ACCRONYMS

KM= Katima Mulilo

NNF= Namibia Nature Foundation

GRN= Government Republic of Namibia

MFC= Muyako Fisheries Committee

DRC= Democratic Republic of Congo

LDC= Lux Development Committee

SGP= Specific Gross Profit

ABSTRACT

The value chain concept was developed by Michel Porter in the 1980s .Keyser argued that the concept has gained considerable popularity in recent years. The concept include a full range of activities which are required to bring a product or service from conception, through the different phases of production, delivery to final customers, and final disposal after use. There have been little or no studies that have been published on value chain analysis in Namibia though, there is therefore a need to conduct value chain analysis of industries/sectors such as that of a fishery in order to examine it a detailed level.

This study examined the fishery in Lake Liambezi through the value chain approach. This study made use of questionnaires and interviews focused on what value chain actors are doing, qualitative data collection tool provided information on prices and quantities of fishery products harvested from Lake Liambezi. This study involved the following value chain actors; fishers, fish traders, fish vendors, governing bodies and other stakeholders who are directly/indirectly involved in the fishery. The data recorded during this study was analyzed using Microsoft Excel.

The key players who are directly involved in the Lake Liambezi fishery were identified as; fishers, fish traders, and fish vendors. Major export markets were identified to be in Zambia and DRC. Most fresh fish is exported to Livingstone, while most dry fish is exported to Kasumbalesa. Constrains preventing full competitiveness of the value chain of Lake Liambezi fishery, were identified out as: lack of protective gear, low demand of products, and lack of storage facilities.

Key words: Value chain analysis, fish traders, fish vendors

CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

1. Introduction

The value chain concept was developed by Michel Porter in the 1980s (Keyser, 2006).Keyser argued that the concept has gained considerable popularity in recent years. The concept include a full range of activities which are required to bring a product or service from conception, through the different phases of production, delivery to final customers, and final disposal after use, (Hellin and Meijer,2006). A value chain is formed by the different activities that take place in the organization, such as that takes place in a fishery, with the main aim being to maximize value creation with minimal costs (Agri review, 2012).. Hempel Porter (2010) identified the following components in the (general) value chain:

- ❖ Inbound logistics: this involves receiving and warehousing of raw materials and their distribution to manufacturing as they are required;
- ❖ Operations: the process of transforming inputs into finished products and services;
- ❖ Outbound logistics: the warehousing and distribution of finished goods;
- ❖ Marketing and sales: the identification of customer needs and the generation of sales;
- ❖ Service: the support of customers after the products and services are sold to them.

Value chain analysis facilitates the identification of constraints to industry growth and competitiveness that include both the product and factor markets and other market-related issues. It also leads to a better understanding of relationships and linkages among buyers, suppliers and a range of market actors in between. (Brown *et a l*, 2010)

Namibia is a relatively dry country that has an extensive coastline that covers approximately 1200km with one of the most productive marine and fresh water systems in the world, (Namibia Planning Commission, 2003). The country is bordered by perennial rivers in the North and South: the Orange river in the south, the Kunene, Kavango, Zambezi and the

Kwando rivers in the north. The freshwater systems provide cheap source of protein (fish) and income for the majority of communities living in rural regions of Namibia. The inland fishery is characterized by hundreds of small-scale fisher folk (fishing for a living) using a range of unsophisticated gears, targeting a multi-species fish resource across a complex network of floodplain water bodies (Purvis, 2002).

The Caprivi region is a finger-like projection in the north east of the country and is bordered by Botswana to the south, Angola and Zambia to the north and Zimbabwe to the east. The region is connected to Botswana through the Kwando Kwando/Linyanti River and Chobe River, Angola and Zambia through the Zambezi River (Barnard, 1998).

Fish occupy a central place in local people's culture and daily life as has been highly preferred as a source of protein over beef, poultry and game (Tvedten et al, 1994), as saying goes "If you don't eat fish, you are not a Caprivian".

There have been studies on value chain analysis done in Africa too (Hampel, 2010). Furthermore there have been little or no studies that have been published on value chain analysis in Namibia though, there is therefore a need to conduct value chain analysis of industries/sectors such as that of a fishery in order to examine it a detailed level. This study examined the fishery in Lake Liambezi through the value chain approach. This study made use of questionnaires and interviews focused on what value chain actors are doing, qualitative data collection tool provided information on prices and quantities of fishery products harvested from Lake Liambezi. This study involved the following value chain actors; fishers, fish traders, fish vendors, governing bodies (such as the fisheries committee), and other stakeholders(Ministry of Fisheries and Marine Resources) who are directly/indirectly involved in the fishery.

1.2Literature review
Overview of Value Chain Analysis

The concept of Value Chain Analysis has and continues to receive great attention. A review of literature on Value Chain Analysis will provide guiding principles on how to carry out a value chain analysis of fishery in Lake Liambezi. Hellin and Meijer(2006) defined value chain as the full range of activities which are required to bring a product or service from conception, through the factors of production including land, labor, capital, technology, and inputs as well as all economic activities including input supply, production, transformation, handling, transport, marketing, and distribution necessary to create, sell, and deliver a product to a certain destination. Value chain analysis is considered a high-resolution analytical tool that enables industry assessment at a detailed level (Brown *et al*, 2010). Definitions given by Hellin & Meijer, Brown *et al* pointed out a common concept on the value chain analysis is that; they both pointed out that "it is an evaluation of sequence of activities involved in production of a certain product from the point of "necessary inputs required to produce it, production process (this can involve processing), distribution and marketing".

Hample (2010) describes a simplified value chain of a fishery to consist of the following components: fishing gear, landing site, processing, wholesale, retail and consumers

In this study efforts have been made to adopt the definitions by the above discussed studies by various authors to the fishery in Lake Liambezi. Value addition with regard to the Lake Liambezi fishery was also used as an evaluation of sequence of activities involved in fishery starting with the necessary inputs used in harvesting, processing methods used to prepare the fishery products, the way fishery products are distributed and marketed to make them available to consumers.

It has been found out that the value chain does not only include a straight line. There are external activities that influence activities within the value chain proper. the input and output chains comprise more than one channel and these channels can also supply more than one final market, thus it important to ensure that mapping covers a broader scale (Hellin, Meijer,2006 and Hample,2010).

Brown *et al* (2010) pointed out that the value chain analysis facilitates the identification of constraints to industry growth and competitiveness. It also leads to a better understanding of relationships and linkages among buyers, suppliers and a range of market actors in between.

The methodology discussed in Brown *et al*(2010), VCD(2006), and Hellin, Meijer(2006) have pointed out a common methodology; mapping value chains and adding critical information to the chain.

The market map is a conceptual and practical tool that helps us identify policy issues that may be hindering or enhancing the functioning of the chain and also the institutions and organizations providing the services that the different chain actors need (Hellin and Meijer 2006). This is done in order to build up an understanding of the different role players in the chain and the relationships between them, along with the factors that determine how well or badly the chains are working. After mapping the value chain, critical information need to be added in order to describe the chain in qualitative and quantitative terms.

In the work of Brown *et al*(2010) and also in the methodology discussed in VCD(2006) it have been pointed out that vital information is needed in mapping value chains. This include identifying the key players in the chains and their respective roles, product requirements in terms of species, form(for example dry/ fresh fish), packaging delivery schedules, activities and processes along the chain, sales of products produced , profitability and revenue generated.

Some of the major findings from studies done on the value chain can be linked to the value chain analysis of fisheries in Lake Liambezi. For example a study done on value chain analysis on the shrimp fishery by Kristen *et al* (2010) showed that lack of technology and quality standards to meet the market demands. Fisherman at lake Liambezi are likely to experience such kind of constrains as those listed by Kristel *et al*(2010), since they do not have access sophisticated gears to increase their fishing efficiency and value of their output. Another study by Brown, *et al* (2010) studied value chain analysis of the sea-cucumber fishery in the Philippines and found out that: there is an absence of officially formulated standards that could guide the transactions along the value chain. Fishery activities at Lake Liambezi are classified as "informal", therefore the findings of Brown *et al* are likely to reflect the findings of this study. Hampel (2010) investigated value chain analysis of fisheries in Africa, with the main aim of the providing a baseline analysis for informed discussions and future activities of the NEPAD Working Group of Trade and for other interested stakeholders of the industry. The study has shown that through the application of the value chain approach, new insights may be gained, which facilitate for the development of new strategies on the management and development of fisheries in Africa. The value chain analysis can provide information that can facilitate for new strategies on the development and management of fisheries in Lake Liambezi.

1.3 Aim of the study

To identify the chain of activities that add value to fishery products harvested from Lake Liambezi and identify constrains along the chain

1.4 Problem statement

Artisanal fishing at Lake Liambezi has increased rapidly making the Lake an important source of fishery products for the local and foreign markets. It is therefore important to study the chain of activities involved in the fishery in Lake Liambezi, and identify constrains along the chain which need to be addressed, in order to improve competitiveness.

1.5 Significance of the Study

Successful completion of this study will facilitate for the identification of constraints affecting growth and competitiveness of fishery at Lake Liambezi. This study will therefore provide possible solutions (if implemented) that will ultimately improve the competitiveness of the fishery and therefore improve the livelihood of people dependent on it.

1.6 Specific research objectives

A. To map the value chains

B. To identify information critical to the value chain map

C. To identify possible constrains along the chain

D. To identify possible solutions and interventions that can eradicate/minimise constrains along the chain

1.7 Research Hypothesis

1.7.1 Research Questions

A. Who are the key players in the chains and what are their respective roles?

B. What are the activities and processes along the chain?

C. Is there any export of products taking place?

D. What is the value of products, the income derived from products among role players?

E. What are the characteristics of the population involved in the fishery?(demographics)

CHAPTER TWO

2. MATERIALS AND METHODS

2.1 Study area

Lake Liambezi and the *Katima Mulilo* market

figure 1: shows a map of Caprivi region with lake Liambezi highlihted in "red"

Adopted from a DEA Research Journal number 52 by John Purvis (2002)
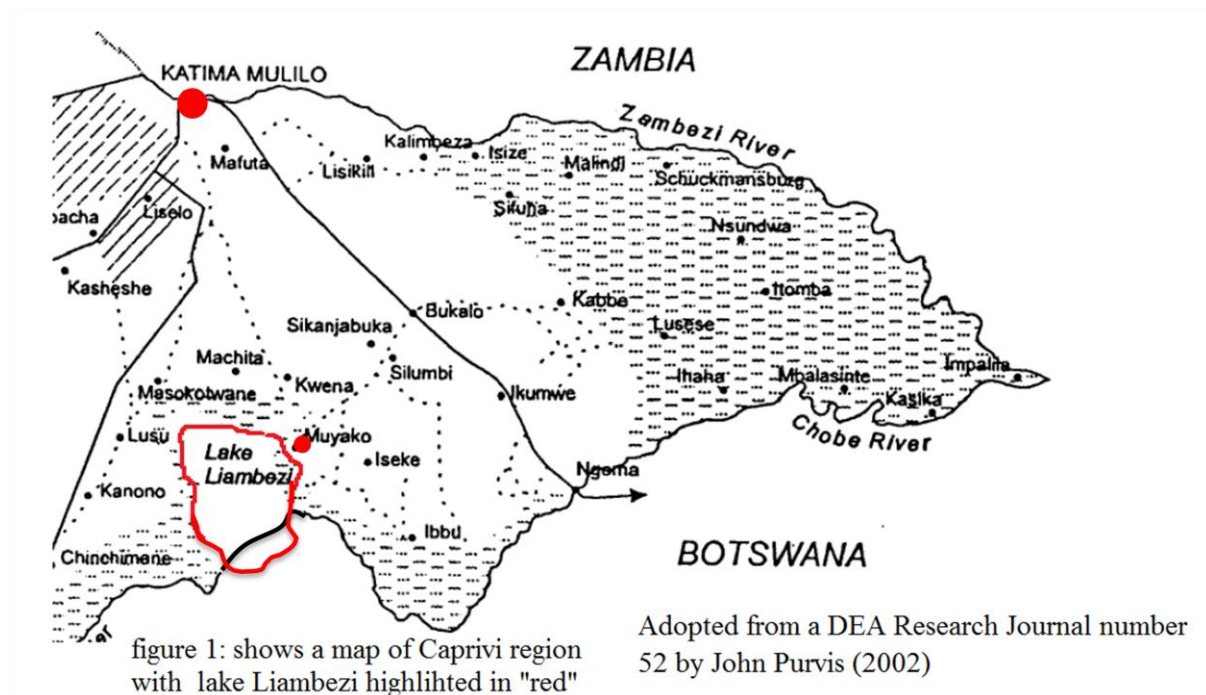
Lake Liambezi is found along latitude: 17°59'S and longitude 24°15'E respectively. Lake Liambezi is located between the Linyanti and Chobe rivers, about 60km south of Katima Mulilo. It lies between Lusu and Muyako, and south of Masokotowani. Lake Liambezi is shared between Namibia (95%) and Botswana (5%). Liambezi is a temporal lake as it undergoes periods when it is sometimes dry. The Lake filled up in the period between 1946/47 and 1980 and dried up in 1985-86 to 2009.In 2009, the lake filled due to strong flooding Osbert Simataa (Personal communication, September 2012). During dry periods the lake is used mainly as crop fields for the villagers and the soil is very fertile especially for maize production. The lake is supported by rivers such as Kwando/Linyanti, Chobe, and the Zambezi., This is due to the fact that when these rivers fills up, excess water flows into the lake .The lake is one of the few natural lakes found within the border of Namibia. Purvis (2002). The lake is inhabited by 43 fish species (Van de Waal, 2010). A small commercial

fishery is established on the lake, with about 60 active fishermen using mainly gill nets. Their catch consists mainly of cichlids (*Oreochromis andersonii*, *Sarotherodon andersoni* and *S. macrochir*) and catfish (*Clarias* spp,) (Van de Waal,2010). This study will involve; fishermens, fish traders and fish vendors involved in the fishery. This study will involve the Katima Mulilo market, villages along lake Liambezi such as ; Muyako, Iseke, Kalengwe, Zilitene, Lusu, Masokotwani, Ngala, Machita,& Kwena

2.2 Study Design

The mapping exercise was both qualitative and quantitative. The qualitative part involved identifying the players and their roles, the relationships/linkages among players, the product

Requirements, the activities/processes along the chain. Main role players in the chain who are directly involved in the fishery were identified who formed part of the data collection techniques used in this study. The fieldwork was done for seven days, 12 September to 19 September 2012. Mr. Osbert Simataa assisted the student with the translation during interviews. The study included both secondary and primary data. A sample of 20 respondents from different sections (fishers, traders, and vendors) of the fishery was covered in the study. Fishers were defined as the group of people who do the fishing. Three questionnaires were developed for collecting information from; fishers, traders, and vendors. Traders were defined as the group of people who buy fish from the fishers in bulk (cooler boxes) and usually sell them as wholesale to the vendors at the KM open market or further process(dry/salting) them for export markets. Vendors were defined as the group of people who buy fish from the traders and sell them at the KM open market.

2.3 Data collection

A study of this study used the following methods for data collection:

- ❖ Secondary Research

- ❖ Primary Research (through structured questionnaire of the key stakeholders, Personal interviews and Observation method)

2.3.1Secondary Research

A thorough desk research approach was used, whereby secondary Data was obtained from the Ministry of Fisheries and Marine Resources (MFMR) in Katima Mulilo and the Namibia Nature Foundation.

Market survey by the MFMR *(a brief summary on the methodology used. Full information can be obtained from the MFMR)*

The Data was collected twice every week. The data was collected by Laimi Ekandjo (a former employee of the MFMR who was based at Katima Mulilo). The following forms below shows a sample of data collection forms that were used to collect information that were used in this study

Table 1: Data collection form used for recoding information on fish Export at Katima Mulilo open market

Date	Fish origin	Destination	Weight	Dry/Fresh
....	....	....	....	....

Table 1 shows the data collection form used for recoding information on fish Export at Katima Mulilo open market: (This data was collected during the period: December 2011 to April 2012.)Data collection form used for recording information on: prices and quantities of

fish (fresh) brought to the KM market (This data was collected during the period: February 2011 to June 2012) [refer to appendix 1.1 for a sample of raw data collected]

Table 2: The data collection form used for recording information on: prices and quantities of fish (fresh) brought to the KM market. [Refer to appendix 1.2 for a sample of raw data collected]

DATE	Fish origin	Number of large coolers	Price per large cooler	Number of medium coolers	Price per medium cooler	Number of small coolers	Price of small coolers
....	....	....	....	....	....	....	....

Market survey by the NNF

The Data was collected twice every week. The Market survey focused mainly on vendors who sell fish(fresh/dry) at stalls in the KM open market .The was provided by Hazel who is currently working for NNF and has been highly involved in collecting data from the KM open market .The following forms below shows a sample of data collection forms that were used to collect information that were used in this study

Table 3: The data collection form used for recording information on: weight and Prices per specific species, and the form of fish sold at the KM open market(data used was collected within a period of: August 2012 to September 2012). [Refer to appendix 1.2 for the for a sample of raw data collected]

Stall number	Species name/code	Weight(g)	Length(mm)	Fresh or dried 1=fresh 2= Dry	Price per fish
....	....	....	....	....	....

Table 4: The data collection form used for recording information on: Income, prices and type of products on sale, demographics, constrains,   among vendors at KM open market (refer to appendix 2.2 for the questionnaire used):

Age class	Gender	Product type (fresh/Dry)	Monthly rental charges	source of fish	Seller	costs of fish	Estimated profit after all costs are covered	Problems/ Constrains experienced
....	....	....	....	....	....	. ...	....	....

2.3.2Primary Research

Primary research was conducted in Muyako (at the two landing site namely; Shamauka and fishery harbor) and Katima Mulilo open market to collect first hand information on the specific parameters developed on the basis of objectives of the study. Muyako was selected on the basis its importance as a landing site in terms of its highest contribution to the total fish output and total revenue of fish generated from Lake Liambezi. Questionnaires used focused on what value chain actors are doing, and give more insight into why actors are doing what they do and how they formulate their decisions. The following tables show the type of information collected using three different questionnaires (NB: for full Raw data and questioners used, please refer to the appendix):

Table 5: Data collection form used to sum up information from the Fishers through the use of questionnaires (refer to appendix 3.1 for the questionnaire used):

Age	Gender	Time spent on fishing	Mode of perseveration	Selling mode	Input costs	Total revenue	Market place (destination)	The buyer(s)	Other sources of income

Table 6: The data collection form used to sum up information from the traders through the use of questionnaires (refer to appendix 3.2 for the questionnaire used):

Age	Gender	Product Type	Input Costs	Mode of perseveration	Selling mode	Revenue generated	destination	The buyer(s)	Other sources of income
……..	………..	………..							

Table 7: The data collection form used to sum up information from the vendors through the use of questionnaires (refer to appendix 3.3 for the questionnaire used):

Age	Gender	Product Type	Input Cost	Quantity	Mode of perseveration	Time spent on selling fish	Revenue generated	The buyer(s)	Other sources of income

2.4 Data analysis

The data recorded during this study was analyzed using Microsoft Excel. Excel was used to summarize and transform raw data into meaningful information through; the use of graphs and charts.

Profit per respective role player was compiled using the Simplified Gross Profit. Gross profit is defined as sales minus direct costs and that gives you an indication of the profitability of the enterprise.

Gross profit= sales - direct costs. Direct costs=Are costs that can be directly attributed to a product

[NB: Calculation of profit using the SGP indicator was adopted from VCD(2006)]

Challenges & Limitations

- ❖ Communication barriers

- ❖ Lack of Interest from interviewees

- ❖ Interviewees not willing to disclose information

CHAPTER THREE

3. Results

3.0. A). The simplified value chain
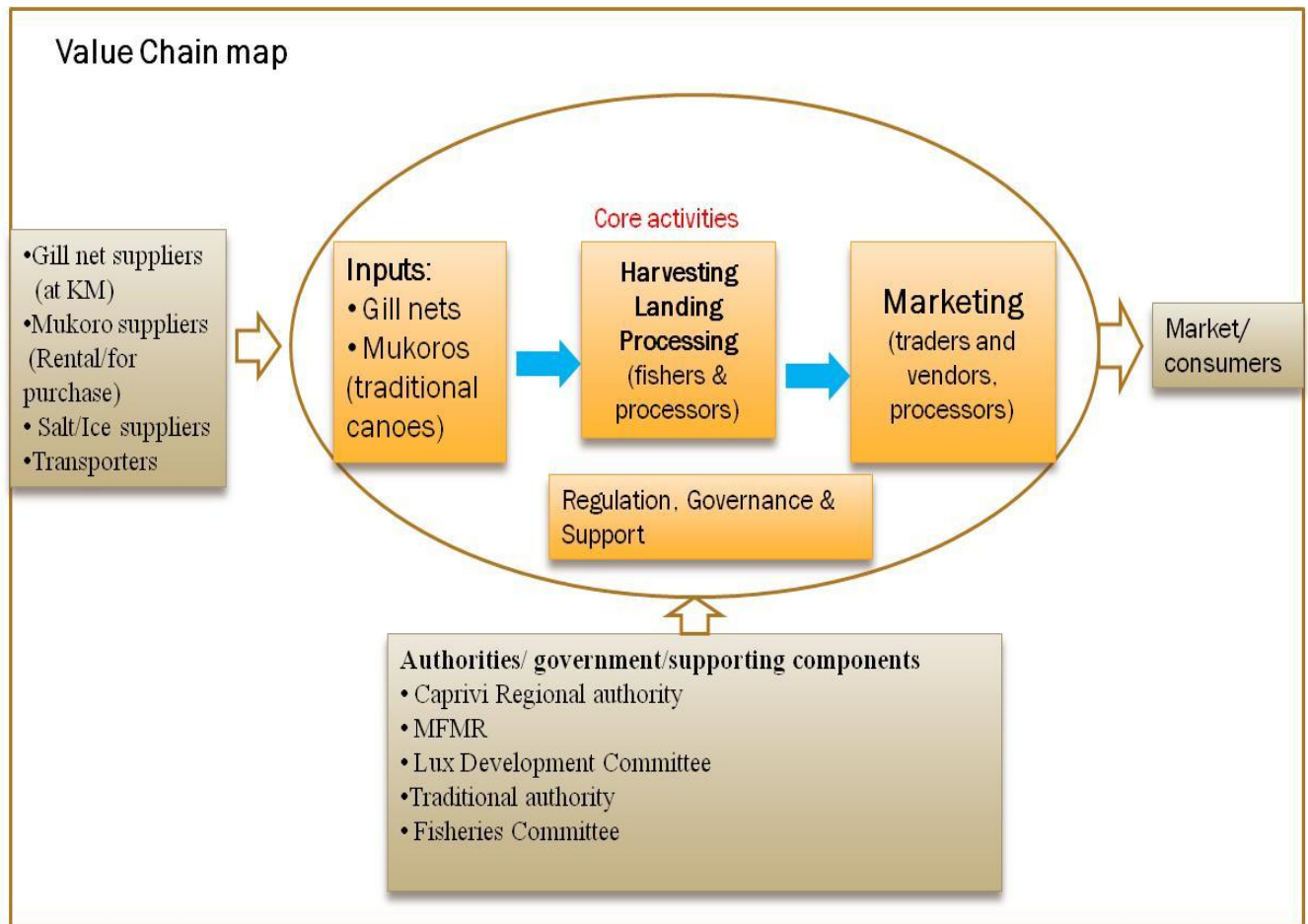
Figure 2: Shows the simplified chain. The simplified chain summarises the value chain in short .Since the value chain does not only include a straight line due to external activities that influence activities within the value chain, the extended value chain is therefore constructed (refer to figure 3).

3.0. B). The extended chain
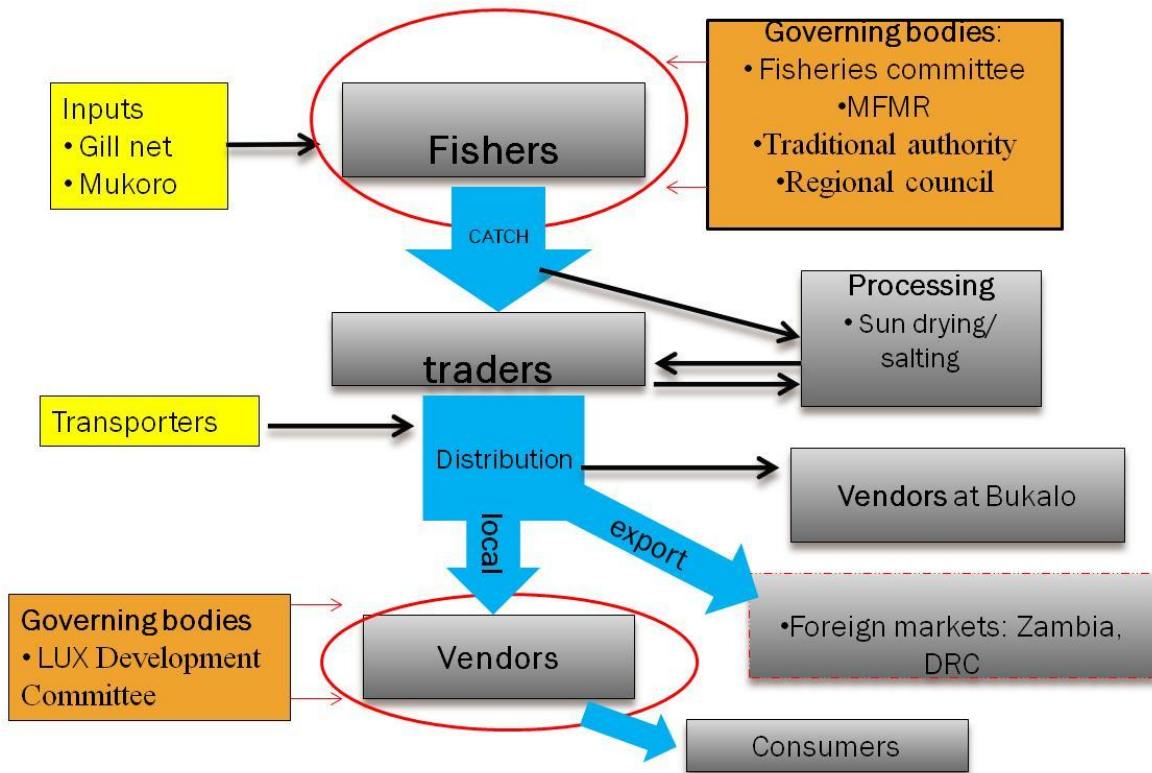
Figure: 3 Shows the extended chain of fishery products harvested from Lake Liambezi

Description of the chain:

3.1. Key (role) players

3.1.1The Fishers (fishermen)

The capital investment in this segment is mainly in the fishing gears. According to the information provided by the fishermen interviewed and through observations; the type of gears used for fishing are gillnets and mukoros (a traditional home-made canoe used in the fishing process). Gill nets cost ±N$ 500(200 metres) at Katima Mulilo and its lifetime is estimated to range between two to six months. Fishermen spend on average, 5 days per week fishing. They set their nets at sun set, come back the next morning to collect their catch, and then bring it at landing sites where they sell them to fish traders.

Figure 4: The student interviewing a local fishermen at Muyako(Shamahuka landing site). This picture shows a fishermen preparing fish for drying (as a mode of preservation).

Figure 5: Shows sun dried fish. Source: MFMR (2011).

Drying process: Remove scales (if present).cut the belly open to remove the guts. Soak the fish in salted or unsalted water. Finally, expose the fish to sun shine. Drying time is determined by the weather conditions. Fast drying is achieved during dry seasons (when the rain has stopped). Salt used by processors (fishermen or traders) who opt to 'salting" cost approximately N$ 50 per 50kg sack

Governing/regulatory bodies which governs fishing at Lake Liambezi

A) Traditional Authority & Fisheries Committee

According to the information provided by Joseph Lubanda (personal communication); There are is Fisheries committee in 3 respective villages namely; Muyako Fisheries Committee(MFC) in Muyako, Masokotwani Fisheries Committee in Masokotwani, and the

Zillitene Fisheries Committee. The fisheries committees are considered as the main governing/regulatory (even though their effectiveness is in question) because they at community levels and they are fully aware of almost all the activities going on in the area. This study will provide brief information on the Muyako Fisheries Committee.

Muyako Fisheries Committee

According to the information given by Frans Bill (a member of the fishing committee).The committee was established in 2009. Executive members of the MFC were elected by the community members. The formation of the fishing committee was facilitated by the Traditional Authority. The committee was established after illegal fishing was on the increase in the village. These illegal activities include: Use of prohibited gears such as drag nets, the invasion of the lake by foreigners (mostly Zambians), and non-village members with primary objectives of harvesting fish resources from the lake. The MFC serves to:

- ❖ Ensure sustainable exploitation of fish resources
- ❖ Ensure that fishers are using registered fishing gears(Fishing gears are registered at the Regional Council in Katima Mulilo)
- ❖ Ensure that fishing is done by Namibian citizens only

The Fishing Committee structure:
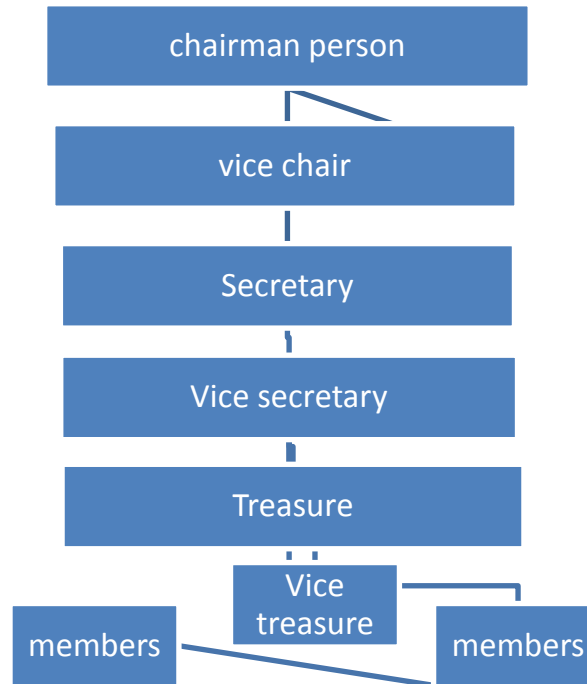
Figure 6: Shows a schematic presentation of the Fishing Committee structure

B). The Regional Council and MFMR

They have the responsibility to register all fishing gears and give permits to fishermen who want to fish at Lake Liambezi. Registration fee is N$ 50 per net annually.

3.1.2Traders

Traders were identified as the group of people who buy fish from the fishers in bulk (cooler boxes) and usually sell them as wholesale to vendors at the KM open market or further process(dry/salting) them for export to Zambia and Democratic Republic of Congo (DRC)

Figure 7: The student interviewing fish traders at Muyako

Figure 8: (on the left): shows dried fish wrapped in big sacks ready to be transported to Zambia.This is the typical mode of transport used for distribution of fish .

Figure 9: (below) Shows fish packed in a schematic way ready to be wrapped into a sack. Source: MFMR(2011)

3.1.3 Vendors

Vendors were identified as the group of people who buy fish from fish traders in bulk(wholesale) and sell per individual fish(one by one) .The student interviewed vendors at KM open market. The prices of fish are governed by the forces of demand & supply, and the type of products sold. According to the information given by one of the interviewees at the open market; prices are high when there are more customers, and vice-versa. Their input costs include: fish, ice, water, and rental fees. .Selling of fish by vendors at KM open market is governed by the Lux Development Committee(LDC) under the Caprivi town council. This committee ensures everyone who owns a stand in the fish market section at the open market is registered with the LDC. This committee also serves to prevent conflicts among vendors.

Conflicts among vendors include fighting for fish at entry points when fish is brought to the market from the lake.

Figure 10: shows entry point of fish at KM open market interviewing a vendor at KM market selling dry fish.

Figure 11: Shows the student

Figure 12: Shows the student interviewing a vendor at KM market selling fresh fish.

According to the interviewees; selling fresh fish poses high challenges due high risks of losses due to spoilages and high operational costs involved as they need to purchase; ice, and water to keep their products fresh.

3.2 Domestic market

Local markets are basically the markets nearby the landing sites. According to the primary and secondary data collected, main market is KM open market. KM is approximately 60 kilometres from lake Liambezi. However, there are also other small market places nearby the lake such as the one in Bukalo.

Prices of fish products

Table 8: Prices of fish at Muyako landing site

Size classification(cooler box)	Price			Mean weight(kg)	Average Price(N$) per kg
	mean price	Fluctuations recorded			
		low	high		
Small	100	100	110	16.5	6.1
Medium	200	200	250	34.5	5.8
Large	400	350	400	67.5	5.9

This table shows prices (N$) of fresh fish at Muyako. The table also show the highest and the lowest prices recorded during the study. However the table also shows the mean (average) weight and prices per respective cooler as recorded and compiled by the MFMR staff at Katima Mulilo. The average price per Kg is higher per small cooler box as compared to the medium and the larger ones

Table 9: Prices of fish at KM open market

Size classification(cooler box)	Price			Mean weight(kg)	Average Price(N$) per kg
	mean price	Fluctuations recorded			
		low	high		
small	150	150	210	16.5	9.1
Medium	300	300	300	34.5	8.7
Big	500	500	550	67.5	7.4

This table shows prices (N$) of fresh fish at KM open market. The table also show the highest and the lowest prices recorded during the study. The table also shows the mean (average) weight and prices per respective cooler as recorded and compiled by the MFMR staff at Katima Mulilo. The average price per kg is higher per small cooler box as compared to the medium and the larger ones. [Refer to appendix 1.2 for prices of fish per cooler box]   .

Figure 13 sums up the information given on table 7&8. The prices of fish per kg are high at KM open market as compared to that at Muyako.

Figure 13: Prices of fresh fish per kg at Muyako landing site and KM open market
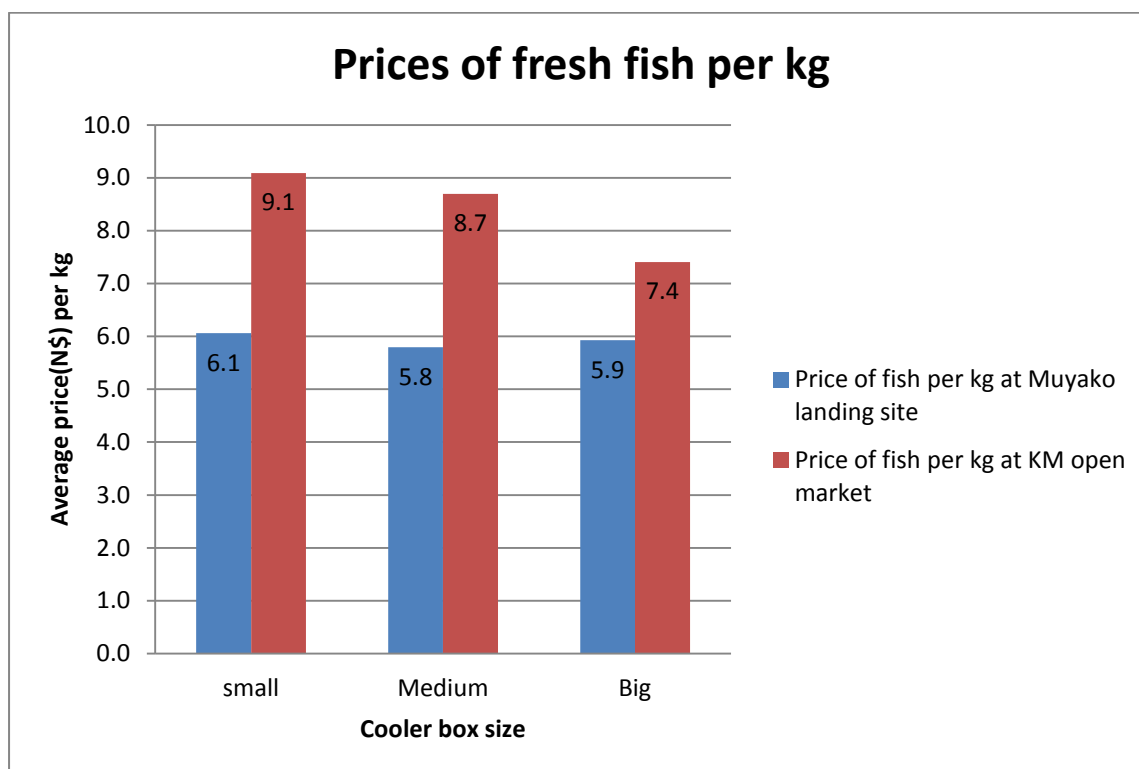
Table 10: Average prices of the most commonly sold fish species at KM open market

AVERAGE PRICES OF THE MOST COMMONLY SOLD FISH SPECIES AT THE KM MARKET				
Code	Price(N$) per 1 g		Price(N$) per 0.1k g	
Scientific name	Fresh	Dry	Fresh	Dry
OAND *Oreochromis andersonii*	0.02	0.05	1.79	4.71
OMAC *Oreochromis macrochir*	0.01	0.05	1.49	5.31
SERM *Serranochromis macrocephalus*	0.02	0.05	1.61	4.94
TREN *Tilapia redalli*	0.02	0.06	2.19	5.52
HODO *Hepsetus odoe*	0.02	0.03	1.56	3.26
SMYS *Schilbe intermedius*	0.01	0.03	0.83	2.64
SANG *Serranochromis angusticeps*	0.02	0.05	1.71	5.37
CNGA *Clarias gariepinus*		0.03		3.02
CGAR *Clarias ngamensis*		0.03		2.81

Table 10 shows the price of fish species that are dominantly sold at the KM open market. The consumers are buy specific species of a specific form(fresh/dry). Prices between different forms(dry and fresh) differs, whereby prices high per 0.1 kg of dry fish as compared to fresh fish. Prices of *Clarias gariepinus* (CNGA) and *Clarias ngamensis* (CGAR) in fresh form are not available because consumers prefer these species in dry form. However due to low

availability at the open market (as recorded by the MFMR staff), the sample size was too small to be considered for computation. [Refer to appendix 2.1 for raw data on prices]
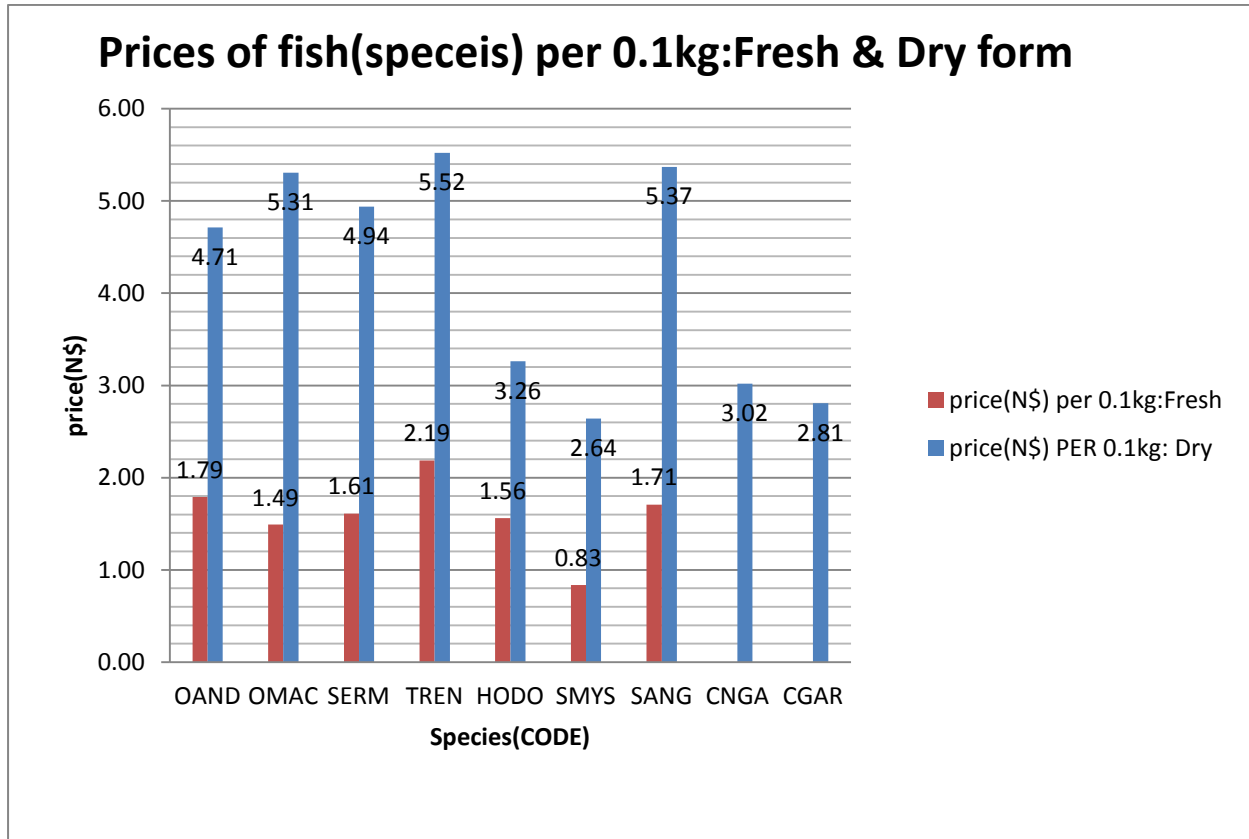
Figure 14: Average prices of the most commonly sold fish species at KM open market. [Refer to table 9 for the full species names as abbreviated (species codes)].

The graph shows that the price per 0.1kg (100g) of dry fish is high than that of fresh fish overall. Price per 0.1 kg for *Tilapia redalli* (TREN) for all forms (fresh & dry) is the highest as compared the rest of other species, as it can seen on figure 14. Price per 0.1 kg for *Schilbe intermedius* (SMYS) for all forms (fresh & dry) is lowest as compared the rest of other species, as it can seen on figure 14.

3.3 Export (foreign) markets

These markets are bigger as compared to local markets situated in villages, small towns, and capitals. This market serves as a channel to cater to up-country markets and distant markets. It is characterised by high supply and demand.

Dry vs Fresh fish exported during the period from December 2011 to April 2012(79 days survey)

■ Dry ■ Fresh

3%

97%
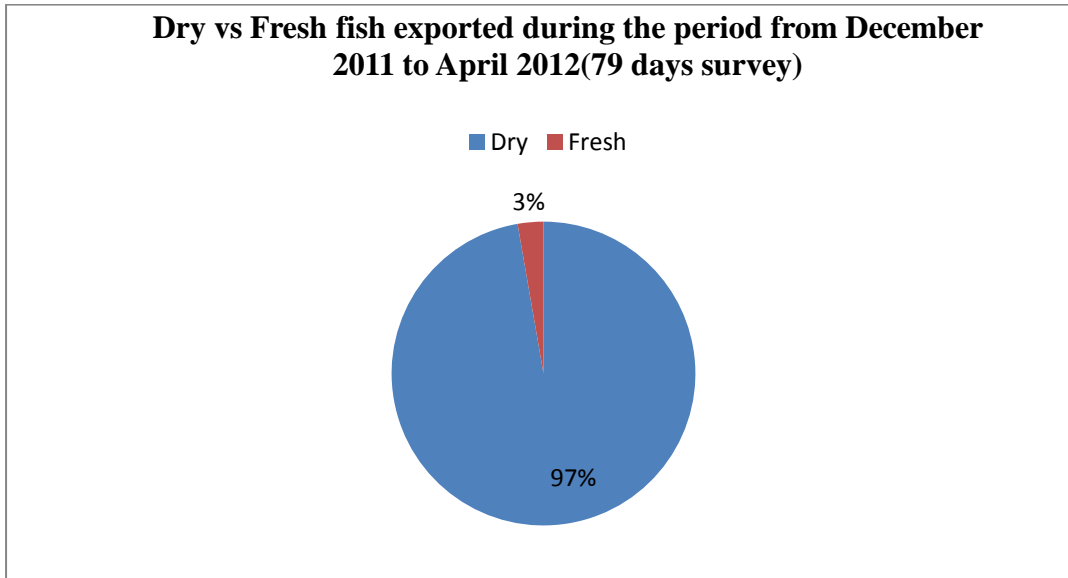
Figure 15: The pie chart shows the percentage of dry fish as compared fresh fish from the lake exported to various destinations during the period from December 2011 to April 2012. This data was collected during a 79 days survey by the MFMR.

Quantity(kg) of Fresh fish exported
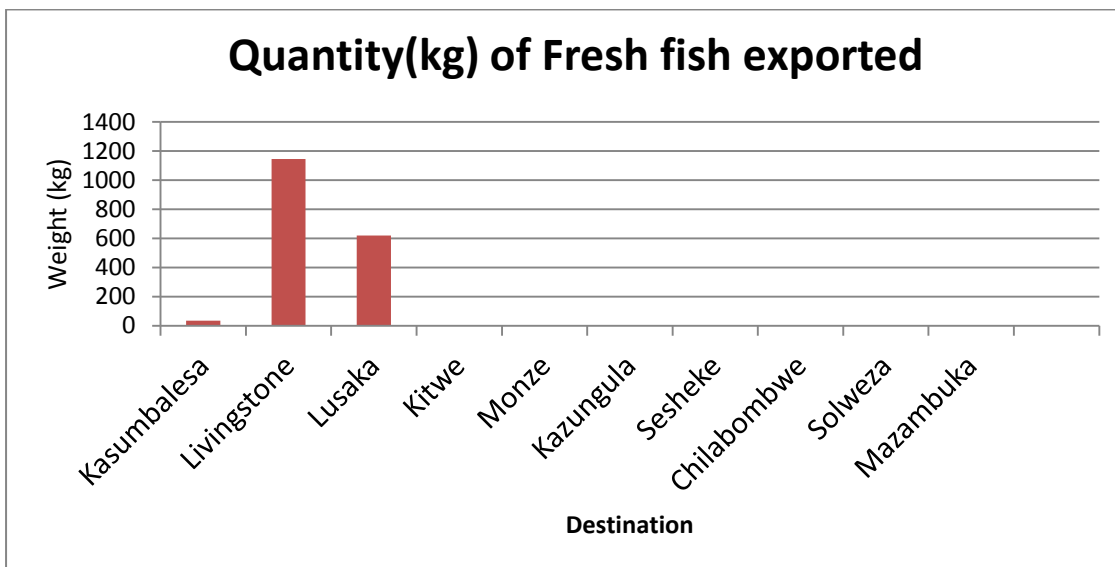
Figure 16: The graph shows the quantity of fresh fish exported to various destinations (indicated on the horizontal axis).

Most fresh fish is exported to Livingstone, followed by Lusaka. (NB: All the listed destination on figure 16 are in Zambia).
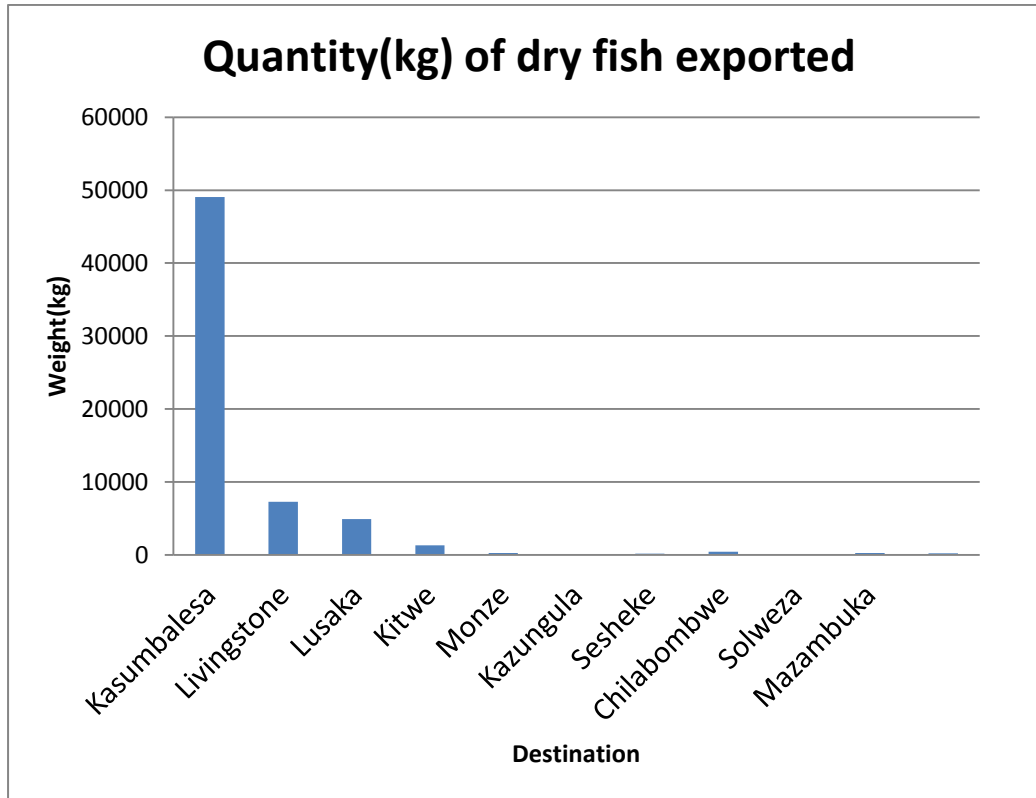
Figure 17: The graph shows the quantity of dry fish exported to various destinations (indicated on the horizontal axis).

Most dry fish is exported to Kasumbalesa, followed by Livingstone, then Lusaka, respectively. Kasumbalesa serves as the trading channel for fish traders from Democratic Republic of Congo (DRC). The location of Kasumbalesa makes trading of fish with DRC easier since Kasumbalesa is located at Zambia-DRC border (refer to figure 18, the area marked "A").[Refer to appendix 4.1 for raw data on exports]
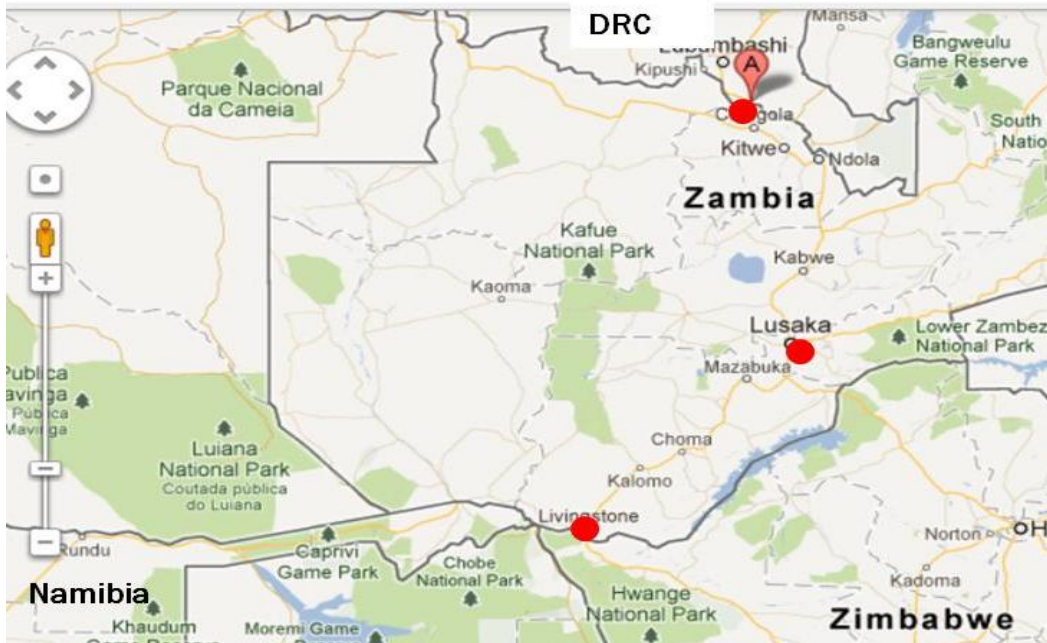
Figure 18: The map of Namibia, Zambia, DRC and Zimbabwe, showing some of the export

destinations (Livingstone, Lusaka, and Kasumbalesa) respectively. Source: Google maps

3.4 Value of Products

Table 11: Value and quantity of fish brought to the KM open market

Time period	Total weight(Tonnes)	Average weight(Tonnes) per day	Total worth(value) of fish(N$)	Average worth(value)(N$) per day
2011 (79 days survey)	307.62	3.89	2394400.00	30308.86
2012 (46 days survey)	259.74	5.65	2003900.00	43563.04

This table show the value and quantity of fish brought to the KM open market within a period

from January 2011 to June 2012. The daily average worth has increased from 30308.86 in

2011 to 43563.04 in 2012 (as illustrated in table 10).

Individual Simplified Gross Profit
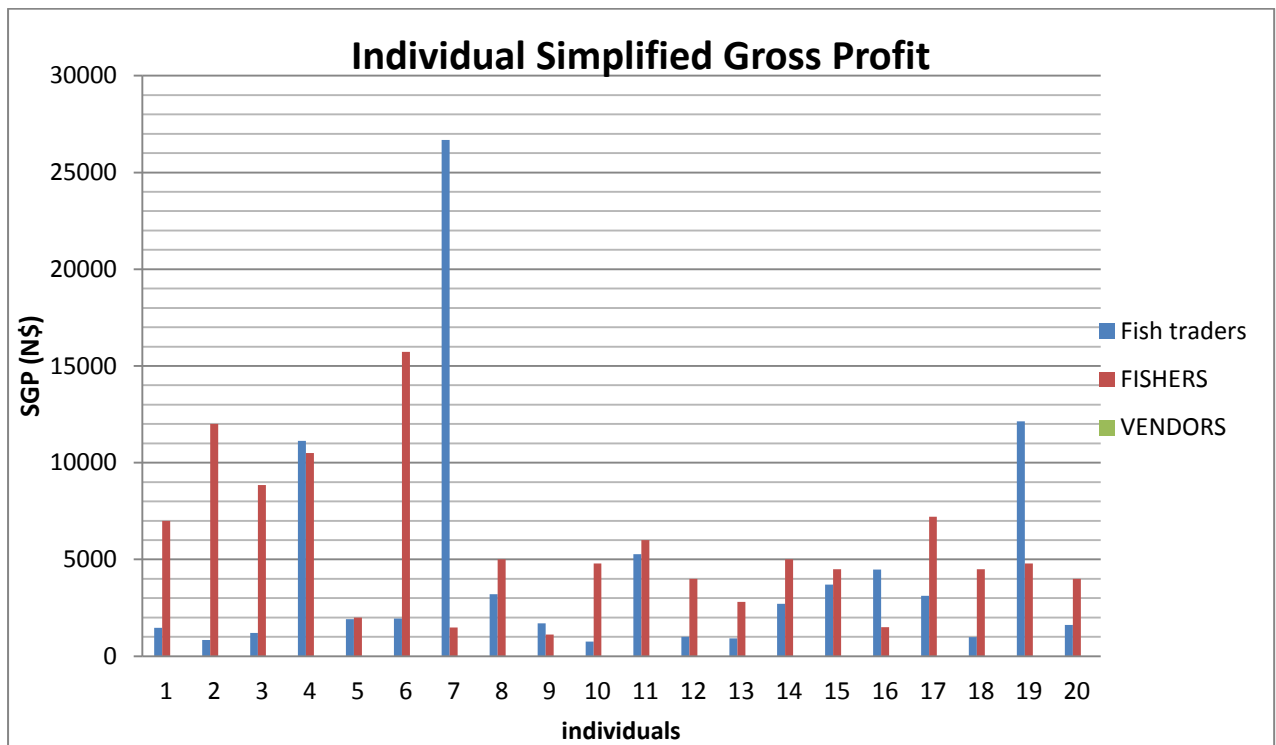
Figure 19: The graph shows the simplified gross profit on a monthly basis. The highest gains in terms of simplified gross profit is not specific to a certain role player (trader, fisher, or vendor), however the overall SGP for Fishers is higher as compared to that of other role players. [Refer to appendices; 4.2, 4.3 and 4.4 for the full data on SGP]

3.5 Constrains affecting the value chain

Constrains preventing the value chain of lake Liambezi fishery were recorded as per respective role player. [This Information was recorded during from interviews and questionnaires conducted/used in this study. Refer to the appendix for the raw data]

Table 12: Constrains experienced by Fishers

Fishers		
Constrain/(problem) experienced	frequency	Percentage contribution
Low demand(fewer buyers, high supply)	10	43.5
lack of protective fishing gears	8	34.8
lack of cold storage facilities to store their catch	3	13.0
Inefficiency of governing Authorities	2	8.7
Total(frequency)	23	100

This table (table 11) shows the nature of problems experienced by fishers. The table also show the level of significance of these constrains by looking at the "percentage contribution". Most fishers have pointed out that their productivity is highly negatively influenced by low demand of their catch which forces them to lower their prices. Protective fishing gears include life jackets and man-made boats (which are lighter than the traditional ones). Lack of protective gears prevents fishers from fishing during bad weather. Lack of storage facilities lead to losses in income due to spoilage. Inefficiency of governing authorities is associated with fact that there are fishers fishing at the lake who do not have fishing rights.

Table 13: Constrains experienced by Fish traders

Traders		
Constrain/(problem) experienced	frequency	Percentage contribution
high input costs	2	7.4
lack of cold storage facilities	9	33.3
Lack of proper transport services	5	18.5
Lack of weighing scales	1	3.7
lack of financial assistance from financial institutions	1	3.7
Low demand(fewer buyers, high supply)	9	33.3
Total(frequency)	27	100

This table (table 12) shows the nature of problems experienced by fish traders. The table also show the level of significance of these constrains by looking at the "percentage contribution". Most fish traders have pointed out that their productivity is highly negatively influenced by low demand of their products and lack of storage facilities where they can store their products in case they are not bought, which forces them to lower their selling prices. Lack of weighing scales prevents them from selling their products per specific weight. They have also pointed out that it is hard to get starting capital due to lack of support from financial institutions.

Table 14: Constrains experienced by fish vendors

Vendors		
Constrain/(problem) experienced	frequency	Percentage contribution
Low demand(fewer buyers, high supply)	9	64.3
lack of cold storage facilities	3	21.4
Lack of proper transport services	2	14.3
Total(frequency)	14	100

This table (table 13) shows the nature of problems experienced by fish vendors. The table also show the level of significance of these constrains by looking at the "percentage contribution". Most fish vendors have pointed out that their productivity is highly negatively influenced by low demand of their products and lack of storage facilities where they can store their products in case they are not bought, which forces them to lower their selling prices.

3.6 Information on part of the population involved in Liambezi fishery

3.6.1 Nationality of role players involved in the fishery

Table 15: Nationality among different role players involved in the fishery

Nationality among different role players involved in the fishery				
	Fishers	Traders	Vendors	Total
Namibian	19	17	20	56
Zambian	0	3	0	3
Angolan	1	0	0	1
Total	20	20	20	60

Only three nationalities were recorded among the interviewees interviewed during this study. Most role players interviewed were Namibians, followed by Zambians then Angolans, respectively. [According to the information on table 14]

3.6.2 Sources of income among different role players involved in the fishery

Table 16: Sources of income among different role players involved in the fishery

Sources of income among different role players involved in the fishery					
	Fishers	**Traders**	**Vendors**	**Total**	**%**
Fishing only	18	15	17	50	83.33
Other sources of income	2	5	3	10	16.66
Total	20	20	20	60	100

Interviewees were requested to give information on whether they have other sources of incomes at the current time at which the study was conducted. Table 15 shows that most(83.33%) role players are dependent on fishery only for their income source, and only 16.66% of the role players have other sources of income. Other sources of income include; crop farming, selling clothes, selling groceries.

3.6.3 Age classes and gender groups involved in the fishery
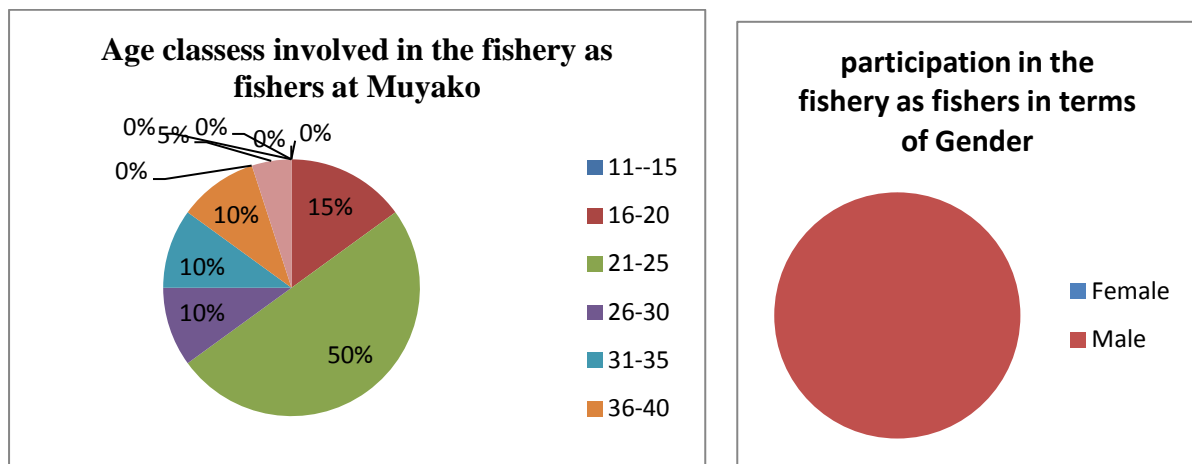
Figure 20: Age classes and gender groups involved in the fishery: Fishers

Most fishers interviewed fall into the age class; 21-25. Fishing is dominated by male part of the population. [Refer to appendix 5.1 for data table(raw data)]
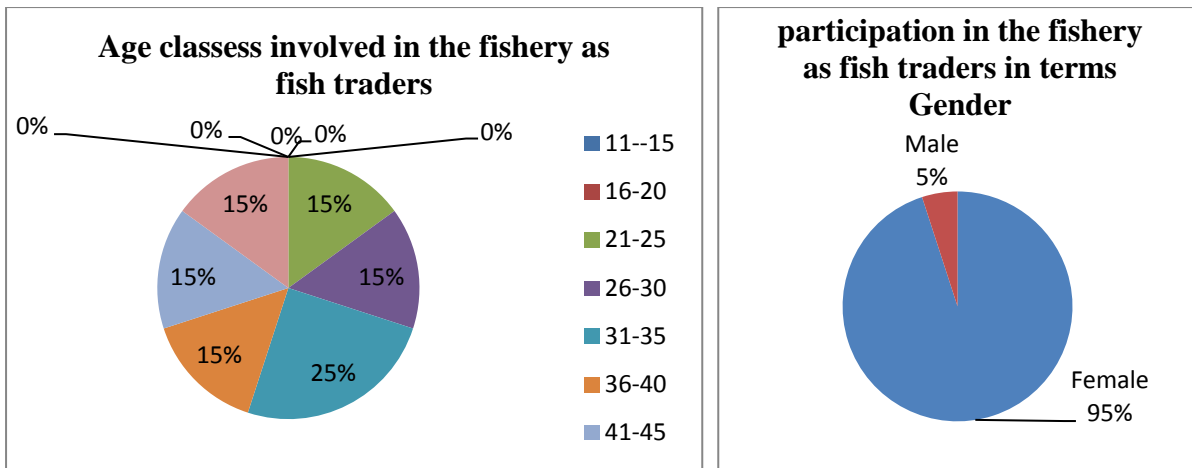
Figure 21: Age classes and gender groups involved in the fishery: Fish traders

Most fish traders interviewed fall into the age class; 31-35. This role is dominated by female part of the population (95% female as compared to 5% male). [Refer to appendix 5.2 for data table(raw data)]
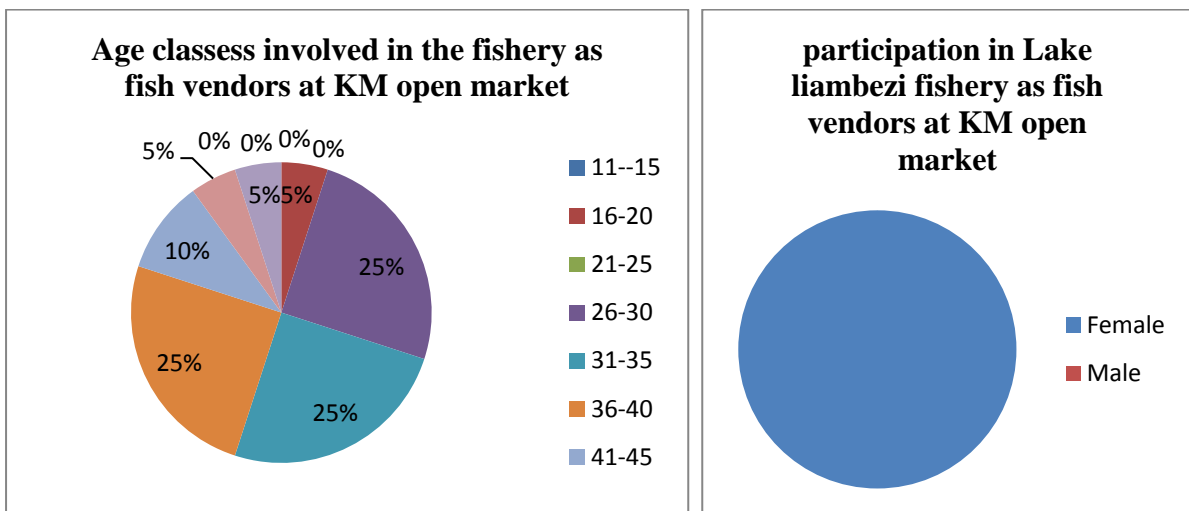
Figure 22: Age classes and gender groups involved in the fishery: Fish vendors

Most fish vendors interviewed fall into the age class; 21-40. This role is dominated by female part of the population (100% female). [Refer to appendix 5.3 for data table (raw data)]

CHAPTER 4

4.1 DISCUSSION

Value chain incorporates as the full range of activities which are required to bring a product or service from conception, through the factors of production including land, labour, capital, technology, and inputs as well as all economic activities including input supply, production, transformation, handling, transport, marketing, and distribution necessary to create, sell, and deliver a product to a certain destination, according to Hellin and Meijer(2006), the value chain of Lake Liambezi fishery falls within this definition. Inputs include; fishing gears, and mukoros as capital, and labour. These inputs are required in order to catch fish and bring it to the landing sites. However, there are external factors which make fishing possible. External factors include allocation of fishing rights by governing authorities such as the MFC, regional authority, and the MFMR, and input suppliers who supply gill nets used for fishing. That is why authors like Brown *et al* (2010) stated that a full value chain cannot be illustrated in a 'straight line" due to influences by external factors. Transformation of fishery products at lake Liambezi is mainly through drying and salting. Drying and salting are used as a cheap mode of preservation. These techniques are widely used around the world and have proven to be efficient. The fishery products from Lake Liambezi are transported to market places by land transport, specifically by pickups. The choice of transportation is due to affordability, availability, and accessibility, since Lake Liambezi is located in a remote area. Some interviewees interviewed during this study have pointed out that transportation charges are quite high.

The key (role) players who are directly involved with the fishery products in the value chain were identified as; fishers, fish traders, and fish vendors. Fishers are the people who do the fishing. They collect their catch, and then bring it at landing sites where they sell them to fish traders. They are key players because if they don't catch fish then there will no fish for the

next role player in the chain. Traders were identified as the group of people who buy fish from the fishers in bulk (cooler boxes) and usually sell them as wholesale to vendors at the KM open market or further process(dry/salting) them for export to Zambia and Democratic Republic of Congo (DRC). They are considered key players as they are the ones responsible for fish trade locally and export markets. Vendors were identified as the group of people who buy fish from the traders in bulk(wholesale) and sell per individual fish(one by one) .The student interviewed vendors at KM open market. They are key players because they are ones selling fish to final consumers. Other role players who are not directly involved with the product include governing bodies such as; MFMR. MFC, the KM Regional Council, the LDC. These bodies are essential in ensuring sustainable use and exploitation of fishery resources.

Fishery products harvested from Lake Liambezi are marketed locally and regionally (export). Local markets are basically the markets nearby the landing sites. The main local market is at Katima Mulilo, this because there are more inhabitants (therefore more buyers). The prices are much higher per same volume of fish at KM open market as compared to prices at landing sites around the lake due additional costs incurred for transportation and stall rental charges. Price per 0.1kg (100g) of dry fish is high than that of fresh fish overall. This is due to the fact that vendors selling dry fish are not forced to lower their prices in order to sell their products as soon as possible to avoid spoilage as it is the case with vendors selling fresh fish. Demand of fish is species specific as some species are more sold than the others. For instance the price per 0.1 kg for *Tilapia redalli* (TREN) for all forms (fresh & dry) is the highest as compared the rest of other species, as it can seen on figure 14. Price per 0.1 kg for *Schilbe intermedius* (SMYS) for all forms (fresh & dry) is lowest as compared the rest of other species, as it can seen on figure 14.

Regional markets are bigger as compared to local markets situated in villages, small towns, and capitals. This market serves as a channel to cater to up-country markets and distant markets. Most fresh fish is exported to Livingstone, followed by Lusaka. Most dry fish is exported to Kasumbalesa. The biggest foreign market by "volume" for fishery products is at Kasumbalesa. Kasumbalesa serves as the trading channel for fish traders from Democratic Republic of Congo (DRC). The location of Kasumbalesa makes trading of fish with DRC easier since Kasumbalesa is located at Zambia-DRC border. Most dry fish is exported to Kasumbalesa, and less fresh fish because dry fish doesn't get spoiled easily as compared to the fresh one. Most fresh fish is exported to Livingstone. Livingstone is located close to Namibian borders (refer to figure 18), therefore it is more convenient and fast to deliver fish before it gets spoiled. Thus the destination, to which a certain form (dry or fresh) of fishery product exported to, is influenced by the "preservation" technique.

Increase in daily average worth of fish brought from Lake Liambezi from 30308.86 in 2011 to 43563.04 in 2012 (as illustrated in table 10), shows that the fishery is expanding in terms of its worth and this can be interpreted as positive improvement in livelihood of stakeholders involved in the fishery. The highest gains in terms of simplified gross profit are not specific to a certain role player (trader, fisher, or vendor) this due to the fact that individuals do not necessarily incur similar costs. For instance, some fish traders do not spend on fish because a family member does the fishing, therefore the SGP will be high as compared to other traders who have to buy fish from fishers.

Constrains preventing full competitiveness the value chains of Lake Liambezi fishery were recorded as per respective key player. Major constrains pointed out include; lack of protective gear, low demand of products, and lack of storage facilities.   Lack of protective gears prevents fishers from fishing during bad weather. Low demand is attributed to "few buyers,

more sellers" implying that the market is small. Lack of storage facilities lead to losses in income due to spoilage. These findings are similar to those stated in Brown *et al*(2010). Cultural believes still have a strong influence on the behaviours of people in Caprivi, this applies in the fishery too; Fishing is dominated by male part of the population, while the role of fish trading is dominated by female part of the population, and finally the of "fish vendor" is heavily dominated by female part of the population. Fishery is a very important sector in Caprivi as most part of the population interviewed in this study, are heavily dependent on fishing as their source of income.

4.2 CONCLUSION

Value chain analysis approach is very important as it facilitates for an evaluation a sequence of activities involved in production of a certain product from the point of "necessary inputs required to produce it, production process, distribution and marketing. The key players who are directly involved with the fishery products harvested from Lake Liambezi were identified as; fishers, fish traders, and fish vendors. Major export markets were identified to be in Zambia and DRC. Most fresh fish is exported to Livingstone, while most dry fish is exported to Kasumbalesa. The destination, to which a certain form (dry or fresh) of fishery product exported to, is influenced by the "preservation" technique needed to be employed to extend its shelf life

Constrains preventing full competitiveness of the value chain of lake Liambezi fishery were pointed out as: lack of protective gear, low demand of products, and lack of storage facilities. Lack of protective gears prevents fishers from fishing during bad weather. Low demand is attributed to "few buyers, more sellers" .Cultural believes still have a strong influence on the behaviours of people in Caprivi, this applies in the fishery too, as roles in the fishery are based on gender. Fishery is a very important sector in Caprivi as most part of the population interviewed in this study, are heavily dependent on fishing as their source of income.

4.3 RECOMMENDATION

❖ The Government of the Republic of Namibia, and other stakeholders, through regional governing bodies should assist in provision of storage facilities and safety gears. Provision of cold storages will help prevent spoilage of fish therefore reducing exploitation of fish resources in the lake as no spoiled fish will be thrown away

❖ Process upgrade: There is a urgent need to introduce other processing mechanisms that can add more value to products harvested from lake.

❖ High returns observed specifically from markets in Kasumbalesa shows that there is a high potential for further market development

❖ Fresh fish being exported mainly to Livingstone and Lusaka. These markets can further be exploited given that storage mechanisms are upgraded through the use of high efficient storage transport equipments.

❖ Market for fresh fish need to be extended locally, regionally, and even internationally given that storage mechanisms is upgraded through the use of high efficient storage transport equipments and there is increase in investment into the fishery

4.4 CONTRIBUTION TO KNOWLEDGE

The research project has contributed a lot to my knowledge in terms of; learning how communities in remote areas are dependent on their natural resources for their livelihood, learning how Lake Liambezi is worth in terms of the value of its fish output, as well as learning about how important fish is in the Caprivi region. Finally, the project has improved my knowledge on; statistical analysis and interpretation of the statistically results, research designs, and data collections. This project allowed me to learn more about the value chain analysis.

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APPENDIX

Appendix 1

1.1 Origins, weight, Destinations and product type

Origin	Destination	Weight(kg)	Dry		fresh
Masokotwani	Kasumbalesa	530	Dry		
	Lusaka	50	Dry		
Luusu	Kasumbalesa	967	Dry		
Muyako	Kasumbalesa	8245		90	35
	Livingstone	1802		212	720
	Lusaka	879	Dry		
	Kitwe	495	Dry		
	Monze	100	Dry		
Kwena	Livingstone	629	Dry		
	Lusaka	150	Dry		
	Kazungula	50	Dry		
Luusu	Kasumbalesa	1016	Dry		
Masokotwani	Kasumbalesa	1412	Dry		
	Sesheke	20	Dry		
	Livingstone	50	Dry		
Muyako	Kasumbalesa	8845	Dry		
	Livingstone	1550		424	20
	Kitwe	802	Dry		
	Lusaka	2433	Dry		
	Chilabombwe	424	Dry		
Ngala	Kasumbalesa	318	Dry		
	Lusaka	40	Dry		
Zilitene	Kasumbalesa	212	Dry		
Kwena	Livingstone	70	Dry		
Luusu	Livingstone	30	Dry		
	Kasumbalesa	424	Dry		
Masokotwani	Kasumbalesa	3806	Dry		
	Livingstone	50	Dry		
Muyako	Livingstone	455	Dry		405
	Kasumbalesa	3450	Dry		
	Mazambuka	250	Dry		
	Lusaka	51	Dry		
	Solweza	50	Dry		
Ngala	Kasumbalesa	1002	Dry		

1.2 Origin, prices of fish

Date	Fish from	No. of large coolers	No. of medium coolers	No. of small coolers	Price of large	price of medium	Price of small cooler
2011/02/15	Kwena	1	16	0	500.00	300	150
2011/02/17	Kwena	3	8		500.00	300	150
2011/02/18	Kwena	1	11		500.00	300	150
2011/02/19	Kwena	5	9		500.00	300	150
2011/02/20	Kwena	4	2	3	500.00	300	150
2011/02/21	Kwena	1	3		500.00	300	150
2011/02/22	Kwena		4		500.00	300	150
2011/02/23	Kwena	1	13		500.00	300	150
2011/02/24	Kwena	3	4		500.00	300	150
2011/02/25	Kwena		6		500.00	300	150
2011/02/28	Kwena		8		500.00	300	150
2011/02/17	Machita	0	7	0	500.00	300	150
2011/02/22	Machita		2		500.00	300	150
2011/02/15	Masokotwani	3	14	1	500.00	300	150
2011/02/16	Masokotwani	7	9	1	500.00	300	150
2011/02/17	Masokotwani	4	6	1	500.00	300	150
2011/02/18	Masokotwani		6		500.00	300	150
2011/02/19	Masokotwani	5	5		500.00	300	150
2011/02/20	Masokotwani	4	3		500.00	300	150
2011/02/21	Masokotwani	11	2		500.00	300	150
2011/02/22	Masokotwani	8	5		500.00	300	150
2011/02/23	Masokotwani	1	11		500.00	300	150
2011/02/24	Masokotwani	12	4		500.00	300	150
2011/02/25	Masokotwani	10	3		500.00	300	150
2011/02/28	Masokotwani	3	1		500.00	300	150
2011/02/15	Muyako	27	5	2	500.00	300	150
2011/02/16	Muyako	32	6	0	500.00	300	150
2011/02/17	Muyako	31	4		500.00	300	150
2011/02/18	Muyako	32	5		500.00	300	150
2011/02/19	Muyako	33			500.00	300	150
2011/02/20	Muyako	13			500.00	300	150
2011/02/21	Muyako	26	3		500.00	300	150
2011/02/22	Muyako	35	3		500.00	300	150
2011/02/23	Muyako	24	5		500.00	300	150
2011/02/24	Muyako	35	6		500.00	300	150
2011/02/25	Muyako	36	2		500.00	300	150
2011/02/28	Muyako	37			500.00	300	150
2011/02/15	Ngala	8		0	500.00	300	150
2011/02/16	Ngala	9			500.00	300	150
2011/02/17	Ngala	8	1		500.00	300	150

Appendix 2

2.1 KM open market stall records

fish species	number	weight	price	weight per fish	price per kg	total stalls occupied	total weight delivered at market
OAND	1	39	4.00	39	102.56		
OAND	1	33	4.00	33	121.21		
TREN	1	39	4.00	39	102.56		
TREN	1	32	4.00	32	125.00	dried	fresh
TREN	1	31	4.00	31	129.03	39	173
TREN	1	35	4.00	35	114.29	fresh	dried fish
SERM	1	52	4.00	52	76.92	19	0
SERM	1	37	4.00	37	108.11	mixed	
SERM	1	34	4.00	34	117.65	0	
OAND	1	35	4.00	35	114.29		
OAND	1	32	4.00	32	125.00		
OAND	1	25	4.00	25	160.00		
OAND	1	33	4.00	33	121.21		
OAND	1	31	4.00	31	129.03		
OAND	1	49	4.00	49	81.63		
OAND	1	44	4.00	44	90.91		
OAND	1	55	4.00	55	72.73		
OAND	1	37	4.00	37	108.11		
SERM	1	255	5.00	255	19.61		
SERM	1	207	5.00	207	24.15		
SERM	1	198	5.00	198	25.25		
TREN	1	150	5.00	150	33.33		
TREN	1	206	5.00	206	24.27		
OAND	1	177	5.00	177	28.25		
OAND	1	202	5.00	202	24.75		
OAND	1	220	5.00	220	22.73		
OAND	1	213	5.00	213	23.47		
OAND	1	208	5.00	208	24.04		
OAND	1	220	5.00	220	22.73		
OAND	1	183	5.00	183	27.32		
OAND	1	140	5.00	140	35.71		
OAND	1	115	7.00	115	60.87		
TREN	1	98	7.00	98	71.43		
TREN	1	117	7.00	117	59.83		
TREN	1	81	7.00	81	86.42		
SERM	1	95	7.00	95	73.68		
SERM	1	98	7.00	98	71.43		
SERM	1	75	7.00	75	93.33		
SERM	1	101	7.00	101	69.31		
OAND	1	152	7.00	152	46.05		
OAND	1	81	7.00	81	86.42		

2.2 Questionnaires used by NNF at KM open market stalls

**KATIMA MULILO OPEN MARKET - FISH MARKET SURVEY
VENDOR INTERVIEW**

Three fresh fish and three dry fish every day. Study from 1 Oct 2010 until 1 Nov 2011

Information on fish vendor

Date 03/08/11 Time 2:59   Interviewer Gloria

1   Name of vendor (if possible) and stall no: 30

2   Gender of vendor (female or male): ✓

3   Have you been interviewed before (since 1 Oct 2010) or is this the first time:

First time:................   Interviewed before: ....2....times

4   How long have you been selling fish? ......4............years

5   Do you rent the market stall from owner or do you own the stall?
Own the stall................   Rent the stall..X......,. Price 10 peday

6   How often are you selling fish at the Katima Fish market?
More than 4 days a week...X......   Between 2 and 4 days a week..........
Once a week...........   Two times a month...........   Once a month.........
Less than once a month.............

7   Where do you live: MUYAKO

8   Where do you get your fish, name of place? Liambezi

9   How is the selling going?

Good.............   Medium................   Bad...X......

Why is it good, medium, bad?.....Due to lack of customers
....
....

10   How important is fish sales to you?

Most important	X	As important as piecework and farming		Not important		

11   Why do you sell fish?

For self employment.

12   What is the vendor selling?

Fresh	X	Dried		Mixed/other

Can you give your reason for your choice?

sells faster than dried.

13   What is best and worst times of year for selling fish?

SEASON	BEST	WORST	REASONS?
Litabula			
Muunda		X	poor catches
Mahila	X		Good catches
Mbumbi			

14   Do you prefer to sell a certain fish species/size of fish?

Species preferred:...... all
Size preferred:...... all
Reason for choice:...... customer's choice .

15   How do you travel from home to where you buy the fish?

Walking	X		
Private car		Cost to collect fish	
Taxi/combi		Cost to collect fish	
Other		Cost to collect fish	

16   How do you travel from home/where you buy the fish to the Katima market

Walking			
Private car		Cost to get to market	
Taxi/combi		Cost to get to market	
bicycle	X		35

17 How many days or weeks does it take you to collect the fish you have brought to the market?

……l….day$ or ……….. weeks

18 What causes the biggest delays in getting to the market? Name in order of importance

Rank in order of importance most important: 1, second most important: 2		
Getting enough fish		
Getting those fish species you want		
Getting the size of fish you want		
Getting the price of fish you want		
Preparing the fish		
Transport of fish	X	①

19 How do you obtain the fish you have on sale?   Where?

		Where?
Family member catches the fish		
Buy fish from fisherman on riverside	X	Liambezi
Buy fish from fisherman at his village		
Travel to other village to buy fish		
Buy fish from trader		
Buy fish at market		
Other		

20 What is your marital status?

Married		Household head	
Single	X	Spouse	
Divorced		Daughter of household head	
Widowed		Responsible for maintenance of children	
Do you have children?		Other relative	

21 How much money did you spend to pay for this fish today?

Nothing		Less than N$50		N$50 to 100		N$100 to 150	
N$150 to 200		N$200-250	α	More than N$250			

22   How much profit will you make when all the fish are sold after all costs, transport and rent have been subtracted?

Nothing		Less than N$20		N$20 to 50		N$50 to 100	
N$100 to 150	Y	N$150-200		N$200 to 250		More than N$250	

For fresh fish vendors only:

1)   Was all fresh fish brought to the market today, if no how many days ago

     .... yes ....

2)   What proportion of all the fish taken to the market for sale was left over from the previous days (including fish in the cooler boxes not on display): All............ Three quarter............ Half............ Quarter............ None....X......

3)   How many days does it take to sell all the fish brought to the market? ....1...... days

4)   What fish is difficult to sell (f. ex. Small fish or some fish species) .... SOME FISH SPECIES. ....

5)   What is the price for the fish of today and what is the reduction in price for old fish from previous days? ....

May I ask some other personal questions? Yes

Level of education: completed grade

3	4	5	6	7	8	9	10	11	12	Post school
							Y			

What is your age

20-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	more
				X						

Thank you for your cooperation!

Appendix 3

3.1 Questionnaire used for fishers

Questionnaire for fishers

Date of interview: *15 September* Name of interviewer: *Alexander A.*

Name of interviewee: *O. Simataa* Age: *32* Gender: *Male*

Address of interviewee: *Muyako, East Caprivi*

Country: *Namibia (citizen)* Province:

District:

Other:

1. What year did you start fishing? *2004*
2. How did you obtain fishing rights? *MFMR - licence (50 per net)*
3. What kind of gear do you currently use?(tick all that apply):

    ☒ Gill net ☐ Seine ☐ Cast net ☐ traps ☐ other(specify):

4. Over the past 5 years has the amount of fish you catch change?(tick)

    ☒ Yes ☐ No ☐ Don't know

    If "yes" ; How did the amount change?

    ☒ Increased ☐ Declined

5. Are there any declines in your daily catch?

    ☐ Yes ☐ no ☒ *Constant*

    If "yes", what do you think is the

    cause?

6. Do you have any other source of income and food apart from fishing?

    ☒ Yes ☐ no If "yes",

    specify *Works at NNF, Cultivate crops (subsistence)*

7. How much of your time (in hours/days) do you spend catching fish (per week)?

    5 day per week

8. What do you do with the fish that you catch?

    ☐ Sell all ☒ sell most ☐ Sell less than half of the catch *He gives to his wife to sell the fish*

9. Who are/is the buyer(s)? *Anyone interested Zambians*, Selling rate:
10. Do you have any estimations of how much you make in day/month/year fishing?

    ☒ Yes ☐ no If "yes", specify *N$ 525 per day*

11. Are experiencing any difficulties as fishermen, which you think if they are to be addressed can improve your wellbeing?

    - The market: first can be expanded (too many sellers, few buyers)
    - Storage facility

    12. The price of the fishing net: N$ 500
    13. life time of the fishing net: ± 2 months

3.2 Questionnaire used for fish traders

Questionnaire for fish traders

Date of interview:................................Name of interviewer......Alexander..........................

Name of interviewee:......Mafurla Floureen (fresh fish)

Age:......47..........Gender...female..........................

Address of interviewee:......Gilkangjatapka..

Country:......Namibia..................................District:..

1. When did you start selling fish?......2011...
2. Do you have any estimations of how much you make in day/month/year?...N$ 550... *big cooler (sell fish yea long)*
3. What do you pay /g/kg/......N$ 400
4. Do you have any other source of income and food apart from selling fish?

   ☐ Yes ☒ no   If "yes",

   specify...
5. Who is the buyer?......Zambians (KM market......Price: N$ 550 *big cooler box sometimes only 5 -10*
6. What do your costs consist of?

   ......Transport [N$ 120] per trip, *big* Cooler N$ 150 *(lasts for approx 4 yrs)*
7. Do you have the ability to store product until a trip to market is necessary?

   ☒ Yes   ☐ No   If "yes", specify how

   ......She dries the fish..
8. Do you ever lose fish after catch because of spoilage or no one buying it?

   ☒ Yes   ☐ No   If "yes", what do you think is the cause?

   ......Due to lack of customers...
   ....
9. Are experiencing any difficulties as ~~fishermen~~ *trader*, which you think if they are to be addressed can improve your wellbeing?

   - They need storage facilities (atleast old freezer so they can put ice

   - They need a weighing scale at the market so they can sell their products according to its/weight

3.3 Questionnaire used for fish vendors

Questionnaire for fish vendors

Date of interview:/.................Name of interviewer....Alexander (translated by Kapala) [KM market]

Name of interviewee:......Albertina

Age:......46.........Gender...Female

Address of interviewee:......Inkaba

Country:......Namibia.........District:......

1. When did you start selling fish?......2004

2. Are there any laws/regulations which governs the selling of fish at the market?

   ☒ Yes ☐ No   If "yes",

   specify;......The Lux Development Committee, regulates cooperation among the sellers.

3. Do you have any other source of income and food apart from selling fish?

   ☒ Yes ☐ No   If "yes",

   specify......

4. Do you have any estimations of how much you make in (day)/month/year? N$00 profit

5. Do you have a supplier(someone who delivers the fish at the market place)?

   ☒ Yes ☐ No   If "No", how do you get the fish? ......

   ......

6. What are your input costs?...ice - N$150 per day, Stand registration N$150 per month

   Buying price...N$ 300

7. What type of fish products do you sell?

   ☒ Fresh ☒ Dry ☐ other ......

8. What is your price rate?...fresh N$2 - 5 , Dry = N$2

9. Do you encounter losses due to (spoilage) or as a result of no one buying it?

   ☒ Yes ☐ No   If "yes", what do you think is the cause?

   due lack of customers

10. Are you experiencing any difficulties as fishermen vendor, which you think if they are to be addressed can improve your wellbeing?

    — Competition for fish at the market entrance

Appedix 4

4.1 Type and quantity of fish exported to various destinations during the period from December 2011 to April 2012(79 days survey).

[NB: Weight is in "kg"]

Type	Destination										DRC
	Zambia										
	Kasumbalesa	Livingstone	Lusaka	Kitwe	Monze	Kazungula	Sesheke	Chilabombwe	Solweza	Mazambuka	
Dry	49068	7269	4904.5	1297	276	50	170	424	50	250	200
Fresh	35	1145	620								

4.2 Individual SGP for Fish traders

#	Cost of fish(N$)	preservation costs(N$)	border charges N$	Transport costs(N$)	Total	Weight	Number of cooler	prices per cooler	Total	SGP	Market place
1	8000	0	0	1530	9530	1350	20	550	11000	1470	KM market
2	1000	0	0	270	1270	66	10	210	2100	830	Bukalo
3	7200	150	0	1350	8700	1215	18	550	9900	1200	KM market
4	5400	120	240	930	6690	931.5	27	660	17820	11130	Kasumbalesa
5	5250	0	0	1080	6330	1012.5	15	550	8250	1920	KM market
6	1100	80	0	720	1900	181.5	11	350	3850	1950	KM market
7	0	120	240	930	1290	1552.5	23	1216	27968	26678	Kasumbalesa
8	2000	0	0	300	2300	345	10	550	5500	3200	Bukalo
9	4550	0	0	900	5450	877.5	13	550	7150	1700	KM market
10	1000	0	0	350	1350	165	10	210	2100	750	Bukalo
11	15500	120	0	930	16550	2139	62	352	21824	5274	Kasumbalesa
12	6000	160	0	1080	7240	1012.5	15	550	8250	1010	KM market
13	1300	0	0	510	1810	214.5	13	210	2730	920	KM market
14	2000	120	0	450	2570	276	8	660	5280	2710	KM market
15	9350	0	240	930	10520	586.5	17	836	14212	3692	Kasumbalesa
16	5600	0	0	1120	6720	966	28	400	11200	4480	Bukalo
17	8250	0	240	930	9420	517.5	15	836	12540	3120	Kasumbalesa
18	4800	0	0	810	5610	810	12	550	6600	990	KM market
19	0	0	0	1620	1620	1687.5	25	550	13750	12130	KM market
20	5600	0	0	490	6090	945	14	550	7700	1610	Bukalo
Total	93900	870	960		112960	16851	366		199724	86764	

4.3 Individual SGP for Fishers

	Monthly Direct costs		Total	monthly sales Total revenue per month	Simplified Gross Profit
#	preservation costs(N$)				
1	0		0	7000	7000
2	0		0	12000	12000
3	120		120	8960	8840
4	0		0	10500	10500
5	0		0	2000	2000
6	120		120	15840	15720
7	120		120	1600	1480
8	0		0	5000	5000
9	0		0	1120	1120
10	0		0	4800	4800
11	0		0	6000	6000
12	0		0	4000	4000
13	0		0	2800	2800
14	0		0	5000	5000
15	0		0	4500	4500
16	0		0	1500	1500
17	0		0	7200	7200
18	0		0	4500	4500
19	0		0	4800	4800
20	0		0	4000	4000
Total				113120	112760

4.4 Individual SGP for Fish vendors

	Monthly Direct costs							
#	Cost of fish(N$)	preservation costs(N$)	Stall rental costs	Transport costs(N$)	Total	SGP	Market place	Product Type
1	6000	0	150	200	6350	9050	KM Market	dry
2	7500	870	200	0	8570	11550	KM Market	Fresh
3	5100	510	150	0	5760	7840	KM Market	Fresh & Dry
4	3600	0	50	150	3800	2300	KM Market	dry
5	3000	0	50	90	3140	1000	KM Market	dry
6	8800	900	150	0	9850	6410	KM Market	fresh
7	6000		200			3500	KM Market	Fresh
8	2500		75			4500	KM Market	Dry
9	6000		30			2700	KM Market	Dry
10	3500		200			6000	KM Market	Fresh
11	2500		30			3500	KM Market	Dry
12	1500		120			2100	KM Market	Fresh
13	375		30			625	KM Market	Dry
14	1500		30			3500	KM Market	Dry
15	1500		30			625	KM Market	Dry

16	2500		200			4500	KM Market	Fresh
17	6000		30			3500	KM Market	Dry
18	550		30			225	KM Market	Dry
19	11000		75			2500	KM Market	Dry
20	3500		75			1500	KM Market	Dry

Appendix 5

5.1 Age classes and gender groups involved in the fishery: Fishers

Age group	Female	Male	Total	PERCENTAGE(%)
11--15	0	0	0	0
16-20	0	0	0	0
21-25	2	1	3	15
26-30	3	0	3	15
31-35	5	0	5	25
36-40	3	0	3	15
41-45	3	0	3	15
46-50	3	0	3	15
51-55	0	0	0	0
56-60	0	0	0	0
60+	0	0	0	0
Total(N)	19	1	20	100

5.2 Age classes and gender groups involved in the fishery: Fish traders

Age group	Female	Male	Total	PERCENTAGE(%)
11--15	0	0	0	0
16-20	0	3	3	15
21-25	0	10	10	50
26-30	0	2	2	10
31-35	0	2	2	10
36-40	0	2	2	10
41-45	0	0	0	0
46-50	0	1	1	5
51-55	0	0	0	0
56-60	0	0	0	0
60+	0	0	0	0
Total(N)	0	20	20	100

5.3 Age classes and gender groups involved in the fishery: Fish vendors

Age group	Female	Male	Total	PERCENTAGE(%)
11--15	0	0	0	0
16-20	1	0	1	5
21-25	0	0	0	0
26-30	5	0	5	25
31-35	5	0	5	25
36-40	5	0	5	25
41-45	2	0	2	10
46-50	1	0	1	5
51-55	0	0	0	0
56-60	1	0	1	5
60+	0	0	0	0
Total(N)	20	0	20	100

Appendix 6

Value of fish brought to the KM market per source

Graph 3- Value (N$) of fish per source, 2012
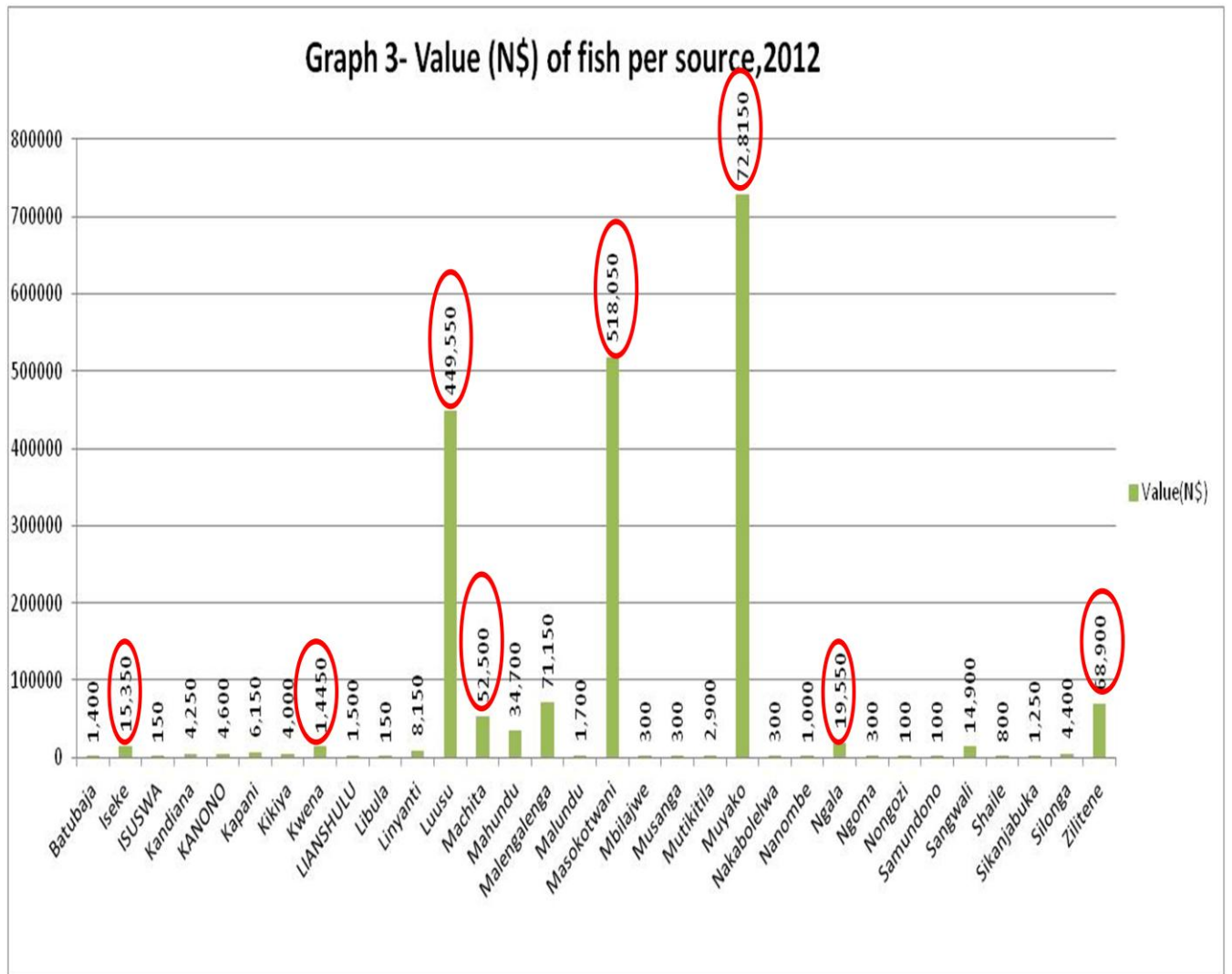
Areas highlighted in "**red**" are located along Lake Liambezi. Muyako contributes more to the total worth derived from the fishery products harvested from the lake Liambezi. This justifies the reason why Muyako is considered the main landing site along the lake. This also justifies why the study was focused more on Muyako.

THE END