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Characterizing market potential and developing business model for processed lake Victoria sardine products

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NM-AIST

CHARACTERIZING MARKET POTENTIAL AND DEVELOPING BUSINESS MODEL FOR PROCESSED LAKE VICTORIA SARDINE PRODUCTS

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ABSTRACT

The study aimed at developing an inclusive business model to improve the marketing efficiency of Lake Victoria processed sardine products. The stakeholder theory was used to characterize actors' roles while structure, conduct and performance framework scrutinized the marketing efficiency. The study identified and tested the consumers' buying decision factors before developing the business model in collaboration with the stakeholders within the sardine value chain. Primary data from Lake Victoria Tanzania side were collected using structured and tested questionnaires from 546 randomly selected respondents in Mwanza, Mara and Kagera regions. Key informants and focus group discussions complemented the information gathered through questionnaires. Data were tested for validity, reliability and model fit by using SPSS program version 24. Data were analyzed using multiple regression models and descriptive statistics. Market analysis used price efficiency, descriptive and organizational structure. The exploitative resource sharing between crew members and boat owners led to inefficiency production and theft of fishing equipment. Sardine traders had not accessed the lucrative market outlets due to weak institutional support and lack of economies of scale. The market analysis showed high income and inequalities with Gini coefficient for traders and processors of 0.59 and 0.64, respectively. Lorenz curves showed 80% of monthly income was accounted by 50% of marketers. The higher income, market share inequalities, and market entry barriers implied that the market was imperfectly competitive and inefficient with greater likelihood of dominancy as economic and game theories suggests. The effect of product recognition and confidence on the buying intention was significant at $p< 0.001$, consumers' confidence and buying intention was significant at $p<0.001$, consumers' product recognition and buying intention was significant at $p<0.001$ and the effect consumers' attitude and buying intention was significant at $p<0.001$. Based on explanatory powers of the determinants; consumers preferred sardines dried on racks, rocks, grass and net, deep fried and hot smoked. Marketing strategies should focus on improving product quality and increase consumers' product confidence, attitudes and recognition. The business model for processed sardine products should focus on improving the delivery and captures through product handling, value addition and delivery practices that considers consumer needs.

DECLARATION

I, Josephine Joseph Mkunda, hereby declare to the Senate of the Nelson Mandela African Institution of Science and Technology that this thesis is my own original work and has never been submitted for higher degree in any other University.

Signature ----------

Date ----------

STATEMENT OF COPYRIGHT

CERTIFICATION

The undersigned certify that they have read this thesis entitled "**Characterizing Market Potential and Developing Business Models for Lake Victoria Processed Sardine Products**" and accept it as a scholarly work for submission to the Nelson Mandela African Institution of Science and Technology for the award of Degree of Doctor of Philosophy in Life Sciences.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
AU-IBAR	The African Union Inter-African Bureau for Animal Resources
BMU	Beach Management Unit
CAS	Catch Assessment Survey
CDM	Consumer Decision Model
DHA	Docosahexaenoic Acid
DRC	Democratic Republic of Congo
EAC	East African Community
EPA	Eicosapentaenoic Acid
EU	European Union
FAO	United Nations Food and Agriculture Organization
FARMESA	Farm Level Applied Research for Eastern and Southern Africa
FETA	Fish Education Training Agency
FGD	Focus Group Discussion
FS	Frame Survey
GDP	Gross Domestic Product
HHI	Herfindal-Herschman Index
LGA	Local Government Authority
LVBC	Lake Victoria Basin Commission
LVEMP	Lake Victoria Environment Management Programme

LVFO	Lake Victoria Fisheries Organization
MALF	Ministry of Agriculture Livestock and Fisheries
ME	Market Efficiency
NFQCL	National Fish Quality Control Laboratory
NI	Net Income
NMB	National Microfinance Bank
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
OR	Operating Ratio
PESTEL	Political, Economic, Social, Technological, Environmental and Legal
PI	Profitability Index
SACCOS	Savings and Credits Cooperatives
SCP	Structure Conduct and Performance
SEDAWOG	Socio-Economics Data Working Group
SIDO	Small Industries Development Organization
SPSS	Statistical Package for Social Sciences
SWOT	Strengths Weaknesses Opportunities and Threats
TAFIRI	Tanzania Fisheries Research Institute
TBS	Tanzania Bureau of Standards
TC	Total Cost
TFDA	Tanzania Food and Drugs Authority

TR	Total Revenue
TVC	Total Variable Cost
TZS	Tanzania Shillings
VIF	Variance Inflation Factor
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Lake Victoria the second largest freshwater lake in the world after Lake Superior in size (Ewald, Närman & Stålgren, 2004) with surface and catchment areas of 68 000 km^2 and 184 000 km^2 respectively. According to Lake Victoria Fisheries Organization (LVFO) report of 2013, the lake is shared by Tanzania (51%), Uganda (43%) and Kenya (6%). The reported lake shoreline is about 3450 km long while 51%, 33% and 16% is in Uganda, Tanzania and Kenya respectively (LVFO, 2013). Turyaheebwa (2014) reported that the fishing industry supported export and local consumption and the production was about 1 million tons per year while Tanzania comprised 66.6% of the total production.

The Lake Victoria basin provides livelihood to about 30 million people, with a rate of growth of 3.5% (Mukasa, 2011). The lake have more than 200 000 fishers whereby 49%, 31% and 20% are from Tanzania, Kenya and Uganda Respectively (LVFO, 2013). The same report indicated that there were more than 600 000 actors involved in fish processing and animal feed industries. The contributions of fisheries to economic growth are seen through the generation of foreign exchange, contributions to gross domestic product (GDP) and revenue generation, household income and employment (Abila, Odongkara & Onyango, 2009). Considering species and biodiversity a total of 500 endemic and introduced fish species while 90 % being from the cichlid family. According to the Lake Victoria Catch Assessment Survey (CAS) report of November 2015, sardines (*Rastrineobola argentea*) constitutes 71.2 % of the total landings in Lake Victoria, Nile perch 16.7%, *Haplochromines* 11.1% and *Tilapines* spp. 0.6%, while the minor fish species contributed 0.4% to the total catch all together.

Mukasa (2013) pointed out that Tanzania is the main exporter of sardine in the region, followed by Uganda. In Tanzania the wholesale market for sardines is Kirumba market located in Mwanza region and is the main wholesale market in Eastern and Southern Africa. LVFO (2016) reported that Tanzania is leading in sardine production and the volumes were 289 873 tonnes in 2010 and increased to 433 845 tonnes in 2015; the value of production increased from US$ 66.8 million in 2010 to US$ 227.7 million in 2015, followed by Uganda in which the volumes rose from 58 717 tonnes in 2010 to 171 210 tonnes in 2015 with the value rising from US$ 5.0 million in 2010 to US$ 32.1 million in 2015.

The existing Lake Victoria sardine business model comprises the fishing equipment owners, fishers, processors, traders, transporters and consumers. The value is created by fishing equipment owners, fishers and processors. The equipment owners work in collaboration with fishers or crew members to fish the sardines. After fishing the processors come at the landing sites and buy wet sardines from the equipment owners for drying, smoking or deep frying. The value delivery is done by traders who buys processed sardines from processors in the landing sites and island and transport and, sell the products at Kirumba and Muganza the whole-sale Markets. The traders at the whole sale markets buy and distribute the processed sardines to domestic and regional markets. Majority of the processed sardine (about 70%) were directed to the animal feed industries (Njiru, Kazungu, Ngugi, Gichuki & Muhoozi, 2008) and 30% is for human consumption. According to Mukasa (2013), sardine products were exported to Kenya, Democratic Republic of Congo, Malawi, Mozambique, Sudan, Rwanda, Zambia, Zimbabwe, and South Africa, and the main products are sun-dried, salted, smoked and deep-fried sardines.

As defined by Osterwalder (2004, p. 15), a "business model is a holistic concept that embraces elements such as pricing mechanisms, customer relationships, partnering and revenue sharing". According to Osterwalder, Pigneur and Tucci (2005, p. 17-18), a "business model is a conceptual tool that contains a set of elements and their relationships and allows expressing logic of specific firm". Teece (2010) argued that a business model denotes the firm's activities for creating and capturing value considering value proposition, the markets and market segments it focuses, the structure of the value chain and value capture as well as the competitive strategy. Foss and Saebi (2015, p. 8) pointed out that the key aspects of business model are the "structures and relations between the firm and its multiple stakeholders that support the value creation and value-capturing processes of the firm".

There are several definitions of a business model; however, this study adopted the definition of a business model by Foss and Saebi (2015) and Teece (2010) as stipulated above. The organizations and collaborations among the fish industry and its actors that support the sardine production, processing and marketing were scrutinized focusing on its structure, conduct, performance and the effects to the local and regional markets. Specifically, it addresses value creation in order to understand what an industry is, how it works and what it offers and to whom.

Basing on the importance of the fishery sector in the provision of employment, income, livelihood, foreign earnings and revenue to the country, this study was intended to characterize the market potential and develop business model suitable for Lake Victoria sardine products focusing on domestic and regional markets. Special emphasis was on the processed sardine product (deep-fried, smoked, and sun-dried on raised racks, sun-dried on grass and nets) as well as sardines dried on sand for the domestic and regional markets. The study analyzed the market orientation and resources commitment (environment characteristics), the available marketing strategies and came up with selected profitable value chains with improved marketing strategies. The author worked closely with the fishery stakeholders in order to identify the industry potentials, opportunities and constraints for domestic and regional markets.

1.2 Research Problem and Justification

1.2.1 Research Problem

Despite the fact that fisheries in Lake Victoria contributes to livelihoods however, the resources is declining due increasing human population at the basin and majority of them lacks alternative livelihoods (Lwenya, Mbilingi, Luomba & Yongo, 2009). Kabahenda and Husker (2009) argued that the growth Nile perch export market has resulted in reduction of fish stock in the Lake Victoria region. The decline in fish threatens the livelihoods of fisher folks and processors as well as the food and nutritional security of the population in the region. Damien and Luomba (2011) pointed out that the decline of Nile perch and Nile tilapia stocks, urbanization as well as the rising in price of other protein sources, the demand for sardine has expanded considerably. However, despite the increased demand of sardine products, the livelihoods of actors along the value chain were not promising. Omwega, Abila and Lwenya (2006) reported that fishers in Lake Victoria were regarded as poorest group of people in all sectors of the economy. In most cases, fish marketers are compelled to sell their product at a very low price to avoid huge wastage and in return their marketing margins and marketing efficiency are reduced (Esiobu & Onubuogu, 2014).

The physical loss of sardine in Lake Victoria is known, however, there is a gap in knowing the economic value loss of the same. This can be connected to lack of economies of scale, poor quality and low shelf life of processed sardine which contributes to low prices received by marketers. In addition, the distribution of wealth which trickles down to the improvement of

the livelihood of market participants was not known and it could be captured by analyzing the markets structure, conduct and performance which gives an overview of the marketing efficiency. Efficient marketing system ensures fair distribution of benefits; but research directed towards sardine products domestic and regional markets, there is inadequate information on disparities in prices as well the distribution benefits among the market participants.

Carlucci *et al*. (2015) reported that market-driven demand as well as considering consumer purchasing behaviour towards fish products is important for developing efficient marketing and policy strategies. Therefore, effective marketing system should consider consumer buying decision factors ensures the preferred products are accessible for utilization in the required quantities and quality. The consumer and retailer buying decision factors are an important aspect to consider when determining the marketing strategy in processed sardine products. Fielt (2011) urged that despite infancy of business model in research, the usefulness of the business model concept was pertinent in designing, innovating and managing businesses as conceptual models and tools. However, in the sardine industry little is known about the existing business models of sardine products for domestic and regional markets.

1.2.2 Research Justification

Fish is important in the diet because it has a high nutritional value with an array of amino acids, vitamins and minerals (Oparinde & Ojo, 2014). Sardine products are cheaper as compared to other animal protein sources in Tanzania (Ministry of Agriculture, Livestock and Fisheries [MALF], 2016). Sardines are one of the major commercial species in Lake Victoria and leads with 71.2% in the catches (Catch Assessment Survey [CAS], 2015). Sardine produces nutritive source for low-income groups in the region (Indian Ocean Commission [IOC], 2012). Carlucci *et al*. (2015) reported that the consumption of fish decreases the risk of cardiovascular diseases as because it contains Omega-3. The same author argued that Omega -3 contains *ieicosapentaenoic acid* (EPA) and *docosahexaenoic acid* (DHA) and consumption of about 250- 500mg of EPA and DHA per day has been proved scientifically to reduce the risk of death from heart diseases (Food and Agriculture Organization of the United Nations/World Health Organization [FAO/WHO], 2011). In 2013, the fisheries sector contributed 1.4% to Tanzanian Gross Domestic Product (GDP) and fishery industry accounted for 10% by value of national exports (Ministry of Livestock and Fisheries Development [MLFD], 2014).

Since the sector is paramount to economy, food security and health, this study conducted stakeholder analysis in the Lake Victoria fisheries focusing on the contribution of the sardines to communities' livelihood as well as the stakeholders working relationships and its effect on the production and marketing efficiency of processed sardine products. In addition, the structure, conduct and performance of the processed sardine products was analyzed to understand the competitive position of the products. The stakeholders' roles, marketing efficiency and consumers' buying decision factors analysis lay the foundation for the development of an inclusive business model for processed sardine products in Lake Victoria Tanzania side.

1.3 Objectives

1.3.1 General Objective

The overall objective of this study was to characterize market potentials and develop inclusive business models of sardine products for domestic and regional markets. The focus was on analysing the profitable market segments for sardines by using structure, conduct and performance framework, identifying and describing stakeholder roles along the values chains as well as determining consumers' buying behaviour in order to develop inclusive business models to cater for fishers, processors and traders.

1.3.2 Specific Objectives

The specific objectives were:

(i) To identify and describe roles of stakeholders along the sardines products value chains
(ii) To analyze the structure, conduct and performance of processed sardine products in domestic and regional markets.
(iii) To study the factors determining consumer buying decisions for processed sardine products.
(iv) To develop and test business models with stakeholders for strategic interventions for sardines.

1.3.3 Research Questions

Drawing lessons from the fishery industry and specifically the Lake Victoria sardine market potential and development of inclusive business model, this study was designed to address the following four key research questions:

(i) What are the roles of different stakeholders along the processed sardine products value chains?
(ii) What is the marketing efficiency of processed sardine products?
(iii) What are the factors determining consumers' buying decision for processed sardine products?
(iv) Which inclusive business model is most suitable for processed sardine products?

1.4 Research Framework

To respond to an important research question on which was an inclusive business model for processed sardine products, it was essential to analyze the existing markets and create a structure for the business model and its components. The analysis of the existing markets included the macro and micro levels of the fishery industry. The macro level consisted the analyses of the macro-economic business environment, which resulted in an overview of the government interventions in the fishery industry as presented in Fig.1 using PESTEL framework.

The micro level of the fishery industry considered the analysis of the sardine industry and its existing business models as explained in the research framework which included stakeholders' analysis, domestic and regional markets analysis and processed sardine products consumer perception and buying decisions factors. To understand well the factors that determine consumers' buying decision of different processed sardine products; the consumers buying decision theory was employed. The results of the analysis of stakeholders, markets and processed sardines product perceptions a proposed business model was developed to fits the industry's requirements. The data required for the analysis of the existing conditions came from review of the existing business models and business relationships. In addition, the key informants and focus group discussions were conducted to value chain actors with experience in the fisheries to complement the review information. The information were collected from representatives of fishers, processors, traders, boat owners, and beach management units

(BMU) representatives as well as from relevant ministries, supporting institutions, regional bodies and research institution

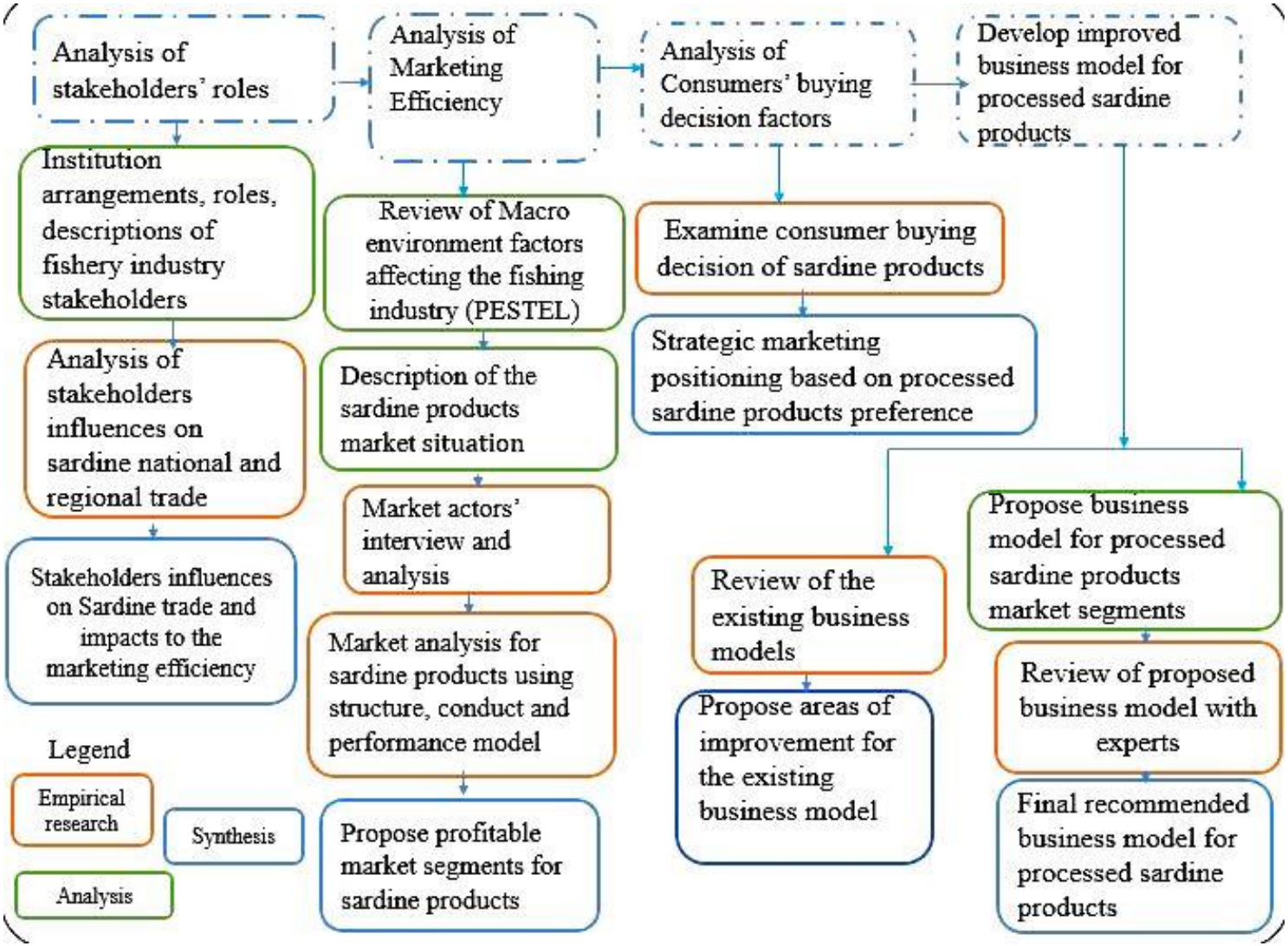

Figure 1: Research Framework

1.5 Significance of the Study

Development of efficient, effective and innovative inclusive business models for sardine products that cater for fishers, processors and traders as well as the identification of the opportunities and threats in the sardine industry are prerequisites for sustainable competition in local, regional and global settings. The findings of the study proposed innovative business model by calling for collective production and marketing of sardine products at domestic and regional markets which caters for all actors along the sardine value chains. The values creation should focus much on quality and consumer needs to improve marketing efficiency and hence the livelihoods of actors. The innovation focuses on product, organizational and marketing whereby product quality based on consumers' preferences is key to increasing profit margins. Organizational innovation calls for formation of producers and marketing groups in order to increase economies of scale, access to markets, market information and formal business loans.

The study identified and propose innovative markets with high profit margins for the development of the sardine products industry. It is expected that the findings from this study supports policy makers and market participants in proper planning, decision-making and allocation of resources for the improvement of the fisheries industry as well as livelihoods of market participants along the value chain. Academically, the development of business models showing the actors, actions and sub actions as well as the impacts (AASI business models) will be a starting point for further research in the agriculture, tourisms sectors and other related sectors in order to come up with inclusive, efficient and effective business model for improving livelihoods of actors along the value chains.

1.6 Scope of the Study

The present study was undertaken from October, 2015 to November, 2018 and involved three regions along the Lake Victoria namely as, Mwanza, Mara and Kagera. In Mwanza region, the districts covered were Ilemela, Ukerewe and Nyamagana and Sengerema while in Mara region, Musoma Rural and Rorya districts were involved. In Kagera region, the districts involved were Muleba and Bukoba Rural. The focus of the study was to analyze the processed sardine products market potential and develop an inclusive business model to cater for all stakeholders along the value chain. In order to develop an inclusive business model, the current business model and working relationship among stakeholders was analyzed using stakeholder theory,

markets were analyzed using structure, conduct and performance model and buying decision factors of consumers was analyzed using Howard Consumer Behaviour Theory.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In order to answer the research questions, it was pertinent to review previous studies in relation to the roles of stakeholders in the industry and how to analyze their influences. In addition, studies in relation to marketing efficiency were reviewed as well as the consumers' buying decision models and theories. Therefore, this chapter presents a review of literature related to marketing of fish products as well as the stakeholder theory and available methods for analyzing stakeholders. The marketing efficiency was reviewed in relation to structure, conduct and performance studies which gives an overview on the models and information required for analysis. Consumers' buying decision models and theories and the available methods/models for analyzing the consumer buying decision factors were reviewed. Furthermore, the review was extended to describe the concepts of the innovation, business model, and business macro environment factors. The literature review was important to help the authors and readers in understanding the theoretical frameworks and main concepts used in the thesis.

2.2 The Stakeholder Theory

According to Freeman (1984, p. 31) the "word stakeholder first appeared in the management literature in an internal memorandum at the Stanford Research Institute in 1963". The notion of the stakeholder is defined as cluster of people where by without their supports the association or industry would stop to exist (Freeman & McVea, 2001). Freeman (1984, p. 31) defines a stakeholder as "any individual who affects or is affected by the achievement of the organization's objectives". Hult, Mena, Ferrell and Ferrell (2011) argued that stakeholders affects or are affected by the industry virtually.

According to Mitchell, Agle and Wood (1997) and Kull, Mena and Korschun (2016) reported that stakeholders are categorized based on power and legitimacy. According to Kull *et al.* (2016) power denotes stakeholders' influence on others and legitimacy is the actions of a stakeholder which comply with firm's norms and values. As grounded on the borders of what constitute a stakeholder, stakeholders are regarded as primary and secondary (Hult *et al*., 2011). Hult *et al.* (2011) and Clarkson (1995) reported that primary stakeholders have power and visible because of their importance in decision making as well as the assessment of the demands. Secondary stakeholders are influenced, affect and are affected by the industry

however important for the survival of the firm (Hult *et al*., 2011; Kull *et al*., 2016; Clarkson, 1995). According to Freeman *et al.* (2010) and Freeman (1984) argued that the stakeholder theory gives solutions of value creation and trade. Stakeholder theory is about value creation and trade and how to manage a business efficiently and create as much value as possible. The theory deals with nature of collaborations among the market participants based on practices and results for the industry and stakeholders (Hult *et al.*, 2011). Based on the above explanation and analysis of the stakeholder theory by different scholars, the theory was adopted to describe and examine the framework of Lake Victoria processed sardine products stakeholders' relationship focusing on processes, structures, practices as well as how profit is distributed among them and performance of the industry at large. In addition, an inclusive method was adopted to analyze the influence of different actors along the value chain.

2.2.1 Stakeholder Theory and Marketing

Polonsky, Suchard and Scott (1999) applied stakeholder theory to analyze the industry and the business environment. They concluded that the industry and its surrounded business environment are interdependent while most components of the external environment influences the firm, therefore the firm must apply stakeholders theory in order to integrate marketing strategies for improving value creation . The Porter (1980) five forces model helps to design and modify the industry business environment; however, Polonsky *et al.* (1999) argued that the model did not considers many forces that influences the business including the government as force as it interacts with the firms as well as can affect the business. According to Kotler (1972) and Hult *et al*. (2011) marketing is about creation, facilitation, stimulation and valuation of transactions. Therefore marketing "comprises two or more social units each consisting more than one human actor while one of the social unit is seeking" a service while the other social unit provided the value needed to the market (Hult *et al*., 2011, p. 55).

The "marketing stakeholder concept offered is derived from the normative foundations of business ethics and the descriptive and instrumental application of stakeholder theory" (Hult *et al.*, 2011, p. 48). According to Bhattacharya and Korschun (2008) and Freeman *et al*. (2010), the marketing discipline by definition is the relationship between the industry and its consumers.

According to Kull *et al*. (2016), stakeholders marketing is beginning to take shape. The authors pointed out that drawing on the stakeholder theory and its theoretical foundations (Freeman,

1984; Freeman *et al*., 2010) and on the recent conceptual expansion of marketing's scope (Kull *et al.*, 2016), stakeholder marketing refers to "activities within a system of social institutions and processes for facilitating and maintaining value through exchange relationships with multiple stakeholders*" (*Kull *et al.*, 2016, p. 5557; Hult *et al*., 2011, p. 46). The concept considers the potential of stakeholders to influence marketing actions (Hult *et al*., 2011; Kull *et al*., 2016; Bhattacharya & Korschun, 2008; Korschun, 2015).

Based on the focus of stakeholder theory whereby it interconnects business issues related to value creation and trade as well connecting beliefs and entrepreneurship and developing managerial attitude to reconsider the outdated ways of hypothesizing the responsibility of the industry. This study adopts the stakeholders' theory for analyzing the stakeholders in Lake Victoria fisheries focusing on the value creation and marketing aspects whereby the analysis of institutional arrangements, processes and working relationship with the view to improve the value creation and trade of processed sardine products.

2.3 The Concept of Market Structure, Conduct and Performance

The market structure, conduct and performance (SCP) framework was derived from the neoclassical analysis of markets (Shaik, Allen, Edwards & Harris, 2009; Ahiakpor & David, 2015). SCP was developed by the Harvard school of thought and popularized during 1940-1960 and its empirical work involved the identification of correlations between industry structure and performance (Shaik *et al*., 2009; Mkunda, Lassen, Chachage, Kusiluka & Pasape, 2019). The standard SCP paradigm claims that there is a direct relationship between the degree of market concentration and the degree of competition among firms within the industry (Shaik *et al*., 2009; Ahiakpor & David, 2015). The basic tenet of the SCP paradigm is that the economic performance of an industry is a function of the conduct of buyers and sellers which, in turn, is a function of the industry's structure (Luo, 2014; Mkunda *et al*., 2019).

According to Irhivben, Enyioko, Oluwafemi and Yusuf (2015, p. 429), *a "*marketing system is said to be good, if the structure, conduct and performance is critically examined*"*. In order to solve the issues related to production and marketing of Lake Victoria sardines, understanding the structure, conduct and performance of the markets is important. The market structure that exists determines the marketing efficiency (Nzima & Dzanja, 2015). Oparinde and Ojo (2014) argued that market structure, conduct and performance defines the market situation which in turn increases the income distribution as well as the marketing efficiency.

2.3.1 Market Structure

Market structure is "the physical appearance of the market in term of the degree of product differentiation, market integration, concentration" (ABDLatif, Tijani, Abdullah & Mohammed 2014 p. 147). According to Adakaren (2014), market structure is the number and distribution of firms' measured by magnitude and concentration, the depiction of products and product diversity and entry situations. The same author pointed out that market structure can be analyzed by looking at the concentrations of sellers and buyers, product diversification, the entry and exit obstacles as well as the welfare distribution. The structure of a market influences the competition level and bargaining power of the market participants (Pomeroy & Trinidad, 1995; Oparinde & Ojo, 2014; Irhivben *et al*., 2015).

According to Pomeroy and Trinidad (1995), market structure can be used as a basis for categorizing markets into perfect competition, monopolistic or oligopolistic. The authors went ahead defining perfect completion as an economic model whereby each economic agent acts as if prices are given or each acts as price taker that is no large firm dominate buying and selling, the products are considered homogeneous, free mobility of resource including free entry and exit in the industry. Further the pure monopoly exists when there is only one seller (producer) in the market, there is no direct competitors, obstacles to entry prevents others potential competitors (Pomeroy & Trinidad, 1995). Oligopolistic is said to exist when more than one seller is in the market but the number is not so large. Arene (2003) reported that the market structure analysis outcomes can be judged based on perfect competition, oligopolistic competition and monopolistic competition. Market structure is distinguished based on the market concentration, production and marketing strategies and the availability of market (Adakaren, 2014). Dittoh (1994) concluded a maximum marketing efficiency is observed in a pure competition market.

Market structure can be measured by Gini coefficient which is the measure of distribution of income among the value chain actors within the market. The Gini Coefficient is a statistical measure based on the Lorenz Curve and measures the dispersion of concentrations in the total market and it thus gives a summary of the deviations in percentage shares of sales among the traders (Abila, 1995). The Lorenz Curve displays the distribution of shares of sales among the traders in the market and therefore shows how the actual distribution of market shares differs from the hypothetical situation of actual distribution (Abila, 1995).

In addition the market structure can be determined by the Herfindahl-Hirschman Indices (HHI) which measures the market concentration by showing the number and distribution of firms in a market and concentration output (Rhoades, 1995). The industry concentration is measures by market share distribution among the market participants (Lindblad, Schauerte & Flinkman 2016). HHI considers the relative size and distribution of the firm in the market, quantifying the concentration and market share using the sum of squares of market shares of all firms in the industry (Lindblad *et al*., 2016; Matthes & Poetzsch, 2002). Markets in which the HHI less than 1000 (0.1) is considered to be unconcentrated; markets in which the HHI between 1000 and 1800 (0.1 < HHI>0.18) are termed as moderately concentrated, and those in which the HHI is in excess of 1800 (HHI >0.18) are considered to be concentrated (Matthes & Poetzsch, 2002).

2.3.2 Market Conduct

Adakaren (2014) said market conduct are competitive strategies employed in an industry to run businesses. Bain (1968) refers a market conduct to the patterns of behaviour that the firms follow in adapting or adjusting to the markets which it operates. Pomeroy and Trinidad (1995) expanded the definition by Bain (1968) arguing that it implies the analysis of human behavioral that are not readily identifiable, obtainable or quantifiable. The same author reported that market conduct explains how sellers coordinate competition, responds to market demand and pricing mechanisms as well as advertisement and improving product quality. Therefore, market conduct is about firms' behaviour looking at numerous features of marketing tacks.

2.3.3 Market Performance

Market performance could be viewed as the assessment of the market in terms of efficiency, progressiveness, innovation and employment generation (Tijani, Ismail, ABDLatif, Goni & Fannami, 2014). In determining market performance some researchers used marketing margin, market efficiency and index number. The pricing efficiency is concerned with improving the operation of buying, selling and other connected aspects of marketing process so that it will remain responsive to consumer direction (Olubunmi & Bankole, 2012; Tijani *et al*., 2014; Nwabunike, 2014). Marketing efficiency is centered on four marketing mix, that is nature of the product, pricing, placement and promotional activities employed by marketers in order to capture more customers (Tijani *et al*., 2014).

Markets are said to be efficient if the ratio of output to the input values is higher throughout the marketing system (Irhivben *et al*., 2015). The same authors concluded by saying that market

performance is therefore, the analysis of efficient and effective the marketing is performed and achieve set targets. Marketing margin is the difference in the price of the consumer to the producer (Irhivben *et al*., 2015). In this study, the market performance will be determined by computing the market profit, market margins, market and pricing efficiency.

2.3.4 Empirical Review of Structure-Conduct-Performance (S-C-P) model

As pointed out by Bain (1968), the structure, conduct and performance (SCP) hypothesis seeks to test structural aspects a market which in turn it affects the way of doing business among market participants based on the market structure; hence the behaviour of firms within a market determines the market performance. The causal relationship model is known as the structure, conduct and performance (S-C-P) model. Pomeroy and Trinidad (1995) illustrated the framework as a tool for market analysis from research on fish marketing in Asia and Latin America. The same author said that S-C-P theory states that the market structure measures the market conduct and thereby, sets the level of market performance. The structure, conduct and performance of markets have been analyzed by researchers using various different approaches. For example, Tijan *et al*. (2014) described market conduct and performance of dried fish in Maiduguri Metropolis of Borno State, Nigeria by using marketing margins, market return or net returns, marketing efficiency and pricing efficient. Abila (1995) assessed the market structure, conduct and performance of fish in Kisumu, Kenya by using Gini coefficient, Herflndahl-Hirschman index (HHI), comparing marketing costs and marketing margins.

Nzima and Dzanja (2015) examined the structure, conduct and performance of soybean in Malawi by using Herfindahl-Hirschman Index (HHI), Marketing Margins, Marketing Efficiency Index (MEI), Price Spread, Cobb Douglas Production Function, and Spatial Market Integration (using bivariate correlation coefficients of price difference). Oparinde and Ojo (2014) investigated the structural performance of artisanal fish marketing in Ondo State, Nigeria by using Gini coefficient, Herflndahl-Hirschman index (HHI), concentration ratio, gross margins, net returns and marketing margins. Irhivben *at el*. (2015) analysed the structure and performance of Catfish market in Ibadan Metropolis, Oyo State, Nigeria by using Gini coefficient, gross margins, profit margins and market efficient. This study, used S-C-P model to evaluate the structure, conduct and performance of sardine products markets in the study area. Specifically, the study used Gini coefficient, Herflndahl-Hirschman index (HHI), profit margins, marketing margins, pricing efficiency and marketing efficiency index. Therefore, this

study adopted the existing measures of market structure and performance to analyze the processed sardines markets in Lake Victoria Tanzania side.

2.4 An Overview of Consumer Buying Decision Making

Mandl, Felfernig, Teppan and Schubert (2011) argued that in early 18th century, economics started exploring the knowledge about consumer decision-making processes. Richarme, (2007) argued that the first consumer decision making theory considered that consumers make buying decisions based satisfying their needs and wants. According to Bernoulli, consumers' selection is based on optimized satisfaction (Mandly *et al*., 2011). The perspective based on the Utility Theory recommends that consumers' selections are determined by outcomes provided by the product in question (Schiffman, Hansen & Kanuk, 2007). Neumann and Morgenstern (2004) introduced four axioms in the Utility theory that explains a rational decision maker as completeness transitivity (preferences are consistent), independence and continuity "Where utility theory views the consumer as a rational economic man" (Schiffman *et al*., 2007; Petra, 2012), Consumer Behaviour studies reflects a number of factors that influences customers which includes products recognition, brand information and evaluation which builds the purchase intention (Petra, 2012).

Blackwell, Miniard and Engel (2006, p. 234) said "consumer buying behaviour is a complex and dynamic issue which cannot be defined easily". Solomon, Bamossy, Askegaard and Hogg (2006, p. 221) describes "consumer buying behaviour as a process of choosing, purchasing, using and disposing of products or services by the individuals and groups in order to satisfy their needs and wants". Schiffman *et al*. (2007) said consumer behaviour involves selection and purchase product and services based on their purchasing power to satisfy their need and wants. Consumer buying behaviour involves the processes of individuals and groups when "selecting, purchasing, using, and disposing of products and services, to satisfy needs and wants" (Kotler & Keller, 2011, p. 105). The following sections describe the consumer buying behaviour modelling from different scholars.

2.4.1 Nicosia Consumer Behaviour Model

Hess (1967) argued that Nicosia attempted to present the hypothetical models for assessing and forecasting consumer decisions. According to Hess (1967) the model integrates the classic economics and behavioral sciences. The model has four interaction fields (Lopez, 2016; Milner & Rosenstreich, 2013) as shown in the Fig. 2. The first field includes all processes of the

message aimed to consumer, such as advertising and other form of promotion for influencing their attitudes through firm attributes and consumer attributes, known as consumer predispositions (Lopez, 2016; Milner & Rosenstreich, 2013). The second turf includes the immediate response to the message where consumers shape consumers' attitudes, evaluate the alternatives for entering the active phase of the model (Milner & Rosenstreich, 2013). The third field the consumer develops a motivation to act, also called behaviour in other models (Lopez, 2016), and then it acts.

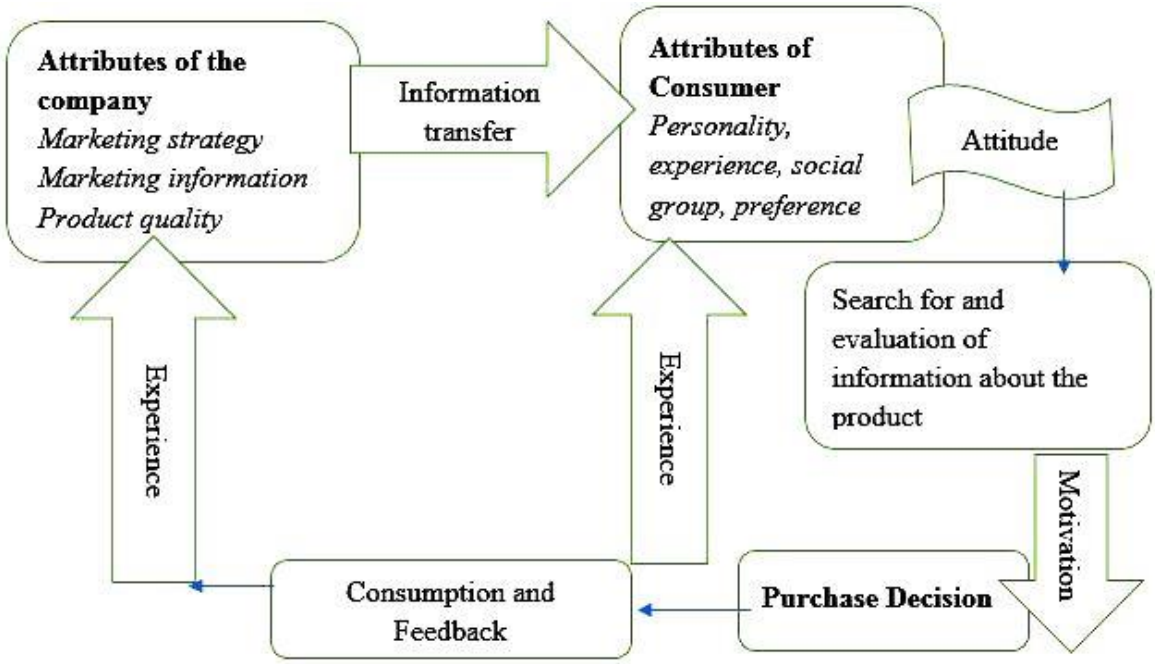

Figure 2: Nicosia Model of Consumer Decision Process (Prasad & Jha, 2014)

Lopez (2016) pointed out that Nicosia model recognizes that there are differences between the formation of attitude and behaviour. The model shows the shared connection between the firm and the consumer (Prasad & Jha, 2014) as well as assimilate the two traditionally different disciplines of classic economics and behavioral sciences (Hess, 1967). These are very important factors in relation to food products marketing as consumers have the opportunity of giving feedback to the food industry and this helps the company to reposition and improve the food quality.

2.4.2 Engel, Kollat and Blackwell Model

Milner and Rosenstreich (2013) reported that the strong point of the reviewed model is the response part which permits for repetitions of incomplete decision-making. Lopez (2016) pointed out that the Engel et al model consists of five kinds of concepts, the first is the input, which refers to the information received by the consumer, second the process of receiving information and third the decision making process which is more frequent in the results of buying process. Finally, are the variables that impact the decision making procedure that are widely about motivation (Lopez, 2016). Milner and Rosenstreich (2013, p. 113) reported that the "linear nature of the model is the source of criticism as it is recognized that the elements of the buyer decision-making process do not necessarily occur in a set sequence and some may in fact occur concurrently".

2.4.3 Howard and Sheth Model (The Theory of Buyer Behaviour)

The model was established in 1969 (Fig. 3**)** with the objective of describing how consumers associate diverse products in order to choose unique and preferred product to suits their requirements (Prasad & Jha, 2014). According to Lopez (2016) the model shows the process that affects the behaviour of the individual includes the perception and attitude towards the product. The same author argued that the exogenous variable include culture, social class, personality and economic level.

According to Skiffman and Kanuk (1997) and Milner and Rosenstreich (2013) the model portrayed a stream of information that progressed through four components. The first component are inputs also known as marketing and social stimuli, followed by the perception constructs and this is all about attention and information search, as well the learning constructs which focuses on motives, brand comprehension which leads to attitude, confidence, intention, and satisfaction Milner and Rosenstreich (2013). The last construct as per authors was the outputs which includes the purchase intention, attitude and brand comprehension (Lopez, 2016).

Lopez (2016) pointed out that the vertical arrows represent the direction of behaviour. Skiffma and Kanuk (1997) described the output variables of the model represent the buyers' response, and follow the progressive progression to purchase. The authors said the "*comprehension"* represents the processed and understanding of the information that is used. Availability of information creates consumer *attitudes* and is "the buyer's evaluation of a brand's potential to

satisfy the needs"; while *intention* describes the consumers "forecast of which product they will buy and *purchase behaviour"*, the purchase behaviour (Lopez, 2016, p. 1335).

The same author aregued that greatest contribution of Howard and Sheth model is that; the model accepts that the consumer is an active seeker of information from the environment by using past experience which constitute as a guide in their decision making. Milner and Rosenstreich (2013, p. 115) argued that the Howard and Sheth model is complex with multiple variables and relationships. The authors argued that the concepts such as "attitude formation, predisposition and time were introduced as well as an overarching sense of perceptual constructs and learning constructs".

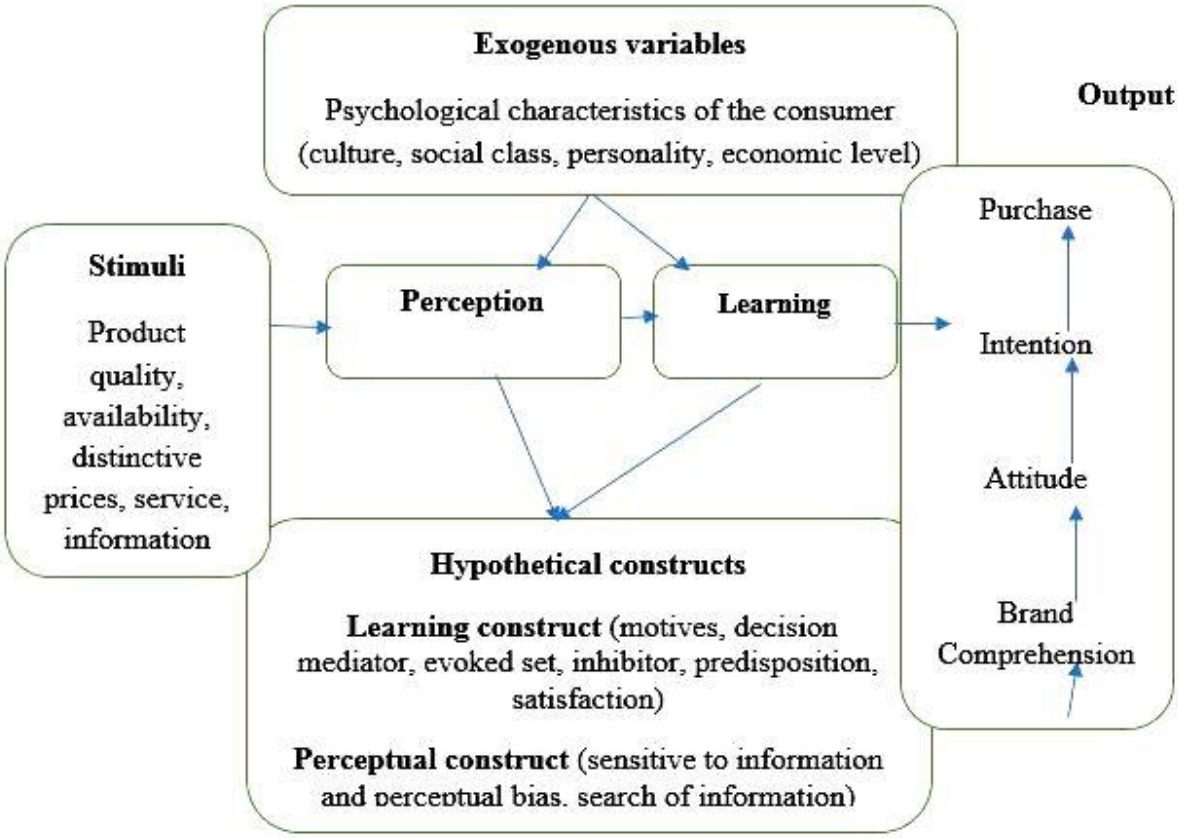

Figure 3: Howard and Sheth Model (Modified from Milner & Rosenstreich, 2013; Lopez, 2016)

According Milner and Rosenstreich (2013) Howard and Sheth model is complex and is one of its inadequacies. This is a revolving fact in development of consumer decision models (CDM), the Nicosia model was developed from clear formulae and grasps level of mathematical thoroughness, the Howard and Sheth model begins the consumer behaviour inclining from statistical inferences to theoretical models (Milner & Rosenstreich, 2013). Lopez (2016)

concluded by saying the model failed to explain the effect of exogenous variable to learning and perception processes.

The Howard model has been revised in the 1970s to the existing version printed in 1994. Engel, Kollat and Blawell (1978) reported that the Howard model of 1975 was grounded on the review of Howard-Sheth model. Howard model depicts the consumer decision process, encompassing six related concepts, these are "Information (F), Brand recognition (B), Attitude (A), Confidence (C), Intention (I) and Purchase (P)" highlighted in green in the Fig. 4 (Howard *et al*., 1988).

2.4.4 The Howard Model (Theory of Consumer Behaviour)

According to Howard (1989, p. 203), the model represents the "information (F) what enables the consumer to recognize the product, evaluate it and form an attitude (A) as well as mentally create a level of confidence (C**)** or certainty in order to judge whether the product will provide satisfactory or unsatisfactory results". The consumer looks for information from external stimuli such as advertisement, "friend, store personnel and interpersonal communication" (Acebrón, Mangin & Dopico 2001, p. 78), as well as memory. The authors pointed out that using the information the consumer then identify the product, product group. The authors argued that habits and experiences represents the internal source of information for the consumer and this have influence buying intention as well as product evaluation. According to Acebron *et al*. (2001) the past experience with the product, eating habits and information represents the parameters of the first part of the model (Fig. 4).

According to Acebron *et al.* (2001, p. 81), attitude towards the product can be defined as "the predisposition towards the product, which is made up of three components the cognitive (credence), the affective (feeling) and the conative (behaviour) and is conditioned by prior experience, habits, information and confidence". According to Lutz (1991) the consumer's attitude determines the buying intention.

Confidence is connected to Intention (I), when Attitude (A) is high (Howard *et al*., 1988, p. 7). A favorable attitude leads to intention and it increases greater when confidence is high (Howard, 1989; Howard *et al*., 1988). If the attitude is favourable and the subject indicates confidence in evaluating the product, confidence definitely supports the product purchase (Acebron *et al*., 2001). Howard (1989, p. 115) defines confidence as the "buyer's degree of certainty about his ability to correctly judge a product, which increases with the positive

experiences gained as a result of trying the product or receiving favorable information from external sources". "Confidence the ability to evaluate the product and attitude also have a bearing on the intention to buy a product, which is defined as the subject's plan to buy a specific number of product units" (Acebron *et al*., 2001, p. 78). The authors argued that as confidence increases and attitude becomes more favorable toward a product, the intention to buy becomes stronger.

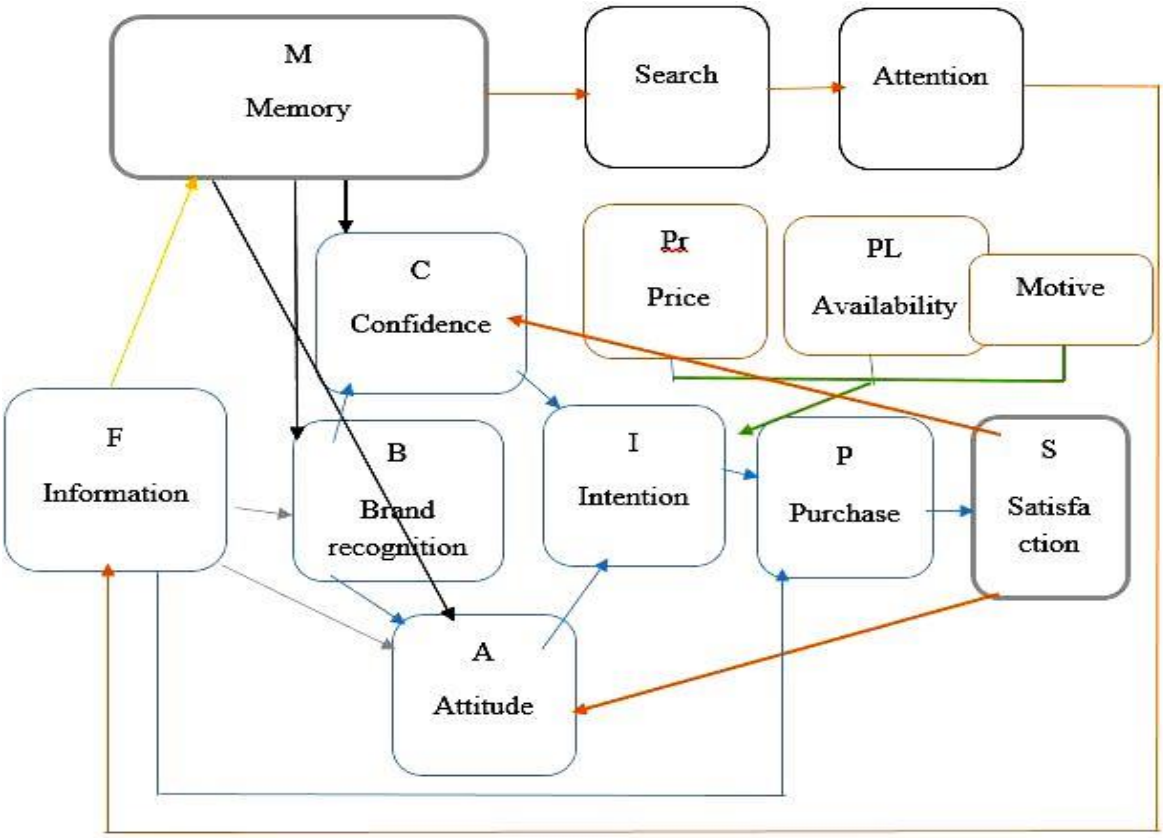

Figure 4: Consumer Decision Making Model (Theory of Consumer Behaviour) Howard (1994) and Howard *et al*. (1988, p. 7).

Lopez (2016, p. 1335) argued that the "intention (I) to purchase represents the mental stage reflecting the consumer's intention to purchase a specified quantity of a particular brand within a specified period and is viewed as a predictor of Purchase (P)". According to Howard (1994, p. 302) "Intention (I) is influenced by product price (Pr) and availability (PL)". As depicted in Fig. 4, "Intention (I) is not only influenced by Price (Pr) and Place or availability (PL) but also by motives". Howard (1989) provides a systematic explanation of the process through which consumers buy. The consumer buying decision is an important aspect to consider when determining the marketing strategy in processed sardines products. This is due to the fact

that it has substantial implication on the success of the product in both domestic and regional markets. Consideration of consumer's behaviour is an important factor for economic agents as consumer's behaviour is a complex practice and most marketing decisions are inclined on theoretical around the consumer's behaviour (Cornescu & Adam, 2015).

According to Cornescu and Adam (2015, p. 658) the factors that affect buying decisions are those of a "personal, psychological and sociological nature". The authors consider that "personal factors include characteristics that are specific for a person, such as demographic factors: age, sex, family size, marital status, income and education levels ". Social factors are represented b "opinion leaders, reference groups, family members' influence, social class and cultural level while psychological factors include; perception, motivation, personality and attitude". Acebron *at el*. (2001) said that consumer's behaviour is also approached and analysed from the viewpoint of marketing; the most common standpoint is the one created by encouraging consumption. As explained in Fig. 4 consumer behaviour factors as articulated in the Howard (1989) model. According to Lopez (2016) the model is simple and supported by facts and quantitatively verifiable hence it has been used in marketing simulation. Since the model is statistically verifiable the model was adopted for the analysis to determine factors determining consumer buying decision of Lake Victoria sardines products. Hence the Howard theory of Consumer behaviour allows development of the consumer decision making proposed conceptual model and hypotheses to be tested to determine the consumer buying decision factors and methodology.

2.4.5 Empirical Review of Consumer Buying Decision Models

The study reviewed the Nicosia model of consumer buying decision process, Engel, Kollat and Blawell model, Howard and Sheth model and Howard Consumer buying decision model. The review aim at giving an overview of different consumer buying decision models focusing on how empirically the model can be used to analyze consumer buying decision factors for Lake Victoria processed sardine products. Nicosia model of consumer buying decision was criticized by analysts because it was not mathematically verified and because of the fact that most of the variables were not clear (Prasad & Jha, 2014), hence the model was not adopted for determining buying decision factors for processed sardines products.

The weakness of Engel, Kollat and Blawell model was very applicable to the consumer decision making process in food products; because the consumer variables were important in

decision making. Issues related to product quality and nutrition are very important for decision making process as it creates awareness of the product, then preferences arise and the need to judge the product effectiveness and hence purchase. However, linearity of the model was the major weakness. The complexity and failing to consider mathematical models in testing the model was the major shortcomings of the Howard and Sheth Model. Another shortcoming was the linearity and failing to explain the effect of exogenous variable to the learning and perception process of consumers. Howard consumer buying decision model was adopted for analyzing consumer buying decision factors for Lake Victoria processed sardine products because the model was quantitatively verifiable and it has been used in marketing simulation.

2.5 The Concept of Business Model

Foss and Saebi (2015, p. 5 - 6) argued that the term "business model" was "introduced in the late 1950s but hardly used in popular or research publications until the 1990s, and only with the hype of the Internet did it reach a first peak in 2000". In spite of the dissimilarities in the explanations and hypothetical of business models and agreement in sense is coming up in the literature (Foss & Saebi, 2015). Foss and Saebi (2015, p. 8) argued that scholar agrees common understanding that business models denote the firm's core logic for creating and capturing value by specifying the firm's fundamental value proposition(s), the markets and market segments it addresses, the structure of the value chain which is required for realizing the relevant value proposition, and the mechanisms of value capture that the firm deploys, including its competitive strategy. The important feature of business models is the structures and relations between the firm and its numerous actors that support the value creation and value-capturing practices of the firm (Foss & Saebi, 2015)

"A business model is a conceptual tool to help understand how a firm does business and can be used for analysis, comparison and performance assessment, management, communication, and innovation" (Osterwalder *et al*., 2005, p. 11). Teece (2010, p. 173) describes that a "business model articulates how the company will convert resources and capabilities into economic value". Osterwalder and Pigneur (2010, p. 27) describes a "business model as a series of elements, the value proposition (product/service offering), customer segments, customer relationships, activities, resources, partners, distribution channels and cost structure, and revenue model".

The business model "describes the system of interdependent activities that are performed by the firm and by its partners and the mechanisms that link these activities to each other" (Zott & Amit, 2010, p. 222). Teece (2010, p. 174) said a "business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit". Santos, Spector and Van der Heyden (2015, p. 44) argue that business models are all about "how is it being done?" rather than "what is being done," "what is the segment being addressed?" and "how is revenue being captured?" The underlying argument is that business models uniquely address "how" issues, whereas the other issues are treated in the extant body of literature on marketing and competitive strategy (Foss & Saebi, 2015). The same authors argued that in such an interpretation, business models are fundamentally about the activities under the control of the firm that allow it to exploit an identified opportunity in the marketplace.

In this study a business model is focusing on "value proposition, the value creation and delivery and value capture" (Bocken, Short, Rana & Evans, 2014, p. 43). The value proposition as defined by Kambil, Ginsberg and Bloch (1996, p. 6) "is how items of value (product and service features as well as complementary services) are packaged and offered to fulfill customer needs"? "Value creation is at the heart of any business model; businesses typically capture value by seizing new business opportunities, new markets and new revenue streams" (Teece, 2010, p. 175). "Value capture is about considering how to earn revenues from the provision of goods, services or information to users and customers" (Teece, 2010, p. 172).

2.5.1 Concept of Innovation and Types of Innovation

An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external. The minimum requirement for an innovation is that the product, process, marketing method or organizational method must be new (or significantly improved) to the firm. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organizations (Organization for Economic Cooperation and Development [OECD/Eurostat], 2005, p. 46).

The Oslo guideline (Organization for Economic Cooperation and Development (OECD/Eurostat, 2005, p. 47-51) has defined four types of innovations and these are, product, process, organization and marketing innovations. Product innovations involve significant

changes in the capabilities of goods or services by producing entirely new goods and services and significant improvements to existing products are included. Process innovations represent significant changes in production and delivery methods. Organizational innovations refer to the implementation of new organizational methods and these can be changes in business practices, in workplace organization or in the firm's external relations. Marketing innovations involve the implementation of new marketing methods and it can include changes in product design and packaging, in product promotion and placement, and in methods for pricing goods and services. In this study, product, process organization and marketing innovations were analyzed along the Lake Victoria sardine products. Issues related to new and improved products, changes in production and delivery methods and changes in product design and packaging was also examined in detail.

2.5.2 Business Model Innovation

Business models are considered as both a vehicle and a foundation of innovation (Foss & Saebi, 2015). Research focusing on business models as enablers of innovation has described the business model as a "device that mediates between technology development and economic value creation" (Chesbrough & Rosenbloom, 2002). Foss and Saebi (2015, p. 20) argued that business models are increasingly being perceived as a likely unit of analysis and initial point for innovation strategies. Same authors defined a business model innovation as "realignment of activities, relations, routines, and contracts which results in configuration of how the firm creates and captures value in the market in which the firm competes". Koen, Bertels and Elsum (2011, p. 54) "classify business model innovation along the three dimensions of innovation in technology, value network, and financial hurdle rate, Giesen, Berman, Bell and Blitz (2007, p. 29) and Lindgart, Reeves, Stalk and Deimler (2009, p. 6) conceptualize business model innovation as innovations in value proposition, revenue model, and operating model". The definition of a business model innovation by Giesen *et al*. (2007) and Lindgart *et al*. (2009) will be adopted in this study.

2.5.3 The Business Environment

Osterwalder and Pigneur (2010, p. 206), pointed out that "developing a good understanding of the business environment gives stronger and competitive business models". Johnson, Scholes and Whittington (2006, p. 65) defining the "macro-environment as broad environmental factors that impact to a greater or lesser extent on almost all organizations, and these include political,

economic, social, technological, environmental and legal (PESTEL)" factors. The same authors proposed the PESTEL framework as a tool to analyze the macro-environment factor of an organization. Jonson *et al.* (2006) argued that within this broad general environment the next layer is called an industry or a sector and this is a group of organizations producing the same products or services. The framework as proposed by Jonson *et al.* (2006) was adopted and used in this study. Johnson *et al*. (2006) analyzed the six forces on basis of the PESTEL-model. The mapping of macro-economic environment factors in of Lake Victoria sardines was pertinent to identify the structural drivers of change within the fishing industry. By undertaking such an analysis, it provided a better understanding of the external factors that are capable of both having significant impact on industry operations and shaping the sector strategies into the future. In this regard, in the PESTEL analysis was used to analyze the factors that influence the sardine products as described in Fig. 5.

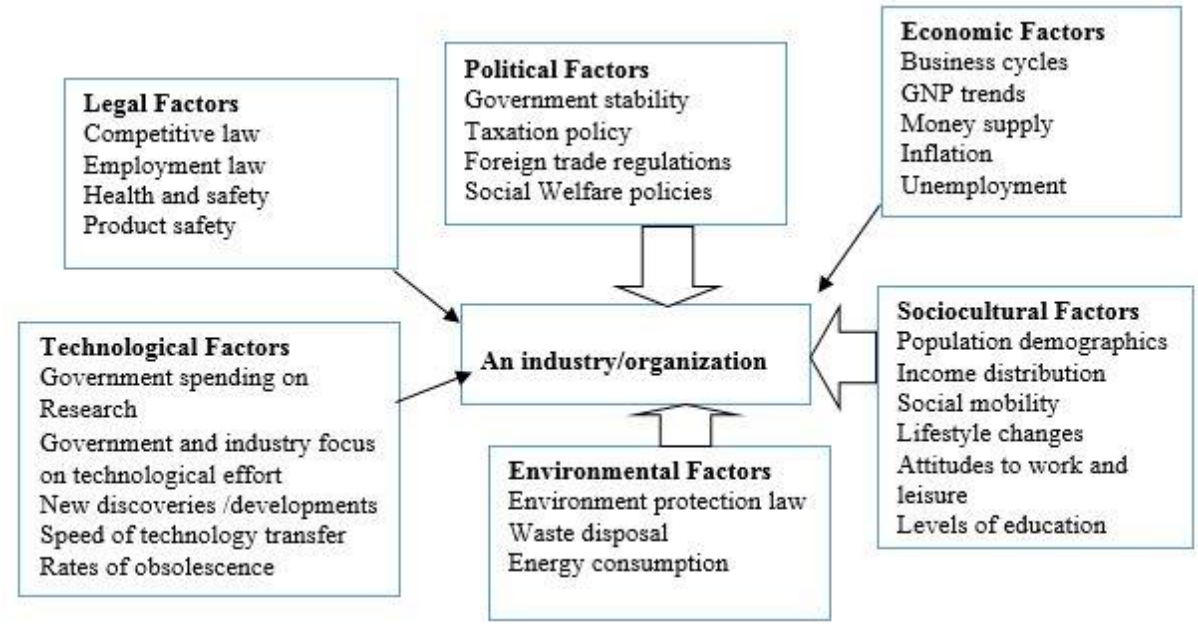

Figure 5: The Macro-Environment Influences (Johnson *et al*., 2006, p. 68)

2.6 PESTEL Review of Lake Victoria Fishery Industry

According Johnson, Whittington and Scholes (2011, p. 68) macro environment can be categorized into six factors; "Political, Economic, Social, Technological, Environmental and Legal factors, which in short is known as PESTEL". The analysis is a comprehensive method of understanding business environment by determining the exact trends of the market from a macro-environment point of view (Islam & Mamun, 2017). Aldehayyat, Khattab and Anchor

(2011) argued that the PESTEL analytic method defines the building of macro-environmental factors for establishing business strategy. The macro-level factors at the industry level clarifies risks associated with the business (Perez, 2014). The same author said that PESTEL approach manages potential risks in the business environmental, however the factors are uncontrollable at the industry level. Islam and Mamuna (2017) argued that PESTEL analysis helps investors to make decisions about investment. The following subsections review the macro-business environment for the fishery industry in Tanzania and its implication to sardine trade.

2.6.1 Lake Victoria Fisheries Political and Legal Factors Review

Fisheries regulations focuses on justifiable utilization of fishery resources and the regulations are entrenched into the Fisheries Act (IOC, 2012). According to MALF (2016), the prevailing legal and regulatory framework appropriate to the fisheries sector are found in Fisheries Act (CAP 279) of 2003 and the Tanzania Fisheries Research Institute (TAFIRI) Act (CAP 280) of 1980, and other related laws and regulations. The Government of Tanzania was well set to regulate the fishery industry through the available legal instruments and institutions established in order to attain the broader policy vision. The Fisheries Regulations, 2009 describes the technical provisions to the sector (MLFD, 2010).

In order to ensure consumer safety and control fish products contamination, the Government has established well and equipped microbiology and chemical analysis laboratories (NFQCL), which deal with quality control of fish and fish products and it is occasionally audited by the European Commission. Before exporting the fish and fish products based on the 2009 Fisheries Regulations, the processing activities must be verified by the NFQCL. The NFQCL is responsible for checking the product quality and provide health certificate as well as the fish movement permit. However, the domestic and regional trade in fishery products have barely had any active food safety controls (MALF, 2016). This implies that the domestic and regional traded products were not inspected for safety controls and results in high post-harvest losses and contamination with different types of hazards. This calls for safety control interventions as stipulated in the Fisheries Regulations, 2009 for domestic and regional trade of fish and fish products in order to reduce post-harvest loss as well as harmful hazards. In addition, the Fish Education Training Agency (FETA) and NFQCL were promoting sardines value addition by providing training on processing and packaging materials for processed sardines (hot-smoked, deep-fried and those dried on raised racks). However, much has to be done to improved sardine

quality through value addition as reflected in the post-harvest losses, which is above 50% during the rainy season.

The Government has invested in building up capacity by establishing fisheries institutes. The Institutes offers technical and quality control courses relevant to the development requirements of the fishery industry (MALF, 2016). The fisheries research has not been forgotten by the Government of Tanzania, the Tanzania Fisheries Research Institute was established to carry out research in fisheries. Based on the above review of the Government of Tanzania intervention in the fishery industry sectors, it has been observed that there is high political will in improving the fishery industry in Tanzania, although much needs to be done in order to realize the good intentions of the government. The policy and the implementation strategy and programmes have to trickle down to the communities involved in the fishery industries in order to realize the broader objectives of the Government.

2.6.2 Lake Victoria Economic Factors Review

Sardines is the largest of the fishery resources in Lake Victoria with production level of about 70% (MALF, 2016). The contribution of the fishery sector was still low as the sector depends on small-scale fishermen with inadequate fishing gear which affects the total landing, quality and high post-harvest losses. Therefore, it impacts fishermen's income and access to capital to invest in the improvement of the product quality. For the success of the Lake Victoria sardines markets, it is essential to offer formal business loans with affordable interest rate to boat owners, traders and processors to increase the capacity during production and post-harvest phases. The post-harvest loss and low quality of sardines was reported by the "*Tanzania Fisheries sector Challenges and Opportunities Report of 2016*" (MALF, 2016). The report noted that the post-harvest loss of is high due to the existing production and processing practices which causes the majority (80%) of the products considered as suitable for animal feeds. This calls for drying technologies that are affordable and sustainable in order to reduce the post- harvest loss and improve the livelihood of the actors along the value chain. Most of the processed sardine products trade was informal (MALF, 2016; Damien & Luomba, 2011). Based on the above statement from the Government, it is evident that the regional business environment was not promising and much needs to be done. Furthermore, Damien and Luomba (2011) pointed out that inadequate capital and lack of economies of scale are the main caused for the sardine products value chain actors' not accessing access more lucrative outlets for their products.

2.6.3 Social Factors in Lake Victoria Sardine Business

This section 2.5.3 reviews the local sardine demand, population growth rate, changing of lifestyles and processed sardine business culture. Following the decline of Nile perch stock, urbanization and rising prices of other protein sources such as meat, pork, and chicken the demand for sardines has expanded considerably (Damien & Luombe, 2011). Because of changes in lifestyle in Tanzania, mostly involving huge migration of people, especially the youth, from rural areas to urban areas, this is an opportunity for sardine traders and processors to earn more income through the provision of affordable source of proteins to the growing population in the urban areas. In addition, sardine products are cheap source of protein, hence, this guarantees the business growth in the short and long run. However, an assessment of the sardines' business culture reveals reluctance in product value addition and hence, the product is still fetching low prices as compared to Nile perch despite of sardines accounting of 71.2 % of the total landings in Lake Victoria (CAS) of 2015.

2.6.4 Environmental Factors

This section reviews the natural resources management and specifically, the fishery resources and available support systems that take into consideration the environmental factors at national and regional levels. It is important observing that, actions to address environmental issues among the fishing populations at the regional level have been taken. The Lake Victoria Fisheries Organization (LVFO) is concerned with the management of the fisheries resources while Lake Victoria Basin Commission (LVBC) is concerned with the water quality in the lake (The African Union Inter-African Bureau for Animal Resources [AU-IBAR], 2016). Article 33 of the Protocol for Sustainable Development of the Lake Victoria Basin states that, "the broad function of the Commission was to promote, facilitate and coordinate activities and actors towards sustainable development and poverty eradication of the Lake Victoria Basin" (East African Community [EAC], 2003, p. 20). Article 8 of the "Protocol makes provision for the Partner States to manage, develop and utilize fisheries resources of the basin in accordance with the Convention establishing the of LVFO" (EAC, 2003, p. 10).

The Mandate of the LVFO is to "foster cooperation among the Partner States by harmonizing national measures, developing and adopting conservation and management measures for the sustainable utilization of living resources of Lake Victoria for maximum socio-economic benefits" (AU-IBAR, 2016, p. 17). Another measure that has been actioned was the formation

of Beach Management Units (BMUs). The BMUs were intended to promote communities participation in the management of the fisheries resource (Nunan & Onyango, 2016). The BMUs works as part of the local Government with the view to decentralize the resource management to the communities (MALF, 2016). The BMUs initiative aims at promoting self-control and prevention of environmental degradation as well as the illegal fishing at the landing sites (MALF, 2016). The interventions in the environment control have trickled down to the fisheries communities, although still challenges exist in controlling illegal and unregulated fishing practices within the communities. The illegal fishing and the use of unregulated fishing nets have impact on the fishery resources depletion as well as the sustainability of sardine trade will be uncertain.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

The material and methods for this study considered the overview of research design, study areas, sampling and sample size, analytical frameworks and data collection. The research design explained how the study objectives were operationalized based on the qualitative and quantitative approaches. The study area was well explained giving reasons of why such locations. Sampling and sample size were thought in order to give an overview on how the sampling procedures was done as well as calculating and justifying the sample size based on the existing literatures. The analytical frameworks were meant to give an overview on how the objectives were operationalized by giving the theories and models used. The data collection section was meant to show the readers how the research information (qualitative and quantitative data) were collected and when.

3.2 Research design

Hyde (2000) pointed out two approaches in business research, namely; deductive and inductive; the approaches diverge in the connection to theory and data. Bryman and Bell (2007, p. 56) stated that a deductive approach is the research when "hypothesis is tested in the light of the existing theory by analyzing empirical data". Bernad (2011) argued that the inductive approach aims at generating senses from the information gathered in order to detect patterns and relationships; it includes the exploration for pattern from reflection and the establishment of explanations. The inductive thinking focuses on learning from experience (Saunders, Lewis & Thornhill 2009). The investigator inclines to development of empirical overviews and categorize initial relationships as progresses through the research (Neuman, 2014). In this study, inductive and deductive approaches were employed to address the objectives and research questions.

Bryman and Bell (2007) argued that business research is classified in qualitative and quantitative approaches. Qualitative research is a research strategy aiming at gaining deep understanding of the phenomenon as it provided understandings into the issue and tries to offer idea, therefore it lays foundation for further quantitative study (Bryman & Bell, 2007; Creswell, 2003). According to Creswell (2003, p. 16), "quantitative research is an approach that aims at generalizing the findings to the population". The purpose of this study was to identify and

analyze roles of stakeholders along the sardine value chains, analyze the domestic and regional markets using structure, conduct and performance framework and finally, identify and test the possible factors that determine consumer buying decisions of different processed sardine products from Lake Victoria Tanzania side. In order to operationalize the objectives previous studies and models derived from existing theories and model were used as well as conducting interviews. As a result, qualitative and quantitative approaches were appropriated to operationalize the objectives. The quantitative research was chosen with the purpose to test hypotheses, adapted from theoretical and empirically tested model; while qualitative approach was chosen to complement quantitative data. Stakeholder analysis in this study was applied in order to find out the relationship of actors along the sardine value chain. Descriptive and empirical approach was employed, focusing on the actual behaviors of the fishery industry by describing and explaining how industry actually interacts with stakeholders along the sardine value chain. Primary stakeholders along the value chain focused on fishers who also act as crew members, boat owners, processors and traders. The secondary stakeholders were mainly the institutions at national and regional levels that supports the Lake Victoria fishery industry directly and indirectly.

The structure conduct and performance model was used to analyze the marketing efficiency of Lake Victoria processed sardine products while the stakeholder theory was employed to analyze stakeholders on the working relationship and the effect of such business arrangements in the trade of sardine products at domestic and regional markets. The Consumer theory of buying behaviours was used to determine factors that affect buying decisions. The relationship between different factors like product recognition, attitude, confidence and purchase intention of different processed sardine products were the ultimate goal of this objective. The factors were tested using multiple regression model to find out the actual relationship of the factors and buying intentions of consumers. The Lake Victoria business model was developed based on the findings of stakeholders and market analysis as well as the empirical results on the consumers buying decisions.

3.3 Study Area

The present study was conducted in Mwanza, Mara and Kagera regions in the Lake Victoria basin. A total of nine districts in these regions were involved in the study including Ilemela, Nyamagana, Sengerema, Ukerewe, Musoma Rural, Rorya, Muleba and Bukoba Rural as shown in Fig. 6. A total of 9 landing sites and one market were also selected for the study. Kirumba

market, Kayenze, Kabangaja, Chinfufu, Izinga and Gana were randomly selected from Mwanza region, while Busekela and Kibuyi landing sites were from Mara region and Kimoyomoyo and Igabiro from Kagera region.

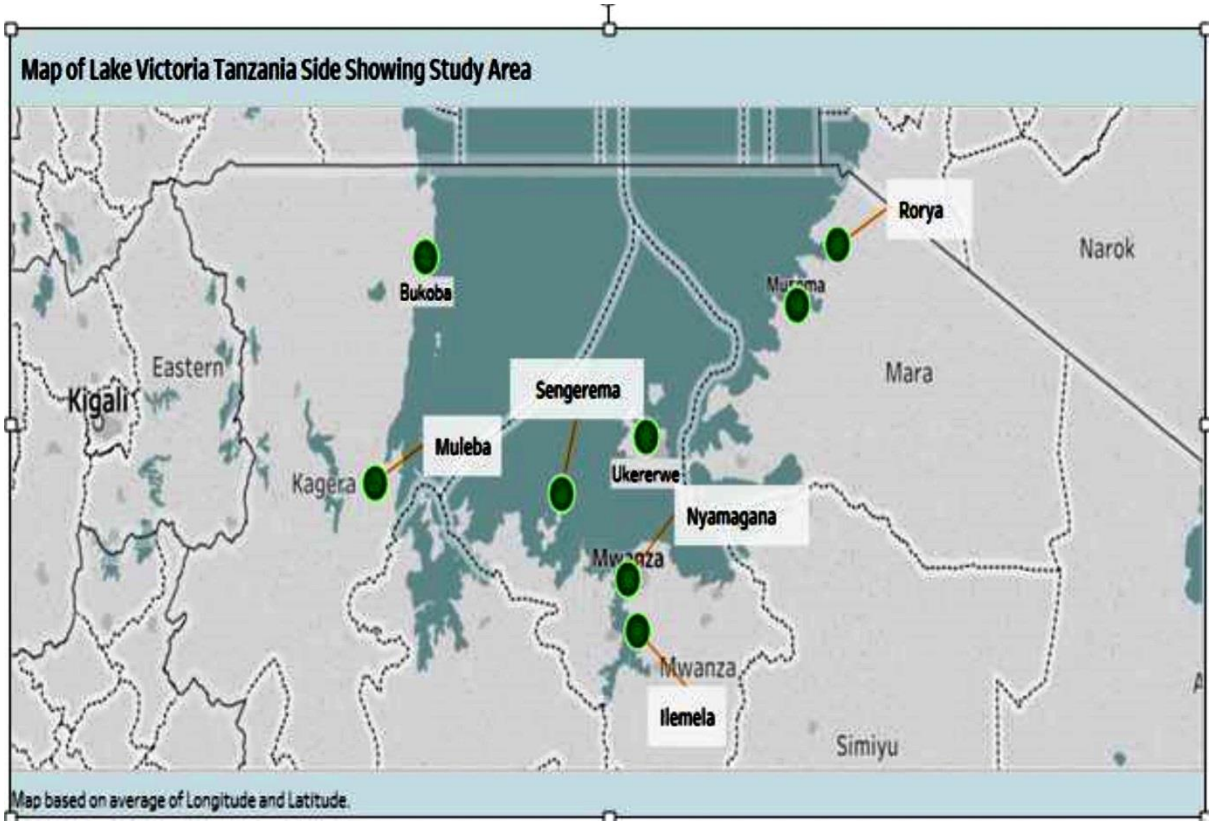

Figure 6: Map of Lake Victoria Showing Region and Districts involved in the Study**.** Average Longitude and Average Latitude (Tableau Software)

Since the study was investigating the markets and the value chains of processed sardine products, selection of three regions along the Lake Victoria was pertinent to get the overview of different processed sardine products. For example, sardined dried on rocks, on sand and on raised racks were mostly found in Mwanza, Mara and some from Kagera regions. While sardines dried on grass and net most was found in Kagera region and some in Mara region.

3.4 Sampling

Different sampling techniques were employed. Multistage sampling technique was employed in the selection of the respondents in the study area. In the first stage, purposive sampling was used to select the three regions (Mwanza, Kagera and Mara) surrounding the Lake Victoria Tanzania. The second stage involved selection of districts (Ilemela, Nyagana Sengerema and Ukerewe) in Mwanza region, two districts (Musoma rural and Rorya) in Mara and two districts

(Bukoba rural and Muleba) in Kagera and hence, a total of eight districts were selected as indicated in the map. The selection was based on the predominance of fishing activities in these areas based on the CAS (2015) report. The third stage, involved purposive selection of Kirumba market because most of products coming from landing sites have to go through Kirumba market before being distributed to domestic and regional markets. Etikan, Musa and Alkassim (2016) describe purposive sampling technique as the deliberate choice of participants due to the qualities the participant possesses and it is a nonrandom technique that does not need underlying theories or a set number of participants.

Random sampling was appropriate for selecting actors for this study because it allows the use of statistical inference and thus, avoiding any form of conscious and unconscious bias in the selection of the respondents. This stage involved random selection of landing sites from the list provided by the fisheries officers. The landing sites were randomly selected from 642 landing sites along Lake Victoria on the Tanzania side (Frame Survey, 2015). Out of 642 landing site, 65 landing were purposively selected in collaboration with fisheries officers based on the predominance of sardine productions. From the 65 landing sites the following landing sites were randomly selected in each district. The landing sites at Ilemela district were Kabangaja and Kayenze; Sengerema district Chinfufu landing site was selected while in Ukerewe district Izinga and Gana islands were selected. In Musoma Rural and Rorya districts, Busekera and Kibuyi landing sites were selected, respectively while for Bukoba Rural and Muleba districts, Igabiro and Kirumo (Island) landing sites were selected respectively. Finally, individual interviewees comprising fishers, processors and traders were randomly selected in the study based on the list provided by the Beach Management Units (BMU) at the landing sites for questionnaires administration.

3.5 Data Collection

In each of the identified landing sites and markets, information was collected using a semi-structured and structured questionnaires from June- July, 2016, May – June in 2017 and May, 2018. In addition, focus groups and key informants' discussions were conducted during the same periods. Trained enumerators administered the questionnaires to fishers, traders, processors and consumers in the landing sites, markets and at household level in Mwanza, Mara and Kagera regions.

The questionnaires was specially designed to track the alternative channels used in sardine products transactions and to capture the associated prices, volumes, and transaction costs from the source to the final markets along the value chain. Data collected included information on processed sardine products marketing operations, number and relative importance of various participants in terms of volume of flow; profile of market participants and level of their participation; flow of information on market conditions; degree of partnership and relationship between buyers and sellers; frequency of transactions; points of transaction in sardine products buying and selling; quantity and quality of the traded sardine products; the seasonality of transactions; cost of sardine products handling and processing; marketing costs and margins; and information on perceived strength and weakness of the sardine products business operation. The qualitative data was collected from traders, BMU leaders, fisher folks and processors through formal focus group and key informants' discussions.

3.5.1 Qualitative Data Collection

Qualitative data were collected through key informants, focus group discussions by using semi-structured questionnaires. Qualitative information was collected from 11 focus group discussions and key informants from Tanzania Fisheries Research Institute (TAFIRI), Fisheries Education Training Agency (FETA) and National Fisheries Quality Control Laboratory (NFQCL) all from Mwanza region. The interviews were in relation to their direct and indirect support to the sardine industry. The focus group discussion involved fishers, processors, boat owners and traders, while key informants were from the government institutions as well as the processed sardine products actors. The semi-structured, open-ended questionnaires were used to collect information from institutions supporting the Lake Victoria fishery industry. Stakeholder analysis was considered important in order to find out the relationship of actors along the sardine value chains. The secondary stakeholders were mainly the institutions at national and regional level that support the Lake Victoria fishery industry directly and indirectly. The information collected was used to answer the first research question on stakeholders' role along the processed sardine value chains. The information was complemented by quantitative data from fishers, processors and traders.

3.5.2 Quantitative Data Collection

The second research question on processed sardined products marketing efficiency was answered by collecting primary data by using structured questionnaires. A total of 249 market

participants comprising 124 sardine's traders and 125 sardine's processors were selected. For the third research question on consumers buying decision factors; information used for this purpose originated from randomly selected consumers from Ilemela, Musuoma Rural and Muleba districts. In collaboration with the district fisheries officers' wards were randomly selected from the list of wards in each district.

Seven wards were randomly selected from Ilemela district, four wards from Musoma district and five wards from Muleba district. The ward executive officers (WEO) and village executive officers the hamlets and streets were randomly selected from the lists provided by the ward executive officers. From the list of villagers and streets members, consumers were randomly selected and interviewed using structure questionnaires. A total of 190 consumers were interviewed whereby 84 consumers were from Ilemela, 56 from Musoma Rural and 50 from Muleba district. Six popular processed sardine products were selected to test the model. They included sun-dried on sand, sun-dried on raised racks, sun-dried on rocks, sun-dried on grass and nets, hot-smoked and deep-fried sardines.

3.5.3 Calculating the Sample Size

A total of 546 market participants and consumers were selected including 124 sardine's traders, 125 sardine processors, 107 sardine fishers and 190 consumers. The sample size was justified based on The Farm Level Applied Research for Eastern and Southern Africa (FARMESA) experience (Matata, Anandajayasekeram, Kiriro, Wandera & Dixon, 2001) which stated that about 80 to120 respondents are adequate for most socio-economic studies in Sub-Saharan Africa. The quantitative data was complemented by qualitative data collected from the focus group discussion of fishers, processors, boat owners, and traders at the landing sites and the key informants. Secondary data were obtained from the journal articles and the review of related documents, government institutions and research institutions.

Different stakeholders (fisher folk, commercial sardine camp owners, processors, traders and consumers) in the sardine products value chain were involved in this study. The samples collected were categorized by the processing method. The sample size was determined according to the method by Kothari (2004).

$n = Z^2(P)(1-P)/e^2$---------- (1)

Where:

n= sample size,

Z= confidence interval (z-value, 1.96 at 95%),

P= sample proportion (50% the expected proportion of the population of the sardines traders, processors, fishers and consumer) within the selected landing sites. When a maximum sample size is thought the assumption of using sample proportion of 50% should be considered (Kothari, 2004). The pilot study found that the landing sites comprises fishers, processors and traders and very few of boat owners.

1-P = 1-0.5

e = ±5% (the allowable margin of error or precision level),

$$n = \frac{1.96^2 0.5 * (1 - 0.5)}{0.05^2} = 0.5 * 0.5 \left(\frac{1.96}{0.05}\right)^2 = 384.16 \approx 385$$

The selected respondents were approximately 385 based on formula (1). The number of interviews conducted in the sample was reduced or amplified according to the extent of variability in the responses to the questions.

3.5.4 Testing of Data Reliability and Validity

The Cronbach alpha was used to test the reliability of questionnaires constructs and items. To establish validity of the research instruments and items the opinion of agriculture economists, business management experts and research mentors and supervisors was considered and the necessary revisions was done for the modification of the research instruments to enhance validity. In addition, items validity was exported using Pearson's correlation analysis. The tests for reliability and validity are indicated in sections 4.2.1, 4.3.2 and 4.3.3.

3.6 Analytical Frameworks

3.6.1 Stakeholders Analytical Framework

Descriptive approach was employed to study the socio-economic characteristics of stakeholders along the sardines' value chains. In this study, primary stakeholders along the value chain focused on fishers who also acts as crew members, boat owners, processors and traders. The challenges and opportunities of stakeholders along the value chain were well

analyzed in this section. The discussion emphasized on actor's role and functions as well as the collaborations along the sardines value chain with the view to identify gaps and recommend the way forward for improving the livelihood of actors through increased income from the sale of sardine products.

3.6.2 Structure, Conduct and Performance Analytical Framework

Descriptive statistics such as frequency and percentage were used to analyze the socio-economic characteristics of the artisanal fish trader and processors and problems facing them. Market performance analysis such as net return, marketing margin, marketing efficiency, profitability index and operating ratio analysis were used to analyze the profitability of artisanal fish marketing in the study area. Gini-coefficient combined with Lorenz curve and concentration ration measured Herfindahl-Hirschman index (HHI), product differentiation and economies of scale were used to measure the market structure. Market conduct analysis was done by investigating the price setting process, availability of market information, market information providers, means of communication and availability of business loans and loans providers in the study area. The net returns, marketing margin, market efficiency and profitability index is mathematically presented as:

i. Measure of Market Performance

The market performance was operationalized by calculating the net returns, market margins, marketing efficiency, profitability index and operating ratio as presented hereunder as adopted from Irhivben *et al.* (2015).

$NR = TR - TC$---------- (2)

Whereas TR = Total Revenue, TC= Total cost and NR = Net Returns

Marketing Margin = $\left[Selling\ Price - Buying\ Price \,/_{Selling\ Price}\right]$*100 ------ (3)

Marketing Efficiency = $\left[\frac{Value\ Added\ through\ Marketing}{Cost\ of\ Marketing\ Services}\right]$ *100 --------- (4)

$ME = Net\ margins/marketing\ cost * 100$

Where by

ME = Marketing Efficiency

Profitability Index (PI) =NI/TR…….. (5)

NI = Net income/net return in TZS per kilogram of processed sardines

TR = Total Revenue in TZS per kilogram of processed sardines

Operating Ratio (OR) = TVC/TR…….. (6)

TVC= Total variable Costs

TR = Total Revenue

ii. Determinants of marketing efficiency

For factors affecting marketing efficiency, multiple linear regression analysis with following variables was done to know the effect of these variables on marketing efficiency.

Y=f (X1 ,……Xn) ……. (Dastagiri *et al.,* 2013)……. (7)

Y=Marketing efficiency (%)

$Y=\beta_0+ \beta_1X_1+ \beta_2X_2+ \beta_3X_3 +\beta_4X_4+ \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 +e$ …… (8)

Where Y = marketing efficiency, β parameter to be estimated and e is the error term

X_1 = Total Revenue per month (TZS), X_2 = Total Net returns per month (TZS), X_3 = Selling Price per Kg (TZS), X_4 = Marketing Margins (TZS), X_5 = Buying Price per Kg (TZS), X_6 = Total fixed Cost (TZS), X_7 = Total marketing costs (TZS), X_8 = Quantity of produces trades per month (Kg)

iii. Measures of Market Structure

Creating an understanding of the industry structure, provides assistance in formulating a suitable development strategy based on an in-depth understanding of the market situation (Lindblad *et al.*, 2016). Herfindahl-Hirschman Indices (HHI) is a measure of market concentration and competition among market participants. When the market is close to 100% or 1, it indicates a high concentrated, monopolistic market. Low concentration indicates a lot of small, equally-sized market participants in a very competitive market. Creating an

understanding of the industry structure, offers support in formulating an appropriate development strategy based on thorough thoughtful of the market condition (Lindblad *et al*., 2016). The structure is determined by the industry concentration, which can be termed as the degree of concentration linked to the output of all firms in that industry (Rhoades, 1995). HHI were calculated to assess market concentration for the markets of Kirumba market and, Kayenze, Kabangaja Chinfunfu, Gana, Izinga landing sites in Mwanza region; Kimoyomoyo, and Bukoba rural landing sites in Kagera region and Busekela, and Kibuyi landing sites in Mara regions. The market structure were operationalized by calculating the concentration ratio using HHI, Gini coefficient, the Lorenz Curve drawn from the Gini coefficient results showing the distribution of market shares among market participants and the economies of scale. The HHI were calculated to assess market concentration ratio and, mathematically, it was presented as follows according to Nzima and Dzanja (2015).

$\text{HHI} = \sum_{i=1}^{n} \quad (MSi)^2$---------- (9)

$\text{MSi} = \text{Vi}/\sum_{\text{i=1}}^{\text{n}} \text{Vi}$ Vi is the quantity of sardines handled by buyers in market i (in kg) per month

MSi is the Market Share of seller i and buyer i

$\sum Vi$ is the total quantity of sardines handled by buyers and sellers in the market i (in kg) per month.

Where i= 1, 2, 3,…, n, HHI = Herfindahl- Hirschman Index n=number of respondents, S= share of firm in the industry.

Monthly quantities of sardines products (in kg) by each wholesaler in Kirumba market, Kayenze, Kabangaja, Chinfufu, Gana, Izinga, Kimoyomoyo, Busekela and Kibuyi landing sites were recorded in the period of May to July, 2016. In order to calculate the HHI, the monthly quantities handled by each processor in respective market and landing sites were divided by total quantity in order to obtain the market share of each market and landing sites.

The Gini coefficients were computed by using the following formula according to Irhivben *et al.* (2015).

$G = 1 - \sum XY$ ---------- (10)

Where; G = Gini Coefficient, X = Percentage proportion share of each class of seller, Y = Cumulative percentage proportion of the sale.

Scale economies is used determine entry and exit situations in the market. It examines the average cost function linked with the sellers' marketing practices. The regression model was used.

$Yi = bo + bixi + e$ (Pomeroy, 1989) ---------- (11)

y = Total cost of marketing per class of seller per month (TZS).

xi = kilograms of fish (dried on sand, dried on raised racks, hot-smoked and deep-fried sardine products) sold per month.

bi = Coefficient of explanatory variables.

bo = Intercept

e = Error term.

If the coefficient of bi is negative, it means as quantity increases, cost decreases. The increase in cost could form a barrier to entry especially by sellers that are not financially sound.

iv. Market Conduct Analysis

Descriptive statistics were used to measure the market conduct, whereby the traders and processors were asked on price setting procedure, availability of market information and the providers, access to formal business loans and selling price as well as the determinants of selling price. Multiple regressions using the ordinary least square (OLS) regression technique was used to determine the effect of marketing cost on the selling price of fish. The model was specified as follows;

$$Y = B_0 + \sum_{i=1}^{i=10} B_i X_i + U$$

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + \ldots + B_{10}X_{10} + U \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Where Y= Selling price in TZS per kg

X_1= Cost of fish/kg in (Tsh), X_2= Handling charges/kg (Ths), X_3= Storage Cost (Tsh) X_4= Transportation cost/kg (Tsh), X_5= Local Government tax (Tsh), U= Error term, B_1, B_2…, B_6= Coefficient of Independent variables to be estimated, B_0 = a constant term.

3.6.3 Consumer Buying Decision Factors Analytical Framework

The consumer and retailer buying decision was an important aspect to consider when determining the marketing strategy for processed sardine products. The consumer buying decision has substantial implication in the success of the product in both local and regional markets. This section aimed at determining the processed sardine products consumer buying decision factors. In order to operationalize this objective, several consumer buying process theories and model were reviewed. The theory of consumer decision model developed by Howard and Sheth (1969) and then review by Howard, Shay and Green (1988) was adapted to determine the factors considered by consumers during the product buying process. The model is detailed in the following section.

In order to test the hypotheses developed, the generalized linear regression model and hierarchical multiple regression model were employed to examine the main direct determinants of sardine products purchase intention and sardines products purchase behavior effect. The testing of the theory of consumer buying behavior used regression model. The liner regression models were used to understand the patterns of the correlation among the model regions and explaining as much of the regional variation with the model specification. Multiple regression model using the Statistical Package for Social Sciences version 24 (SPSS Version 24) were applied to determine the relationship between product recognition and intention to buy, product recognition and attitude hence intention to buy, product recognition and confidence which leads to intention to buy. Finally, the product confidence and attitude in relation to intention to buy the product in question was tested. Initial tests were compulsory for the regression model to be valid. These included checks for the missing data, descriptive statistics of variables, test of zero order correlation, test for uni-dimensionality, test for normality, test of homogeneity of variance, test of homoscedasticity, test of linearity, multicollinearity test and data independence test (Garson, 2012). The following sections operationalizes the consumer buying decision factors.

i. Hypothesis Formation

According to Howard *at el.* (1988), the consumer decision model (consumer behaviour in marketing strategy) was all about the industry efforts to provide product information in order to create consumers product recognition (B), attitude (A), confidence (C) so that the consumer intention to purchase rises. Howard *at el*. (1988), argued that the measurement of the consumers' intention to buy was the most reasonable way to predict whether or not purchase would be made. In the adapted and modified model (Fig. 7), the model portrays how consumers reaches a decision to purchase a product, the consumers product familiarity, prior experience, and eating habits which can cause any of the three effects, the product recognition (B), build attitude (A), and confidence (C) to strengthen the intention to buy (I). However, the consumers' prior experience, product familiarity and eating habits could lead to buying intention (I). Based on the model, the purchase intention (I) was influenced by the product price (Pr), Product availability (PL) and motives. Sheth (1975, p. 5), identified five dimensions of motives which included the "functional motives, aesthetic-emotional motives, social motives, situational motives and curiosity motives". This study only considers situational motives, all of which were about product availability, price discount, and product accessibility (Sheth, 1975).

The consumer characteristics that influences the intention to buy were in personal, economic and psychological in nature, hence, consumers' demographic characteristics as articulated by Cornescu and Adam (2015) was included in the model. This led the author to the first hypothesis regarding consumer characteristics. $H_{1:}$ "Consumer demographic characteristics have direct influence on the purchase intention of processed sardine products".

The rationale of the hypothesis was well-articulated by Cornescu and Adam (2015). The factors that impact consumer behavior that are considered are those of personal, economic, psychological and sociological nature. According to Milner and Rosenstreich (2013), consumer characteristics were of psychological and social influences, with the addition of key demographic indicators. The variables under consideration in this section were broadened to include influences that were personal to the consumer as well as psychological or social (Milner & Rosenstreich, 2013). Multiple regression was employed to determine demographic factors consumers consider during the buying decision process of sardine products.

Acebron *et al*. (2001), argued that many studies analyze the hunting of information from the viewpoint of external information sources while most of consumers, particularly for food products, rarely look for information due to the fact that food products have a low cost. Hence, the study of sardine products consumer buying decision didn't get involved in external

information. Therefore, the variable has been selected as the previous information or level of information developed up to the moment on the product to be analyzed (Acebron *et al.*, 2001).

This study adopted Acebron *et al*. (2001) model, whereby the information variable shows the level of information that customer have on the product in question. It is assumed that information on the product was obtained through, product familiarity, previous experience and eating habits and this is internal source of information. Empirical research for food products had revealed that past experience and eating habits are significant source of information in the case of buying food products (Acebron *et al*., 2001). The relationship between prior experience, product familiarity and eating habits (product recognition), confidence and intention to buy (Fig. 7) formed the basis of the hypotheses (H_2 – H_4):

H_2: Prior experience, eating habits and product familiarity of processed sardine products creates confidence on the product and hence, the purchase intention of the product in question;

H_3: The greater the confidence towards processed sardine products, the greater the predisposition to purchase the aforementioned product will be;

H_4: Prior experience, eating habits and product familiarity of processed sardine products creates purchase intention of the product in question.

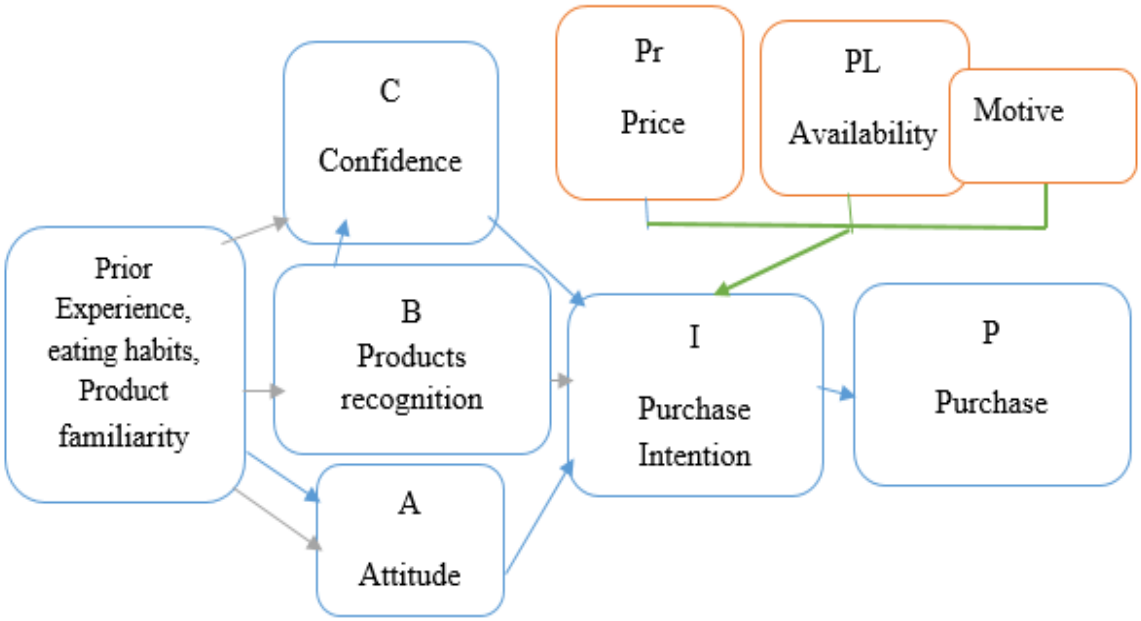

Figure 7: Proposed Model for Consumer Buying Decision on Lake Victoria Sardine Products (Howard *at el*., 1988, p. 7; Acebron *et al*. 2001, p. 81).

The rationale for the hypotheses were anchored in both theoretical and empirical conclusions (Bennett & Harrell, 1975). According to Laroche, Kim and Zhou (1995, p. 336), the "direct positive relationship between confidence and intention to buy was first proposed by Howard and Sheth (1969). Bennett and Harrell (1975, p. 110), provided empirical evidence to support the argument". Howard and Sheth (1969, p. 35) stated "Confidence plays a major role in the buyer behavior system". The intention to buy was influenced by the product price, availability and motivation (Howard, 1989). According to Howard *et al.* (1988), product recognition (prior experience, eating habits and product familiarity) has positive relation to confidence and hence, the buying intention of the products. The relationship between the consumer prior experience, eating habits and product familiarity, (product recognition), attitude and intention to buy formed the basis of the hypotheses (H_5 – H_6):

H_5: "The previous experience, eating habits, product familiarity (product recognition), the greater the attitude towards sardines products and hence, the purchase intention".

H_6: "The greater the attitudes towards processed sardine products, the greater the predisposition to purchase the aforementioned product will be".

The rationale of the above hypotheses were anchored on Howard (1989) and Howard *et al.* (1988), the authors argued that favourable attitude has a considerable bearing on intention, which becomes greater if product information is high. Furthermore, the authors equated the direct and positive relationship between the attitude towards the product and the intention to buy the product in question.

ii. Measures of Socio-demographics of Consumers

The questionnaire started with questions that were related to the socio-demographics of the respondents. Few socio-demographic characteristics were considered, which most likely influence processed sardine products consumption behavior of the family. These socio-demographic characteristics were identified based on the previous studies (Verbeke & Vackier, 2005; Kotler & Armstrong, 2012). These characteristics and their measurement were as follows; processed sardine products buyer gender were measured as "male or female". Age of the decision maker referred to his or her age. Household size was measured as number of people in the family. Income class of the family was measured by asking about monthly average income, providing categories of <100 000, 150 000- 200 000, 200 001-250 000, 250 000-300 000, 300 001-350 000 and >350 000. Education of the decision maker was measured by asking

the level of education attained ranging from informal education, primary, secondary, advanced secondary and tertiary levels.

iii. Measures of Processed Sardine Products Buying Behavior

Buying behavior regarding a product was the extent to which buyers were engaged in purchasing that product. Frequencies of consumption of processed sardine products were taken as a measure of the family sardine consumption. Four items measure of processed sardine products buying behavior were used in this study. The respondents were asked about "how often they consume different processed sardine products". The response to buying behavior about sardines were a five-point scale with alternatives "daily", "weekly", "monthly" and "seldom", and "not at all" for different sardine products. In addition, the respondents were asked about the types of sardine products they preferred most and factors considered when buying sardine products. Finally, the respondents were asked "why do they eat processed sardines products. The response had three alternative options as "part of meals", "part of diet" and "served with food". The frequency of consumption was based on the type of processed sardine products consumed more frequently.

iv. Prior experience, Eating habits and Product Familiarity

Three questions of 7-point Likert scales on consumers' past experience, product familiarity and eating habits were asked. The questions had option answers as follows "not informed at all to very informed", "not familiar at all to very familiar" and "never at all to very frequent" was used to measure, prior experience, product familiarity and eating habits. The consumers were asked on the eating habits, familiarity and past experience they had on processed sardine products which create product recognition in order to make an informed judgement on the products. Past experience was based on the exposure and use of the product, while familiarity was based on the knowledge of the product based on colour, taste and smell and this was acquired through involvement in the process of product production, processing and distribution. In addition, the eating habit was part of understanding the product quality (taste, colour, smell and free from sand). The three factors were inter-related but different consumers can have different level of exposure and involvement with the regard to the product in question.

v. Measures of Attitude towards Sardine Products

"Attitude towards certain behavior was the degree to which the relevant person has a positive or negative assessment of the behavior under consideration" Laroche, Kim and Zhou (1996, p. 120). This study, hence, considered sardine products buying intention of the respondents as the target behavior and therefore, the attitude was an evaluative and affective judgment about the sardine products. Attitudes towards sardine products was measured with two items adopted from Laroche *et al*. (1996, p. 120) and Acebrón *et al*. (2001, p. 96) i.e. (1) How much does your family like processed sardine products? (2) What is your attitude when evaluating processed sardine products? The questions were measured by a seven point Likert-scale from "Don't like it to like it very much" and unfavourable to very favourable". In addition, in order to create attitude on the product, the consumers were asked to show their eating habits, past experiences and level of product familiarity on the processed product was measured based on Acebrón *et al*. (2001, p. 96). Consumers were asked the following questions: (1) How often does your family eat processed sardine products? (2) What is your degree of familiarity on processed sardine products? and (3) How informed do you consider yourself on processed sardine products? All the questions were measured by seven point Likert scale. Therefore, the attitude constructs were measured using five items in general.

vi. Measure of Sardine products consumer Confidence

According Bergkvist (2009, p. 867), "repeated reminders of the brand through marketing and word of-mouth cause confidence, and confidence, in turn, causes purchase intention". Howard *et al*. (1988) and Laroche *et al*. (1996) support the causal relationship between confidence and purchase intention. Confidence was measured with a two items adopted from Laroche *et al*. (1996, p. 96) "What is your confidence level when evaluating processed sardine products", "What level of assurance on quality of sardine products?" Responses were measured on a seven point Likert scale with the endpoints. In addition, in order to create confidence on the product, the consumers were asked to show their eating habits, past/prior experiences and level of product familiarity on the processed product was measured based on Acebrón *et al*. (2001). Consumers were asked the following questions "How often does your family eat processed sardine products?" "What is your degree of familiarity with processed sardine products?" and "How informed do you consider yourself on processed sardine products?" Therefore, the confidence constructs were evaluated using five items in general.

vii. Measures of Sardine products Buying Intention

Buying intention was a "measure of the strength of a decision maker's drive to execute buying of a certain product in future" (Liang & Lim, 2011, p. 862). Consumers were asked how many times in a week they consumed certain processed sardine products. This measure has been used in the literature by Juster (1966). For this research processed sardine products "buying intention refers to likelihood of family to engage in sardines buying behaviour" (Liang & Lim, 2011, p. 862). Measure of the sardines buying intention was adopted from Ajzen and Fishbein, 1980), consisting of one item on seven point Likert scale ranging from "Extremely unlikely" to "Extremely likely". The item included "I will buy sardine products in the near future". The variable of processed sardines buying intention was established by accruing and taking mean of one question item measuring intention.

3.6.4 Business Model Development Framework

The findings from the roles of stakeholders along the sardine products value chains, domestic and regional markets analysis and consumers buying decision factors were the major determinants of the proposed business model for Lake Victoria sardine products. The stakeholders' analysis gave an overview of the existing business models at local market, domestic and regional markets segments. The markets analysis using the structure, conduct and performance frameworks was the basis for judging the efficiency and effectiveness of the existing business models. Consumers' buying decision findings gave the author an overview of consumer preferences for different sardine products, hence the proposal of marketing strategies and strategic positioning of the proposed and approved by stakeholders business model.

The proposed business model for Lake Victoria sardine products was developed based on the existing business models involving market based, domestic and regional market segments (Fig**.** 11, Fig. 12 and Fig. 13). The proposed business model was then shared with stakeholders. The stakeholder's representatives were from the fishers, boat owners, processors, traders and supporting institutions like the National Fish Quality Control Laboratory (NFQCL), Tanzania Food and Drugs Authority (TFDA), Tanzania Bureau of Standards (TBS), Tanzania Fisheries Research Institute (TAFIRI) and Fisheries Education Training Agency (FETA). The roles of all stakeholders was well narrated in the results and discussion for the business model

development process. For proposed and recommended business models see Fig. 14 and Fig. 15.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This section details on the results of the study and discussion on the same. The results and discussion focuses on the four research questions. Firstly, the identification of roles of stakeholders along the processed sardine products value chain were analyzed based on the socio-economic characteristics, working relations, challenges and the existing market potential for sardines. Secondly, the sardines marketing efficiency was analyzed using the structure conduct and performance framework. In addition the organizational analysis through the review of the working relationships and the institutional support complemented the findings. The analysis was thought in order to find out how the sardines market is structured and behaving in terms of incomes and market shares distributions among the market participants and how such distributions reflects the marketing efficiency by employing the game and marketing theories.

Thirdly, the consumers buying decision factors for processed sardine product was empirically tested using the theory of consumer buying behaviour. This section was thought in order to propose marketing strategies based on consumer preferences on the tested processed sardine products. Finally the existing business model at market based, domestic and regional levels were developed based on the findings of stakeholder's analysis, focus group and key informant's discussions. The proposed business model for market based, domestic, and regional market segments was based on the findings of stakeholders, markets and consumer buying decision factors analysis.

4.2 Stakeholder's Analysis

4.2.1 Socio-economic Analysis of Fishers and Crew Members

The results shows that 100% of fishers involved in actual fishing activity were men. Over 57% of the fishers were aged 20-40 years whereas 43% of the respondents belonged to the 41-60 age group. This result indicates that now younger people have joined the fishery. The results aligns to Socio-economic data working group of Lake Victoria research phase II [SEDAWOG II] (1999) which revealed that fishers of Lake Victoria were dominantly men with the age bracket of 20-60 years. Regarding the marital status 85% of fishers were married while 15%

were single. Education being one of the most important indicator of poverty shows that literacy level amongst fishers was high whereby 82.2% of fishers had attained primary level of education, 16.8% secondary level and 1% had attained college level education. Esiobu and Onubuogu (2014), and Ocholi and Nyiatagher (2018), reported that exposure to high level of education contribute significantly in decision making in production and attaining high income levels.

Results from the study indicate that 40.2% of fishers have no other sources of income except fishing. The results conforms to Beuving (2013) reported that fishers are migrant young men with a rural background who normally come to the lake with little finance at their disposal and are hired to work on the fishing boats. With regard to fishing activities experience, the findings indicated that the fishers had long experience with 62.5% having 6-20 years and 6.5% with over 20 years while only 31% has experience of 0-5 years. The results aligns to the LVFO (2015) report which asserted that sardines crew members and fishers have familiarity on the seasonality of the fishery and the actual harvesting of the fish and fishing methods. Most of the fishers were not members of any cooperative and this accounted for 94.4% and; only 5.6% of the respondents were member of cooperatives or social group. This poses a big challenge for the fishers and crew members to advocate for their rights.

4.2.2 Fishers and Crew Members Challenges and Opportunities Analysis

The fishers and crew members were asked if the see opportunities for improving the fishery industry and finally, increase incomes of the fishers and crew members and other actors along the sardine value chains. A total of 107 fishers and crew member were interviewed and the results show that with regard to opportunities, 89% of fishers pointed out that more emphasis should be directed to processing and handling techniques in order to reduce the post-harvest losses. The post-harvest losses caused by poor handling in the boat are huge, as most of the sardines arrive at the landing sites already spoiled. The fishers pointed out that the current processing technique which is mainly sun-drying sardines on sand has negative impact due to the fact that the products fetch low price, hence their remuneration goes down. Although some processors have started using raised racks in the study area, still dependency on sun-drying poses a huge challenge on post-harvest losses caused by weather especially during the rainy season and this is the peak season for sardine production.

4.2.3 Socio-economic Characteristics of Traders and Processors

As shown in Table 1, the results indicate that out of 124 traders and 125 processor; males and females were 53% and 47% respectively with 95.6% of the total respondents married. The reason for males and females being almost equal in proportion may be attributed to the fact that, in fish trade, women are mostly involved in fish processing while men are involved in trade. Based on the data, male traders were 72.6% and female processors were 66.4%; the reason is on the fact that fish trade need high investment cost, which most women cannot afford.

Table 1 also reveals that the majority (82.3%) of the respondents had primary school education and only 17.3% and 0.4% had secondary and tertiary education, respectively. Education level has implication on the production and processing as well as the quality of sardine products; this in turn affects the prices and incomes of individual market participants. As pointed out by Bakari and Usman (2013), educational level of a trader does not only raise productivity but also increases the ability of traders to understand and evaluate new techniques and processes for better marketing the final products. Esiobu and Onubuogu (2014) and Ocholi and Nyiatagher (2018), asserted that attainment of high level of education contributes significantly in decision-making of marketers and is an added advantage in terms of achieving high income and efficient marketing activities.

Empirical data indicated that, majority (88.7%) of the fish marketers were between the ages of 20 – 50 years and only 11.3% of the respondents were between the ages of 51-60 years. This is an indication that fish marketing is dominated by young individuals who are active and within the productive age group. The observation is in agreement with the finding of Esiobu, Nwosu and Onubuogu. (2014b) and Esiobu and Onubuogu (2014), who reported that 20-50 years age group represents the major productive workforce, therefore individuals have potential to endure stress, strain, and risk connected with sardine marketing. Response on years of experience in fish trading and processing indicates that more than half of the respondents (63.5%) had between 6-20 years' experience in fish marketing while 36.5% had 0-5 years of fish marketing experience. The findings imply that there is an indication of reasonable risk managed due to the gained mastery of fish trading and processing over the years. The findings are similar to those of Olubunmi and Bankole (2012), and Ocholi and Nyiatagher (2018) who underscore the importance of experience in contributing to the success of fish marketing activities.

Table 1: Socio-economic Characteristics of Sardine Traders and Processors in Study Area

Age of respondents	Frequency	Percent
20- 30 year	27	10.8
31-40 years	103	41.4
41- 50 year	91	36.5
51-60 years	28	11.2
Total	249	100.0
Number of years in Trade		
0-5 year	91	36.5
6- 10 years	89	35.7
11- 15 years	34	13.7
16- 20 years	35	14.1
Total	249	100.0
Education level of respondent		
Primary school	205	82.3
Secondary school	37	14.9
High School	6	2.4
Tertiary Education	1	.4
Total	249	100.0
Marital Status of respondents		
Married	238	95.6
Single	8	3.2
Divorced	3	1.2
Total	249	100.0
Gender of respondents		
Male	132	53
Female	117	47
Total	249	100
Access to formal business loans		
Yes	62	24.9
No	187	75.1
Total	249	100.0
Sardines traded (kg) per month		
100 – 2000	99	39.8
2001 – 4000	107	43.0
4001 – 6000	33	13.2
6001 – 8000	10	4.0
Total	249	100.0
Value of Sardine transacted per month in TZS		
100 000 – 3 000 000	146	58.6
3 000 001 – 6 000 000	35	14.1
6 000 001 – 9 000 000	20	8.0
9 000 001 – 12 000 000	36	14.5
12,000,001 – 15 000 000	4	1.6
15 000 001 – 18 000 000	6	2.4
21 000 001 – 24 000 000	2	.8
Total	249	100.0

The results showed that majority (95.6%) of the fish marketers were married, 3.2% were single, while 1.2% were divorced. This shows that fish marketing in the area is dominated by married individuals who are responsible according to the societal standards and therefore, are likely to have some experience of life (Onubuogu, Esiobu, Nwosu & Okereke, 2014; Esiobu & Onubuogu, 2014).

The majority (75%) had no access to formal loans, which implies that the informal financing was an important source of finance in the study area. The informal financing might be the cause of high income inequalities among the market participants. Majority of market participants (82.8%) had the capacity of marketing 100 kg to 4000 kg of processed sardine products per month. This indicated that majority of the market participants were smallholder processors and traders. The condition could be a reflection of the availability of formal loans as only 25% of the market participants had access to formal loan business. The results in Table 1 shows that majority of the market participants (72.7 %) were earning between 100 000- 6 000 000 TZS (100 – 3000 US$). These findings suggest that the majority of market participants were smallholder processors and traders. Only 27.3% of the market participants had monthly revenue of above 6 000 000 TZS (above 3000 US$). The percentage tallies those marketers who had access to business loans. Empirical analysis has shown that access to formal business loans increase significantly the marketing efficiency due to increased volume of traded products.

4.2.4 Sardine Traders and Processors Opportunities and Challenges

The main opportunities that were pointed out by traders were the provision of training to processors on processing technologies and good handling of processed sardines in order to reduce the post-harvest losses; this was mentioned by 46% of the traders. In addition, 54% of the traders said that in order to improve the final sardine products, the fishermen and boat owners need to be trained on good handling of the fresh fish because some of the fresh fish normally reach the landing sites while already spoiled.

Sardine processors of which majority were females 56.8% said that the opportunity they see from sardine trade is that they were able to provide for their families education, health services and food. Furthermore, processors pointed out that there was room to improve on quality of sardines if training on processing technologies will be provided as well as provision of packaging materials. Some of processors have been provided with packaging materials by the

National Fish Quality Control Laboratory (NFQCL) at Nyegezi, Mwanza and trained on sardines' products handling. About 48.8% of processors responded that attending national farmers and trade exhibitions improved their product marketing and visibility and hence enjoy doing business within and outside the country. Finally, 25.6% of the processors pointed out that if the processors were fixing the selling price that is an opportunity as prices will be fixed based on the cost of production. The existing model of doing business is that the traders fix the prices.

The main challenge pointed out by traders and processors was the high post-harvest losses of sardines. About 84.6% of traders and 87.8% of processors said that the post-harvest loss of sardines especially during the rainy season is huge and, sometimes it goes to 60% of the total catch. This is big challenge to the traders and processors as it becomes difficult in doing business and sometimes, they lose markets because of failure to supply the required quantity and quality. The results conforms to the report by Kolding, Béné and Banvink (2014) who reported that the lack of recognition of the importance of sardine products for sustenance, livelihood and public health have prevented the investment for improving the quality and shelf life. The same authors asserted that there are significant post-harvest losses in processing and trade due to the absence of quality control measures in the entire value chain of sardine. Therefore the high post-harvest losses of sardines in connected to poor recognition of the importance of the sector to livelihood and public health contribution as well as the absence of quality control measures.

Lack of capital was mentioned as another challenge by sardines' traders. The traders called for the government and other development partners to provide soft loans to the sardines' traders, processors, and boat owners in order to improve the quality of sardine products. High transportation costs from the landing sites and islands within Lake Victoria Tanzania side to Kirumba and Muganza markets was one of the challenges that was pointed out by traders. The traders depend much on privately-owned boats which are very expensive. The traders called for government intervention in the transportation sector.

4.2.5 Boat Owners, Fishers and Processors Challenges Analysis

The challenges which were mentioned by the fishers, boat owners and processors, were the dependency on the sun for drying sardines as the only processing technique. Furthermore, they pointed out that the peak season for sardine production is from November to May. This is also

the rainy season where by drying of the products is difficult leading to high post-harvest loss. Tesfay and Teferi (2017, p. 6) pointed out that post-harvest fish losses can be defined as "nutrient or economic losses rendering the commodity unavailable or nutritionally deficient for human utilization". Cheke and Ward (1998) pointed out that losses can be characterized into physical, quality, nutritional and market force loss.

The losses were observed as most of the produced sardines during rainy season was directed to animal feeds whereby a bucket of 4 kg of dried sardines were sold for 3500 TZS (1.75 US$) to 5 000 TZS (2.5 US$) instead of 7000 TZS (3.5 US$) to TZS 10 000 (5 US$) during the dry seasons depending on the quality. This is similar to what was reported by Akande and Diei-Ouadi (2010) that during rainy days 5 percent of sardine is regarded as physical loss and another 80 percent is sold at less than 20 percent of the best price for good quality sardine because of wash off and spoilage. Furthermore, Tesfay and Teferi (2017) pointed out that quality loss is the poor grade of the harvest with a lower price. Furthermore, Cheke and Ward (1998) argued that the conditions of fish after capture and death normally affect the values as food and reducing the market prices per unit weight. According to the key informants and available literature, the post-harvest loss can go to over 50% during the rainy season and this was also observed in the field. These findings are similar to those reported by FAO (2012) that the loss during the rainy seasons is about 20-40% of the Lake Victoria sardine fishery.

The fishers and crew members also pointed out poor remuneration as a challenge. The current remuneration arrangement according to the fishers and crew member and which was also acknowledged by the boat owners, the payment is based on equal sharing among the crew members and boat owners after deduction of operations and boat engine maintenance costs. In every lunar cycle which is around 14 to 18 days every month, a total of 250 000 TZS (125 US$) has to be deducted for the maintenance of the boat engine. This adds a burden to the crew members as it is considered as operational cost. Based on the focus group discussion, the crew members were normally four in the boat. Therefore, the amount paid to the crew members has to be shared among the four members. The poor remuneration of the crew members has been pointed out by Lokina (2008) that the crews are paid based on a share of the catch. Furthermore, Lokina (2014) argued that there is a big gap among the possessing and the labouring classes within the industry. Hence, the sharing provisions gives diverse motivations to the skippers and therefore, anticipated to impact the productivity of the crews.

Sardines price fluctuation was mentioned by fishers, crew members and boat owners as another challenge in Lake Victoria sardine trade. The condition was connected to the cost of fishing activities and the income gained after the sale of the produce. The price of sardines depended on the supply, quality and weather (sun or rainy). This was also observed by Tesfay and Teferi (2017) that, quality loss is the lower grade harvest of the harvest with decreased price and the market forces loss is caused by unexpected market demand and supply. This was very evident during the preliminary survey which was conducted in March, 2016 during the rainy season whereby sardines were discarded due to failure to dry and most of the products were sold for animal feeds. According to the fishers and boat owners, if the wet sardines were landed while there was signs that it is going to rain, the price given by the processors who buys wet sardines was very low as compared to when there is no signs of rain. The same applied to the quality of sardines based on how the products were handled during the transportation to the landing site. According to the fishers, crew members and boat owners, the quality of underneath sardines in the boat is always spoiled because of the way it is stored. In addition to handling, the quality of the sardines was considered in terms of the size as well as the processing technique and weather. During the rainy season, most of the products were considered as for animal feeds and not human consumption, hence fetched low prices. The issue of insecurity while fishing was pointed out by fishers, crew members and boat owners. During the survey, abducting and theft of fishing equipment, specifically the boat engines and pressure lamps, was high in the study area. The crew members and boat owners called for government intervention on the security issues in the lake. However, the same was taken care by the beach management units (BMUs) through the use of community based security (*Sungusungu*).

4.2.6 The Potential of Lake Victoria Sardines

Fishers, boat owners and processors pointed out that there was high potential for sardine production because the Lake still has abundance of sardines as compared to other fish species. They further argued that, if affordable processing technologies will be availed, they were ready to invest as they see potential in the sardine business. The availability of regional markets in Rwanda, Burundi, Democratic Republic of Congo and Zambia have increased the potential for Lake Victoria sardine markets. This was also reported by Luomba and Onyango (2012) that sardine fishery offers great potential for wealth creation and reduction of fishing pressure on Nile perch due to its abundances and the growing market demand.

The emergency and growth of value addition techniques such as hot-smoking, deep-frying and spicing and drying on raised racks were evident in Mara, Mwanza and Kagera regions. The processors focusing on such value chains were increasing as it is profitable as compared to sardines dried on sand. Processors through the support from National Fisheries Quality Control Laboratory (NFQCL) Mwanza, had been provided with quality control and handling trainings as well as packaging materials. This was another potential to tap in order to improve the livelihood of the actors along the value chain by increasing the quality and value of processed sardine product.

In this study, the levy paid to the government based on the value of sardine's products passing through Kirumba market in Mwanza to other regions in Tanzania and neighbouring countries had been substantially increased from 2013 to September 2016 as depicted in Table 2. The evidence shows that the sardine products value has been increasing with the highest value in 2014/15 and same is depicted in the levy paid to the government. However, this could be underestimated given the challenges of proper documentation, traders giving under-reporting in order to reduce the levy paid to the government.

Table 2: Sardines Products Value and Levies for 2013 to September 2016

Financial Year	City Levies (TZS)	Sardine Product Values (TZS)
2013/14	292 470 150	29 407 614650
2014/15	492 952 470	57 137 122533
2015/16	354 178 300	29 055 799600
2016/17	209 661 751	15 995 137600

Source: District Fisheries Office: Kirumba Market Mwanza

This was also pointed by Odongkara, Abila and Luomba (2009) that, it is unfortunate that major markets such as Kirumba and Muganza that generate massive income to the district budget and district fisheries offices lack modern and reliable data storage facilities like computers, which could have stored the collected information in a better way than ledger books currently used which when lost, lead to data loss. There was high potential in increasing processed sardine products value and levies paid to the government if proper data collection and documentation facilities were provided to the major sardine markets at Kirumba in Mwanza region and Muganza in Geita region. The availability of proper documentation helps the government in

decision-making and plan for intervention to improve the sardine's product for more contribution to the economy.

4.3 Market Structure, Conduct and Performance Analysis

4.3.1 Test of Reliability of Data

The pilot study identified problems that may arise from design and layouts of the questions in the questionnaire. The recommended pilot testing sample is 10 percent (Mugenda & Mugenda, 2009). The researcher recruited four Research Assistants who assisted with data collection at pilot and main survey stages. The study tested for reliability and thereafter, collected data for the main survey. The reliability of the questionnaire was tested from 26 market participants (13 processors and 13 traders) and the results of the Cronbach's alpha are presented in Table 3. The Cronbach's alpha values for traders and processor were greater than 0.70 suggesting that the constructs were reliable. The overall Cronbach's alpha values for traders and processors questionnaires were 0.874 and 0.752, respectively. Aaker, Kumar, Day and Leone (2011) and Bryman and Bell (2007) reported that construct validity was a measure of how well an operation definition was able to measure a concept. To establish the validity of the research instrument, the researcher sought opinions of agriculture economist, business management experts and law enforcers and this facilitated the necessary revision and modification of the research instrument thereby enhancing validity.

Table 3: Values of Cronbach Alpha for Measurement Constructs

	Cronbach's Alpha (Trader)	Items	Cronbach's Alpha (Processors)	Items
Market Structure	0.820	4	0.712	4
Market Conduct	0.782	5	0.743	5
Market Performance	0.754	9	0.761	9
Overall	0.874	18	0.752	18

4.3.2 Lake Victoria Sardine Processing and Marketing Channels

Sun-drying was the cheapest method of sardine preservation and it was noted that in the study area about 59.4% of processors were processing sardines by drying on sand. About 12.4% of

processors were drying sardines on rocks, 10.8% on raised racks and only 10.4% of the respondents were practicing deep-frying. Six percent (6%) and 0.8% were drying on grass and nets as well as hot smoking, respectively. In general drying on sand, rocks, raised racks and drying on grass and net comprised 86.6% of the sardine processing techniques. It has to be noted that even for hot-smoked and deep-fried sardines; the sun-drying was required to reduce the wetness of the products.

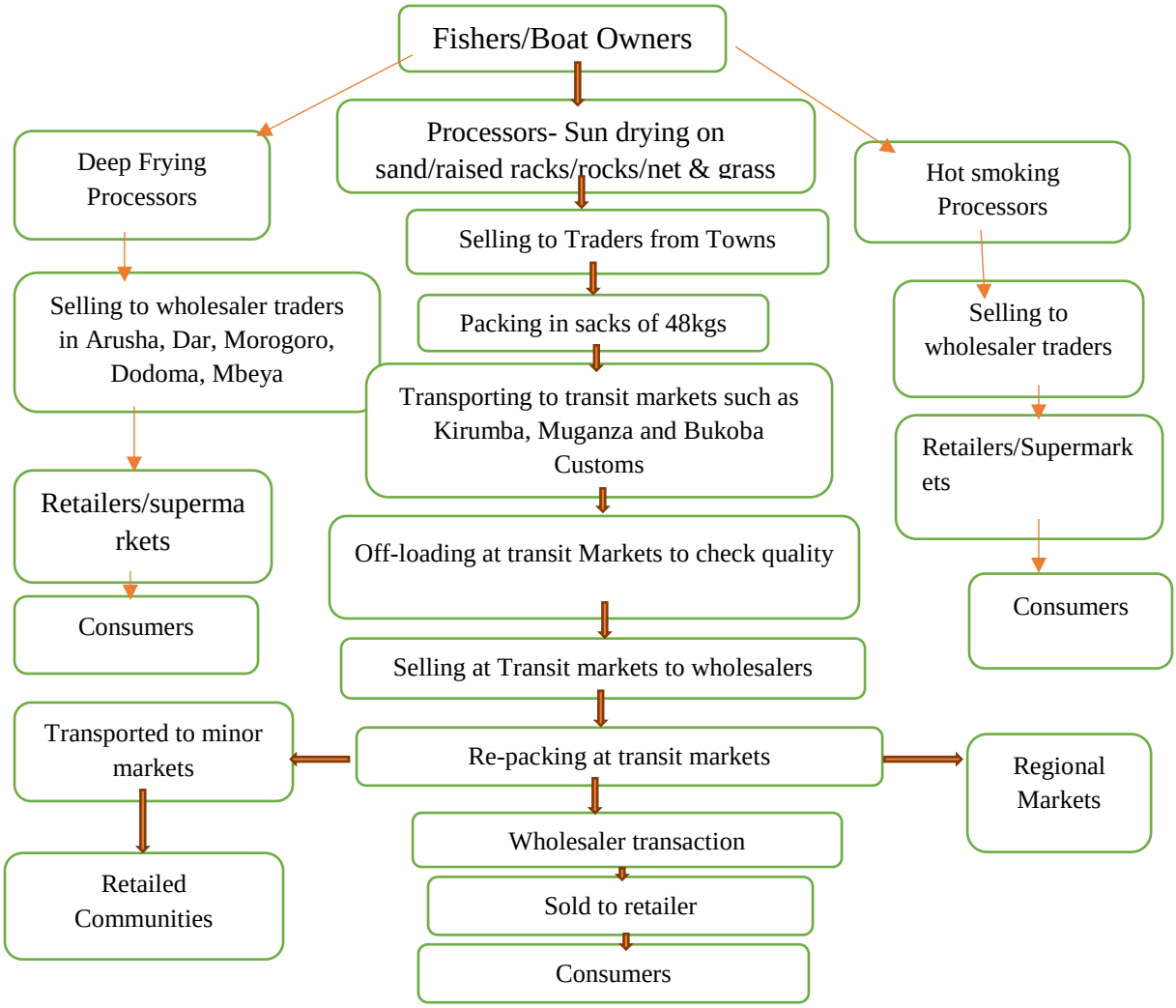

Figure 8: Flow Diagram Showing Sardine Processing Path and Distribution Route at Local and Regional Markets. Modified from Mgawe and Mondoka (2008).

Locally the sardine catch were processed by sun-drying for 8-10 hours depending on the weather, but it goes to two and three days during the rainy seasons. During the rainy season when the product was dried for two to three days, the final products were fit for production of animal feeds. The sardines were spread on the sand, rocks and on nets and grass.

The processors at landing sites preferred drying sardines on the ground because they believed that the drying processes was fast. As pointed out by the key informants and focus groups, most of processors believed that it was the heat from the ground that dries sardine quicker. Kabahenda and Husken (2009) argued that drying on the sand was favoured because it resulted in sand sticking on sardine and thereby accumulating the weight of the dried product. There was no central market at the landing sites, therefore, traders bought fish at low prices from fishers and processors located in the landing sites and beaches in the islands. Traders' visits different sardines landing sites, buy and transport to markets in major markets.

In this case, sun-dried sardine traders were collecting sardines from Ukerewe Islands (Gana and Izinga) and transport the products to Kirumba and Mganza main markets. Those who were collecting sardines from Murumo Island (Muleba district) were transporting directly to Muganza main market and those from Igabiro landing site (Bukoba Rural) were transporting to Bukoba town and further, the sardines were transported to Muganza and other regional markets like Burundi, Rwanda and Democrstic Republic of Congo (DRC). The sardines from Kibuyi landing site (Rorya district) were collected by traders and transported to Busia border (border between Tanzania and Kenya).

The processed sardine products from Kibuyi, Murumo and Igaboro landing site were most preferred by traders because they were free from sand as they were mostly dried on rocks, raised racks and grass and nets. The local price was set depending on the demand of sardines and distances from the landing sites to the markets (Fig. 8). The market price of processed sardine products was determined by quality, size and weight, season, market structure, supply and demand as also reported by Ibwengwe (2010). Sardine was commonly distributed in local and regional markets (Fig. 8).

Local agents supplied the sardines to the town markets, the largest transit markets for the repacking and resale of sardines in Tanzania were Kirumba, Muganza and Bukoba customs. The deep fried and hot smoking processors were buying sardines from the fishers/boat owners and process the products. After processing the products were sold to the wholesaler traders in Arusha, Kilimanjaro, Dar es Salaam, Dodoma, Morogoro, Mbeya and Iringa. The key informants and focus group discussions indicated that there were three main markets for sardines and theses were, market-based (Kirumba and Muganza), domestic market and regional markets in Zambia, DRC, Burundi, Rwanda, Kenya and Malawi and fishmeal industry (both local and regional). This observation was also reported by Ibwengwe (2010).

4.3.3 Market Structure

The analysis of the market structure was based on the product differentiation, market concentration measure by Herfindahl-Hirschman Index (HHI), which reflects the number of buyers and sellers, income inequalities measure by Gini coefficient and justified by Lorenz Curves as well as market entry barriers determined by access to capital and markets as well as the economies of scale.

i. Market Concentration of Sardines

The market share was then squared to obtain the Herfindahl-Hirschman Indices (HHI) as indicated in Table 4 and Table 5. Herfindahl-Hirschman Indices were calculated to assess market concentration for the markets of Kirumba market, Kayenze, Kabangaja, Chinfunfu, Gana, Izinga, Kimoyomoyo, Busekela, and Kibuyi landing sites in Mwanza, Kagera and Mara regions, respectively. The degree of sellers and buyers' concentration were moderate at 0.13 or 13% in the market and landing sites as indicated in Table 4 and Table 5.

Table 4: HH Indices of Seller Concentration in the Study Area Markets

Study area Markets	Sardines in Kgs	∑MSi	HHI $(\sum(MSi)^2$
Kirumba Market- Ilemela	33 468	0.190	0.036
Kayenze landind site –Ilemela	23 832	0.135	0.018
Kabangaja landing site – Ilemela	15 110	0.086	0.007
Chinfufu landing site- Sengerema	4980	0.028	0.001
Izinga landing site- Ukererwe	19 500	0.111	0.012
Kimoyomoyo landing site- Muleba	30 080	0.171	0.029
Busekela landing sites- Musoma Rural	21 040	0.120	0.014
Gana Landing site-Ukerewe	16 290	0.093	0.009
Kibuyi Landing site- Rorya	11 700	0.066	0.004
Total	176 000	1.000	0.13

The findings imply that the markets and landing sites were moderately concentrated and dominated by many sellers and buyers. Furthermore, the moderate index indicates a less competitive industry with dominant players. The competition amongst sellers and buyer in respective market and landing sites is imperfect competition with monopolistic nature.

The results indicate that there were many sellers and buyers as indicated in the calculation of the HHI, who had barriers to entry to sardines marketing business which indicates an inclination towards imperfect competitive market structure. Moderate concentration of buyers and sellers means that there is domination in the market; therefore, most of market participants were price takers. The phenomenon affects the income distributions and market performance as most of marketers are price takers and there is high level of domination therefore the incomes are accrued to the few marketers hence the market performance is affected.

Table 5: HH Indices of Traders Concentration in the Study Area Markets

Study area Markets	Sardines in Kgs	∑MSi	HHI) $(\sum(MSi)^2$
Kirumba Market- Ilemela	40 390	0.11	0.011
Kayenze landind site –Ilemela	16 800	0.04	0.002
Kabangaja landing site – Ilemela	23 200	0.06	0.004
Chinfufu landing site- Sengerema	21 300	0.06	0.003
Izinga landing site- Ukererwe	29 500	0.08	0.006
Kimoyomoyo landing site- Muleba	72 280	0.19	0.037
Busekela landing site	66 500	0.18	0.031
Gana Landing site-Ukerewe	26 500	0.07	0.005
Kibuyi Landing site- Rorya	18 600	0.05	0.002
Igabiro - Bukoba Rural	62 800	0.17	0.028
Total	377 870	1.0	0.129

ii. Income and Market Share Distributions

In order to calculate the Gini coefficient and drawing of the Lorenz curves for traders and processors in the study area, the monthly quantities of sardines (mainly sun-dried, deep-fried and smoked sardines (kg) sold by each trader and processor at Kirumba market, Kayenze, Kabangaja, Chinfunfu, Gana, Izinga, Igabiro, Kimoyomoyo, Busekela, and Kibuyi landing sites in Mwanza, Kagera and Mara regions were recorded during the period of May to July 2016. This was multiplied by prevailing average prices of sardines as shown in Table 8 and Table 9. The sardine traders and processors were further categorized into small, medium and large scale as shown in Table 6 and Table 7. The categorization was based on the range values of sardine sold per month. It was found that 21.77% of traders and 58.40% of processors were small scale and accounted for only 5.9% and 18.8% of the monthly sales value, respectively.

The average value of sardines traded per month by traders was computed and the smallest transaction by traders and processors (wholesalers for sardines was from 600 000 TZS to 125 000 TZS per month, respectively. Traders with the largest transaction of fish sold sardines valued at 24 000 000 TZS per month and average of 6 784 942 TZS per month and the largest processors sold sardines valued at 21 125 000 TZS and mean of 4 438 034 TZS per month. Because of the wide range, the traders were grouped into eight groups using the interval of 3 000 000 TZS, and processors were grouped into eight groups indicated in Table 6 and Table 7.

Another 61.29% of traders and 30.40% of processors fell under the medium category accounting for 54.4% and 47.4% of the monthly sales, respectively. The large category of traders constituted 16.9% and controlled 39.7% of the sales; while only 11.20% of processors were large and accounted for 33.8% of the monthly sales. Based on these results as stated by Bain (1968) under the classification of firms based on sales share, the author argued that if the first 8 largest firms constitute <45% of the sales share that market can be described with moderate concentration large competitive fringe.

Table 6: Category of Sardine Traders in the Study Area

Category	Value of fish traded per month in TZS/class	Number of traders	Percentage of traders	Value of Fish sold in (TZS)	Percentage of total value
Small	≤3 000 000	27	21.77	49 043 750	5.9
Medium	3 000 001 – 10 000 000	76	61.29	455 395 000	54.4
Large	≥10 000 000	21	16.94	332 430 000	39.7
Total		124	100.00	836 868 750	100.0

However, in this case, 21% traders and 14% processors constituted the said range of sales share, therefore it was difficult to conclude the status of the market based on the market concentration ratios. The value of the Gini coefficient and Lorenz concentration curves for traders and processors was computed as presented in Table 8 and Table 9. The Gini coefficient for traders and processors were 0.59 and 0.64 respectively. The Gini coefficients reflect the market share distributions as presented by the Lorenz curves in Fig. 9 and Fig. 10. The findings were in line to those reported by Eggert, Greaker and Kidane (2015) in their study entitled: "*Trade and Resource, Welfare effect of Lake Victoria Boom.*" The study found that there was modest growth in real income and substantial increase in inequality when comparing the Gini

coefficients for 1993 and 2008 samples. Eggert *et al*. (2015) concluded that, growth in real income was primarily accrued to the wealthier part of the population and in this case, are the boat owners who enjoyed the growth in the real incomes.

Table 7: Category of Sardine Processors in the Study Area

Category	Value of fish traded per month in TZS	Number of processors	Percentage of processors	Value of fish sold in TZS	Percentage of total value
Small	≤3 000 000	73	58.40	104 250 250	18.8
Medium	3 000 001 – 10 000 000	38	30.40	262 814 000	47.4
Large	≥10 000 000	14	11.20	187 690 000	33.8
Total		125	100.00	554 754 250	100.0

In addition, Odongkara *et al*. (2005) pointed out that the disparities were attributed to unequal distribution in production assets such as capital, skills and credit facilities; free-market price determination mechanisms; inadequate access to market and useful information. Rhoades (1995) argued that the principle of economic theory propose that the inequality for firm market shares have consequences for competition and strategic behaviour. If there was greater inequality there was likelihood that some traders and processors produced large enough quantities that affected the market price, hence other market participants were price takers. The game theoretic approach for analyzing market competition suggest that dominant firms were likely to exist when inequality was large (Rhoades, 1995).

The Gini coefficient of 0.59 for traders means that, a randomly-selected trader is expected to have sales level which is 59% above or below the mean sales level. This can be explained by the level of investment capital by traders in the study area. Furthermore, the Gini coefficient of 0.64 for processors means that a processor selected at random is likely to have sales level with deviations from the mean by 64%. The inequality in the market could be the result of variation in the investment level of the respondents. The income and market share distribution inequality was reported by the AU-IBAR (2016) that the lake's fisheries have significant inequalities, in general the socio-economic dynamics of the lake sees greater financial benefits to big owners, and much less financial benefit reaches fishers and labourers.

Table 8: Estimate of Gini-Coefficients for Sardine Traders in the Study Area

Class of traders per transaction in TZS	Frequency	Proportion of traders (X)	Cumulative proportion of traders	Total monthly sale per class of traders in TZS	Proportion monthly sale	Cumulative proportion monthly sale (Y)	XY
500 000 – 3 000 000	27	0.22	0.22	49 043 750	0.059	0.059	0.013
3 000 001 – 6 000 000	42	0.34	0.56	196 075 000	0.234	0.293	0.099
6 000 001 – 9 000 000	29	0.23	0.79	211 395 000	0.253	0.546	0.128
9 000 001 – 12 000 000	16	0.13	0.92	168 855 000	0.202	0.748	0.096
12 000 001 – 15 000 000	1	0.01	0.93	15 000 000	0.018	0.766	0.006
15 000 001 – 18 000 000	2	0.02	0.95	33 750 000	0.040	0.806	0.013
18 000 001 – 21 000 000	1	0.01	0.95	18 750 000	0.022	0.828	0.007
21,000,001 – 24 000 000	6	0.05	1.00	144 000 000	0.172	1.000	0.048
Total	124	1.00		836 868 750	1.000		0.411

Table 9: Estimate of Gini-Coefficient for Sardine Processors in the Study Area

Class of processors per transaction in TZS	Frequency	Proportion of processors (X)	Cumulative proportion of processors	Total monthly sale per class in TZS	Proportion monthly sale	Cumulative proportion monthly sale (Y)	XY
100 000 – 3 000 000	74	0.592	0.592	108 000 250	0.195	0.195	0.115
3 000 000 – 6 000 000	17	0.136	0.728	82 564 000	0.149	0.344	0.047
6 000 001 – 9 000 000	10	0.08	0.808	77 300 000	0.139	0.483	0.039
9 000 001 – 12 000 000	18	0.144	0.952	187 200 000	0.337	0.821	0.118
12 000 001-15 000 000	2	0.016	0.968	28 440 000	0.051	0.872	0.014
15 000 001-18 000 000	3	0.024	0.992	50 000 000	0.09	0.962	0.023
21 000 001-24 000 000	1	0.008	1	21 250 000	0.038	1	0.008
Total	125			554 754 250	1		0.364

Furthermore, Njiru *et al*. (2008) argued that "despite the economic boom associated with the introduction of Nile perch, the income from the Lake Victoria fishery has been concentrated among a smaller proportion of participants in the fish industry" and this has direct impact on the livelihood of the labourers as the majority are poor as it was reported by Omwega *et al*. (2006).

Some of the processors in the study area owned more than 20 outbound engines boats which worked on a daily basis during the lunar cycle while others had 3 to 5 outbound engine boats which confirms the differences in the monthly sales. Some of the processors did not own any outbound engine boats hence, these were more dependent on buying the sardines from the boat owners. Inequality in income among traders was very high as indicated in Fig. 9, about 80% of the monthly sales were accounted by 50% of the traders.

As indicated earlier the differences in monthly incomes was associated with the investment levels among traders. If the curve bows outward towards the southeast then, there was inequality in the market share of the market participants as indicated in Fig. 9 and Fig. 10. The red line shows the cumulative proportion of processors and traders, respectively while the blue line indicates the cumulative proportion of monthly sales of processors and traders.

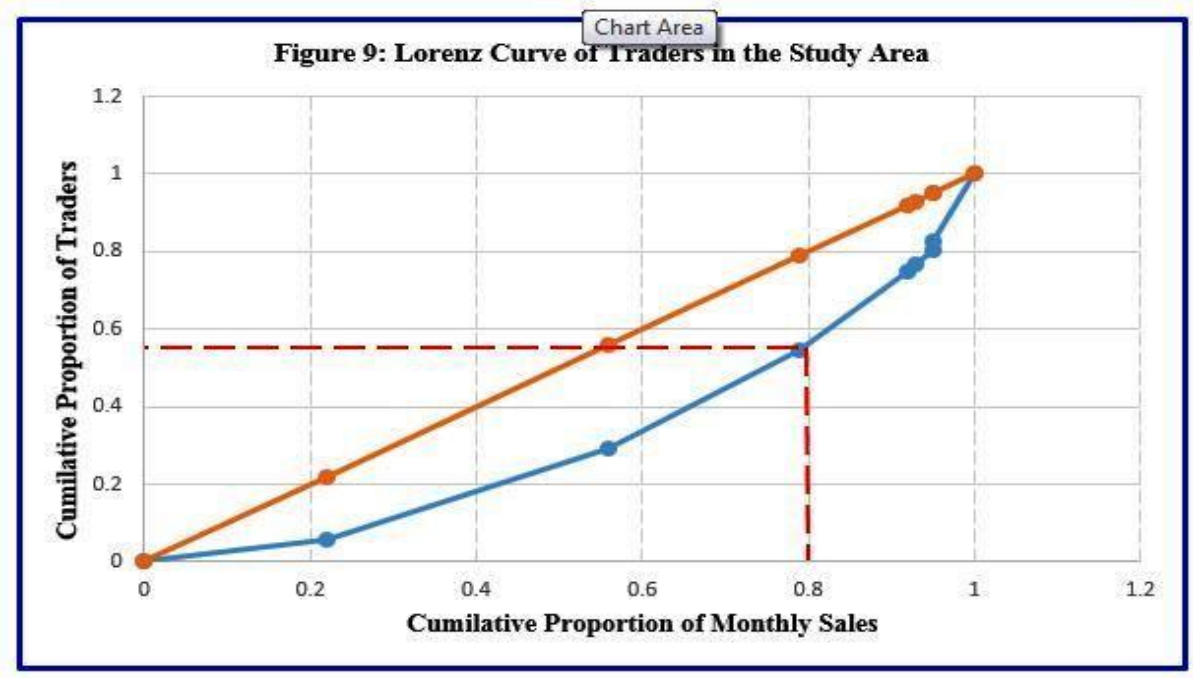

Figure 9: Lorenz Curve of Sardine Traders in the Study Area.

The Lorenz curves as presented in Fig. 9 show inequality in income among traders was very high as indicated about 80% of the monthly sales were accounted by 50% of the traders. As indicated earlier the difference in monthly incomes is associated with the investment levels among traders. The same applies to the processors whereby about 80% of the monthly income were accounted by 50% of the processors and indicated in Fig. 10.

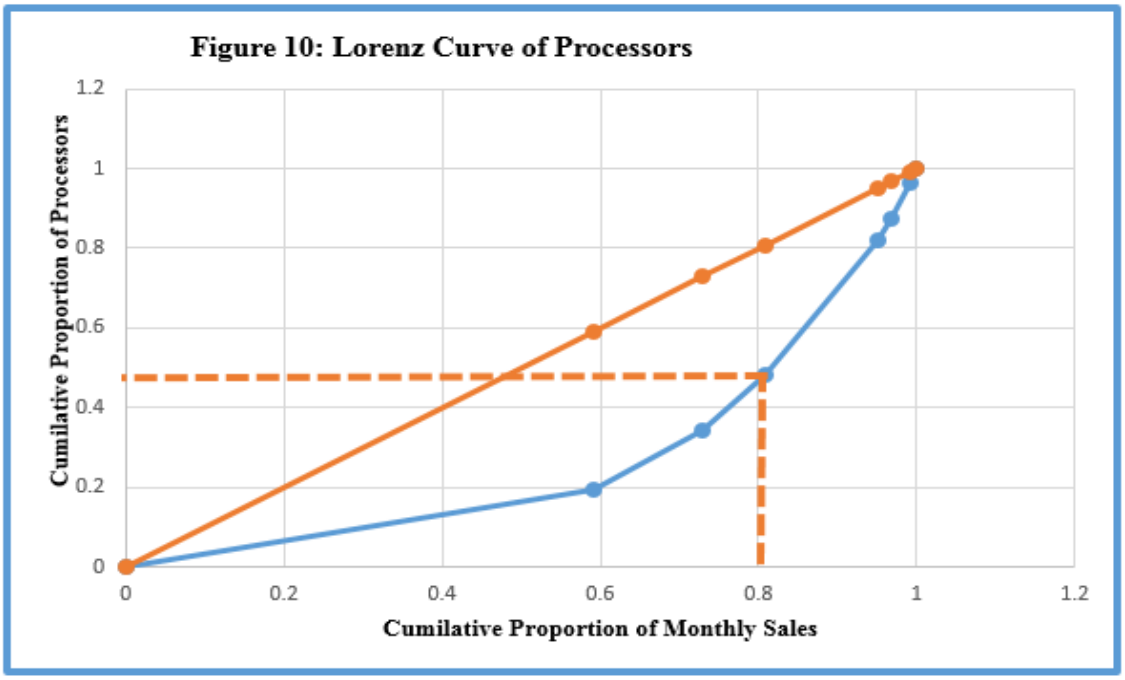

Figure 10: Lorenz Curve of Sardine Processors in the Study Area.

iii. Product Differentiation

The different types of processed sardine products in the study area are shown in Table10. The sardine's trade was dominated by the products that were dried on sand at 59.4% followed by those dried on rocks, dried raised racks, deep-fried and dried on grass and nets, at 12.4%, 10.8%, 10.4%, and 6% respectively. Though sardines dried on sand fetched low prices as compared to deep-fried, dried on raised racks and on rock, most fishers and processors preferred drying on sand. Based on the information collected the sardines that were deep-fried, dried on raised racks and on rock was sold at 10 000 TZS per kg as compared to those dried on sand sold at around 2 500 TZS – 4 500 TZS per kg at the landing site and it was dependent on the weather.

Processors, fishers and traders believed that sardines dried on sand dries faster as compared to those dried on raised racks and on rocks. Damien and Luomba (2011) pointed out that although the sardines was fetching low prices because of poor quality of the products, the processors did not seem to have any interest in improving the quality, because there were no incentives to do so. Although the prices were relatively low, the demand was high and the prospect of receiving higher price by processing a higher quality fish was not evident. In general, based on this information, the product differentiation was still low, hence more efforts should be directed to

the value addition of sardines in order to improve the quality as well as the income of the stakeholders along the value chains. The conclusion is based on the fact that consumers' prefers sardines that are free from sand; therefore the market forces traders to deliver products that are preferred by consumers.

Table 10: Different Types of Sardine Products

Sardine Products	Frequency	Percent
Smoked fish	2	0.8
Sun-dried on sand	148	59.4
Deep-fried	26	10.4
Sun-dried on rocks	31	12.4
Drying on raised racks	27	10.8
Drying on grass and nets	15	6.0
Total	249	100.0

iv. Barriers to Entry

Most traders and processors raised finances for entering the business from previous savings as indicated in Table 11. About 77% of processors and 82% of traders realized their initial capital from previous savings. Only 4.8% of processors and 4% of traders had received formal business loans to finance their trade even though about 78% and 90% of processors and traders, respectively indicated the need of formal business loan to facilitate business. Pomeroy and Trinidad (1995) pointed out that capital requirement serves as an entry obstacle as those who have enough money can enter the market.

Further, the authors argued that in fish marketing, initial capital costs include equipment of which the types vary from one fishery to another, the daily operation capital and loanable funds. The initial capital for a boat owner with (Outbound engine boat, fishing nets, pressure lamps) was around 8 400 000 TZS (4200 US$) for equipment and daily operating cost per boat including fuel for the boat, pressure lamps fuel and food for fishermen was on average 200 000 TZS (100 US$). This amount of money was huge for normal fishermen to own such fishing equipment and hence, most of the fishermen in the study area were working for people who owned the fishing equipment known as "*tajiri"* which means rich (boat owners) in Tanzania.

Table 11: Traders and Processors Sources of Initial Capital Source

Processors Initial Capita Sources	Frequency	Percent
Loan from commercial bank	6	4.8
Loan from friends and relatives	22	17.6
Savings	97	77.6
Total	125	100.0
Traders Initial Capital Source		
Loan from commercial bank	5	4.0
Loan from friends and relatives	16	12.9
Savings	102	82.3
Government assistance	1	.8
Total	124	100.0

This observation was confirmed by Pomeroy and Trinidad (1995) who reported that the initial capital costs provide an entry barrier especially for small-scale fishermen. Another entry barrier which was mentioned by the key informants was the boat license, which was renewed annually; but if the boat owner decided to go to another district for fishing activities along the lake, the same amount of money had to be paid. The cost of the boat license was 85 000 TZS (42.5 US$) per boat per annum during the survey.

In most cases, as indicated in Table 11 and Table 12, business capital was the main entry barrier to sardines trade followed by the low reliability of markets of the products. The market reliability was also mentioned even during the focus group discussion with key informants, which included the BMU's representatives, boat owners, processors, fishers and traders. Another barrier to entry which was mentioned by the key informants was the government levies on the processed sardines which included fish products collection license which is being paid per district where the produce is being collected and it was 200 000 TZS (100 US$) per year during the survey. This means that if the trader opts to go to another district along the Lake Victoria for fish products collection, he/she has to pay for another 200 000 TZS (100 US$) for collection license.

This was seen as a barrier to trade as the trader is required to pay the same amount of collection license cost from one district to another. However, the license costs was the same for all traders irrespective of the type of fish sold. This allows traders free movements from one fish

products/type to the other. Furthermore, sardine market associations existed in the study area whereby about 35.4% of respondents were members of cooperatives, but did not enforce restrictive rules to exclude anybody from selling and buying in the market

Table 12: Traders' and Processors' Business Entry Barriers

	Frequency	Percent
Processors' entry barriers		
Lack of capital	77	61.6
Long and costly TFDA certification process	6	4.8
No Reliable markets	42	33.6
Total	125	100.0
Traders' entry barriers		
Lack of capital	86	69.4
No reliable markets	38	30.6
Total	124	100.0

v. Scales Economies as Entry Barrier

The results in Table 13 shows that the coefficient of determination (R^2) was 0.84 for wholesalers' traders of processed sardines in Lake Victoria, therefore average marketing cost describes 84% of the quantity of dried sardine marketed. The coefficient of the quantity traded was negative (-3359.27) and statistically significant at 1% level.

Table 13: Least Square Regression Estimates

Marketers	Coefficients	Standard Error	t Stat	P-value	F-Value	R Square	Significance	Number
Intercept	3636.31	487813.5	0.745	0.457		-	-	
Traders	-3359.27	-132.511	-25.35	0.000	0.0000*	0.840	0.0000*	124

* = Significant at 1% level

The inference was that as the quantity of dried fish traded increases, the average marketing cost decreases. This results from bulk purchases, transportation and processing, thus confirming the presence of economy of scale. This can be well achieved if the traders would work in cooperation or through innovative platforms, whereby processors, traders and transporters will work in collaboration to realize the economies of scale. Pomeroy and Trinidad (1995) said that

“scale economies explains market entry conditions and market concentration and it exists when the average marketing costs are inversely related to the volume of products handled and these scale economies encourage the growth of large and specialized market intermediaries”. This was observed in the sardine markets whereby, the marketing costs and volume of sardine handled were inversely related and this is why the coefficient of volume handled has a negative sign and was statistically significant at 99% confidence interval. This was computed using least square regression as shown in (equation 11) in the analytical framework.

4.3.4 Market Conduct

The market conduct was analyzed based on the availability of market information and means of contact between market participants to access business loan and loan providers and price setting procedures.

i. Market Information

The analysis of the market as presented in Table 14 reveals that, 87.1% of the respondents said that the market information is available whereas 83.5% of the respondents get market information through co-traders, 8.8% through traders’ cooperatives and associations, 7.2% through market officials. The implication of the findings was that, majority of the market participants received market information through personal contacts. Since the main source of the market information was traders and processors themselves, there were possibilities of misinformation. The risk of misinformation underscores the importance of using collaboration, cooperatives and innovation platforms for accessing reliable information. Analysis of the market conduct further revealed that 46.2% of marketers contacted each other through phone, 33.7% through personal contacts and phone while 12.0% and 8.1% was through middlemen and meeting in the market, respectively.

The findings reveal that the intervention of middlemen in the study area were low; hence, there were also insignificant price collusion among marketers. In general, there was unreliable market information which in turn affected the product price because, the processors were getting information from traders who were the main buyers. In addition, the prices were set through negotiation based on the information provided by the trader, this influenced the negotiation process and in turn the seller was the main looser in the game.

Table 14: Market Information

Market information provider	Frequency	Percent
co-traders	208	83.5
Traders cooperatives/association	22	8.8
market officials	18	7.2
government extension workers	1	.4
Total	249	100.0
Means of contact between marketers		
In the market	30	12.0
Middlemen	20	8.1
Telephone	115	46.2
Personal contact and telephone	84	33.7
Total	249	100.0

ii. Availability of Business Loans

The result on the availability of business loans as indicated in Table 15 revealed that only 24.9% of the respondents had access to formal business loans. The main providers of formal business loans were FINCA microfinance and National Microfinance Bank (NMB) with 9.2% and 5.2% respectively. The low accessibility of formal business loan is caused by the requirements which includes having guarantors and collaterals (title deeds, registration car cards etc) of which most of market participants couldn't afford. Furthermore, the interest rates charged by banks, microfinance institutions and Savings and Credits Cooperatives (SACCOS) were relatively high as reported by processed sardine traders and processor as it is about 18% the and repayment is on monthly basis.

The poor access to business loans in the study area calls for intervention to improve the access to the loans in fishery industry. Poor access to business loans affects both the buyer and the seller, however, the sellers were most affected because they depend much on social capital provided by traders to cover investment and operations cost of which were expensive (Medard, 2012). The social capital binds the processors to accept the prices provided by the traders. The arrangement has long term impacts to the producers in terms of the product quality and price. The traders determine prices based on the market. This calls for safety nets provided by

development partners and government as well as special provision of soft loans directed to the fishery industry and specifically sardines.

Table 15: Availability of Business Loan and Loan Providers

Loan provider	Frequency	Percent
PRIDE	6	2.4
SACCOSS	3	1.2
NMB bank	13	5.2
Mwashita group	2	.8
Wanawake group ukombozi	4	1.6
Finca	23	9.2
USWEKI GROUP	1	.4
Brack	3	1.2
Advance bank	3	1.2
CRDB bank	4	1.6
Total	62	24.9
Availability of loan		
Yes	62	24.9
No	187	75.1
Total	249	100.0

iii. Price Setting Procedures

The result on how the selling prices were set revealed that the majority (85.1%) arrived through haggling while, 8.4% said processors fixed the price and 6.4% suggested that traders fixed prices as indicated in Table 16. The findings implied that the price of processed fish was not standardized in the study area. Furthermore, the results show that the price setting has, therefore, elements of collusion because most of processor were not well informed about the market prices

Table 16: Price Setting Procedures

Sale agreement price setting	Frequency	Percent
Negotiation	212	85.1
Processors to fix the price	21	8.5
Trader to fix price	16	6.4
Total	249	100.0

4.3.5 Market Performance Analysis

Market performance could be viewed as the assessment of the market in terms of efficiency, progressiveness, innovation and employment generation (Tijani *et al*., 2014). The market performance was measured based on the net returns received by traders, market margins, marketing efficiency and, operating ratio and profitability index and the factor influencing marketing efficiency.

i. Market Net Returns

Market returns gives an overview of what the markets participants received after deducting the total marketing and investment costs from total revenue as net profits from doing business. The net returns per kilogram for sardines dried on sand, deep fried, dried on rocks, dried on raised racks and dried on nets and grass were 995.37 TZS (0.498 US$), 2259.2 TZS (1.1296 US$) 1 857.08TZS (0.929 US$), 2054.16 TZS (1.027 US$) and 1349.167 TZS (0.675 US$) respectively, as indicated in Table 17**.**

Table 17: Computations of Market Net Returns

Product type	Sun-dried on sand	Deep fried	Sun-dried on rocks	Dried on raised racks	Dried on grass & nets
Quantity sold per month (kg)	322 760	16 730	63 880	87 580	62 800
Average Buying price/ Kg	1850	4000	3000	2800	3000
Average selling price TZS/ kg	3000	6500	5000	5000	4500
Total revenue (TR)	968 280 000	108 745 000	319 400 000	437 900 000	282 600 000
Total fixed cost (TC)	597 106 000	66 920 000	191 640 000	245 224 000	188 400 000
Total variable cost (TVC)/ kg	154.63	240.80	142.92	145.84	150.84
Total variable cost (TVC)	49 908 378.8	4 028 584.0	9 129 729.60	12 772 667.2	9 472 752.0
Total cost (TC) (TVC+TFC)	647 014 378.8	70 948 584.	200 769 729.6	257 996 667.2	197 872 752.0
Total net return (TR-TC)	321 265 621.2	37 796 416.0	118 630 270.4	179 903 332.8	84 727 248.0
Net return/ kg	995.37	2259.20	1857.08	2054.16	1349.16

1US$ = 2,000 TZS

The total net return for sardines dried on sand per month was greater as compared to the return per kilogram because of the huge volume sold per month. The sun-dried on sand sardines per month was 322 760 kg as compared to 1 6730 kg, 63 880 kg, 87 580 kg, and 62 800 kg for deep-fried sardines, sardines dried on rocks, dried on raised racks and dried on nets and grass, respectively. The findings suggest that it is more profitable to invest on deep-fried sardines, sardine dried on rocks, sardine dried on raised rack and sardines dried on net and grass as they fetch good prices as compared to sardines dried on sand.

ii. Market Margin Analysis

The proportion of the consumer expenditure that goes to the traders is referred to as market margin, and in this case, is the proportion of selling and buying prices by the wholesale (Ohen, 2017). The results of the analysis in Table 18 shows that 38.33%, 38.46%, 40%, 44% and 33.33% of market margins were obtained from sardines dried on sand, deep-fried sardines, sardines dried on rock, sardines dried on raised racks and sardines dried on grass and nets per kilogram of sardine product.

Ani, Chidebelu and Enete (2016) associated the high marketing margins with market imperfection as the performance of the markets exhibits pricing inefficient. The same authors reported that efficient markets in developing countries must have margins of less than 10% of the consumers' prices for non-perishable goods like processed sardines. The higher the marketing margin the greater the market share of market participants along the value chain. This is in line with the findings Olukosi, Isitor and Ode (2005), who asserted that a larger variation between the marketing margins of participants indicates a wide price variation along the chain; participants with higher marketing margin, are said to have a larger share of the marketing.

Table 18: Market Margin Analysis

Product type	Sun-dried on sand	Deep-fried	Sun-dried on rocks	Dried on racks	Dried on grass & nets
Average buying price/ kg	1850	4000	3000	2800	3000
Average selling price TZS/kg	3000	6500	5000	5000	4500
Marketing margins/kg	38.33	38.46	40	44	33.33

1US$ = 2,000 TZS

Pomeroy (1989) argued that existence of higher market margins can be detrimental to producers and consumer as it results in imperfect competitions conditions. The author confirmed that higher retail prices can be attributed to high operational costs at retail markets as fish products sold at low quantities are spoiled fast. In Lake Victoria the post-harvest losses of sardine products were high and it was attributed by poor handling and poor processing practices which led to high levels of infestation and physical losses.

iii. Marketing Efficiency Analysis

Marketing efficiency determines the ratio of output to the input value of doing business throughout the marketing system, the higher the ratio the efficient is the market in question. The marketing efficiency results indicate that sardine products marketing system was efficient with efficiency value of 49.7%, 53.3%, 59.1%, 69.73% and 42.82% as indicated in Table 19 for sardines dried on sand, dried on rocks, dried on raised racks and dried on nets and grass, respectively. The average marketing efficiency was 54.91% implying the existence pricing efficiency of processed sardine products.

Table 19: Computation of Marketing Efficiency (ME)

Product type	Sun-dried on sand	Deep-fried	Sun-dried on rocks	Dried on raised racks	Dried on grass/nets
Quantity sold/month (kg)	322 760	16 730	63 880	87 580	62 800
Average buying price/kg	1850	4000	3000	2800	3000
Average selling price TZS/kg	3000	6500	5,000	5,000	4,500
Total revenue (TR)	968 280 000	108 745 000	319 400 000	437 900 000	282 600 000
Total Cost (TC)	647 014 378.8	70 948 584.0	200 769 729.6	257 996 667.2	197 872 752
Total net return	321 265 621.2	37 796 416	118 630 270.4	179 903 332.8	84 727 248
ME	49.70	53.30	59.09	69.73	42.82

1US$ = 2,000 TZS

The results suggest that marketers are able to cover their activity cost with no loss in the business (Irhivben *et al*., 2015). The high marketing efficiency can also be contributed by the under costing of the handling costs. The costing of fish products loss was not included in the calculations as the traders were not able to approximate the loss caused in financial terms. In addition, there was under payment of labour charges especially for people hired for turning the sardines during drying on raised racks and grass and nets. People hired for turning sardines during drying on raised racks were paid a bucket of sardine worth 10 000 TZS in every 14 buckets of sardine dried. The high marketing efficiency mighty be attributed to high selling prices in the wholesale markets as compared to the buying prices at the landing sites.

iv. Profitability Index (PI) and Operating Ratio (OR)

The profitability index measures the ratio of net income received by traders to the total revenue. The higher the ratio the more profitable the product in question is. The operating ratio is the cost of the product and marketing expenses to the sales revenue. This is an indicator of the operational efficiency of a business, a lower operating ratio indicates high operating profit.

Table 20: Computation of Profitability Index and Operating Ratio

Product type	Sun dried on sand	Deep fried	Sun dried on rocks	Dried on raised racks	Dried on grass/nets
Total revenue in TZS	968 280 000	108 745 000	319 400 000	437 900 000	282 600 000
Total cost in TZS	647 014 378	70 948 584	200 769 729	257 996 667	197 872 752
Total net return in TZS	321 265 621	37 796 416	118 630 270	179 903 332	84 727 248
Profitability index (PI)	0.33	0.35	0.37	0.41	0.30
Operating ratio (OR)	0.67	0.65	0.63	0.59	0.70

1US$ = 2,000 TZS

The results in Table 20 indicate that processed sardine business is profitable whereby sardines dried on raised racks was more profitable with profitability index of 0.41 with lower operating ratio of 0.59, followed by sardines dried on rocks, deep-fried sardines, sardined dried on sands

and on grass and nets with 0.37, 0.35, 0.37 and 0.30 profitability index and 0.63, 0.65, 0.67 and 0.70 operating ratios, respectively.

Among the factors which impacted significantly sardine trader's profits were the transport cost, handling costs, taxes/levies paid as well as access to credit. The cost of doing business is higher because of lack of economies of scale, therefore, traders' dwells much on the domestic market rather than accessing lucrative regional markets. On average traders received 35% of investment costs as net return and spending on average 65% for doing business. In general, the sardine market is imperfect competitive, high income inequality, highly concentrated and less efficiency because on average 80% of monthly revenues goes to only 50% of the marketers.

v. Factors Influencing Marketing Efficiency

A multiple regression model was done to determine the factors that have significant influence on the marketing efficiency of processed sardine products in Lake Victoria Tanzania. The dependent variable was the marketing efficiency, while the independent variables are indicated in Table 21. The total net returns, selling price and quantity traded per month significantly influenced positively the marketing efficiency at 1% level of significance (Table 21), the coefficients showed that increase in net returns, selling price and quantity traded led to increase in marketing efficiency by 13%, 87.5% and 10.8%, respectively while holding other variable constant. The results conform to those of Ayieko, Bett and Wabuage (2014) who argued that market profits and price paid by consumers positively influence the marketing efficiency. Access to formal business loans significantly influenced the marketing efficiency at 5% level of significance.

Access to formal business loans increased marketing efficiency by 1.6% as indicated in Table 21. Access to market information influenced positively the marketing efficiency at a significance level of 10%, access to information increased the marketing efficiency by 1%. The marketing margin, buying price, marketing cost and fixed cost negatively influenced the marketing efficiency at significance level of 5%. Increase in marketing margin, buying price, marketing costs and fixed costs decreased the marketing efficiency by 1.4%, 24.4%, 2.4% and 7.7%, respectively. The finding agrees with those of Ayieko *et al.* (2014), Dastagiri *et al.* (2013) and Emam (2011) who found that marketing margin and marketing costs had negative effect on marketing efficiency.

Table 21: Determinants of Marketing Efficiency

	Std. Error	Beta	T-Value
(Constant)	11.478		10.485
Total net return	.000	.130***	5.376
Selling price	.001	.875***	37.111
Buying price	.003	-.244***	-26.036
Total fixed cost	.000	-.077**	-2.605
Total marketing cost	.000	-.024**	-2.493
quantity traded per month	.003	.108***	3.717
Age	.169	.005	.733
experience in the fishery industry	.217	.008	1.190
Access to market information	0.824	.010*	1.669
Access to formal loan	0.011	.016**	2.477
marketing margin	0.032	-0.014**	-1.946

R^2 = 0.996, * = 10% level of significance, ** = 5 % level of significance, *** = 1% level of significance

4. 4 Consumer Sardines Buying Decision Factors

4.4.1 Descriptive Statistics Analysis

Descriptive statistical analysis was carried out to explore the organization of the information and to recognize each variable in this objective. For better recognition of the variables, means and standard deviation were calculated. Arithmetic means and standard deviations for all variables are indicated in Appendix 1. The arithmetic means of the consumers buying decision factors variables were compared with their scales on criteria of (High >4, Neutral = 4 and Low < 4). Results in Appendix 1 revealed that respondent's opinion for all variables except eating habits of smoked sardines was greater than the agreement point (>4). The eating habits of smoked fell under the category of "Low" i.e. (<4).

Greater mean value described in Appendix 1 for sardine dried on rocks, deep-fried and hot-smoked (Mean= 6) followed by sardines dried on grass and net as well as sardines dried on raised racks (mean> 5) indicated that respondent intentions to buy the product in question was high. Mean value of 6 and >5 for processed sardine products buying intention on the Likert scale of 1 to 7 showed that respondents had favorable intention towards sardine products and

it was most likely that they would purchase the products in the near future. Attitude and confidence for sardines dried on raised rack, rocks, grass and nets as well as hot-smoked and deep-fried sardines of household decision maker towards the products, who make sardines buying decision also indicated (Mean > 5) for favourable attitude and confidence towards the products in question. To describe the spread of the individual scores of respondents from their arithmetic mean, standard deviations of the variables were considered. All standard deviations values were minimal and thus showing the accuracy of a measurement.

4.4.2 Test of Variable Reliability

Garson (2012) stated that the main goal of the investigation of reliability was to guarantee the stability and internal uniformity of the instrument and processes of the different variables of the research. Since in this objective, the instrument used was adopted from previous studies on consumer behaviour theory and it was tested and reviewed before collection of data, it was expected that the variables were reliable. In Table 22, the Cronbach α reliabilities for scales used in this study are presented. Good internal item uniformity tests were produced by the inter items consistency analysis.

The Cronbach α for all items of the questionnaire was 0.951, which indicates an outstanding uniformity of items in the scale. The Cronbach α for processed sardine products recognition was 0.718, Cronbach α for attitude towards processed sardine products was 0.866, Cronbach α for confidence evaluations towards processed sardine products was 0.847, Cronbach α for processed sardine products buying intention was 0.765 and Cronbach α for processed sardine products factors that influence buying intentions (Price, product availability, convenience, preferences) was 0.710 respectively. Based on rule of thumb as reported by George and Mallery (2003), the Cronbach α value for the variables presented in Table 22 falls within the good and accepted range. Garson (2012, p. 19) noted that "value of Cronbach's alpha from 0.6 to 0.8 is suitable for generalized linear regression model".

Table 22: Summary of Reliability Analysis of Variables

Research variables	Sardine products	Number of items		Cronbach's alpha	
Product recognition	Sardines dried on sand	3	18	0.599	0.718
	Sardines dried on raised racks	3		0.736	
	Sardines dried on rocks	3		0.710	
	Sardines dried on nets and grass	3		0.830	
	Deep-fried sardines	3		0.810	
	Hot smoked sardines	3		0.620	
Attitudes towards product	Sardines dried on sand	5	30	0.738	0.866
	Sardines dried on raised racks	5		0.788	
	Sardines dried on rocks	5		0.718	
	Sardines dried on nets and grass	5		0.848	
	Deep-fried sardines	5		0.916	
	Hot smoked sardines	5		0.766	
	Sardines dried on sand	5	30	0.662	0.847
Confidence towards sardine products	Sardines dried on raised racks	5		0.765	
	Sardines dried on rocks	5		0.758	
	Sardines dried on nets and grass	5		0.827	
	Deep-fried Sardines	5		0.922	
	Hot-smoked sardine	5		0.744	
Buying intention of sardine products	All products	6		0.765	
Measure of buying intention influences	All products	8		0.710	

4.4.3 Test for Uni-dimensionality and Validity of Constructs

Garson (2012) stated that the common method of testing uni-dimensionality of constructs is Cronbach's α and is the measure of the inter- correlations of the items. The same author pointed out that if α was greater than or equal to 0.80 then the items were considered uni-dimensional for confirmatory purposes. However, for explanatory purposes some researchers use a lower cutoff of 0.60 of Cronbach's α. The uni-dimensionality of constructs was tested using the

Cronbach's α, the results are presented in Table 22 and all fall under the accepted cutoff point of 0.60.

Aaker, Kumar, Day and Leone (2012) and Bryman and Bell (2007) reported that construct validity was a measure of how well an operation definition was able to measure a concept. Construct validity was explored using Pearson's correlation Malhotra and Birks (2003). Bryman and Bell (2007) pointed out that if the value was greater than 0.8, it indicates a very strong correlation between the two variables. Construct validity was measured through the correlation matrix of items of constructs for different processed sardine products as indicated in Appendix III. The correlation of most items was found significant and under 0.8, therefore, validity was ensured. The two-way tables were also drawn to understand the sardines buying intention in relation to demographic characteristics; to test the significance of relationship between respondent profiles and sardine products buying intention this objective used Chi-square test as indicated in Appendix IV.

4.4.4 Test for Normality

Normal distribution of data is the main assumption for applying regression model. Garson (2012) pointed out that the graphical methods can be used in assessing normality. The assumption of normal distribution was checked with histogram of residuals and P-P plots. The findings of descriptive statistics and graphical representations have indicated that the information used had a normal distribution as shown in Appendix II.

4.4.5 Test of Homoscedasticity

Garson (2012) demonstrated that if the association between independent variables and dependent variables for the complete series of the dependent variables is similar then, it is known as homoscedasticity. "Homoscedasticity can be explored through a scatterplot diagram of standardized predicted dependent variable against standard residuals" (Garson, 2012, p. 40). If residuals in the scatterplot, form pattern less cloud of dots then homoscedasticity assumption of regression is met (Garson, 2012). To check for homoscedasticity, scatterplot of the standardized residuals against the fitted values was found using SPSS. The scatterplots for all independent variables indicated low cloud patterns of dots, therefore approve homoscedasticity of the data.

4.4.6 Zero Order Correlation Analysis of Processed Sardines Variables

Results in Appendix III show the correlation analysis of the processed sardine products variables. The results of zero order correlations shown in Appendix III between the consumer buying decision factors variable which includes the product recognition measure by product information, eating habits and prior experience; the consumers attitudes, confidence and buying intention of different processed sardine products. The consumers buying decision factors was used to describe the general pattern of relationship between dimensions using correlation analysis. The results show that most of the variables were correlated and significant at $p<0.0001$, $p<0.001$ and $p< 0.05$. The results in Appendix III prove the ability of the model to predict the buying intention of consumers on different processed sardine products in Lake Victoria Tanzania side.

4.4.7 Multicollinearity Test of Variables

Multicollinearity was analyzed in the light of the values of variance inflation factors (VIFs) and Tolerance. VIFs and Tolerances were calculated for each of the predictor variables for sardine product intention to buy. The recommended value for VIF for the absence of multicollinearity was VIF >=5 and Tolerance > 0.2 (Garson, 2012). Results of VIF and Tolerance were summarized in appendix V. It was clear from the findings that, all VIFs and Tolerance values met the suggested threshold values. In conclusion, the data met all postulation of the regression model and thus validate that the proposed model was fit for regression analysis.

4.4.8 Consumption Behaviour of Different Sardine Products

The respondents were asked to show their consumption behaviour for the six processed sardine products; 60.5% of the respondents indicated that they did not consume sardined dried on sand as shown in Table 23**.** This can be explained by the product being contaminated by sand and hence caused inconveniences in the preparation process. Furthermore, 73.7% of the respondents pointed out that they have not consumed sardines dried on grass and nets in the study area. This phenomenon can be explained by the quality in terms of being free from any contaminations. The consumers believe that sardine dried on grass and net, can be contaminated by grass particles.

Table 23: Sardine Products Consumption Behaviour

Dried on Sand	Frequency	Percent	Dried on grass/nets	Frequency	Percent
Daily	20	10.5	Daily	24	12.6
Weekly	25	13.2	Weekly	5	2.6
Monthly	13	6.8	Monthly	9	4.7
More seldom	17	8.9	More seldom	12	6.3
Not at all	115	60.5	Not at all	140	73.7
Total	190	100.0	Total	190	100
Dried on racks	Frequency	Percent	Hot smoked sardines	Frequency	Percent
Daily	50	26.3	Daily	2	1.1
Weekly	34	17.9	Weekly	1	0.5
Monthly	28	14.7	Monthly	5	2.6
More seldom	44	23.2	More seldom	9	4.7
Not at all	34	17.9	Not at all	173	91.1
Total	190	100.0	Total	190	100.0
Dried on rocks	Frequency	Percent	Deep fried sardines	Frequency	Percent
Daily	97	51.1	Daily	75	39.5
Weekly	26	13.7	Weekly	62	32.6
Monthly	11	5.8	Monthly	20	10.5
More seldom	22	11.6	More seldom	24	12.6
Not at all	34	17.9	Not at all	9	4.7
Total	190	100.0	Total	190	100.0

In addition, the practice of drying sardines on grass and nets was most common in Kagera and Mara region. This might be the reason that the availability of the product was scarce in other areas. With regard to sardines dried on raised racks, only 17.9% of the respondents reported that they have not consumed the product. This can be explained by availability and freedom from sand contamination of the product.

In addition, the drying practice was used by most people in the three regions where the survey was conducted. Majority of the respondents (91.1%) reported that they had not consumed hot-smoked sardines. This can be explained by availability of the product, as most of the respondents said that they had not even seen the product. Only 17.9% and 4.7% of the respondents reported that they have not consumed sardines dried on rocks and deep-fried

sardines, respectively. This shows that majority of the respondents had consumed sardines dried on rocks and deep fried. This can be explained by the fact that this processing method was used by most of the respondents in the study area. Drying on rocks was reported in all the three study regions.

4.4.9 Factors Affecting Purchase of Processed Sardine Products

Product quality (colour, smell, taste and free from sand), price, availability and accessibility as well as convenience of processed sardine products were main criteria when deciding whether to purchase the sardine products. About 51.6% of respondent were on the quality conscious of sardine (colour, smell, taste and free from sand) products while 40% were more concerned by the affordability, accessibility and availability factors and only 8.4% considered the product convenience as shown in Table 24.

Table 24: Factors Affecting Buying Decision

Factors	Frequency	Percent
Quality (colour, smell, taste and free from sand)	98	51.6
Price, availability and accessibility	76	40
Convenience (motive)	16	8.4
Total	190	100

The results have implications in the processing practices existing in the study area. The processors should consider processing practices that focus on the quality of the final product, convenience as well as the prices. Consumers seemed to be price-sensitive but still they needed product with good taste, fresh and free from sand as well as convenient in the preparation process. Convenience was based on the process of the saving of time, physical or mental energy at stages of the overall meal preparation (Brunsø & Grunert, 2007). The results confirm the consumers' buying decision behaviour as pointed out by Howard *et al.* (1988) that product purchase intention was influenced by product availability, price and conveniences (motive).

4.4.10 Consumers Product Preferences

Consumers were asked to identify one processed sardine product they preferred most when compared to other products. The results are presented in Table 25. Consumers indicated that the most preferred sardine product was the one dried on rocks, representing 37.4% of

respondents followed by sardines dried on raised racks (23.2%). Deep-fried and sardines dried on grass and nets accounted for 16.8% and 15.8% of the respondents, respectively. The preference of sardine products was reflected in the factors which affect buying decisions as presented in Table 25.

Freshness and freedom from sand was also reflected in the product preference as only 6.3% of respondent said they prefer sardines dried on sand. The price of sardines dried on rocks was cheaper than sardines dried on raised racks, this can also explain the price sensitivity of the consumers. Only 0.5% of consumers preferred hot-smoked sardines, which can be explained by product availability and eating habits of consumers. Hot-smoked sardines were reported to be not commonly seen by most consumers.

Table 25: Consumers Processed Sardine Products Preferences

Processed sardine products	Frequency	Percent
Dried on sand	12	6.3
Dried on raised racks	44	23.2
Deep-fried	32	16.8
Hot-smoked	1	0.5
Dried on rocks	71	37.4
Dried on grass and nets	30	15.8
Total	190	100

4.4.11 Consumers Sardine Product Consumption Reasons

When respondents were saying sardines were served with food they were implying that the said food have to be served with sardine as the only option for the food to be eaten. While, when consumers says sardine were part of their diet implies that they were able to serve sardine in their meals in addition to other protein sources. Sardine being part of their meal means that in every meal sardines were also served. Respondents were asked to give reasons for consuming different sardine products. The results are presented in Table 26. The main reason for sardine products consumption was as part of meals and this accounted for 62.1% of the respondents. This can be explained by the fact that most consumers said in every meal they prefer to have sardine as part of their meal because it tastes good especially when served with different dishes. While 26.3% of the respondents said that they eat sardine products as it is served with food and only 11.6% reported the reason being part of their diet.

Table 26: Reasons for Eating Sardine

Reasons for eating sardines	Frequency	Percent
Part of meal	118	62.1
Part of diet	22	11.6
Served with food	50	26.3
Total	190	100.0

4.4.12 Socio- Demographics and Sardines Buying Intention Behaviour

The findings in Table 27 indicates statistically significant ($F\ (6,181) = 2.707$, $p = .01$) for sardine products buying intention based on socio-demographics of the respondent as determined by one way ANOVA. The six factors that were considered were gender, age, education level, average monthly income and household size. During the formulation of hypothesis on the impact of the socio-demographics of the buyers of sardine products, it was noticed that buyer's gender, age, education level, average monthly income and household size of the buyer affects sardines buying intention.

Results were consistent with the findings of Cornescu and Adam (2015) and Milner and Rosenstreich (2013) who noted that demographic factors that affect consumers buying behaviours were of social and economic nature. Using cross tabulation approach, Chi square test and symmetric measures were calculated and the findings are indicated in Appendix IV. The analysis was conducted to understand the relationship between the demographic variables of the sample and dependent variables which included the processed sardine products buying intentions.

Table 27: One Way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.353	5	6.392	2.707	.01
Residual	425.112	181	2.362		
Total	463.465	187			

The results in Appendix IV show that all the five demographic characteristics considered in this study are significantly associated with sardine products buying intentions. Based on the same test on the sardine product dried on sand, all the five demographic characteristics were

insignificant, showing that the effect of demographic characteristics were low on the buying intention. This might be associated with the respondent's preference and quality of the product. Most of respondents believe that sardines dried on sand were contaminated with sand and pose risks to the health of the consumer.

The Chi square test for sardine products dried on raised racks was significant specifically on the gender, average income and household size at $p < 0.05$; however, on education and age of the consumer were insignificant. The statistical significance on gender can be associated with the ease of preparation as it was believed that most of the household purchases were done by women. The majority of the respondents were female constituting 83.7% of total respondents. The significance in the average household income is associated by the price of different processed sardine products. It was pointed out during the survey that the price of sardines dried on raised racks was a bit higher than sardines dried on sand.

The Chi square test for sardines dried on rocks was statistically significant specifically on education, average monthly income and household size with $p < 0.001$ and $p < 0.01$, respectively. The significance in education with the sardine buying intention might be associated with the quality and health (free from sand) of sardines dried on rocks as it was believed that the product was free from sand. The Chi square test for sardine product dried on grass and nets was significant basically on the education and average monthly income of the consumer at $p < 0.001$. The same reasons may apply as for sardine products dried on raised racks and rocks and all of these products were free from sand and the price is a bit high as compared to sardine products dried on sand. The Chi square test for deep-fried and hot-smoked sardines was significant. The deep-fried sardine product was significant basically on four demographic characteristics (age $p < 0.05$, education $p < 0.1$, income and household size $p<0.01$) except the gender of the respondent. For hot-smoked sardines, the Chi square test was significant for all the five demographic characteristics of the consumer except the age. The significance level for gender, education and household size at $p < 0.001$, and income at $p < 0.05$). This leads to the acceptance of the hypothesis that says the consumers' demographic characteristics have direct influence on the intention to buy sardine products. The demographic characteristics were further used on the regression analysis to find the causal effects on consumers buying intention for difference processed sardine products.

4.4.13 Direct Effects of Socio-demographics on Sardine Products Purchase Intention.

Olsen (2003) argued that variation in food choices was mostly based on socio-economic or demographic variables such as age, gender, race, income, occupation, price and supply. Regression analysis for testing the effect of socio-demographics variables on sardine products buying intention was carried out to test the following hypotheses, H_1: Consumer Demographic characteristics have direct influence on the intention to buy of Sardine products

Regression model with values of [$F(5, 182) = 2.83$, $p < 0.01$] was established for deep fried sardines buying intention by socio-demographic with a significant portion of the total variation 8.6% in deep fried sardines buying intention was explained by the variables. There was increase of buying intention units by 0.106, 0.192 and 0.116 for gender, household size and age of respondents respectively. The increase of buying intention based on gender of respondent was significant at $p < 0.001$. This can be explained by the fact that most of the household food purchase is normally done by women and this is confirmed by the number of female respondents in this study. However, education level and average monthly income had negative effect on the deep-fried sardines buying intention. This might be the cause of increased price of deep-fried sardines due to increased cost of production. The negative effect of the education level of respondents can be explained by the quality in terms of nutrition aspects of the deep-fried products. It was pointed out during the survey that consumers were not sure with the kind and type of oils used for sardine deep frying, this can explain the negative effect of education in buying intention of deep fried sardines in the study area.

Findings showing values of [$F(5, 182) = 3.154$, $p < 0.001$] was developed for hot-smoked sardines buying intention by socio-demographic with a significant portion of the total variation (8.0%) in hot smoke sardines buying intention was explained the variables. There was increase of buying intention units by 0.270, 0.008 and 0.049 for gender, household size and age of respondents respectively. The increase of buying intention based on gender of respondent were significant at $p < 0.001$. However, education level and average monthly income had negative effect to the hot smoked sardines buying intention. The negative effect on average monthly income might be explained by the increase in the price of hot-smoked sardines due to increased cost of production.

Regression results of [$F(5, 182) = 1.915$, $p < 0.05$] was originate for buying intention on socio-demographic with a significant portion of the total variation of 5.0% in sardines dried on rocks

was explained the variables. There was increase of buying intention units by 0.151, 0.023 and 0.088 for gender, age and average monthly income of respondents, respectively. The increase of buying intention based on gender of respondent were significant at $p < 0.05$. However, education level and household size had negative effect to the sardines dried on rocks buying intention.

Table 28: Main Effects of Socio-demographics on Sardine Products Purchase Intention

	R^2	F	β	T
Deep-fried sardines	0.086	2.83**		
Gender of respondent			.106	1.451
Age of respondent			.192**	2.617
Education level of respondents			-.047	-.658
Household size			.116	1.575
Income per month			-.080	-1.090
Sardines dried on sand	0.037	1.378		
Gender of respondent			-.033	-.450
Age of respondent			-.045	-.603
Education level of respondents			-.082	-1.106
Household size			.120	1.600
Income per month			.105	1.410
Sardine dried on raised racks	0.047	1.766		
Gender of respondent			.174**	2.345
Age of respondent			.076	1.020
Education level of respondents			-.049	-.665
Household size			.022	.302
Income per month			.088	1.187
Sardine dried on grass and net	0.021	0.79		
Gender of respondent			-.052	-.690
Age of respondent			.101	1.332
Education level of respondents			.065	.870
Household size			-.026	-.341
Income per month			-.076	-1.005
Sardines dries on rocks	0.05	1.915*		
Gender of respondent			.151*	2.044
Age of respondent			.023	.307
Education level of respondents			-.158*	-2.167
Household size			-.024	-.327
Income per month			.088	1.184
Hot-smoked sardines	0.08	3.154***		
Gender of respondent			.270***	3.715
Age of respondent			.008	.115
Education level of respondents			-.028	-.388
Household size			.049	.667
Income per month			-.011	-.151

*p< 0.05, **p< 0.01, ***p<0.001

A non-significant regression model [F (5, 182) = 1.378,] was found for sardines dried on sand buying intention by socio-demographic with a 3.7% of the total variation in sardines dried on sand buying intention explained by the variables. There was increase of buying intention units by 0.120, and 0.105 for household size and average monthly income of respondents respectively. However, education level, gender and age of the respondents had negative effect to the sardines dried on sand buying intention.

The positive effects of the sardine dried on sand based on average income and household size can be explained by the low price of the product as well as the family size increases the amount of sardine consumed. The negative effect on buying intention based on education level, gender and age of respondents can be explained by the quality of product; it has been observed that the main food purchaser in the household was the woman, hence product convenience (easy to prepare, free from sand) can explain the negative effect of gender to sardines dried on sand.

The socio-demographic results were consistent with Cornescu and Adam (2015) and Milner and Rosenstreich (2013) who argued that consumer socio-economic characteristics have influence on the products buying intention/behaviour. The results demonstrate that gender of the respondent who buys sardines products for the family influence the buying intention. From the results, females seem to be more frequent buyers as compare to males, which can be explained by the number of respondents in this study where by 83.7% were females. Other factors (household size and average monthly income) were statistically not significant, however, they had positive and negative effects on the processed sardine products buying intention as explained.

The findings of the socio-demographic influence on processed sardine products buying intention were similar to studies by Verbekea and Vackier (2005) and Rimal, Moon and Balasubramanian (2005) who reported significant effect of gender, household size, income and education on the purchase of food. Smed, Jensen and Denver (2007) also reported a positive relationship between education and food consumption. It was also reported by Aertsens, Verbeke, Mondelaers and Huylenbroeck (2009) that, the influence of age and education was insignificant on the buying behaviour of organic products. The support of findings for H_1 is multifaceted as the existing publications. The gender, education level and age of respondents' variables were significant. However, the results failed to support H_1 for average monthly income and household size effect/influence on sardine products buying intention.

4.4.14 The Effect of Product Confidence Predictors on Buying Intention

Regression analysis for testing the effect of processed sardine products on product recognition (prior experience, eating habits and product familiarity) variables on product confidence and hence the buying was conducted to test the hypothesis H_2. H_2: Prior experience, eating habits and product familiarity of processed sardine products creates confidence on the product and hence intention to buy.

A statistically significant regression model was found for the predictors (past experience, eating habits and product familiarity) of processed sardine products on confidence as indicated in Table 29. In the regression model produced, $F(3,186) = 15.574$, $p < 0.001$, the predictors were able to explain 18.8% of the variance in confidence and buying intention of sardine dried on sand. The relationships between the product familiarity, prior experience and eating habits on confidence (evaluative ability of consumers) on sardines dried on sand was positive and significant at $p < 0.001$ as indicated in Table 29. Product familiarity, prior experience and eating habits increased the buying intention of sardines dried on sand by 0.231, 0.177 and 0.204 units, respectively. The product familiarity and eating habits were significant at $p < 0.001$ while the prior experience was significant at $p < 0.01$. The positive relationship between product recognition and confidence of sardine dried on sand, can be explained by the low price and availability of the product. In addition, the product has been in the market for so long and people know how to prepare it in order to remove sand from the product to reduce the risks associated with sand.

Furthermore, a statistically significant regression model was found $F(3,186) = 82.381$, $p < 0.001$, the predictors were able to explain 57.1% of the variance in sardines dried on raised racks on confidence and hence, the intention to buy the product (product familiarity $\beta = -0.031$, prior experience $\beta = 0.767$, $p < 0.001$ and eating habits $\beta = 0.005$). The product prior experience and eating habits on the sardine dried on raised racks had positive relationship with the product confidence and the buying intention. There was an increase in units of buying intention by 0.767 and 0.005 respectively for prior experiences and eating habits predictors on confidence. The product familiarity had negative relationship and it was not significant. The scenario could be explained by the drying practice being new in the study area, therefore majority of the respondents reported being not familiar with sardine dried on raised racks. However, more investment on drying practice would increase the product availability and product familiarity hence increase the buying intention.

A statistically significant regression model was originated from F (3,186) = 17.197, p < 0.001, and the predictors were able to explain 21.7% of the variance in sardines dried on rocks and confidence hence the intention to buy the product (product familiarity β= 0.297, p < 0.001, prior experience β= 0.192, p < 0.01 and eating habits β= 0.172, p < 0.001).

Table 29: The Effect of Product Confidence Predictors on Buying Intention

	R^2	F	β	T
Sardines Dried on sand	0.188	15.574***	df 3	186
Product familiarity			.231***	3.259
Prior experience			.177**	2.437
Eating habits			.204***	3.924
Sardines dried on raise racks	0.571	82.381***		
Product familiarity			.-0.03	-0.576
Prior Experience			.767***	14.309
Eating habits			0.005	.110
Sardines dried on rocks	0.217	17.197***		
Product familiarity			.297***	3.799
Prior experience			.192**	2.452
Eating habits			.172**	2.645
Sardines dried on grass and net	0.362	35.127***		
Product familiarity			.503***	5.939
Prior experience			.139	1.652
Eating habits			.-0.031	-0.496
Deep fried sardines	0.373	36.904***		
Product familiarity			.255***	3.177
Prior experience			.389***	4.909
Eating habits			0.034	0.569
Hot smoked sardines	0.162	12.007***		
Product familiarity			.219**	2.790
Prior experience			.219**	2.845
Eating habits			.059	.784

Df. 3, 186, *p< 0.05, **p< 0.01, ***p<0.001

Product familiarity, prior experience and eating habits increased the buying intention of the product by 0.297, 0.192 and 0.172 units, respectively. The findings could be explained well by the fact that along the Lake Victoria zone where the study was conducted there were rocks in most areas and people were using them for drying purposes. This was well reported by respondents from Mwanza, Kagera and Mara regions.

A statistically significant regression model was created from $F(3,186) = 35.127$, $p < 0.001$. The predictors were able to explain 36.2% of the variance in sardines dried on grass and net on confidence predictor and the intention to buy the product (product familiarity $\beta = 0.503$, $p < 0.001$, prior experience $\beta = 0.139$, and eating habits $\beta = -0.0031$, $p < 0.001$). Product familiarity and prior experience increased the buying intention of the product by 0.503 and 0.139 units of sardines dried on grass and net, respectively. The eating habits had negative relationship with confidence and hence, buying intention. Apart from using rocks for drying sardines in the study area, most people also use grass and net, and this was most reported by respondents from Mara and Kagera regions. This proves the positive relationship of predictors and confidence and, hence increased buying intention.

A statistically significant regression model was formed, $F(3,186) = 36.904$, $p < 0.001$, the predictors were able to explain 37.3% of the variance in deep-fried sardines on confidence and the intention to buy the product. Product familiarity, prior experience and eating habits increased the buying intention of the product by 0.255, 0.398 and 0.034 units of deep-fried sardines, respectively. The product eating habits was not significant; this can be explained by the fact that deep-frying technology is new in the study area, therefore majority of the respondents reported not being frequent users of the product. However, more investment on the drying practice would increase the product availability and accordingly, increase the buying intention.

A statistically significant regression model results, $F(3,186) = 12.007$, $p < 0.001$, the predictors were able to explain 16.2% of the variance in hot-smoked sardines on confidence and the intention to buy the product. Product familiarity, prior experience and eating habits increase buying intention of the product by 0.219, 0.219 and 0.059 units of hot-smoked sardines, respectively. The eating habit of the product had positive relationship with confidence and the intention to buy but not significant. For hot-smoked sardine majority of respondents reported that they had not seen the product or even tasted it, but their response was based on the product recognition and prior experiences they had on other fish species.

According to Howard *et al.* (1988), the consumer buying decision model; product familiarity, prior experience and eating habits create product recognition. The product recognition created product confidence, the product confidence increased the intention to buy the product in question. Based on the findings above, it can be concluded that the past experience, eating habits and product familiarity of the consumers increase their level of product evaluation by identifying the product outcomes and hence, the intentions to buy the product in question. It could be noted that for sardines dried on raised racks, deep-fried and hot smoked sardines, the eating habits were not statistically significant as explained in the results. However, since the product familiarity and prior experience on the products were statistically significant this allows the acceptance of hypothesis (H_2) which was consistent with Howard *et al*. (1988) and Acebron *et al*. (2001) by establishing that "product prior experience, eating habits and product familiarity creates product confidence and hence the intention to buy the product in question".

4.4.15 Product Confidence and Buying Intention of Processed Sardine Products

In this study, confidence was defined as the ability of the consumer to evaluate the products based on the final befits and risks associated with the product. As discussed in the previous section that product confidence was created by the past experience, eating habits and product familiarity of the consumers which leads to product recognitions and hence creates the confidence on the product in question. This was adopted from Howard *et al.* (1988) model on consumer buying behavior and the model was tested by Acebrón *et al*. (2001) while Laroche *et al*. (1995) tested the direct and indirect effect of consumer confidence on the product on purchase intention on different brands. In this objective, different processed sardine products were used to test consumers buying intention based on product benefits and product quality (colour, taste, smell and free from sand), linear regression analysis results were presented in Table 30. A significant regression model was produced, $F(2,187) = 13.905$, $p < 0.001$, the predictors were able to explain 12.9% of the variance in sardine dried on sand confidence and the buying intention of the product. The product befits and quality evaluations as predictors of confidence on sardines dried on sand were positive and significant at $p < 0.001$ as indicated in Table 30. Product benefits and quality evaluation increased the buying intention of the product by 0.226 and 0.281 units of sardines dried on sand respectively.

The increase in buying intention could be explained by eating habits, product availability as well as low price of the sardines dried on sand. This is depicted in the model that product confidence creates buying intention of the product but it might be influenced by the product

availability, product price and accessibility. The price of sardines dried on sand was very low and they were available to consumers which might be the reason for increased buying intention of the products regardless of product benefits, risks and quality evaluations of the product being considered. It should be noted that most of the consumers were sensitive to product prices.

Furthermore, a statistically significant regression model was found from $F(2,187) = 87.74$, $p < 0.001$; the predictors of confidence on the product were able to explain 48.4% of the variance in sardines dried on raised racks on the intention to buy (product benefits $\beta = 0.549$, $p < 0.001$ and product quality evaluation $\beta = 0.295$, $p < 0.001$). The product confidence predictors had positive relationship with the buying intention units. There was an increase of 0.549 and 0.295 units, respectively for product benefits and quality evaluation. This could be explained by the confidence of consumers of sardines dried on raised racks, as they believe it was free from sand and other contaminations by animal and human secretions, some of which have disease pathogens. Therefore, consumers were assured of the product quality and benefits hence the intention to buy the product in question.

A statistically significant regression model was originated from $F(2,187) = 6.768$, $p < 0.001$, the predictors of confidence were able to explain 6.7% of the variance in sardines dried on rocks on the intention to buy the product (products benefits $\beta = 0.215$, $p < 0.05$ and product quality evaluation $\beta = 0.065$). Product benefits as well as product quality evaluation increased buying intention of the product by 0.215 and 0.065 units of sardines dried on rocks, respectively. However, the quality evaluation predictor on confidence was not statistically significant. Based on the survey results consumers believed that sardines dried on rocks could be contaminated by animal and human excretions as the rocks were on open spaces. This might be the reason of insignificance on the product quality.

A statistically significant regression model was created from $F(2,187) = 3.027$, $p < 0.05$, the predictors of confidence were able to explain 3.1% of the variance in sardines dried on grass and net on the intention to buy the product (Product Benefits $\beta = 0.100$ and product quality evaluation $\beta = 0.118$). The products evaluation and quality assurance increased the buying intention of the product by 0.100 and 0.118 units of sardines dried on grass and net. The predictors were not statistically significant. The statistical insignificance of sardines dried on grass and nets quality can be explained by contamination of grass on the dried sardines and this was pointed out by most consumers.

Table 30: Predictors of Product Confidence and Sardine Products Buying Intentions

	R^2	B	T- value	F- value
Sardine dried on sand	0.129		*df=2, 187*	13.905***
Product befits evaluation		.226***	3.316	
Product quality evaluation		.281***	4.117	
Sardines dried on raised racks	0.484			87.740***
Product befits evaluation		0.549***	9.974	
Product quality evaluation		0.295***	5.366	
Sardine dried on Rocks	0.067			6.768***
Product befits evaluation		0.215*	2.442	
Product quality evaluation		0.065	0.739	
Sardine dried on grass and nets	0.031			3.027*
Product befits evaluation		0.100	1.323	
Product quality evaluation		0.118	1.551	
Deep fried sardines	0.169			19.008***
Product befits evaluation		0.081	1.002	
Product quality evaluation		0.359***	4.419	
Hot smoked sardines	0.207			24.366***
Product befits evaluation		0.298***	4.124	
Product quality evaluation		0.238***	3.286	

*p< 0.05, **p< 0.01, ***p<0.001

A statistically significant regression model was formed, F (2,187) = 19.008, p < 0.001, the product confidence predictors were able to explain 16.9% of the variance in deep-fried sardines on the intention to buy the product (product benefits β= 0.081 and product quality evaluation β= 0.359). Product benefits evaluation as well as quality evaluation increased the buying intention of the product by 0.081 and 0.350 units of deep fried sardines, respectively. The product quality and benefits evaluations was not statistically significant. This could be explained by the quality of the oils used in deep-frying the sardines. Most consumers pointed out that the quality of the oil was questionable as the oils could be used several times until it was finished. Consumers said overuse of the oils might cause health problems although they were not specific. Although they were not sure about the scientific explanations but they believed that it might cause health problems. Furthermore, consumers pointed out that as

sardines contain a lot of oil in aged consumers it may lead to increase in their blood pressures; therefore they did not consume deep-fried sardines.

A statistically significant regression model results from F (2,187) = 24.366, $p < 0.001$, the product confidence predictors were able to explain 20.7% of the variance in hot smoked sardines on the intention to buy the product (product benefits $\beta = 0.298$, $p < 0.001$, product quality evaluation $\beta = 0.238$, $p < 001$). Product benefit and product quality evaluation increased the buying intention of the product by 0.298 and 0.238 units of hot-smoked sardines, respectively. The product benefits and product quality evaluation had positive relationship with the intention to buy and statistically significant. Although majority of respondents reported that they had not seen or used the hot-smoked sardine products, the positive relationship can be explained by their past experience, eating habits of other hot smoked fish species.

The direct and positive relationship of product confidence and intention to buy was proposed by Howard and Sheth (1969), Bennet and Harrel (1975) provided empirical evidence to support the argument. Laroche and Sadokierski (1994) and Laroche *et al*. (1996) demonstrated the direct and indirect positive relationship of confidence constructs in multiple brand buying intention. Several of literatures have shown that confidence functions as a predictor of intentions to buy products (Bergvist, 2009). Vermier and Verbeke (2008) found an affirmative relationship between product confidence and intention to buy of dairy products in Belgium with Pearson correlation coefficient ($r = 0.438$). The Pearson correlation coefficients for different processed sardines products were ($r=0.255$, 0.638, 0.147, 0.137, 0.287 and 0.401) for sardines dried on sand, raised rack, rocks, grass and nets, deep fried and hot-smoked sardines respectively.

The results agrees with the findings of Vermier and Verbeke (2008). In addition, the authors found a significant regression model of high confidence respondents {$F (1455) = 68.67$, $p<0.001$)} on the buying intention of dairy products. The hypothesis on consumers product confidence and buying was tested the on different processed sardine products. In all the six groups of processed sardines (dried on sand, dried on raised racks, dried on rocks, dried on grass and net, hot-smoked and deep-fried sardines), statistically significant and positive relationships of the predictors of confidence models on buying intentions of products were identified as shown in Table 30 This allows the acceptance of hypothesis (H_3) of this objective which states that "the greater the confidence towards processed sardine products, the greater the predisposition to buy the aforementioned product will be".

4.4.16 The Effect of Product Recognition on Intention to Buy

Bettman and Park (1980) considered product familiarity as advanced level than attentiveness and it was a measure of knowledge and accepting the customer had on the product. Consumers become more familiar with the brand because of previous exposure, prior purchase and usage and hence less perceived risk (Baltas, 1997). Laroche, Teng and Kalamas (2001) argued that knowledge was "recognized in consumer research as a characteristic that influences all phases in the decision-making process" and was important as it was regarded as having an influence on the consumer decision-making process. Acebrón *et al*. (2001) argued that empirical research for food products has revealed that prior experience and habits were very important information source in the case of buying food products. Ashraf, Rizwan, Iqbal and Khan (2014) argued that consumer past experience can offer better prediction of buying intention. In this objective, the product prior experience, product familiarity and eating habits were hypothesized to have direct and positive relationship with consumers buying intention. The results of the model tested based on processed sardine product are presented in Table 31.

A statistically significant regression equation was produced, $F(3,186) = 13.699$, $p < 0.001$, for product familiarity, prior experiences and eating habits the predictors were able to explain 18.1% of the variance on the buying intention of sardine dried on sand. The relationships between the product familiarity and buying intention was not significant while prior experience and eating habits on consumers buying intention of sardines dried on sand was positive and significant at $p < 0.05$ and $p < 0.001$ respectively as indicated in Table 31. Product familiarity, prior experience and eating habits increased buying intention of the product by 0.072, 0.140 and 0.329 units of sardines dried on sand, respectively. The non-significance of product familiarity could be explained by the fact that the consumers' buying intention of the product was facilitated by their past experience and eating habits and as well as the product familiarity. The consumer knew that the product was always contaminated by sand as it was being dried on sand. Consumers knew how the product was being processed hence, the insignificance of product familiarity to the buying intention.

Furthermore, a statistically significant regression model was found $F(3,186) = 212.021$, $p < 0.001$, and the predictors were able to explain 77% of the variance in sardines dried on raised racks on the intention to buy the product (product familiarity $\beta = 0.252$, $p < 0.001$, prior experience $\beta = 0.752$, $p < 0.001$ and eating habits $\beta = -0.056$). The product familiarity and prior experiences on the products had positive relationship with the consumers' buying intention

there were increases of 0.252 and 0.752 units respectively for product familiarity and prior experiences predictors on buying intention of sardines dried on raised racks. The product eating habits had non-significant negative relationship; this could be explained by the drying practice being new in the study area, therefore majority of the respondents reported not being frequent users of sardine dried on raised racks. However, more investment on drying practice would increase the product availability and hence increase the buying intention facilitated by product eating habits. In addition, it was worth noting that the price of sardine dried on raised racks was a bit high as compared to sardines dried on sand. It might be also a reason for negative correlation with buying intention.

A statistically significant regression model was originated $F(3,186) = 47.656$, $p < 0.001$, the predictors were able to explain 43.2% of the variance in sardines dried on rocks on consumers intention to buy the product (product familiarity $\beta = 0.115$, prior experience $\beta = -0.059$, and eating habits $\beta = 0.657$, $p < 0.001$). Product familiarity and eating habits increase buying intention of the product by 0.115 and 0.657 units of sardines dried on rocks, respectively; however, product familiarity predictor on buying intention was not statistically significant. In addition, prior experience on the product had negative relationship with consumers buying intention. This could be explained by respondent's originality. The respondents from Mwanza and few from Mara regions reported to be frequent users of products dried on rocks. None of respondents from Kagera region reported having familiarity on sardines dried on rocks.

A statistically significant regression model was created, $F(3,186) = 6.43$, $p<0.001$, the predictors were able to explain 9.4% of the variance in sardines dried on grass and net on consumers the intention to buy the product (product familiarity $\beta = 0.079$, prior experience $\beta = -0.047$ and eating habits $\beta = 0.291$, $p< 0.001$). Product familiarity and eating habits increased buying intention of the product by 0.079 and 0.291units of sardines dried on grass and net, respectively. Apart from using rocks for drying sardines in the study area, most people also used grass and net, and this was most reported by respondents from Mara and Kagera regions. This proves the positive relations of predictors on increased the intention to buy.

A statistically significant regression equation was formed, $F(3,186) = 14.181$, $p< 0.001$, the predictors were able to explain 18.6% of the variance in deep fried sardines on consumers intention to buy the product (product familiarity $\beta = 0.116$, prior experience $\beta = 0.274$, $p < 0.001$ and eating habits $\beta = 0.161$, $p < 0.01$). Product familiarity, prior experience and eating habits increased the buying intention of the product by 0.116, 0.274 and 0.161 units, respectively.

Table 31: Product Recognition Predictors and Buying Intention

	R^2	Beta	t- Value	F- value
Sardines dried on sand	0.181		df=3, 186	13.699***
Product familiarity		.072	1.007	
Prior experience		.140*	1.906	
Eating habits		.329***	4.644	
Sardines dried on raised racks	0.770			212.021***
Product familiarity		.252***	6.542	
Prior experience		.752***	19.339	
Eating habits		-.056	-1.585	
Sardines dried on rocks	0.435			47.656***
Product familiarity		.115	1.728	
Prior experience		-.059	-.889	
Eating habits		.657***	11.896	
Sardines Dried on grass and nets	0.094			6.43***
Product familiarity		.079	.780	
Prior experience		-.047	-.467	
Eating habits		.291***	3.957	
Deep fried sardines	0.186			14.181***
Product familiarity		.116	1.272	
Prior experience		.274***	2.973	
Eating habits		.161**	2.372	
Hot smoked sardines	0.083			5.581***
Product familiarity		.207***	2.513	
Prior experience		.100	1.248	
Eating habits		.040	.506	

*p< 0.05, **p< 0.01, ***p<0.001

The product familiarity had positive relationship but not significant; this can be explained by the deep-frying practice being new in the study area, therefore majority of the respondents reported being not familiar. However, more investment on deep frying processing practice and information would increase the product availability and hence, increase the buying intention

A statistically significant regression model results, $F(3,186) = 5.581$, $p < 0.001$, the predictors were able to explain 8.3% of the variance in hot-smoked sardines of consumers intention to buy the product (product familiarity $\beta = 0.207$, $p < 0.001$, prior experience $\beta = 0.100$ and eating habits $\beta = 0.040$). Product familiarity, prior experience and eating habits increased buying intention of the product by 0.296, 0.100 and 0.040 units of hot-smoked sardines, respectively. Prior experience and eating habit of the product had positive relationship with consumers' intention to buy but it was not significant. For hot-smoked sardines, majority of respondents reported that they had not seen the product or even tasted it, but their responses were based on the product familiarity they had on other hot-smoked fish species.

Acebrón *et al*. (2001) argued that previous knowledge, experience and habits have influence on product buying intention. The findings were in line with Verbeke and Vicker (2005), Price and Gislason (2001) and Saba, Vassallo and Turrini (2000) who reported the significance and positive impact of the eating habit of fish and buying intention. The regression results presented in Table 31 on the product familiarity, prior experience and eating habits of different processed sardine products proved the direct and positive relationship of consumers buying intention on the product in question, hence the acceptance of the hypothesis (H_4) which says "Product prior experience, eating habits and familiarity create product recognition of processed sardine products hence, intention to buy the products".

4.4.17 The Effect of Recognition on Product Attitude

Howard and Sheth (1969) stated that product recognition was the fundamental part of consumer formation of attitude which was based on individuals' beliefs and perceptions. Yin, Wu, Du and Chen (2010) appealed that consumer attitude is impacted by the knowledge they had, such as consumer past experiences. Howard (1988), stated that product recognition creates favourable/unfavourable attitude towards the product in question. A statistically significant regression model was produced, $F(3,186) = 16.199$, $p < 0.001$, the predictors were able to explain 20.7% of the variance in sardine dried on sand favourable attitude towards the product and hence, the buying intention of the product. The relationships between the product familiarity, prior experience and eating habits on attitude (predisposition towards the product) on sardines dried on sand is positive and significant as indicated in Table 32. Product familiarity, prior experience and eating habits increased buying intention of the product by 0.276, 0.142 and 0.198 units of sardines dried on sand respectively. The product familiarity was significant at $p < 0.001$, prior experience was significant at $p < 0.01$ while eating habits

was significant at $p<0.05$. The positive relationship between product recognition and attitude of sardine dried on sand could be explained by the low price, accessibility and availability of sardines dried on sand. In addition, the product has been in the market for so long and people know how to prepare it in order to remove sand from the product.

A statistically significant regression model was found $F(3,186) = 176.232$, $p < 0.001$, the predictors explained 74% of the variance in sardines dried on raised racks on attitude towards the intention to buy the (product familiarity $\beta = 0.09$, $p < 0.05$, prior experience $\beta = 0.811$, $p < 0.001$ and eating habits $\beta = 0.035$). The product familiarity, prior experience and eating habits on the products had a positive relationship with the attitude towards the product and the buying intention units increased for 0.09, 0.811 and 0.035 units, respectively for product familiarity, prior experiences and eating habits predictors on product attitude. The product eating habit was not significant; this could be explained by the dried practice being new in the study area and the higher price of the product, therefore, majority of the respondents reported not being frequent users of sardine dried on raised racks.

A statistically significant regression model originated from $F(3,186) = 39.957$, $p < 0.001$, the predictors were able to explain 39.2% of the variance in sardines dried on rocks attitude towards the product buying intention (product familiarity $\beta = 0.354$, $p < 0.001$, prior experience $\beta = 0.325$, $p < 0.001$ and eating habits $\beta = 0.183$, $p < 0.001$). Product familiarity, prior experience and eating habits increased the buying intention of the product by 0.354, 0.325 and 0.183 units of sardines dried on rocks, respectively. This is explained well by the fact that the study was conducted along the Lake Victoria, which had many rocks and most people were using them for drying purposed. This was reported by respondents in Mwanza and Mara regions.

A statistically significant equation was created, $F(3,186) = 134.135$, $p<0.001$, the predictors were able to explain 68.4% of the variance in sardines dried on grass and net on attitude towards the product buying intention (product familiarity $\beta = 0.495$, $p<0.001$, prior experience $\beta = 0.333$, $p<0001$ and eating habits $\beta = 0.148$, $p<0.001$). Product familiarity, prior experience and eating habits increased the buying intention of the product by 0.495, 0.333 and 0.148 units of sardines dried on grass and net, respectively. Apart from using rocks for drying sardines in the study area, most people also use grass and net, and this was most reported by respondents in Mara and Kagera regions. This proves the positive relations of predictors and favourable attitude towards the product and increased buying intention.

A statistically significant regression model was formed, F (3,186) = 88.743, p<0.001, the predictors were able to explain 58.9% of the variance in deep fried sardines on attitude towards the product buying intention (product familiarity β= 0.260, p<0.001, prior experience β= 0.562, p<0.001 and eating habits β= 0.010). Product familiarity, prior experience and eating habits increase buying intention of the product by 0.260, 0.562 and 0.010 units of deep fried sardines respectively. The product eating habits was not significant; this could be explained by the deep-frying practice being recent in the study area, therefore, most of the participants reported not frequent user of the product. However, more investment on deep frying processing practice would increase the product availability and hence increase the buying intention.

Table 32: Product Recognition and Attitude

	R^2	B	T-value	F-value
Sardines dried on sand	0.207		df 3,186	16.199***
Product familiarity		.276***	3.922	
Prior experience		.142*	1.955	
Eating habits		.198**	2.848	
Sardines dried on racks	0.740			176.232***
Product familiarity		.0.090*	2.185	
Prior experience		.811***	19.422	
Eating habits		0.035	0.924	
Sardines dried on rocks	0.392			39.957***
Product familiarity		.354***	5.125	
Prior experience		.325***	4.715	
Eating habits		.183***	3.198	
Sardines dried on grass and nets	0.684			134.135***
Product familiarity		.495***	8.293	
Prior experience		.333***	5.636	
Eating habits		.148***	3.413	
Deep fried sardines	0.589			88.743***
Product familiarity		.260***	3.997	
Prior experience		.562***	8.574	
Eating habits		.010	0.216	
Hot smoked sardines	0.19			14.547
Product familiarity		.296***	3.823	
Prior experience		.179**	2.367	
Eating habits		.055	.741	

*p< 0.05, **p< 0.01, ***p<0.001

Statistically significant regression equation results, from F (3,186) = 14.547, p < 0.001, the predictors were able to explain 19% of the variance in hot-smoked sardines on attitude towards product buying intention (product familiarity β= 0.296, p < 0.001, prior experience β= 0.179,

$p < 0.01$ and eating habits $\beta = 0.055$). Product familiarity, prior experience and eating habits increased buying intention of the product by 0.296, 0.179 and 0.055 units of hot-smoked sardines, respectively. The eating habit of the product had positive relationship with attitude and the intention to buy but not statistically significant. For hot-smoked sardines, majority of respondents reported that they had not seen the product or even tasted it, but their response was based on the product familiarity and prior experiences they had other smoked fish species.

The hypothesis on product recognition and consumers' attitude was based on Howard *et al*. (1988) consumer buying behaviour theory and it was hypothesized that prior experiences, eating habits and level of product familiarity on processed sardine products creates favourable attitude towards the product in question and the predisposition of buying intention. The findings were consistent to Acebrón *et al*. (2001), Saba and Di Natale (1999) who reported a significant and positive impact of habit and past experience on attitude and the buying intention The hypothesis was tested using multiple regression model and the findings were presented in Table 32. The results were positive and statistically significant as explained above, leading to acceptance of hypothesis H_5 which states "The previous experience, eating habits and product familiarity, the greater the attitude towards sardine products and hence the buying intention".

4.4.18 Product Attitude and Intention to Buy Processed Sardine Products

A significant regression model was found for the attitude towards the product predictors (family preference and degree of product favourability) of processed sardine products on buying intention as indicated in Table 33. A significant regression model was produced, $F(2,187) = 9.007$, $p < 0.001$, the predictors were able to explain 8.8% of the variance in attitude towards sardine dried on sand and the buying intention of the product. The product family preference and the degree of product favourability as predictors of attitude towards sardines dried on sand were positive and significant at $p < 0.001$ and $p < 0.05$ respectively, as indicated in Table 33. Product family preference and the degree of product favourability increased the buying intention of the product by 0.211 and 0.146 units of sardines dried on sand, respectively. This could be explained by eating habits, product availability and low price of the sardines dried on sand. However, the degree of product favourability was low and the significant level low as well; this indicates how unfavourable the product was, but because of availability, accessibility and low prices, the attitude towards the product increased and hence the buying intention.

A statistically significant regression model was found F (2,187) = 220.249, p < 0.001, the predictors of attitude towards the product explained 70.2% of the variance in sardines dried on raised racks on the intention to buy (family preference β= 0.321, p < 0.001 and degree of favorability β = 0.598, p < 0.001). The product family preference and degree of favourability predictor had positive relationship with the buying intention and increased by 0.321 and 0.598 units, respectively of the product in question. The high degree of favourability and family preference could be explained by the belief that the product was free from sand and hence preparation convenience.

A statistically significant regression model originated from F (2,187) = 6.688, p < 0.001, the predictors of attitude explained 6.7% of the variance in sardines dried on rocks on the intention to buy the product (family preference β = -0.061, and degree of favourability β= 0.296, p < 0.05). Product degree of favourability increased buying intention of the product by 0.296 units of sardines dried on rocks. However, the family preference predictor on attitude towards the product was not statistically significant and had a negative relationship. Based on the survey results, consumers believed that the sardines dried on rocks could be contaminated by animal and human excretions as the rocks are on open spaces. In addition, preference could explain the negative relationship, as most of responded in Kagera region reported that they have not used sardines dried on rocks.

A statistically significant regression model was created, F (2,187) = 6.536, p<0.001, the predictors of attitude explained 6.5% of the variance in sardines dried on grass and net on the intention to buy the product (family preference β= 0.035 and degree of favourability β= 0.229, p <0.05). The product family preference and degree of favourability increased the buying intention of the product by 0.035 and 0.229 units, but the family preference predictors were not statistically significant. The statistical non-significance of family preference could be explained by the eating habits since only consumers from Kagera and Mara regions reported using sardines dried on grass and nets.

A statistically significant regression model formed from, F (2,187) = 19.893, p<0.001, the product attitude predictors were able to explain 17.5% of the variance in deep-fried sardines on the intention to buy the product (family preference β= -0.091 and degree of favorability β= 0.492). Product degree of favourability increased the buying intention of the product by 0.492 units for deep-fried sardines. The product family preference had a negative relationship and statistically not significant; this can be explained by the quality of the oils used in deep-frying

the sardines. Most consumers pointed out that the quality of the oil was questionable as it could be used several times until it was finished and this might cause health problems. Although they were not sure about the scientific explanations but they believed that it might cause health problems.

Table 33: Predictors of Product Attitude towards Sardine Products Buying Intentions

	R^2	B	T- value	F- value
Sardine dried on sand	0.088		*df=2, 187*	9.007***
Family preference		.211**	2.831	
Degree of favourability		.146*	1.958	
Sardines dried on raised racks	0.702			220.249***
Family preference		0.321***	6.242	
Degree of favourability		0.598***	11.641	
Sardine dried on Rocks	0.067			6.688***
Family preference		-0.061	-0.630	
Degree of favourability		0.296***	3.076	
Sardine dried on grass and nets	0.065			6.536***
Family preference		0.035	0.336	
Degree of favourability		0.229*	2.223	
Deep fried sardines	0.175			19.893***
Family preference		-0.091	-0.742	
Degree of favourability		0.492***	4.027	
Hot smoked sardines	0.249			31.023***
Family preference		0.061***	0.661	
Degree of favourability		0.453***	4.895	

*p< 0.05, **p< 0.01, ***p<0.001

A statistically significant regression model resulted from, F (2,187) = 31.023, p<0.001, the product attitude predictors were able to explain 24.9% of the variance in hot-smoked sardines on the intention to buy the product (family preference β= 0.061, degree of favorability β= 0.453, p<001). Product family preference and degree of favorability increased the buying intention of the product by 0.061 and 0.453 units for hot-smoked sardines, respectively. The product family preference had a positive relationship with the intention to buy but statistically insignificant. Although majority of respondents reported that they had not seen or used the hot-smoked

sardine products, the positive relationship could be explained by their past experience, eating habits of other hot-smoked fish species.

Tarkiainen and Sundqvist (2005) claimed that the favourable attitude was with regard to a behavior, the stronger was the consumers' intention to perform the behavior under consideration. Chen (2007) argued that attitude towards a product predicts purchase intention. Positive attitude towards the product has been empirically endorsed by numerous studies as a predictor of buying intention; Olsen, Heide, Dopico and Toften (2008) confirmed substantial relationship of attitude ($\beta = 0.21$) with intention to consumer fish products; Zagata (2012) proved that attitude was the determining factor of intention to purchase organic food with $\beta = 0.32$. Smith and Paladino (2010) also found a positive and statistically significant $p<0.001$ relationship between attitude and intention to buy organic vegetables.

Howard *et al*. (1988) consumer buying behaviour theory and Acebrón *et al*. (2001) proposed buying model for fresh mussels; it was hypothesized that favourable attitude towards the product in question has positive relationship with intention to buy and hence, purchase of the product. The hypothesis was tested using multiple regression model and the results were presented in Table 33. The findings were positive and statistically significant, which led to the acceptance of hypothesis H_6 which stated "The greater the attitudes towards processed sardine products the greater the predisposition to buy the aforementioned product would be".

4.5 The Existing Lake Victoria Sardine Products Business Model

4.5.1 Lake Victoria Existing Market Based Business Model

The primary data collected from Kirumba and Mganza regional markets in Mwanza and Geita regions, respectively revealed that dried sardines were purchased from different landing sites by individual traders and traders in associations. In Mara region, the main regional markets were Busekera and Mwaigobero. The mode of purchasing included providing operational costs to the camp owners in advance and purchasing the dried sardines at the landing sites. The Kirumba and Mganza markets were the main suppliers of processed sardines to the domestic and regional markets.

Previously, there were three sardine traders' association at Muganza market including Uaminifu Fish Traders group, Jikomboe Fisheries Cooperative Society, Tumaini and Upendo groups. However, the associations collapsed, the reasons were not well stated by the key

informants. At Kirumba market, there was one sardine business group known as "*Ushirika wa Wauza Samaki*" with 170 traders. The traders' association at Kirumba market was active and working. Primary data revealed that main domestic destinations were Dar es Salaam (35.6%), Mbeya (16%) Morogoro (8.5%), Dodoma (4.4%), Tanga (2.5%), Tabora (2%) and Singida (1.9%). Mtwara, Arusha, Kilimanjaro, Kigoma, Rukwa, Pwani, Njombe, Ruvuma, Iringa, and Simiyu regions accounted for 29.1% of the sardines sold within the country.

The findings were consistent with LVFO (2016) which found that Dar es Salaam, Mbeya, Morogoro, Dodoma, Tanga, Tabora and Singida regions accounted for 73.1% of the market while Mtwara, Arusha, Kilimanjaro, Kigoma, Rukwa, Pwani, Njombe, Ruvuma, Iringa, and Simiyu regions accounted for 26.9% of the market for sardines sold within the country. The main export routes for dried sardines were through Sirari border in Tarime in Mara region to Kenya, Rusumo border in Ngara district in Kagera region to Rwanda and Democratic Republic of Congo (DRC), Tunduma border in Mbeya region to Zambia and DRC. Other border posts were Kabanga in Misenyi district to Burundi, Mtukula to Uganda and Kasumulo to Malawi, Zimbabwe and Mozambique. The market based business model is as shown in Fig. 11.

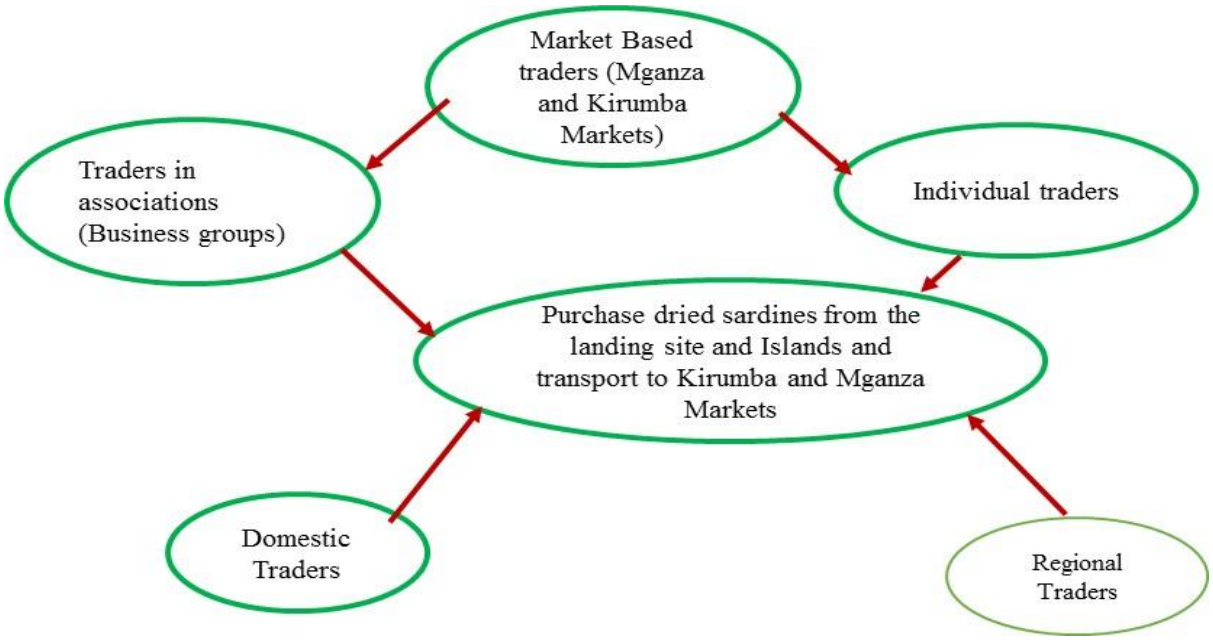

Figure 11: Lake Victoria Existing Market based Business Model

4.5.2 Value Chain Actors Analysis and Social Network Interaction Business Model

The Lake Victoria sardine market analysis found that only 25% of traders and processors had access to formal business loans for financing trade and processing activities. It was further

found that about 78% and 90% of processors and traders respectively indicated the need of formal business loans to facilitate the businesses. Pomeroy and Trinidad (1995) pointed out that capital requirement serves as an entry barrier because only those who afford such monetary outlay could enter the market. Further, the authors argued that in fish business, initial capital costs include equipment of which the types vary from one fishery to another, the daily operational capital and loanable funds. This study found that the initial capital was 8 400 000 TZS (4200 US$) for an outbound engine, boat, fishing nets and pressure lamps. The daily operating costs per boat which included fuel for the boat, kerosene for pressure lamps and food for fishermen was 200 000 TZS (100 US$) during the survey. This amount of money was huge for a normal fishermen to own such fishing equipment, hence most of fishermen in the study area were working under people who own the fishing equipment known as *Tajiri*. This statement was confirmed by Pomeroy and Trinidad (1995) who reported that the initial capital costs provide a restriction entry barrier especially for small-scale fishermen.

In addition, it was found that 75% of the financial source for production and trading activities were acquired through relatives and social networking. This was a business model whereby traders were financing the fishing activities and in return they were receiving the processed sardine products for the financial resources provided in advance. Since the traders provide the finances in advance, the traders decided on the final processed sardine products based on the market (Fig.12). In addition, the product price was given by traders based on the product in question whether it was for human consumption or for animal feed. In general, this type of business model whereby the boat owners and processors depended on advance financing of the fishing activities has impacts to the producers and on resource management.

The producer was bound to produce and sell the product based on the requirements of the person who provided the money in advance. The model has impact on the price of the final product. This is because the price was set by the trader who didn't know the cost of production and hence, the producer was always the looser. In addition, the business model creates long term ties between the producer and the trader (Fig.12); since the price of the product was set by the finance provider, there was the possibility of underpricing in order to receive more products to cover the money given. This has been the source of poor value contribution of Lake Victoria sardines in relation to the landing volumes as per the 2015 Catch Assessment Report (CAS).

On the resource management, such business model forces the producers to increase the fishing efforts to provide the required quantity in order to cover for the advance money paid by the traders. Here, there was only one option for the producer that is, using unregulated fishing nets in order to increase the quantity. Such practice causes the depletion of the resources in the lake (Fig.12). In short, the capital barrier for boat owners and fishers forces producers to produce the final product based on the requirement of the financier.

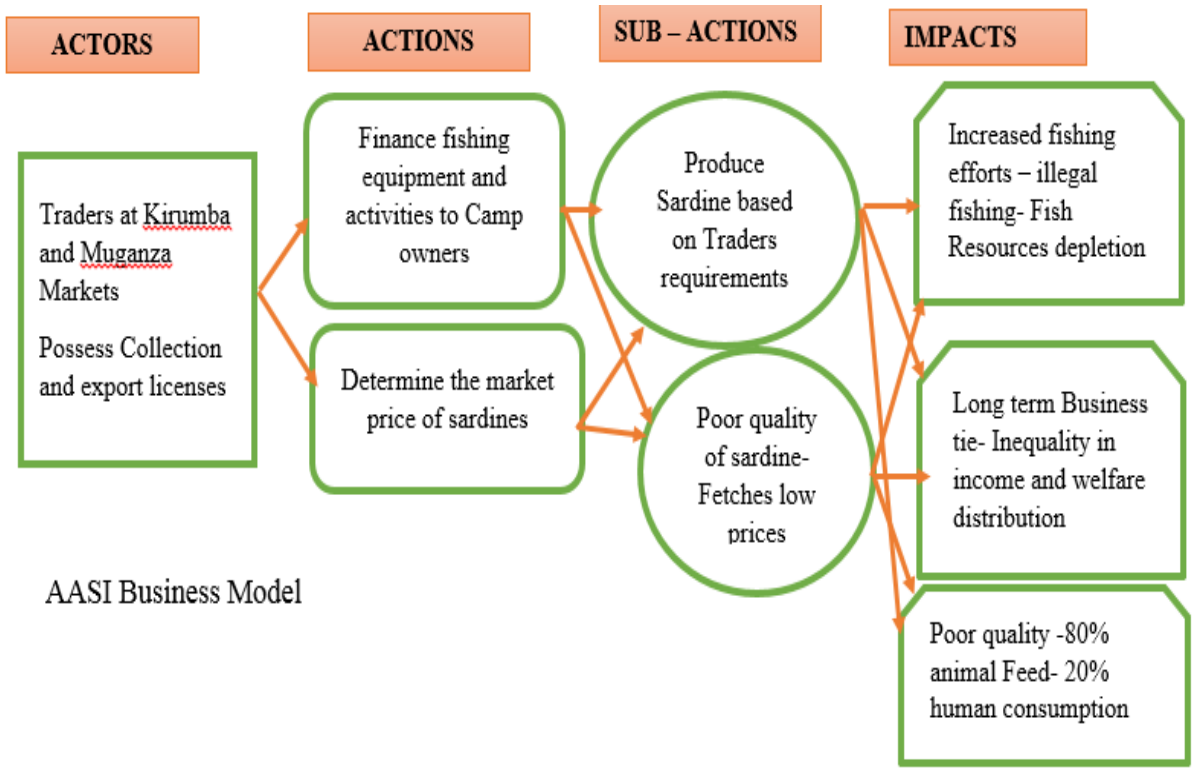

Figure 12: Lake Victoria Sardine Product Existing Mini Domestic Business Model

4.5.3 Lake Victoria Sardine Products Existing Regional Market Business Model

According to Mukasa (2011) and MALF (2016), the major regional markets for sardines were the Democratic Republic of Congo, Burundi, Zambia, South Sudan, Kenya, Rwanda, Malawi Zimbabwe and South Africa. The major regional trading centres for sardines were located in Mwanza and Geita regions in Tanzania (MALF, 2016). Damien and Luomba (2011) and MALF (2016) reported that traders at the major regional trading centres often collect the products from fishers, clear the goods at the border and then transport to the border of the destination country.

Damien and Luomba (2011) argued that the importers take full control of the product when it arrives at the border. This was the arrangements that existed because the importers were not allowed to possess exporting licenses in a foreign country. In addition, the Government of Tanzania acknowledged that most of the sardine's regional trade was informal and that is why, there are few reliable statistics regarding exporting quantities (MALF, 2016). Based on the focus group and key informants discussions; the regional collection brokers normally receive funds for buying sardine products from the traders from Rwanda, Burundi, Zambia, Democratic Republic of Congo and Kenya.

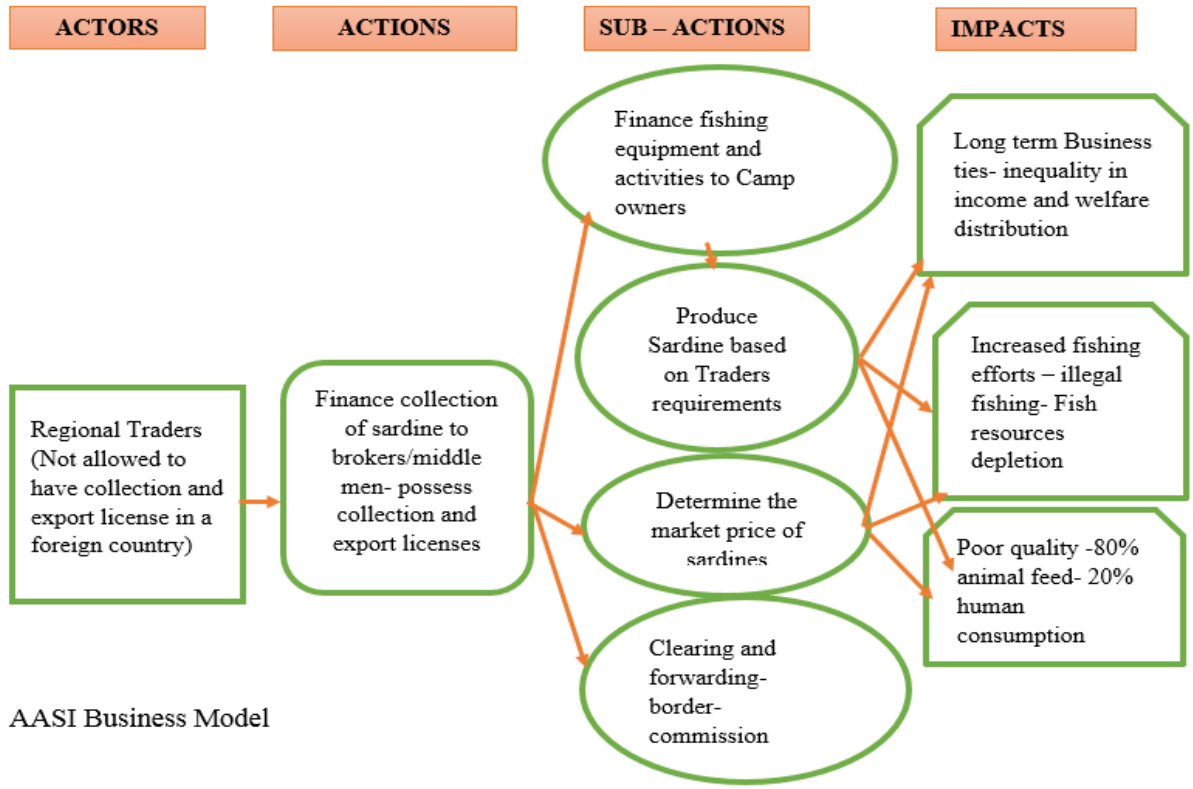

Figure 13: Lake Victoria Sardine Products Existing Regional Business model

The collection brokers possess legal collection and export licenses from the Government of Tanzania. After receiving the money from the regional traders, the brokers finance the fishing activities by providing advance payment to the boat owners and other fishers at the landing sites. The boat owners and fishers in return provide the sardine products to the regional brokers at a predetermined product quality and price (Fig.13). The prices were determined by the brokers who didn't know the cost of production. In such business model, producers were price takers and losers in the game. In turn, they were forced to increase the fishing effort to cover the required quantities based on the money provided in advance (Fig.13).

The increase in fishing efforts led to illegal fishing practices and hence, the depletion of sardine products. The brokers after getting the product from producer, made all arrangements for delivering the sardine products to the borders of the receiving country whereby the regional traders took full control of the sardine product by paying the commission to the collectors/brokers. As shown in Fig. 13 the business arrangements that exists at the regional level. The main cause of such business arrangement is the lack of capital and economies of scale among Tanzanian traders.

4.5.4 Proposed Lake Victoria Sardine Products Business Model

The findings from Lake Victoria stakeholders' analysis, market analysis and consumers' buying decision factors identified the following challenges the sardine market faces. The main barriers to the market were capital for financing the fishing activities and non-adherence to the government policies and regulation in relation the fishing activities. The market was found to be dominated by few buyers and sellers and most of the market participants were the price takers and this was well-depicted in the existing domestic and regional business models.

Eggert *et al*. (2015), found that there was modest growth in real income and substantial increase in inequality when comparing the Gini coefficients for 1993 and 2008 samples. The authors concluded that growth in real income was primarily accrued to the wealthier part of the population and in this case, the boat owners and traders were enjoying the growth in the real incomes. This study found that the Gini coefficients for traders and processors were 0.59 and 0.64, respectively. The findings imply that traders and processors selected randomly were expected to have 59% and 64% of sales above the mean levels. Furthermore, the study found that 80% of monthly sales were owned by 50% of traders and processors.

The inequality in the market could also be as a result of variation in the investment level of the respondents. This was also reported by AU-IBAR (2016), indicating that the lake's fisheries had significant inequalities. In general, the socio-economic dynamics of the lake favour greater financial benefits to big owners, and much less benefit accrued to fishers and labourers. Based on the available information, the inequality within the sardine markets was caused by advance payment of the fishing activities costs by big domestic and regional traders, which in turn controlled the quality of the product and the prices. Hence, 50% participants in the market controlled over 80% of the monthly sales. Another barrier was the availability of capital for financing the fishing and marketing activities. This study found that only 25% of the

respondents had access to formal and 75% of the respondent accessed financing from relatives, previous savings and social networks as depicted in the market based, domestic and regional business models in Fig. 11, Fig. 12 and Fig. 13. The proposed business model discourages the advance payments to cover the costs of the fishing activities but instead, it suggests the availability of affordable and formal business loans, provision by government safety nets to the actors along the sardine value chains in order to reduce the inequality and hence, improve the market performance.

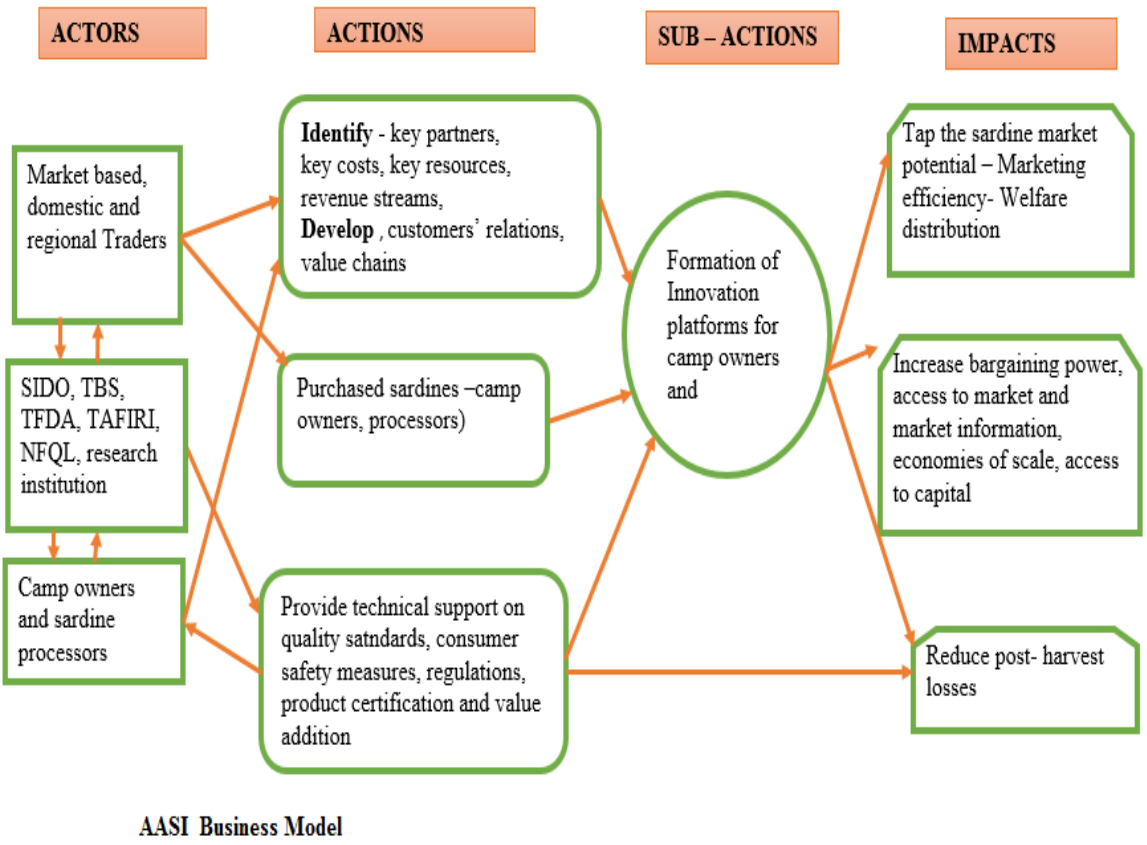

Figure 14: Proposed Business Model for Lake Victoria Processed Sardine Products

The advance payment had impact on the quality of the processed sardine products and resource management (Fig.14). The producers were forced to produce huge quantities of sardines for a short period of time (14 lunar cycle days). The quality was affected during handling because fishermen were tempted to overload the boats and the sardines underneath reached the landing sites when already spoiled and thereby impacting on the quality of the final product. On the resource management point of view, the producers were forced to increase the fishing effort in order to provide the required quantity. The fishing effort could be increased by either increasing the number of boats or by using unregulated fishing nets as well as other illegal

fishing methods. Such practices may have contributed to the depletion of the resources in the lake (Fig.14).

The study also observed that the advance financing caused an increase in the fishing efforts in order to provide the required quantities of sardine products. The increase in the fishing efforts propagated illegal fishing practices. It should be noted that the buyers who provide advance payments to cover the fishing activities costs dictate the final product quality and prices (Fig.14). This might be the reason why most processors do not seem to improve the quality of the final product as it was pointed out by Damien and Luomba (2011).

The proposed business model proposes accessibility to formal business loans to boat owners, processors and traders. Accessibility to formal business loans promotes production, processing and distribution of the sardine products. If the government provides soft loans to the actors along the sardine value chain, it may indirectly reduce the illegal fishing activities, which were mainly prompted by the need to increase quantities of sardines for sale to traders in order to get more money since the existing business model does not provide opportunity for fishers to determine the price of the catch.

Another barrier which has also been pointed out by previous authors in this area was the failure of Tanzanian traders to access the regional markets. The most prevailing business arrangement is that the fish products were collected through groups that have export license at Kirumba and Muganza markets, respectively as shown in Fig.14. The groups organize the transportation and facilitate custom clearance for the products and take to the border of the destination country. The second arrangement involves the importers sending money for buying, transporting and clearing of the products to traders who possess export licenses. The traders receives a commission from the exporter.

The business models were mainly caused by lack of capital and lack of economies of scale that did not motivate local traders to access more lucrative outlets for their products since the cost of doing business was too high. Economies of scale are said to exist when the average marketing costs are inversely related to the volume of products handled. This could be better achieved if the traders unite their efforts and bargaining power through cooperatives or through innovative platforms, whereby processors, traders and transporters work in collaboration to realize the economies of scale. The proposed business model encourages formation of exporters' and producers associations (innovation platforms) (Fig.14) so that they can be

easily supported by the government to acquire exporting licenses and thereby access and participate effectively in regional markets for sardines. Market information was another entry barrier to most of processors, traders and boat owners. The available market information was mainly obtained through co-traders comprising 83.5% of the available market information, 8.8% through traders' cooperative and associations, 7.2% through market officials. The source of market information was unreliable and proved to be a weak source of market information. The author's business model proposes market networking through provision of mobile market information (prices and markets) on weekly basis through the traders' and processors' associations (Innovation platforms). Formation of these associations improves networking, innovations, product improvements and bargaining power, access to business loans, markets and market information. The government supporting institutions, specifically the Tanzania Food and Drugs Authority (TFDA), Tanzania Bureau of Standards (TBS), Small Industries Development Organization (SIDO), National Fish Quality Control Laboratory (NFQCL) and Tanzania Fisheries Research Institute (TAFIRI) and the Local Government Authorities (LGAs) had been supporting the sardine industry in value addition, provision of certification to processors and provision of training on value addition technologies (Fig.14). The proposed business model encourages more support to processors and traders in order to improve the quality of sardines as well as access the lucrative regional markets.

The study conducted an analysis on the factors that enhance consumers' buying intention of different processed sardine products. The processed sardine products tested were sardines dried on sand, dried on raised racks, dried on rock, dried on nets and grass, hot-smoked and deep-fried sardines. Factors that were tested were product recognition (eating habit, past experience and familiarity); consumers' attitude, confidence and buying intention of the processed sardine products. The results indicated that consumers had positive attitudes and hence, the buying intention of sardines dried on raised racks, followed by sardines dried on grass and nets, deep-fried sardines, dried on rocks and hot-smoked. The results indicate that consumers had positive belief and could evaluate the characteristics of products in question based on colour, smell and test and make an informed decision. The findings suggest that the selection of marketing strategies should focus on two aspects of attitude creation; cognitive (nutritional value, safety, trustworthiness) and affective (taste, colour, smell, variety of products) by creating more awareness, knowledge, liking and preference.

In addition, processors and traders in the sardine industry should provide more information to convince consumers to believe that processed sardine products are safe and tasty food. The regulatory authorities were required to confirm compliance of the food safety by the fishery industry and specifically, the sardine industry. The proposed business model recommends processors and traders to focus more on products that were preferred by the consumers based on quality (taste, colour, smell and freedom from contamination). For packed processed sardine products, they should be labeled showing the nutritive value, shelf life and expiry date as stipulated in the respective national and regional standards.

4.5.5 Recommended Business Model for Lake Victoria Processed Sardine Products

In order to develop an inclusive business model for Lake Victoria processed sardine products, consultation with key stakeholders was of paramount important in order to gather their views on how the proposed business model can cater for the current and future businesses and improve their capacity to expand and become actively players in local and regional business. The stakeholders' consultative meeting was meant to share the findings on the Lake Victoria processed sardines market potentials, prevailing business models and the proposed inclusive business model. After sharing the findings and the business models the stakeholders were required to provide views and opinions on how the proposed inclusive business model based on the findings and the experience of the stakeholders on the ground should be. Specifically, the following objectives was realized by the stakeholders' consultative meeting:

(i) Sharing of research findings that informed the development of the proposed business model for Lake Victoria processed sardines.
(ii) Stakeholders improved the proposed business model based on their experiences and market requirements.
(iii) Developed inclusive business model for Lake Victoria processed sardines

The meeting was attended by various government officials including Fisheries Officers from Ilemela, Ukerewe, Musoma Rural and Muleba districts. Officers from support and regulatory institutions in the fisheries sector including the Tanzania Fisheries Research Institute, Fisheries Education Training Agency (FETA), National Fisheries Quality Control (NFQCL), Tanzania Bureau of Standards (TBS) and Tanzania Food and Drugs Authority (TFDA) were part of this very important meeting. Traders, processors, boat owners and fishers from Mwanza, Kagera and Mara regions were well represented during the meeting.

Boat owners and fishers were important stakeholders because these were the first market participants in the production and processing. The quality of the final product depended much on the quality of sardines brought to the landing sites by fishers who reported to the boat owners. The study revealed that most of the sardines arrived at the landing site while were already spoiled, due to overloading the boats and delay in reaching the landing sites. Therefore, the views of producers in the proposed business model were important. It should be noted that this group of people were important in the sense they decide on the value proposition and key activities in order to produce high quality processed sardine products (Fig.15). In addition, they determine the key resources required for production and the returns from production (revenue streams).

The views of the sardine processors were also important because they were representing the processing community. The consumers' buying decision factors revealed that most consumers preferred sardines that were free from sand. Therefore, the forum was important for dissemination of the findings in order to inform and influence the processing activities. In addition, processors' views in the proposed business model were important because this was the second group of people in the value chain especially in the value proposition, key activities for production, customer segmentation, customer relations, identification of distribution channels, key resources required for production, cost structure and revenue streams as elements of the business model.

Traders were invited to the meeting in order to give their views with regard to consumers' preferences and needs on processed sardine products because they are main distributers of the products. The traders commended on the findings of the research that most consumers prefer processed sardines that were free from sand. Their views in the proposed business model were particularly critical in the areas of value proposition, value chain segmentation, customer relations and customer segment. Government institutions were important stakeholders because they are on the ground working with sardine producer stakeholders in research, processing technologies, quality control and consumer protection. Their views in improving the proposed business model were paramount and had impact in all the components of the business model from value proposition to consumers' product safety as shown in Fig. 15.

The stakeholders meeting was conducted because business models involves content, structure, and governance of transactions within the industry and between the industry and its external partners that support the industry in the creation, delivery and capture of value. Therefore, an

inclusive Lake Victoria processed sardine products business model required to consider the content of the transactions, the structure of the transactions (the organizational) conducting the stakeholders meeting to agree on the content, structure and governance of transactions.

The meeting made resolutions on what interventions would assist the industry in solving the problems at production, distribution and consumers' needs. It was recommended that camp owners and processors should consider what the market's needs and the traders should consider the consumers requirements. The structure and governance of transaction required the linkage between fishers, processors, traders and external partners to assure delivery of the required product and capturing value based on the cost of production and profits.

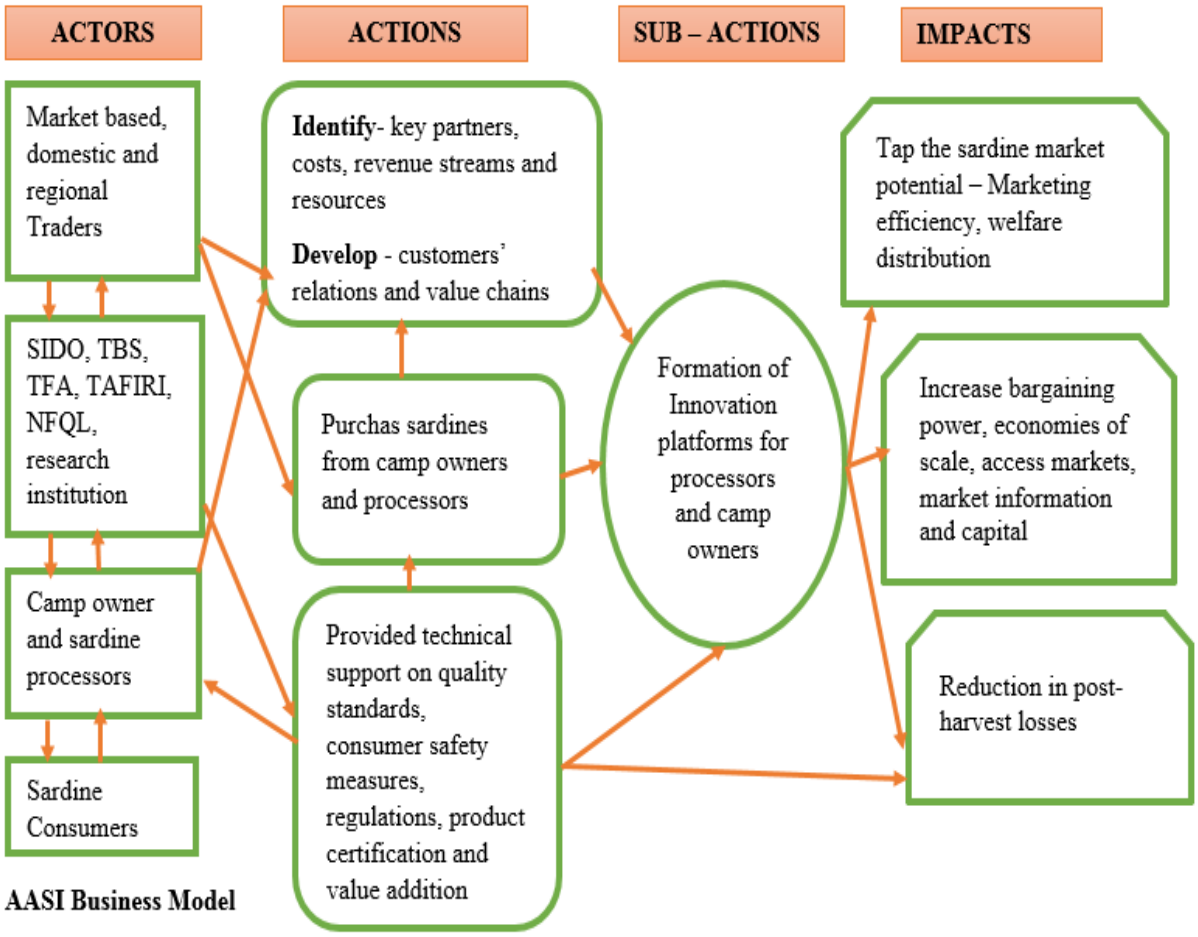

Figure 15: Recommended Business Model for Lake Victoria Processed Sardine Products

The proposed business model was adopted by stakeholders whereby it was recommended that the business model should consider the four groups of the market participants along the sardine products value chains i.e. fishers, processor, traders and consumers. The recommendation was

based on consumers product preferences, then the preferences direct the traders what the market needs; finally, the traders informs the boat owners and processors. In the recommended business model as shown in Fig. 15, consumers were included and were connected to the value proposition section, where the solutions of the problem identified start by producing based on the consumer preferences and needs. In addition, the fishers, camp owners and processors were directly connected to the consumers because signals given by traders to the producers reflect the market and hence, the consumers preferences and needs.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section highlights the main findings, conclusion and recommendations of this study. Specifically the main findings in each objective was highlighted in order to draw the scientific conclusion and recommend strategies to be taken in order to tap the Lake Victoria processed sardine industry potential with the view of improving the livelihood of the actors along the value chains. The conclusion and recommendations focus on the influence of stakeholders, institutional arrangements, business environment, consumers and existing business models in relation to marketing efficiency.

5.2 Conclusion

The first objective of the study was to identify and to characterize roles of stakeholders along the sardine product value chains. The objective was operationalized by conducting a review of Lake Victoria fish products business and institution arrangements for domestic and regional trade. The paper titled *"A Review of Lake Victoria Sardine Products Business and Institutional Arrangements for Domestic and Regional Trade"* was published and is attached to this thesis as research output. In addition, the stakeholders were characterized based on their socio-economics and effects to marketing efficiency of sardine products. The information was collected using structured questionnaire, key informants and focus group discussion to fishers, processors, boat owners and traders.

Considering the findings in the marketers' age, education level, business experience, access to business loans, volumes handled per month and monthly income this study concluded that, the age group of marketers comprised the productive, hence increases the sardine production and business and hence efficiency markets. Literacy and experience in business for marketers were important factors in increasing productivity, understand and evaluate new techniques as well as improve decision making in terms of achieving huge market share and hence efficient markets. However, the main challenge was the access to capital as most traders depended much on social capital and hence, the market was dominated by few marketers who had access to capital.

A comprehensive way for scanning a business environment is PESTEL analysis. The Government of Tanzania has made political and legal interventions in the fisheries sector, which also apply to Lake Victoria fishery industry. Much was well described in the fisheries policy, strategy and the sector development programme. The same had to roll down to the communities involved in the fishing activities for the impact to be realized, especially through the improvement of consumer's healthy safety, protection of the sardine business and increased production and investment. Since the safety control for domestic and regional traded fish and fish products was not well established, it calls for interventions as stipulated in the Fisheries Regulations of 2009 in order to control harmful contaminations and post-harvest losses.

Economically, the fisheries sector's contribution to the GDP, employment, food and nutritional security has been realized; however, much still needs to be done in terms of technological interventions in order to improve the quality and value of sardines, which is an important factor for accessing lucrative markets. Furthermore, the economic value contribution of sardines compared to its abundance was not correlated, which calls investments in the areas of sardine production, processing and distributions. Facilitating investment in the form of provision of subsidized loan and access to financial services would catalyze the sector's growth and contribution to GDP, food security and employment. Socially, the demand of sardines was high due to rural-urban migration, high prices of other protein sources and the population growth. However, there was need to address the adverse effect of sardine business culture, whereby the processors did not see the value of producing high quality products since the traders/consumers were reluctant of paying higher and premium prices for high quality products. The investment in value addition technologies would be very important to reduce the post-harvest loss and increase availability of the product in the markets at the required quantity and quality.

The environmental issues have been tackled very well at regional level through the institutions established by the East African Community with the support of development partners. In addition, similar support had been established through the Beach Management Units for environment and fishery resources protection at the community level. Furthermore, monitoring the exploitation of the fishery resources through a harmonized field data collection by national working groups had been providing information on fishing effort and fish catch trends. However, government intervention is still required in the control of illegal and unregulated

fishing equipment because the community local members were hesitant in prosecute the people involved based on the cultural beliefs and living practices.

The second objective was to analyze the sardine products markets using the structure, conduct and performance model. The findings in the market structure showed that the market was concentrated with large number of buyers and seller associated with high income and market share inequalities determined by the Gini coefficient and the Lorenz curves respectively. Based on the structure-performance hypothesis the market was performing well but the incomes were accrued to the small group of market participants and this shows the marketing system was inefficient and imperfect competitive with monopolist nature as economic and game theories suggests.

Empirical analysis of factors influencing marketing efficiency has shown access to market information and business loans significantly increase the marketing efficiency. The net returns, selling prices and quantity traded significantly increase the marketing efficiency. However, due to unreliable market information, poor access to business loans and lack of economies of scale concludes that the processed sardine marketing was inefficient. The marketing costs, fixed costs, buying prices and marketing margins significantly reduced the marketing efficiency of processed sardines. In conclusion, it should be noted that marketing efficiency measure the market performance based on market share distribution of the products in question and its result should be supported by the structure and conduct processes of the marketing process. Since there was, inequality in income and market shares, lack of economies of scale, poor access to business loans, market information and markets for processed sardine products, the cost of doing business was high hence the marketing system was inefficient.

Objective three was formulated to determine factors that influences consumers buying decision of different processed sardine products in Lake Victoria Tanzania side. Hypotheses were formulated based on the factors that were identifies in the adopted consumers buying decision model. Factors that were considered were consumers' socio-demographic characteristics, product recognition measured by past experience, eating habits and product familiarity. Other factors were consumers' confidence on processed sardine products measured by product befits and quality evaluations as well as the consumers' attitudes towards processed sardine products. The consumers' attitudes towards processed sardine products were associated with product recognition, family preferences and degree of product favourability.

The first hypothesis was to test the influence of socio-demographic characteristics in relation to consumers' buying intention of different sardine products. The Chi-square test results showed that the socio-demographic characteristic was statistically insignificant in influencing buying intentions of consumers for sardine dried on sand. However, with regard to sardines dried on raised racks gender, average monthly income and household size were statistically significant in influencing the buying intention. For sardines dried on rocks, the respondent education level, income and household size were statistically significant in influencing the buying intention of the product. Gender, age, education level and income of the respondents were statistically significant in influencing the buying intention for sardines dried on grass and nets. The Chi-square test for deep-fried sardines was statistically significant for respondents age, education level, income and household size and finally, the hot-smoked sardines was statistically significant for the gender, education level, income and household size of the respondents in influencing the buying intention. In conclusion the findings demonstrate that socio-demographic characteristics have significant influence in respondents buying intention of different processed sardine products.

The second hypothesis was formed to test the effect of product recognition of processed sardine products on consumers' confidence and hence the buying intention. The findings demonstrated that product recognition had significant influence on consumers' confidence and therefore, the buying intention of the product in question. Based on explanatory powers of the regression model, consumer' had more confidence on sardined dried on raised racks followed by deep-fried sardines and sardines dried on rocks. The processed sardine products that had the lowest explanatory powers were hot smoked sardines and sardines dried on sand. Having positive confidence on the processed sardine products confirms that consumer finds processed sardine products were adding value the family wellbeing of the family and it was projected that they would purchase sardine products. In conclusion the findings suggest that consumer product recognition was very important in increasing the evaluative ability of the product in question and therefore the purchase. Understanding variation in the confidence based on processed sardine products was pertinent for the sardine industry and marketers to produce proper value additions for the customers in order to satisfy the needs, nutritional and food safety qualities.

The third hypothesis was formed to test the effect of consumers' confidence of processed sardine products and consumers' buying intention. The results demonstrated that consumers' confidence on processed sardine products significantly influenced the buying intention of the

product in question. Based on explanatory powers of the regression model, consumers' were likely to buy sardines dried on raised racks followed by hot smoked sardines and deep-fried sardines. The buying intentions for sardines dried on sand and rocks as well as sardines dried on grass and nets were low based on the region model explanatory power. In conclusion consumers' indicated positive buying intention for sardines dried on raised racks, hot smoked and deep-fried sardines when considering product benefits and quality evaluative factors. Sardine processors and traders should consider investing in value addition focusing in product quality and benefits.

The fourth hypothesis was developed to test the relationship between product recognition and the intention to buy of processed sardine products. The results demonstrated that consumer product recognition had significant and positive correlation with buying intention for different processed sardine products. Based on explanatory powers of the regression model, consumers' were likely to buy sardines dried on raised racks followed by sardines dried on rocks and deep-fried sardines. The buying intentions for sardines dried on sand, sardines dried on grass and nets and hot smoked sardine were low based on the region model explanatory powers. In conclusion, the findings suggested that in order to position well the processed sardine products in the market, the marketing strategies should focus on improving the product information through labeling and advertising the nutritional benefits of different processed sardine products.

The fifth hypothesis was created to test the relationship between consumer product recognition and attitude towards processed sardine products. Based on explanatory powers of the regression model, consumers' were likely to buy sardines dried on raised racks followed by sardine dried on nets and grass, deep-fried sardines and sardines dried on rocks. The consumers' had low favourable attitudes towards hot smoked sardines, and sardines dried on sand based on the region model explanatory powers. In conclusion the strategic marketing planning and implementation should focus on consumers' product recognition by investing on product labeling, processors participating in national, regional and international product exhibitions in order to improve consumers' recognition and attitudes towards processed sardine products. In addition, processors should be trained to produce sardine products based on consumers' preferences. Value addition technologist should focus on supporting the labeling process by providing the nutrition contents and shelf life of processed sardine products.

The sixth hypothesis was meant to test the relationship between consumer attitude towards processed sardine products and buying intention. The findings demonstrated that consumer attitude toward processed sardine products had significant and positive relationship with buying intention. Based on explanatory powers of the regression model, consumers' were likely to buy sardines dried on raised racks followed by hot smoked sardines and deep-fried sardines. The consumers' had low favourable attitudes towards sardines dried on sand, sardine dried on rocks and sardine dried on nets and grass based on the region model explanatory powers. In conclusion the consumers' attitudes towards processed sardine products were the predicted the buying intention.

The results in the stakeholders' analysis, market analysis and consumers' buying decision factors analysis were the foundation for the development and testing of the business model for Lake Victoria processed sardine products. The business model requires the local, domestic and regional traders to buy sardine products from boat owners and processors at the landing sites and Islands in Lake Victoria Tanzania side. However, the government supporting institutions and research institutions should support the producers in new processing technologies, quality improvement, trainings on good fishing and processing practices and provision of incentives for value additions. The producers should form producers' associations in order to access formal loan, increase the bargaining power and access to trainings related to processing technologies, good handling practices and business. On the other hand, government institutions should provide technical business support to traders at local, domestic and regional markets on issues related to regulation, product movement within and outside the country and provision of good business environment.

In conclusion, the existing business model for Lake Victoria processed sardine products was inefficient because of high cost in doing business which had led low net returns. There was poor access to business loans, market information, therefore the value creation did not feature the consumers' needs hence low net returns per volume trades. More emphasis should be directed to customers' value creation, structural dimension and economic dimensions by considering the economies of scale through collective marketing that would improve access to market information, business loans hence increase the volume trades and reducing the cost of doing business.

5.3 Recommendations

The following recommendations were made based on the findings to answer the guiding research questions on stakeholders' promoting sardine trade, marketing efficiency, consumers' products preferences and the buying behaviours as well as the existing business models. Based on the findings on roles of stakeholders' in promoting sardine trade it was suggested that the focus should be in improving the quality of processed sardines entering the market. There is need for capacity enhancement through trainings to the fishers and processors in order to improve quality of sardine products for accessing lucrative markets within the country, at the region and global levels. There are quite a number of value addition technologies existing within the country and what is needed is extending them to the communities involved in the sardine business in the Lake Victoria basin. There is also need for enhancing the businesses, especially marketing skills of the local traders so that they can penetrate to regional and global markets and therefore, get more profits for their products. As of now, sales agents in the destination countries (Rwanda, Burundi, DR Congo) seem to get more profits than the traders who labour much in the ground.

It is also recommended that further research is required with regard to the structure and dynamics of regional and international markets for sardines and strategies for increasing the participation of traders from the country in these markets. Furthermore, more coordination and linkage is required among the fishery industry supporting institutions in order to optimize their outputs and maximize value for their establishment. It is also considered important to review the policies and strategies governing the fishery industry for more comprehensive approach for sustainable management and utilization of fisheries resource with the view of improving livelihoods and living standards of the people engaged in the sector as well as contribution of the sector to the GDP.

The marketing system for Lake Victoria processed sardine products is inefficient and imperfectly competitive due to high levels of barriers to entry and high cost of doing business. It is recommended that collective marketing would improve the marketing efficiency by increase the bargaining power, access to formal business loans, markets and market information as well as increase the volume of traded products. This should go hand in hand with building the capacity of sardine producers, processors and traders to engage in lucrative markets, access to formal business loans, and market information. In this regard microfinance institutions and rural banks can be advised to develop facilities and financial products where

small scale fishers, traders and processors would be able to access financing for short-term and long-term investments. Availability of formal business loans could foster competition and improve distribution of sales and income there by enhance the marketing efficiency for development of competitive marketing system. The Government of Tanzania should adequately provide infrastructural facilities such as good roads; access to electricity through the Rural Energy Agency (REA), facilitate export of sardines to the regional markets by improving the marketing efficiency and reducing cost of doing business. The taxes and levies directed to the fishery industry should be reviewed specifically the boat license and products levies which requires the owners to pay the same amount when she/he moves from one district to another.

The findings on consumers' preference and buying behaviour suggest that consumer product recognition was very important in increasing the evaluative ability of the processed sardine products in and hence the purchase. Therefore, promotion of benefits and quality of different processed sardine products should be maintained and enhanced in order to increase the buying intention and consumption levels of processed sardine products. There should be continuous promotion efforts of processed sardine products focusing on nutrition, product safety, and quality (taste, colour, smell, free from sand) in order to increase consumer confidence and positive attitudes. In addition, fishers and processors should be trained to produce sardine products based on consumers' preferences. Value addition technologists should focus on supporting the labeling process by providing the nutrition contents and shelf life of processed sardine products in order to improve the product recognition of the processed sardine products.

The existing Lake Victoria sardine products business model depicts inefficiencies in value propositions which have implication on customer value, economic and structural dimension as shown in the net returns, volumes traded and selling prices. More emphasis should be directed to customers' value creation, structural dimension and economic dimensions by considering the economies of scale through collective marketing that would improve access to markets, marketing information, and business loans hence, increase the volume traded and reducing the cost of doing business.

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APPENDICES

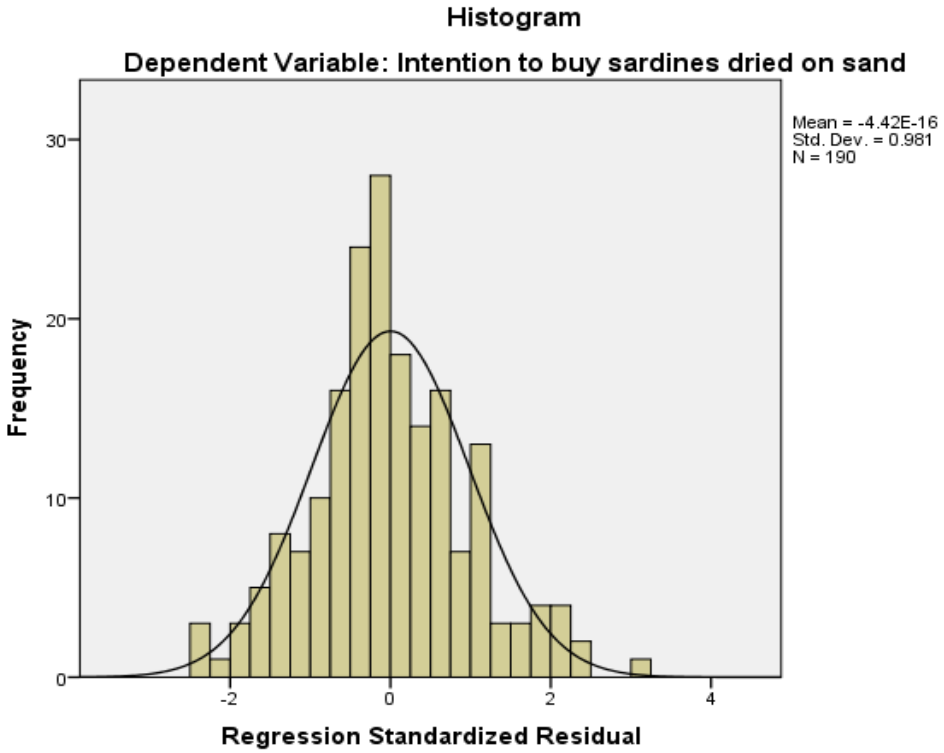
Appendix I: Descriptive Statistics of the Study Variable

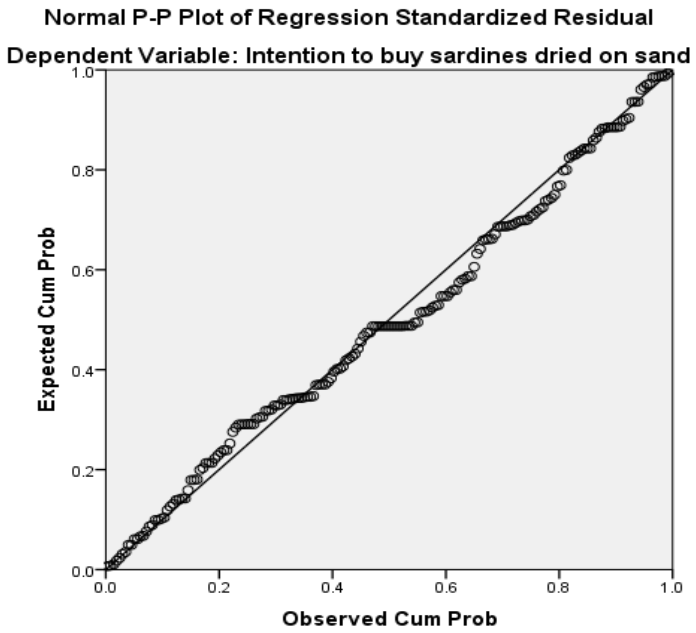
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
Product familiarity for sardines dries on sand	5.2000	1.39992	Family preference for sardines dried on grass and nets	5.1579	1.19360
Product familiarity for sardines dried on raised racks	5.2526	1.01281	Family preference for deep fried sardines	5.5211	1.59599
Information sardines dried on rocks	6.3158	1.03651	Family preference for hot smoked sardines	5.2579	1.22661
Product familiarity for sardines dried on grass and nets	5.2789	1.21763	Attitude towards sardines dried on sand	4.9263	1.34709
Product familiarity for deep fried sardines	5.2579	1.21795	Attitude towards sardines dried on raised racks	5.6842	1.18869
Product familiarity for hot smoked sardines	4.1053	1.29283	Attitude towards sardines dried on rocks	5.7368	1.47078
Prior experience for sardines dries on sand	5.2158	1.36888	Attitude towards sardines dried on grass and nets	6.1895	1.42015
Prior experience for sardines dries on raised racks	5.7474	1.15441	Attitude towards deep fried sardines	5.8737	1.64102
Prior experience for sardines dries on rocks	6.2211	.79254	Attitude towards hot smoked sardines	5.9053	1.51935

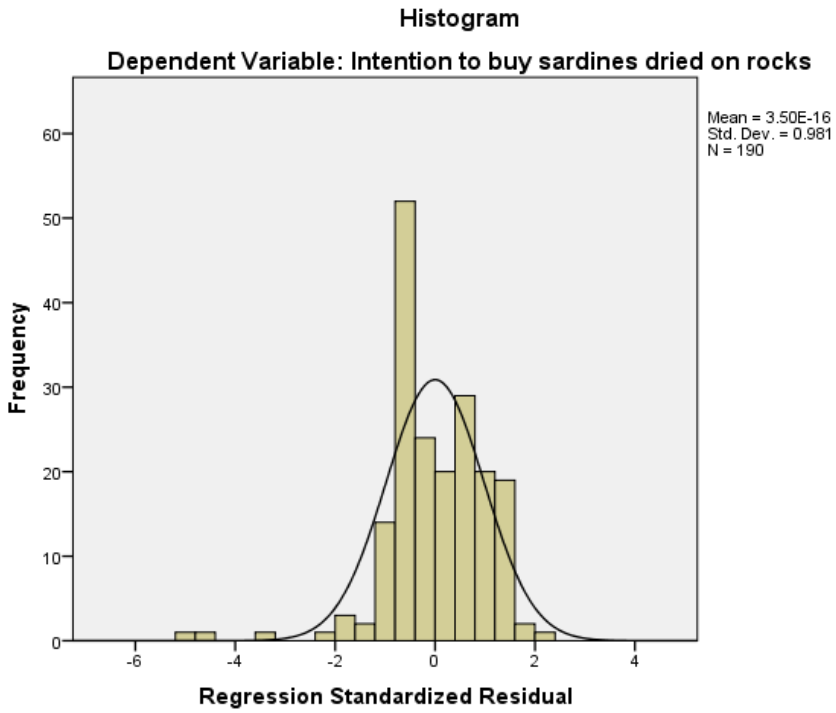
Prior experience for sardines dries on grass and nets	5.4158	1.36888	Confidence toward sardines dried on sand	4.8789	1.44789
Prior experience for deep fried sardines	5.2316	1.42875	Confidence toward sardines dried on raised racks	5.5895	1.31330
Prior experience for hot smoked sardines	4.5368	1.43509	Confidence toward sardines dried on rocks	5.4947	1.70200
Eat habits for sardines dried on sand	4.8737	1.64746	Confidence toward sardines dried on grass and nets	5.7000	1.96248
Eat habits for deep fried sardines	5.3737	1.14658	Confidence toward deep fried sardines	5.6000	1.98620
Eat habits for sardines dried on raised racks	5.4947	1.36760	Confidence toward hot smoked sardines	5.6526	1.74737
Eat habits for sardines dried on rocks	5.5789	1.20034	Quality evaluation on sardines dried on sand	4.6053	1.48252
Eat habits for sardines dried on grass and nets	6.0316	1.59332	Quality evaluation on sardines dried on raised racks	5.5579	1.16124
Eating habits for Hot smoked sardines	3.9526	1.76769	Quality evaluation on sardines dried on rocks	4.5684	1.16067
Family preference for sardines dried on sand	6.2474	1.22879	Quality evaluation on sardines dried on grass and nets	5.1842	1.49877
Family preference for sardines dried on raised racks	5.4105	1.04395	Quality evaluation on deep fried sardines	5.2632	1.43066

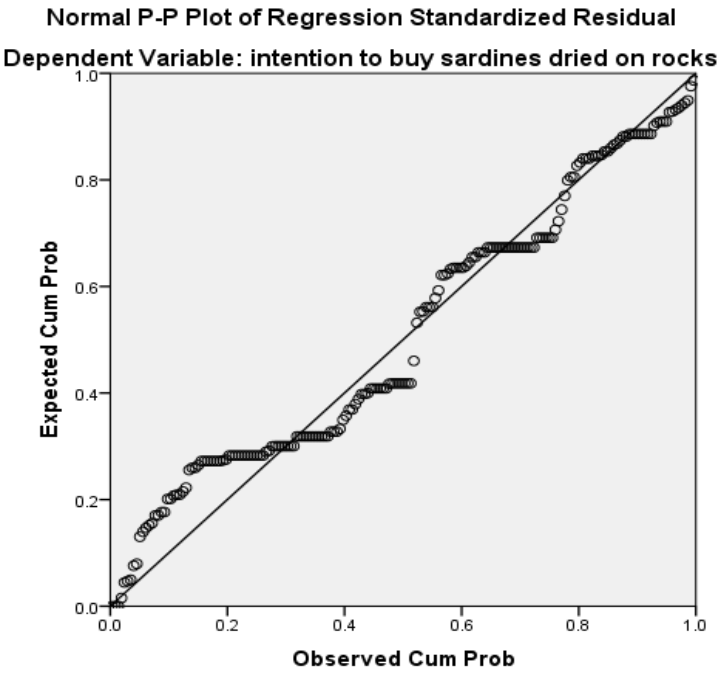
Family preference for sardines dried on rocks	6.1684	.90446	Quality evaluation on hot smoked sardines	4.2421	.92828
Intention to buy sardines dried on rocks	6.1895	1.42015	Intention to buy sardines dried on sand	4.5211	1.07254
Intention to buy hot smoked sardines	6.0316	1.59332	Intention to buy sardines dried on raised racks	5.9158	1.12370
Intention to buy deep fried sardines	6.0474	1.47389	Intention to buy sardines dried on grass and nets	5.7368	1.47078

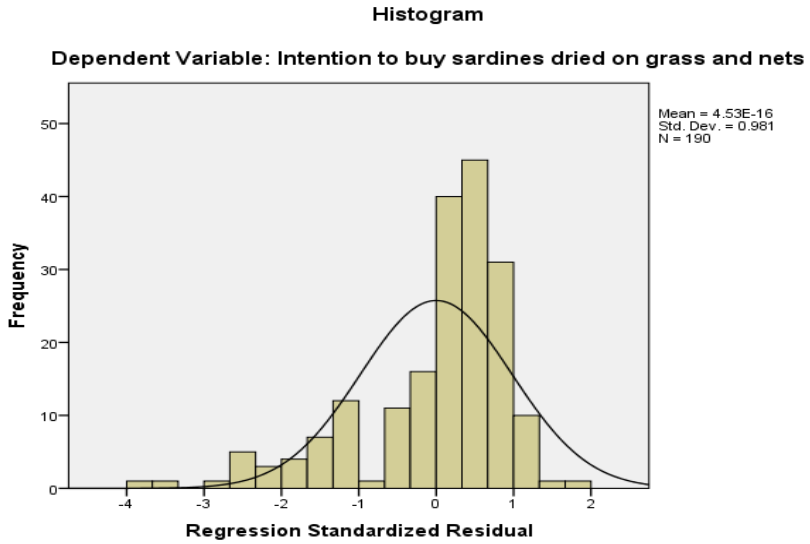
Appendix II: Test on Normality




Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Intention to buy sardines dried on sand
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

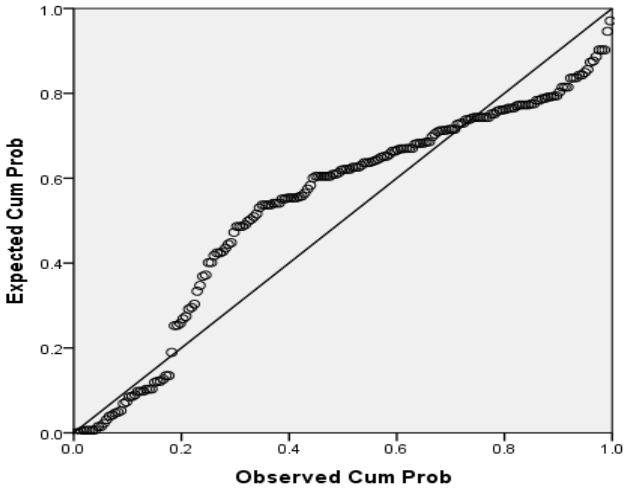

Histogram
Dependent Variable: Intention to buy sardines dried on rocks
Mean = 3.50E-16
Std. Dev. = 0.981
N = 190
Frequency
Regression Standardized Residual
0
10
20
30
40
50
60
-6
-4
-2
0
2
4


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: intention to buy sardines dried on rocks
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Histogram
Dependent Variable: Intention to buy sardines dried on grass and nets
Mean = 4.53E-16
Std. Dev. = 0.981
N = 190
Frequency
Regression Standardized Residual
0
10
20
30
40
50
-4
-3
-2
-1
0
1
2

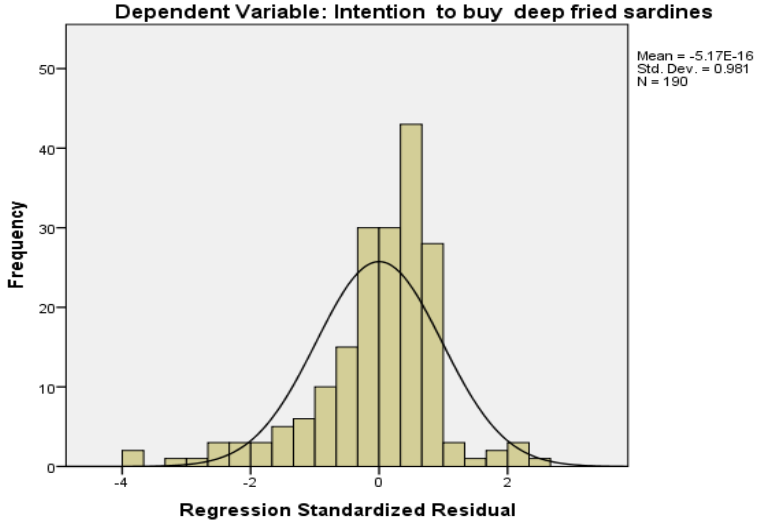
Normal P-P Plot of Regression Standardized Residual

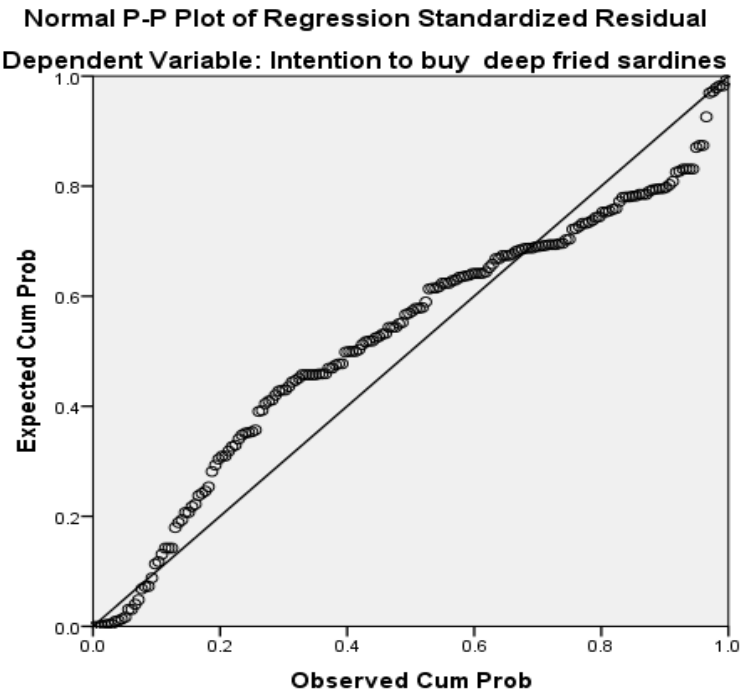
Dependent Variable: Intention to buy sardines dried on grass and nets

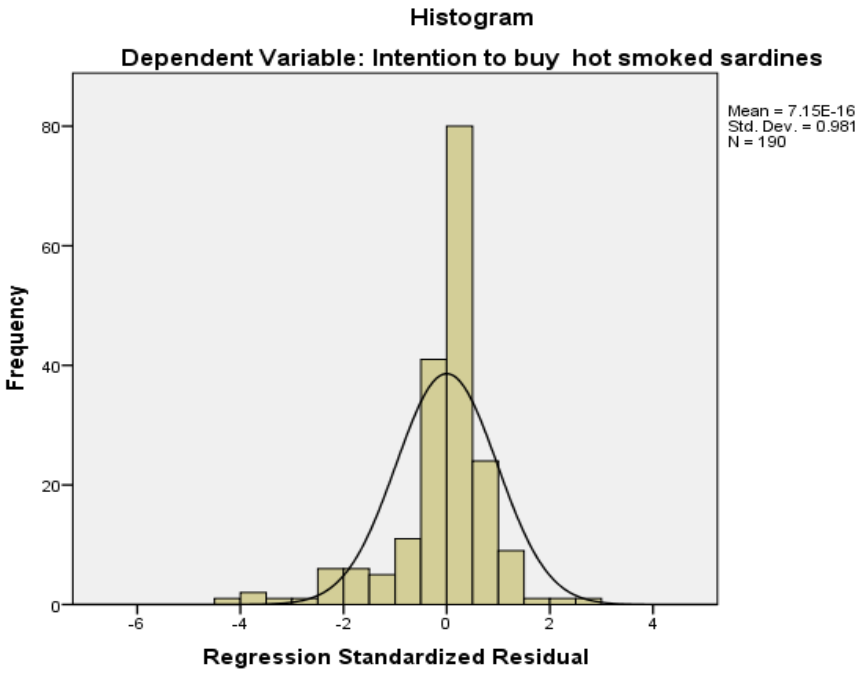


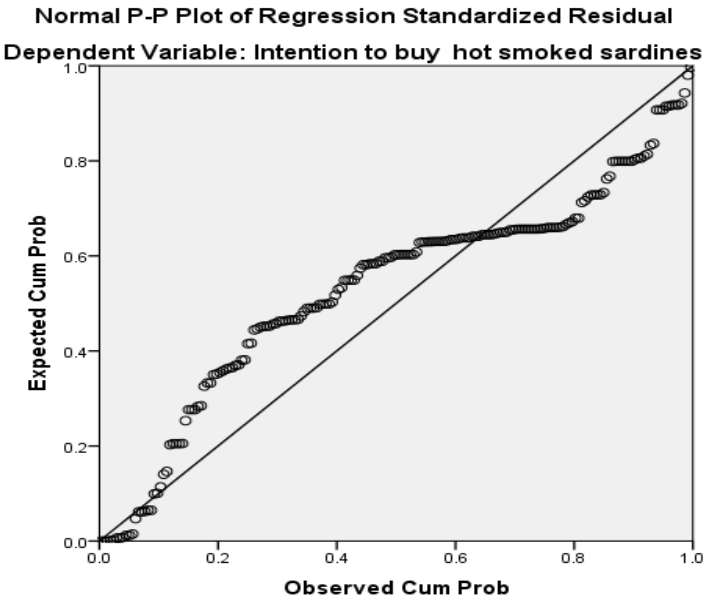
Histogram

Dependent Variable: Intention to buy deep fried sardines




Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Intention to buy deep fried sardines
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Histogram
Dependent Variable: Intention to buy hot smoked sardines
Mean = 7.15E-16
Std. Dev. = 0.981
N = 190
Frequency
Regression Standardized Residual
0
20
40
60
80
-6
-4
-2
0
2
4



Appendix III: Zero Order Correlation analysis of Processed Sardines Variables

Correlation Analysis of Variables for Sardines Dried on Sand

	Product familiarity	Prior Experience	Eating Habits	Family Preference	Attitude	Confidence	Quality Evaluation	Buying Intention
Product familiarity	1.000							
Prior Experience	0.356***	1.000						
Eating Habits	0.231***	0.324***	1.000					
Family Preference	0.491***	0.475***	0.342***	1.000				
Attitude	0.373***	0.304***	0.308***	0.353***	1.000			
Confidence	0.341***	0.326***	0.315***	0.305***	0.882***	1.000		
Quality Evaluation	0.311***	0.183**	0.218***	0.240***	.086	-.005	1.000	
Buying Intention	0.198**	0.273***	0.391***	0.263***	0.221***	0.225***	0.280***	1.00

*p< 0.05, **p< 0.01, ***p<0.001

Correlation Analysis of Variables for Sardines Dried on Raised Racks

	Product familiarity	Prior Experience	Eating Habits	Family Preference	Attitude	Confidence	Quality Evaluation	Buying Intention
Product familiarity	1.000							
Prior Experience	0.421***	1.000						
Eating Habits	0.108	0.180**	1.000					
Family Preference	0.522***	0.648***	.135*	1.000				
Attitude	0.436***	0.705***	.191**	0.629***	1.000			
Confidence	0.293***	0.755***	.140*	0.486***	0.750***	1.000		
Quality Evaluation	0.235***	0.414***	.105	0.391***	0.362***	0.297***	1.000	
Buying Intention	0.563***	0.848***	.106	0.697***	0.800***	0.636***	0.458***	1.000

*p< 0.05, **p< 0.01, ***p<0.001

Correlation Analysis of Variables for Sardines Dried on Rocks

	Product familiarity	Prior Experience	Eating Habits	Family Preference	Attitude	Confidence	quality Evaluation	Buying Intention
Product familiarity	1.000							
Prior Experience	0.559***	1.000						
Eating Habits	-.029	.020	1.000					
Family Preference	0.541***	0.546***	.114	1.000				
Attitude	0.530***	0.527***	0.180**	0.678***	1.000			
Confidence	0.400***	0.362***	0.167***	0.496***	0.767***	1.000		
quality Evaluation	0.250***	0.173**	.127*	0.286***	0.599***	0.540***	1.000	
Buying Intention	.063	.019	0.652***	0.140*	0.255***	0.147*	0.194**	1.000

*p< 0.05, **p< 0.01, ***p<0.001

Correlation Analysis of Variables for Sardines Dried on Grass and Nets

	Product familiarity	Prior Experience	Eating Habits	Family Preference	Attitude	Confidence	quality Evaluation	Buying Intention
Product familiarity	1.000							
Prior Experience	0.714***	1.000						
Eating Habits	0.301***	0.273***	1.000					
Family Preference	0.761***	0.708***	0.223***	1.000				
Attitude	0.777***	0.727***	0.388***	0.728***	1.000			
Confidence	0.593***	0.490***	0.159***	0.533***	0.581***			
Quality Evaluation	0.601***	0.525***	0.175**	0.513***	0.622***	0.316***	1.000	
Buying Intention	.133	.089	0.302***	0.202**	0.255***	.137	0.149*	1.000

*p< 0.05, **p< 0.01, ***p<0.001

Correlation Analysis of Variables for Deep Fried Sardines

	Product familiarity	Prior Experience	Eating Habits	Family Preference e	Attitude	Confidence	Quality Evaluation	Buying Intention
Product familiarity	1.000							
Prior Experience	0.689***	1.000						
Eating Habits	0.184**	0.231***	1.000					
Family Preference	0.589***	0.703***	0.200***	1.000				
Attitude	0.649***	0.744***	0.188**	0.839***	1.000			
Confidence	0.535***	0.581***	0.173**	0.582***	0.614***	1.000		
Quality Evaluation	0.674***	0.801***	0.153	0.709***	0.738***	0.572***	1.000	
Buying Intention	0.335***	0.392***	0.246*	0.322***	0.416***	0.287***	0.406***	1.000

*p< 0.05, **p< 0.01, ***p<0.001

Correlation Analysis of Variables for Hot Smoked Sardines

	Product familiarity	Prior Experience	Eating Habits	Family Preference	Attitude	Confidence	Quality Evaluation	Buying Intention
Product familiarity	1.000							
Prior Experience	0.451***	1.000						
Eating Habits	0.403***	0.352***	1.000					
Family Preference	0.503***	0.465***	0.318***	1.000				
Attitude	0.398***	0.332***	0.237***	0.729***	1.000			
Confidence	0.342***	0.339***	0.224***	0.615***	0.765***	1.000		
Quality Evaluation	0.517***	0.494***	0.304***	0.581***	0.575***	0.434***	1.000	
Buying Intention	0.268***	0.208***	0.158*	0.391***	0.497***	0.401***	0.367***	1.000

*p< 0.05, **p< 0.01, ***p<0.001

Appendix IV: Chi-Square Test on Demographics and Intention to Buy of Sardines

Sardines Dried on Sand		Value	df	Sig (2-sided
Gender	Pearson Chi-Square	3.91	6	0.689
Age	Pearson Chi-Square	24.003	24	0.406
Education	Pearson Chi-Square	10.23	24	0.994
Average income per Month	Pearson Chi-Square	30.134	36	0.743
Household Size	Pearson Chi-Square	73.819	72	0.418
Sardines Dried on Raised Racks				
Gender	Pearson Chi-Square	11.943	4	0.018
Age	Pearson Chi-Square	94.291	16	0.254
Education	Pearson Chi-Square	19.611	16	0.236
Average income per Month	Pearson Chi-Square	20.053	36	0.01
Household Size	Pearson Chi-Square	71.588	48	0.015
Sardines Dried on Rocks				
Gender	Pearson Chi-Square	8.443	6	0.207
Age	Pearson Chi-Square	22.918	24	0.525
Education	Pearson Chi-Square	67.363	24	0.000
Average income per Month	Pearson Chi-Square	92.341		0.000
Household Size	Pearson Chi-Square	88.468	72	0.091
Sardines Dried on Grass and Net				
Gender	Pearson Chi-Square	5.349	6	0.5
Age	Pearson Chi-Square	33.374	24	0.096
Education	Pearson Chi-Square	25.429	24	0.000
Average income per Month	Pearson Chi-Square	64.505	36	0.002
Household Size	Pearson Chi-Square	54.162	72	0.942
Deep Fried Sardines				
Gender	Pearson Chi-Square	9.138	6	0.166
Age	Pearson Chi-Square	39.397	24	0.025
Education	Pearson Chi-Square	33.506	24	0.094
Average income per Month	Pearson Chi-Square	59.418	36	0.008
Household Size	Pearson Chi-Square	109.211	72	0.003
Hot Smoked Sardines				
Gender	Pearson Chi-Square	36.752	6	0.000
Age	Pearson Chi-Square	39.936	24	0.412
Education	Pearson Chi-Square	39.936	24	0.000

Average income per Month	Pearson Chi-Square	54.182	36	0.026
Household Size	Pearson Chi-Square	111.623	72	0.002

Appendix V: Test of Multicollinearity for Study Variable

	Tolerance	VIF		Tolerance	VIF
Sardines Dried on Sand			Sardines Dried on Raised Racks		
Product familiarity	.663	1.509	Product familiarity	.704	1.421
Prior Experience	.707	1.414	Prior Experience	.214	4.668
Eating Habit	.792	1.262	Eating Habit	.961	1.041
Family Preference	.617	1.621	Family Preference	.480	2.082
Attitude	.207	4.831	Attitude	.229	4.374
confidence	.205	4.873	confidence	.385	2.598
Product evaluation	.830	1.205	Product evaluation	.802	1.247
Sardines Dried on Rocks			Sardines Dried on Grass and Nets		
Product familiarity	.576	1.736	Product familiarity	.294	3.402
Prior Experience	.570	1.754	Prior Experience	.378	2.643
Eating Habit	.942	1.062	Eating Habit	.826	1.211
Family Preference	.460	2.173	Family Preference	.369	2.707
Attitude	.226	4.418	Attitude	.255	3.927
confidence	.400	2.498	confidence	.585	1.710
Product evaluation	.587	1.705	Product evaluation	.556	1.798
Deep Fried Sardines			Hot Smoked Sardines		
Product familiarity	.455	2.199	Product familiarity	.609	1.641
Prior Experience	.278	3.599	Prior Experience	.647	1.546
Eating Habit	.935	1.070	Eating Habit	.794	1.259
Family Preference	.272	3.683	Family Preference	.376	2.660
Attitude	.229	4.371	Attitude	.282	3.545
confidence	.565	1.770	Confidence	.400	2.500
Product evaluation	.290	3.450	Product evaluation	.507	1.973