INVOLVEMENT OF SMALL AND MEDIUM SCALE ENTERPRISES IN CULTURE FISH VALUE CHAIN IN NIGER STATE, NIGERIA

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TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study assessed involvement of small and medium scale enterprises (SMEs) in cultured fish value chain in Niger State, Nigeria. Fish provides a rich source of protein for human consumption. The specific objectives were to: describe the socio-economic characteristics of the SMEs, examine the various SMEs in cultured fish value chain, determine the income disparities between the SMEs along the cultured fish value chain, evaluate the factors influencing the profit of SMEs in cultured fish value chain and finally examine the constraints of different SMEs along the cultured fish value chain. A multi-stage sampling technique was employed in the selection of respondents to get a total number of two hundred and sixteen (216) respondents composed of 79 producers, 75 processors and 62 marketers on which questionnaire were administered and complemented with face-face interview. Data collected were analyzed using descriptive statistics, flow chart, farm budgeting technique and inferential statistics such as multiple regression analysis. The results obtained showed that mean age of producers, processors and marketers were 42 years, 40 years and 42years, respectively. Majority (93.8 %, 68.0% and 71.2%) of the producers, processors and marketers respectively, were male implying that men were more involved in cultured fish farming than their female counterparts. The average mean of household size was 7, 7 and 8 for producers, processors and marketers. Also, majority of the cultured fish actors were educated having a minimum academic qualification of first school leaving certificate. This implies that the cultured fish farmers could read and write, thus, able to adopt new innovations. The results also showed that average farming experience of producers, processors and marketers was 11.4 years, 10 years and 8 years, respectively. The cost and return analysis of the culture fish producer for 1000stock/production cycle gives a gross margin sum of ₦176,113.89 and a net profit of ₦123,096.91, while processors (100kg) had a gross margin of ₦51,239.00 with a net income of ₦32,260.09 and the marketers (100kg) had a gross margin of ₦26,564.80 with a corresponding net income of ₦25,351.40 this implies that the culture fish value chain business is profitable. The pair-wise t-test showing differences in the profit margin of the three value actors (producer, processors and marketers) and how they significantly differ from one another revealed t – statistic value of 1.741 at 10% level of probability. This implies that there was a significant difference in the mean profit of the producers and processors, while t – statistic value of 1.634 showed that there was no significant difference in the mean profit of the producers and marketers. Thus, the null hypothesis was therefore accepted Furthermore, t – statistic value of -0.192 showed that there was no significant difference in the mean profit of the processors and marketers. Thus, null hypothesis was therefore accepted. The major constraints faced by cultured fish value chain actors include: Lack of ready market, Shortage of ponds' water, Poor extension services, and high cost of fingerlings. Processors constraints are majorly Poor market information, Limited access to credit and high interest rate, Lack of storage facilities. Marketing constraints are Challenges in prices of harvested fish, Lack of ready market, High cost of transportation, Fish price are unstable, Lack of transportation facilities The study concluded that cultured fish farming has helped increase shelf-life, open new market opportunities for producers by increasing job creation down the value chain this directly reduces rural poverty. Based on the findings of this study, it was recommended that government should improve on infrastructures in the rural areas and there should be active use of extension agents to transfer innovative ideas and technologies to the farmers.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Small and Medium Enterprises (SMEs) has impacted greatly on the economic growth and development in Nigeria and across the world (Olowe *et al*., 2013). Ofoegbu *et al.* (2013) also agreed that SMEs are the bench mark of many developing countries such as Nigeria. They believe that interest in SMEs will enhance job opportunity, reduce income disparities, and increase production of goods and service in the economy as well as providing a fruitful ground for talent progress. SMEs contribute to improving standards of living, bring about substantial local capital formation and achieve high level of productivity. SMEs are recognized as the principal means of achieving equitable and sustainable industrial diversification and dispersal (Adewuyi *et al*., 2010). According to Salami (2013), SMEs account for well over half of the total share of employment sales, and constitute the most viable and veritable means for self -sustaining industrial development. SMEs possess the capability to grow an indigenous enterprise culture more than any other strategy.

SMEs are divided into different industrial sectors such as agricultural sector, fishery sector and marketing sector which plays a vital role in the industrial development. Schaper (2016) reported that, there have been several ideas to move from capital intensive to large scale industrial project which is based on improving the SMEs that have better views for developing domestic economy, thereby producing the required goods and services that will boost the economy of Nigeria towards development. Ojo (2009) posited that the major

challenges of development in developing countries particularly in Nigeria, is encouragement of entrepreneurial development scheme. Despite the abundant natural resources, the country still finds it hard to discover her developmental bearing since independence. Quality and adequate infrastructural provision has remained difficult; other sectors have perceived downward performance while unemployment rate is on the increase (Oni and Daniya, 2012).

Fish is an important source of animal protein with good amino acids and essential minerals profiles. According to Food and Agriculture Organization of the United Nations (FAO) (2018), there is great gap between the demand of fish and fisheries production in Nigeria. According to the report, there is about 179 million tonnes of supply in 2018 globally; while in Nigeria the current fish production stands at 0.8million metric tonnes with a deficit of 1.9million metrics tonnes of fish, as local demand for the protein is 2.7million tonnes annually. This makes Nigeria one of the largest importers of fish in the developing world, importing 600,000 metric tonnes annually (Adewuyi *et al*., 2010). It is therefore important to ensure that improved fish production technologies that have been developed and disseminated are adopted, in order to increase fish production. Fishery industry is essential to the World economy, the livelihood of millions of people worldwide are dependent on fish farming (Golden *et al*., 2016). Fish provides a rich source of protein for human consumption. The flesh of fish is readily digestible and immediately utilize by the human body, making it suitable and complementary for regions of the world with high carbohydrate diet, like Africa (FAO, 2015). However, global evidence indicates that in many areas of the world, particularly in Africa, fishery management has decline (Beaumont, 2016).

Over the years, efforts have been made to develop new technologies, which have been introduced to the industry. This has led to more fish being caught, but this has also resulted in the over-exploitation of fisheries (Yáñez *et al*., 2017). The consumption and demand for fish as a major source of protein is rapidly increasing in most African countries, because of the poverty level in Africa. Fish is mainly supped from rivers in the continent, but capture fisheries are based on species presently exploited which seems to have reached their natural limits (Ferrol-schulte *et al*., 2013).

The aquaculture industry has great potential to meet the increasing demand for aquatic food in most regions of the world (Akegbejo-Samsons and Adeoye, 2017). The need for intensive and skilled management stems from the high level of capital invested in the facilities, and in the high levels of operating capital required to operate a competitive and profitable SMEs. Commercial aquaculture (farming operations of aquatic organisms) seeks to maximize profits (business-oriented) especially by the private sector. Majority of SMEs involved in cultured fish require substantial amounts of both operating and investment capital. One of the largest problems encountered in starting a cultured fish SMEs often is to acquire sufficient capital.

Aquaculture value chains include a sequence of value adding activities, from production to consumption, through processing and marketing (Gereffi and Fernandez-Stark,2011). Each segment of a chain has one or more backward and forward linkages. A value chain in agriculture identifies the set of actors and activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product (De Silva,2011).

According to Ifejika *et al.* (2007a), fish farming is one of the new initiatives that have been implemented in various areas in Niger State. Fish farming is carried out by fish farmers through fish ponds and is mainly practiced by farmers in the rural communities as a source of food and income. The response has been positive and extremely high as evidenced by a large number of individual farmers and famers' groups specialized in fish farming.

As reported by Ali *et al*. (2008), culture fish value chain in Niger State was fairly simple and short, with wholesalers and traders buying at the farm-gate and re-selling either directly to restaurants or market women who retail fresh or smoked fish directly to consumers in Niger State's various markets. The consumer preference is for large fish at bars/joints and restaurants, the small and odd-sized fish also find a ready market with wholesaling market women who specialize in smoking fish. Domestic smoked fish demand in Nigeria is estimated to be as large as the fresh fish market, and increasing in markets far away from the coast. Smoked fish markets were generally controlled by fish market women who by tradition, smoke fish and sell at a margin to mostly traders and retailers, and sometimes to consumers as well.

1.2 Statement of the Research Problem

The global production of fish has decline over the years, and has highlighted many challenges to development. Culture fish enterprises, particularly in Niger State, often have low production efficiency, experience occasional production crashes due to fish diseases Ifejika *et al.* (2007b) contribute to pollution and the loss of mangroves. Efforts to sustain or accelerate culture fish growth in Niger State must address breed improvements, fish health, sustainable feeds and environmental management, together with the need for socially equitable distribution of economic and nutritional benefits.

In Niger State, majority of poor and unemployment youth have engaged in establishment of personal SMEs in other to improve their standard of living (Sharu and Guyo, 2013). Consequently, entrepreneurship is growing to a fast level and becoming a household name in Niger State. Reasons being that the white collar jobs that people admire and boast of are no longer there. Even, the touted sectors (Banks and companies) known to be the largest employer of labour are on the down-turn following the consolidation crisis and fraudulent practices of high and mighty in the banking sector. The companies of course are folding up as a result of erratic power supply, insecurity and persistent increase in interest rate which has led to high cost of production that undermines profit making potentials of companies operating in Niger State. As a result of banking sector practices and continuous folding up of companies, a lot of people are thrown into unemployment which inevitably is detrimental to the economic situation of the country (Salami, 2013).

Culture fish are projected to be the dominant supply of fish for many in Niger State for decades (World Bank, 2014). However, most people face severe pressure from overfishing, particularly in resource-poor regions where fish is an important source of food and income (FAO, 2014). The most recent analysis of culture fisheries clearly demonstrates that the importance of small-scale fish farming for food security of Niger State cannot be overemphasized (Pauly, 2008). The performance of the fisheries sector in Niger State is below expectation with low supply as a result of low production. This is evident in the fact that Niger State still imports fish into the State to supplement fish production. Fish farming in Niger State is the least exploited fishery sub-sector with the vast brackish water fishing grounds almost unexploited (Ejiola and Yinka, 2012). Less than 1.0% of the fresh water grounds and about 0.05% of the brackish water grounds are under aquaculture to produce a

current average yield of 20,500 tonens of fish per annum. This represents only 3.12% of the estimated culture fish potentials of 656,815 tonens per annum (Oyinbo and Rekwot, 2013).

In spite of these great potential of natural resources and man-power availability to fish farming in Niger State, the State is still currently unable to bridge the gap in the short fall between total domestic fish production and total domestic demand. Niger State has been unable to produce enough fish for consumption because improved high-breeds of fish that depend on phytoplankton have not been adequately adopted; but still depend on local varieties that are of low productivity. Salami (2013). Besides, most rural farmers who are the major producers of fish, do not have adequate access to purchase fish equipment or facilities which have tendencies for enhancing productivity, income and alleviating rural poverty. Fish farmers as other farming producers are not enjoying the benefits of their products due to inadequacy of inputs and markets. Value chain is essential to the understanding of markets, their relationships, the participation of different actors, and the critical constraints that limit the growth of fish production and consequently the competitiveness of smallholder farmers. These farmers currently receive only a small fraction of the ultimate value of their output, even though in value chain theory, risk and rewards should be shared down the chain. The potential for an improved and well-functioning market which will enable smallholder producers to derive greater benefits from their production activities has not been fully tapped.

Despite the great opportunities which the fishery sub-sector holds in Niger State, a lot of the fish resources are being wasted and underutilized on a daily basis due to an unorganized or uncoordinated distribution channel (Aihonsu and Shittu, 2008). The fish

value chain in Niger State are not yet developed to meet international market requirements as limited value addition is done in the industry and this has limited fish and fish products to only domestic markets. Value addition to fish in Niger State is mostly simplistic and traditional. The reasons include fisher folk eagerness to raise immediate income from fish harvest and the high level of fish spoilage once harvested. It is thus against these backdrops that this study intends to examine the SMEs value chain of culture fish in the study area by providing answers to the following research questions:

i. What are the socio-economic characteristics of the SMEs?
ii. What are various SMEs in culture fish value chain?
iii. What are the income disparities between the SMEs along the culture fish value chain?
iv. What are factors influencing the profit margin of SMEs in culture fish value chain actors?
v. What are the constraints of different SMEs along the value chain?

1.4 Aim and Objectives of the Study

The main aim of the study is to determine the involvement of small and medium scale enterprises in culture fish value chain in Niger state, Nigeria. The specific objectives of the study are to:

i. describe the socio-economic characteristics of the SMEs;
ii. examine the various SMEs in culture fish value chain;
iii. determine the income disparities between the SMEs along the culture fish value chain;

iv. evaluate the factors influencing the profit of SMEs in culture fish value chain, and

v. examine the constraints of different SMEs along the culture fish value chain.

1.4 Hypotheses of the study

The following null hypotheses were formulated subject to further empirical validation in this study:

$HO_{1:}$ There is no significant relationship between some socio-economic characteristics of (age, gender, household, education and experience) of SMEs value chain and profit realized.

HO_2: There is no significant difference in the profit realized among the various SMEs in culture fish value chain.

1.5 Justification of the Study

In Nigeria, the role of fish is recognized in the National Development Plan (2013 - 2016). Improvements in governance and management of resources along the value chain are identified as key to sector development (Sharu and Guyo 2013).Fish as a source of animal protein has played a vital role in the nutritional budgets of many nations as fish production is becoming more valuable and important source of food protein. The world food crisis and present demand for food are increasing the demand for fish and aquatic organisms which can directly be consumed or converted to food for human consumption.

Fish requires high quality nutritionally balanced diet for growth and attainment of market size within the shortest period of time. Therefore, local production of fish feed is very important to the development and sustainability of culture fish in Nigeria, particularly the

rural areas. For aquaculture to reach and bridge the already existing wide gap between fish demand and supply especially in the Sub-Saharan Africa, the vital role of locally produced fish feed in reducing production cost, thereby making fish farming attractive to both private and commercial investors and ultimately to boost fish production cannot be over-emphasized (Gabriel *et al.,* 2007). Fish and fisheries are included in the SMEs and are expected to maximize their contribution to the target 6% annual agriculture productivity growth rate. The value chain approach has been seen by notable organizations, government and other agencies as a very reasonable and concrete way of poverty alleviation by focusing on weak links and constraints faced by various actors in the value chain. The process not only include more actors but it also covers wider range of activities such as facilitating access to inputs, strengthening the delivery of SMEs and financial services, enabling the flow of information and facilitating leveraging to higher-value markets. The cumulative effect of the activities collectively leads to the creation of more jobs and more income.

Therefore, the outcome of this study is expected to expand the frontier of knowledge. The exploration of facts findings is expected to raise some policy issues and give policy direction to policy makers. It will give new knowledge for prospective entrants into the SMEs, stakeholders and researchers. This will not only reduce poverty, but also help the poorest of the poor to contribute and benefit from the value chain. This study will also provide basis for the review, design and implementation of new poverty reduction strategies and could serve as a baseline for the assessment and monitoring of fish value chain under SMEs in Niger State. Thus, the study aimed at contributing to bridging the

knowledge gap, promoting co-operation, co-ordination and communication among the fish value chain stakeholders.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1Concepts of Value Chain

Value Chain is described as an analytical, as well as, an operational model Wikipedia (2011). This is based on the premise that, in a modern economy a product is rarely directly consumed at the place where it is produced. Value chain also refers to a sequence of target oriented combinations of factors of production that create a marketable product or service from its point of production to the final consumption. According to FAO (2015) a 'value chain' in agriculture identifies these two factors and activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product. Value chain is a specific type of supply chain– one where the actors actively seek to support each other so they can increase their efficiency and competitiveness.

An agricultural value chain is usually defined by a particular finished product or closely related products and includes all firms and their activities engaged in input supply, production, transport, processing and marketing (or distribution) of the product or products. Kaplinsky and Morris (2001) defines the value chain as 'the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers, and final disposal after use.' An agricultural value chain can, therefore, be considered as an economic unit of analysis of a particular commodity (example milk) or group of commodities (example dairy) that encompasses a meaningful grouping of economic activities that are linked vertically by market relationships. The emphasis is on the relationships between networks

of input suppliers, producers, traders, processors and distributors (United Nations Conference on Trade and Development (UNCTAD), 2000).

The value chain concept entails the addition of value as the product progresses from input suppliers to producers to consumers. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added. Value addition results from diverse activities including bulking, cleaning, grading, packaging, transporting, storing and processing. In summary, the concept of value chain provides a useful framework to understand the production, transformation and distribution of a commodity or group of commodities. With its emphasis on the coordination of the various stages of a value chain, value chain analysis attempts to unravel the organization and performance of a commodity system. The issues of coordination are especially important in agricultural value chains, where coordination is affected by several factors that may influence product characteristics, especially quality (Anandajayasekeram and Berhanu, 2009).

In agricultural value chain, a stage of production can be referred to as any operating stage capable of producing as a liable product serving as an input to the next stage in the chain or for final consumption or use. A stage of production in a value chain performs a function that makes significant contribution to the effective operation of the value chain and in the process adds value. The performance of an agricultural value chain depends on how well the actors in the value chain are organized and coordinated, and on how well the chain is supported by business development services (BDS). A particular stage in a value chain may affect and be affected by the stage before or after it. The result of good coordination

between the stages of a value chain may be reflected in a good match between buyer preferences and seller supplies. That is, better coordination in a value chain results in better matching of demand and supply between the chain stages, resulting inefficient and low-cost exchange, quality maintenance, and value addition.

2.1.1 Concept of Value Chain Analysis

Value chain analysis is an assessment of the actors and factors influencing the performance of an industry, and relationships among participants to identify the driving constraints to increased efficiency, productivity and competitiveness of an industry and how these constraints can be overcome (Fries, 2007).

According to Kaplinsky and Morris (2001) value chain analysis is important due to three reasons in this era of rapid globalization. The first reason they raised is that with the growing division of labor and the global dispersion of the production of components, systemic competitiveness has become increasingly important. Second, efficiency in production is only a necessary condition for successfully penetrating global markets. Third, entry into global markets that allows for sustained income growth requires an understanding of dynamic factors within the whole value chain. The value chain can help to answer questions regarding how the producer each the final consumer; the structure (economic relationships) between players in the chain; how this structure is likely to change overtime; the key threats to the entire value chain; and the key determinants of your share of the profits created by your chain.

2.1.2 Importance of value chain analysis

Kaplinsky and Morris (2001) also defines Value Chain Analysis (VCA) as study of the "full range of activities which are required to bring a product or service from conception,

through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use". The concept stresses the importance of value addition at each stage, thereby treating production as just one of several value-adding components of the chain.

Value Chain Analysis is the process of breaking a chain into its constituent parts in order to better understand its structure and functioning. The analysis consists of identifying chain actors at each stage and discerning their functions and relationships; determining the chain governance, or leadership, to facilitate chain formation and strengthening; and identifying value adding activities in the chain and assigning costs and added value to each of those activities United Nations Industrial Development Organizations(UNIDO, 2010). The flows of goods, information and finance through the various stages of the chain are evaluated in order to detect problems or identify opportunities to improve the contribution of specific actors and the overall performance of the chain. The study of value chains comprises of two key concepts: value and chain.

According to Hawkes and Ruel (2011), the term value is synonymous to "value added" in the Value Chain Analysis (VCA) as it characterizes the incremental value of a resultant product produced from processing of a product. For agricultural products, value addition can also take place through differentiation of a product based on food safety and food functionality. Price of the resultant product shows its incremental value. At production level of an agricultural produce, value addition will involve enhancements or additions to a product that result in higher returns to the commodity seller, who is often the farmer. For instance, technological enhancements, labour-saving steps, or any other innovation that

allows the producer to offer more of a commodity is a form of "input value-added" enhancements that reduce costs of production, thus returning value to the farmer. However, if the farmer grows specialty crops, engage in strategic marketing of commodities or she/he sells the product for a premium, this constitutes "output value-added" enhancements. The term chain refers to a supply chain indicating the process and the actors involved in the life cycle (from conception to disposal) of a product (Hawkes and Ruel, 2011).

Value chain analysis is conducted for a variety of purposes. The primary purpose of value chain analysis is to understand the reasons for inefficiencies in the chain and identify potential leverage points for improving the performance of the chain.

In general, agricultural value chain analysis can be used to understand how an agricultural value chain is structured, conducted and its performance (Anandajayasekeram and Berhanu, 2009).

Value chain analysis facilitates an improved understanding of competitive challenges, helps in the identification of relationships and coordination mechanisms, and assists in understanding how chain actors deal with powers and who governs or influences the chain. Developing value chains is often about improving access to markets and ensuring a more efficient product flow while ensuring that all actors in that chain benefit. Changing agricultural contexts, rural to urban migration, and resulting changes for rural employment, the need for pro-poor development, as well as a changing international scene (not least the increase in oil prices) all indicate the importance of value-chain analysis (Anandajayasekeram and Berhanu, 2009).

Value chain analysis is the key entry point to poverty alleviation and achieving outcomes. It is usually aimed at increasing the total amount and value of products that can be sold in

value chain (Hempel, 2010). This, in turn, results in higher absolute incomes for the poor as well as for the other sectors in the value chain. The objective of improving value chains for the poor are two-fold as reported by Making Markets Work for the Poor (M4P) (2008). First is to increase the total amount and value of products that are been sold by poor in the value chain. This results in higher absolute incomes for the poor as well as for other sectors in the chain. The second is to sustain the share of the poor in the sector or increase the margins per products, so that the poor do not only gain more absolute income but also relative income compared to the other sectors in the value chain. Value chain analysis involved a sequence of steps, from identification of sectors through chain sector mapping, linkages, and quantification of earnings into rewards by various sectors using information gathered from observation, rapid appraisals, and the quantitative and qualitative surveys augmented by secondary data (Bene et al. 2010).

Upgrading is defined as a desirable change in chain's participation that enhances rewards and reduces exposure to risks and means of acquiring capabilities and accessing new market segments through participating in particular (Hempel, 2010), pointed out that, upgrading concept describes how firms and sectors shift towards making better products, making them more efficiently or moving into more skilled activities and improving their performance and rewards in high-value markets. Upgrading in agriculture value chains relates to changes in production processes to improve productivity and products that are increasingly defined by domestic and international quality standards and food safety measures. German Technical Cooperation (GTZ) (2009) posited that, value chain describe the full range of activities that are required to bring a product from its conception to its end user and beyond. This includes activities such as design, production, marketing,

distribution and support to the final consumer. These activities can take place within a firm or among different firms in one or several geographical locations.

The concept of value chain analysis as introduced by Michael Porter was useful in production company production and management. However, (El-Sayed *et al*., 2015) reported that, the prominence of VCA as a useful tool of analysis in the fisheries, aquaculture and aqua feed sectors has increased during recent years. Value-chain analysis (VCA) has been proved to be a useful means to assess performance in different systems including; distributional issues and pro-poor and gender equitable growth, the relative importance of factors affecting competitiveness, and the costs and earnings of each cycle of the value chain, identifying and analyzing gaps and weaknesses in value chain performance, and identifying and suggesting appropriate upgrading, management and development strategies to improve value chain performance.

In the recent years, value chain has becomes very important in agriculture. Asiedu *et al*. (2015) itemized that, value chain in fisheries and aquaculture has a number of benefits such as providing policymakers and fishing company management with a systematic tool which allows them to understand the processes in the industry. Also value addition seemed to be important concept in fisheries and aquaculture as it promotes better profit, more stable market conditions, job opportunities and product diversification. According to Mitchell *et al*. (2009), upgrading refers to the acquisition of technological capabilities and market linkages that enable firms to improve their competitiveness and move into higher-value activities. The value chain analysis has given development economics a tool to understand why the weak, poor and dis-organized are unlikely to benefit from trade, and also a series of practical strategies to empower poor people to change the terms of their

engagement in global trade by overcoming barriers to entry or creating barriers to entry of their own. Upgrading in firms can take place in the form of process upgrading, product upgrading and functional upgrading. Process upgrading involves increasing the efficiency of internal processes such that they are significantly better than those of rivals, both within individual links in the chain, and between the links in the chain. Product upgrading involves introducing new products or improving old products better than rivals. This involves changing new product development processes both within individual links in the value chain and in the relationship between different chain links. Functional upgrading involves increasing value added by changing the mix of activities conducted within the firm or moving the cost of activities to different links in the value chain.

2.2 Concept of Culture Fish Farming

Culture fish farming involves the raising of fish commercially in tanks or enclosure that is mainly for food (Adedeji and Okocha, 2011). It is the cultivation of aquatic population under controlled conditions. Culture fish farming can be contrasted with commercial fishing which is harvesting of fish. Commercial culture fishes supply one half of the fish and sells fish that are directly consumed by consumers.

In Nigeria, culture fish farming is practiced in various forms using different holding units which include, ponds, pens (enclosures) and re-circulating tanks (Cobbinah, 2010). Culture fish farming is most likely practiced in pond. With this method, areas of land are enclosed by dikes and flooded. Fish are then added to the pond and are fed on a regular schedule and a clean source of water is used to keep the pond in the proper condition for healthy growth (Kawarazuka, 2010).

Floating pens are the most common methods for growing marine finfish, such as salmon, in protected coastal waters. One of the biggest concerns in this method is continuously providing fresh, clean water for the fish. In large enclosures made of netting, fish can enjoy a natural flow of water and all the food they can eat. This open-water approach is also used in growing marine shellfish, with the natural currents bringing both clean water and plenty of food for filter-feeding bivalves such as oysters, quahogs and scallops (Tsue *et al.,* 2013). The most recent kind of culture fish farming uses recirculation systems to clean and re-use water. Recirculation systems are made up of several components that filter the culture water of waste and toxins as well as treating it to reduce its bacteria and viruses load. Because one can control the environmental parameters in this recycling system, it allows growers to carefully control water quality and eliminates them from the risk of weather-dependent ponds and pens (Anyanwu *et al*., 2014)

2.2.1 Culture fish farming in Nigeria

The history of culture fish farming dated back to the middle Ages fish culture in Europe, when fish culture was practiced in Monasteries (Adewumi and Olaleye, 2011). Some centuries like the Chinese and Indo- Pacific regions practiced the art of culturing fish, in North America fish culture developed at the beginning of this century while in Africa the practice is far more recent. Culture fish farming is concerned with rearing of fish under complete human control also involves the manipulation of at least one stage of an aquatic organisms' life before harvesting in order to increase its production (Kapetsky 2000).

Culture fish farming embraces the use and manipulation of natural and artificial water bodies to produce fish required by man and thus concerns all activities concerned with breeding and culture of fish (FAO, 2009). It is a non-indigenous technology, which has

received limited adoption in rural sub-Saharan Africa ((Adewumi and Olaleye, 2011). Culture fish practices are used world-wide in three types of environments (freshwater, brackish water and marine) for a great variety of culture fish. Culturing of fish is carried out either in fish ponds, fish pens, fish cages or, on a limited scale. Marine culture employs either fish cages or substrates for molluscs and seaweeds such as stakes, ropes, and rafts.

According to (Tsue *et al.,* 2013) the primary role of culture fish farming in a subsistence farming system is to provide edible fish thus contributing to food security and availing some income to vulnerable populations through sale of the surplus. In Nigeria fish production in ponds was the beginning of man's effort to culture his desired fish species in a controlled environment. Modern fish farm in Panyam, near Jos in Plateau State was established. This opened the gateway for modern fish farming in other states of the country.

2.2.2Advantages of culture fish farming

Fisheries products represented a major source of export revenue for developing countries, amounting to over US $20 billion per annum in late 1990s (FAO, 2015). This exceeded a value obtained from the exports of vegetables, meat, dairy, fruits, oil seed and cereals in (1997) from developing countries International Trade Center (ITC, 2002). Fish also contains some essential nutrients with high protein value and low fat in comparison to terrestrial animals (Kassam, 2014) stated that only selected fish are at the point of extinction, thus leaving limitless species for exploitation. Fish is easily maintained and it required less attention than other farm animals such as poultry, duck, and some ruminant animals.

According to (Asiedu, 2012), the intensification of fish production from the pools in an African flood plain through water management, fertilization and stocking with fingerlings was technically a success and he discovered that fish production per hectare is 171% greater in manageable ponds compare to unmanageable ponds in terms of income derived from labor inputs for food management. The returns per man hour compared to other favorable alternative activities. (Kawarazuka, 2010), stated that since 2007, there had been a urge interest on large scale commercial farms owned and operated by a new breed of influential, wealthy and knowledgeable or skilled Nigerians whose interest in the sector has been kindled by awareness created by the various fisheries administrations and series of reforms enacted by government in favour of agricultural development after the oil boom era.

2.2.3 Value chain analysis of culture fish enterprise

Shamsuddoha (2007) revealed that the nature of value chain activities differs greatly in accordance with the types of species and producers. Roheim (2008) argued that the value chains of producers/companies have undergone many changes in the last two decades due to advancements in technology facilitating change at a very rapid pace in the business environment. The author further obliged that outsourcing will cause major changes in organizations and their value chains, with significant managerial implications. Value chain analysis is an innovative, sector-based approach to competitiveness focuses on getting more value from goods and services produced for export (Shamsuddoha, 2007). Value chain analysis is the key entry point to poverty alleviation and achieving pro-poor outcomes. It is usually aimed at increasing the total amount and value of products that the

poor can sell in the value chain. This, in turn, results in higher absolute incomes for the poor as well as for the other actors in the value chain.

According to German Technical Cooperation (GTZ, 2009), Development interventions now utilise the value chain approach as an important entry point for engaging target groups, individually or collectively, in various interventions in marketing or poverty alleviation. Value chains are networks of labour and production processes where the result is a finished commodity.

Hopkins and Wallerstein, (1994) A value-chain can be seen as a step further in evolution, as it moves beyond just getting the product to market and aims at providing a more mutually beneficially environment for all stakeholders (FAO, 2013).

It has the enormous advantage to bring together stakeholders from different production stages and sectors, to create a productive and innovative dialogue and to draw the attention to Collective Competitiveness' (CYE Consult, 2009). Value creation is used to characterize fish and fishery products that have incremental value in the marketplace by differentiating them from similar products based on product attributes such as: geographical location (Mediterranean tuna, Norway salmon, Thailand Black Tiger shrimp, etc.); environmental stewardship (MSC label, Eco-labeling, fair trade), organic products; and food safety (HACCP, Free from antibiotics and heavy metals) (De Silva, 2011). The production systems in fisheries involve value-addition through production of five different forms; fresh, smoked, dried, salted and frozen in which fish and fish products are mostly marketed (FAO, 2012). According to Jacinto and Pomeroy (2011), small-scale fishers need to strengthen their organizations for resource management and market development, they

also need to identify and examine the types of markets with which they can engage and benefit from.

It enhances the analysis of specific constraints encountered by fishers, processors, cooperatives, etc. and solutions not merely focus on business development, but in recent years also address networking, social, institutional and environment issues and/or micro finance (CYE Consult, 2009). Building mutually beneficial relations among the various actors in the value chain while maintaining priority on improving the livelihoods of small-scale fishers can start from the hypothesis that the small-scale fishers and their support organizations, that traders can be potential partners rather than being the adversaries in a zero sum game Jacinto and Pomeroy (2011). Fish value chains in Nigeria are not yet developed to meet international market requirements as limited value addition is done in the industry, with the result that market for fish and fish products are limited to domestic markets (Investopedia, 2011).

2.2.4 Value chain actors

Value Chain actors are the people at each link along the chain required to move a product from the farm to the consumer (McGregor and Stice, 2014). Value chain actors are those involved in supplying inputs, producing, processing, marketing, and consuming the products (Getnet, 2009). They can be those that are directly involved in the value chain (rural and urban farmers, cooperatives, processors, traders, consumers etc.) or indirect actors who provide financial or non-financial support services, such as credit agencies, government, researchers and extension agents. Usually they own the product for certain time as it travels along the chain (CYE Consult, 2009).

Roduner (2005) distinguishes between different participants in the value chain and groups them into micro, macro and meso levels respectively. Firstly, those participants who are directly involved with the primary product are referred to as 'value chain players' and are grouped in the micro level. They include input suppliers, farmers, dealers and traders, until the final consumers, whether the product is consumed locally or exported. Clearly, the micro level includes only those participants who are directly involved with the product.

The second level is the macro level where the participants are referred to as 'value chain influencers' (Roduner, 2005). They are those participants who, as indicated by their name, influence the value chain. The value chain influencers include those participants responsible for the regulatory and administrative conditions as well as for international competition (Spies, 2011). These conditions include, amongst others, food law and regulations, food control and company inspection, customs and taxes, incentives and free trade agreements. The third level is the meso level and the participants are referred to as 'value chain supporters'. The value chain players at this level are responsible for providing information, training and promotions. Their activities includes; business advice, trade promotion, research and development, quality management advice/certification.

2.3 Overview of Global Fish Production

Aquaculture is one of the fastest growing food production sectors in the world with an annual growth rate of 10% since the mid-1980s and a farm gate value of 70.3 billion US dollars in 2004 Aquaculture value chain (AVC, 2012). Presently, twenty two percent of global fish production comes from aquaculture and global production of aquatic products was valued approximately 93.2 million metric tonnes in 1997, of which capture fisheries supplied 64.5 million metric tons and aquaculture 28.6 million metric tons (Delgado *et al*.,

2003). Official statistics indicated that majority of the growth in fish production from 1985-1997 came from China for both capture fish food and aquaculture. By 1997, China's shares in capture fish food and aquaculture had grown to 68% and 21% respectively making it the single largest producer in both categories in the world.

Delgado *et al*. (2003) further stated that the overall fish food production in the past 30 years steadily shifted away from developed countries to developing countries, where production has been growing at few rate per year since 1985 as against 2.7% for developed countries within the same period. Of the three major categories of production environment listed (FAO, 2014) aquaculture few accounts for the majority of global production in 1999, followed by Mari culture thirty three percent and brackish water six percent.

Aquaculture provides foreign exchange to many developing countries with trade in culture fish products accounting for twenty two percent and 20 billion US dollars per year in the late 1990s of the world trade in fish (FAO, 2008). The value of fisheries exports from developing countries exceeded that from meats, dairy, cereals, vegetables, fruits, sugar, coffee, tobacco and oilseeds in 1997 (International Trade Centre, 2002). Adikwu (1999) noted that with the growing realization on the amount of fish that could be harvested from the world's seas and fresh water system, coupled with the growing human population, the means to explore other means of complementing fish production has become imperative.

2.3.1 Fish production trend in Nigeria

Fish is the cheapest source of animal protein consumed by the average Nigerian and accounts for about 50% of the total animal protein intake Federal Department of fisheries (FDF, 2009). According to FAO (2013) documented report, Nigeria supplied about 0.4 percent of global cultured products. This is far from same report which indicated that

countries like china supplied 61.6%; India (7.3%), Indonesia (4.3%), Norway (1.8%) and Egypt (1.6%). Rondon and Nzeka (2010) reported that Nigeria's fish demand amounted to nearly 2.0 million MT (valued at more than $1.8 billion) in 2009, leaving approximately 600,000 metric tons of untapped market potential and about 800,000 metric tonnes valued at approximately $900 million, were imported fresh and frozen fish (mostly frozen mackerel, herring and croaker). Fish consumption accounts for about 35 percent of animal protein consumption in Nigeria (USAID, 2014). Fish production in Nigeria comes from three sources; artisanal (inland rivers, lakes, costal and brackish water), aquaculture (fish farm) and industrial fishing (Otubusin, 2011). The inland water mass was estimated to be about 12.5 million hectares of inland waters capable of producing 512,000 metric tons of fish annually (Shimang, 2005). Domestic fish production of about 500,000 metric tonnes is supplied by artisanal fishers (85%), despite over fishing in many water bodies across the country (Adetunji, 2011). Fish farming is the least exploited fishery sub-sector with the vast brackish water fishing grounds almost unexploited (Ejiola and Yinka, 2012). Fish production in Nigeria has not been consistent in all the sources (artisanal inland, aquaculture and industrial fishing) despite the considerably high potentials; local fish production has failed to meet the country's domestic demand (FAO, 2013). The fish industry remains the most virgin investment in Nigeria compared with the importation of frozen fish in the domestic market (Nwiro, 2012).Total domestic fish production in Nigeria ranges between 242,525 and 615,507 metric tonnes from 1981-2007 and has not been consistent (FDF, 2009).

According to USAID (2014), the average Fish consumption in Nigeria is 9.8 kg/caput, while the demand for fish is 1.4 m MT/annum. Recent data show that Nigeria produced

just over 600,000 metric tonnes of fish in 2007 (Kingsway, 2013). Consumer demand, on the other hand, was reported at 2.66 million metric tons and was met only in part by imports of about 740,000 metric

tonnes that same year (USAID, 2014). This report confirms the fact that domestic demand for fish in Nigeria could not be met only by dependence on artisanal fisheries.

According to (Ojo and Fagbenro 2004), fish farming has the potential to help expand the resource base for food production and reduce the pressure on conventional sources of fish that are harvested faster than they can be regenerated. Nigeria has high potentials for aquaculture development and thus potentials can be realized substantially through extension services (Adetunji, 2011).

2.4 Small and Medium Scale Enterprise

Small and Medium Enterprises (SMEs) financing in the developing economies attracted much attention among many scholars and development economists globally. Its importance for socio-economic growth placed it high on development policy agenda in developing countries (Beck *et al.*, 2005). SMEs and fish SMEs in particular are important for socio-economic development in developing countries (Fulgencio, 2009). They are flexible due to their special structures, adaptable to market conditions, versatile human resource skills, building subcontracting relations with large corporate enterprises and can be technologically efficient at specific tasks (Malaiyandi *et al*., 2010). Addressing effective fish SMEs‟ financing and capability concerns could serve as a springboard for rapid economic growth as realised in Vietnam, Chile and most Southeast Asian economies (Edakkandi, 2012).

In high-income countries, SMEs constitute 67 percent on average of the formal employment in the manufacturing sector and 45 percent in developing countries (Shrestha and Pant, 2012). Similarly, SMEs contribute 49 percent on average to GDP in high-income countries and on average 29 percent in low-income countries (IFC, 2010) due mainly to better access to technologies, financial credit and skilled manpower. SMEs accounts for majority of total established enterprises in European Union economies and about two-thirds of jobs and half of the turnover in non-agricultural sector. (Rocca *et al.*, 2009).

Despite fish SMEs being crucial in the economy, it is paradoxical that they continue to experience acute lack of access to formal financial credit that has been identified as enterprise growth (Shiffer and Werder, 2001). Fish SMEs‟ growth potentials continue to be limited (Namisi, 2005) due to several factors including unstable macroeconomic policy environments, poor infrastructure, lack of access to finance, skilled human resources, appropriate technology, collateralised assets and inability to meet hard information requirements of financial institutions among others. Due to these difficulties, most fish SMEs finance their activities through informal sources and trade credits. Fish is a perishable commodity requiring strong capabilities and institutional support to maintain quality and hygiene fish handling along the supply chain to boost production and exports. The stringent technical and sanitary standards require huge financial investments to enhance fish SMEs participation and competitiveness in global markets where sophistication of fish products matter to a great extent.

SMEs constitute a significant part of private sector in both the developing and developed economies yet substantial evidence show that small enterprises face greater financing and growth constraints than large enterprises, thus explaining their retarded growth (Beck and

Demirguc-Kunt, 2006). SMEs financing is based on the concept that they are engine of growth in many developing economies but their growth patterns continue to be impeded by market imperfections and institutional weaknesses (Beck *et al.*, 2006). The financial and institutional developments do assist in alleviating SMEs‟ financial and growth constraints, thus leveling the playing field among enterprises of different ages and sizes.

2.5 Empirical Review of Past Studies

2.5.1 Socio-economic characteristics of SMEs

The socio-economic features of fish farmers have been known to have bearing on some factors like educational level, age, sex, marital status, experience and household size among others.

Odebiyi *et al.* (2013) reported that the socio-economic characteristics of the fish value chain actors at the coastal area of Ogun state, Nigeria are One hundred percent of the fishermen and fish processors were male and female respectively; while majority of the fish-marketers were male and female respectively. Most of the fishermen fell within the age bracket of 41-50 year while majority of the fish processors and fish-marketers were within the age range of 31-40 years respectively.

However, the ages of some of the fishermen, fish processors and fish-marketers were higher than 50 years respectively. Majority of the fishermen, fish processors and fish marketers were married with household sizes of 6-10 persons and a mean household size of 9, 10 and 6 persons. Most of the fishermen and Fish-marketers practiced Islam, while fifty two percent of the fish processors were Christians. Respondents with primary school leaving certificate were thirty percent (fishermen), fifty percent (fish processors) and thirteen percent (fish-marketers) as against thirty one percent of fish processors with no

formal education; hence the high level of illiteracy among value chain actors in Ogun Waterside LGA. The survey further revealed that majority of fishermen, fish processors and middle men who Practiced their occupation on a full time basis are, sixty five percent (fishermen), forty percent (fish processors) and no (middlemen) practiced farming as their minor occupation. Based on the years of experience in fish-related business, few of fishermen, fishprocessors and fish marketers respectively had between 11 and 20 years of experience. Out of the 72, 64 and 45 fishermen, fish processors and fish-marketers interviewed respectively, most were not members of any cooperative societies.

Dambatta and Sogbesan (2015) assessed the profitability of fisheries enterprises in kano state Nigeria. The results show that majority of the respondents were within the prime age group of 35-44 years. Followed by 25 -34 years old with twenty seven percent and the least value of one percent was for those within 65-74 years old Household sizes of fisheries stakeholders in Kano State. The result further revealed the gender and educational background of fish farmers in Kano State. There is a wide range of differences between these household in sizes and percentage occurrence. Gender and Educational Status of fisheries stakeholders in Kano State: gender and educational status of the fishers. In terms of educational status of the populace of the study area, the educational background range from the First School leaving certificate, secondary, tertiary, qur'anic and adult education.

A total of 30 respondents were recorded with varying years of experience. Out of 30 respondents, 3 had 1-5 years of experience, 1 had 6-10 years of experience, 8 people had 11-15 years of experience, 11 people had 16-20 years of experience and 7 people had 21-25 years of experience. Fishing organizations and membership by the fishermen in Kano

state: The information generated showed that majority of the fishermen are actively engaged in fishing organization while few do not belong to any fishing organization.

The study of Oluwemimo and Daramola (2013) showed sixty percent of the sampled fish farmers in the study area to be 40 years of age and below, 20% were between age 41 and 50years while the other 20% were above 50years. Most of the farmers were married constituting about sixty seven percent, the family size were relatively small with seventy eight percent of the respondent having between 1 to 5 persons. High level of education was found among the respondents as about sixty six percent had tertiary qualification, eighty three had 5 years' experience in the sector and all the respondents had other occupation aside fish farming. The average pond size in the study area was 4760.2m^2 which indicated the farmers to be smallholders.

Socio-economic characteristics of fish farmers as studied by Shitote *et al.* (2013) revealed that a larger percentage of the respondents were male, considerable few percentage are quite young ranging as from below 20 years to 40 years and majority had experience of less than 5 years which was indicated as less experience in fish farming in the study area. The same study revealed that majority of the sampled fish farmers were married and few had a household size of between 3 and 5 persons also low educational level was reportedly high and had only primary education.

Oluwemimo and Daramola (2013) investigated Value Chain Analysis and performance of Small Scale Agri-business: Evidence from Cultured Fish farmers Kwara State. Results reveal that majority of the farmers are within the ages of thirty six. The cultured fish farmers surveyed have at their disposal a mixed blend of labour supply e.g. husband, wife,

children or siblings to manage them. Furthermore, the operations of most of the farms encountered required minimal labour as they are mostly small holder farms that requires less than hour per day of farm operations. Among the sampled cultured fish farmers in the study area, all had formal education to varying levels. Also, among the sampled fish farmers, majority came into business with not more than 15 years' experience. Fish farming was not the main source of income in the study area. Most of farmers sampled are salary earners. The working capital for the majority of fish farmers were sourced through personal savings. Many of the sampled respondents claimed they did not access financial credit from lending institutions to finance their farming businesses due to the stringent conditions attached to loans.

Gwary *et al.* (2013) studied value chain analysis of fish caught in Lake Alau, Borno State, Nigeria. Results reveal that all of the fishers and processors were male. It can therefore be inferred that all the fishers in the study area were all male. This could be because fishing activities in the northern part of Nigeria especially Borno state are viewed as a man's job. Moreover religious and cultural practices of the people (Hausa's and Kanuri's) do not allow the women especially house wives engage in hard labour. The result also revealed that few of the marketers were male and female respectively. Result also depicts the level of education among the respondents. Majority of them fisher-folks and processors had Qur'anic education as their highest educational qualification.

Among the fish marketers, majority had Islamic education; few had primary school education while few of the marketers attended secondary and tertiary education respectively. Also results on household shows that few of the fishers had a range of 1-5 and 6-12 household size, respectively while forty percent of the processors had 6-12 and

above 13 household size and above 13 household size. However, many of the marketers had the household size range of 6-12. The mean household size for the Fishers, Processors and Marketers was 16, 12 and 11 persons, respectively. This indicates a large family size of more than six persons (comprising of four children and two parents). This is perhaps due to the practice of polygamy and extended family system in the area. Study further revealed that majority of the fishers had 13 years of fishing experience while forty seven percent of the marketers had experience of 13 years and above. Sixty percent of the processors had experience of between 1-5 years. This indicates that the fishers had more years of experience compared to the other actors. It needs to be noted that the more the years of experience the more the knowledge of a particular aspect of the fishing business.

2.6 Small and Medium Scale Enterprise in Culture Fish

In a study by Failler *et al*. (2014), it was reported that culture fish value chain in Nigeria was fairly simple and short, with wholesalers and traders buying at the farm-gate and reselling either directly to restaurants or market women who retail fresh or smoked fish directly to consumers in the county's various markets. While the consumer preference is for large fish at soup bars/joints and restaurants, the small and odd-sized fish also find a ready market with wholesaling market women who specialize in smoking fish. Domestic smoked fish demand in Nigeria is estimated to be as large as the fresh fish market, and increasing in markets far away from the coast. Smoked fish markets were generally controlled by fish market women who by tradition, smoke fish and sell at a margin to mostly traders and retailers, and sometimes to consumers as well.

In Uganda, Maurice (2010) found that African catfish value chain to a large extent is not governed by middlemen; but the lost value and bargaining power are a result of size and

scale of production. The researcher therefore pointed out two relevant value chains which can be defined for Uganda's grow-out farmed African catfish; the regional export market chain and the domestic market chain.

The regional export market chain:

Grow-out farmer ➡ cooperative ➡ processor ➡ regional exports.

The domestic market chain:

Grow-out farmer ➡ middlemen ➡ processors/retailers ➡ consumer.

In the study done by Ferdous *et al.* (2012) in Bangladesh, it was reported that, farmers' share of the consumers' prices for different fishes, seem to be reasonable except for hilsha fish. Farmer received the major share of the consumer's Taka for major carp-pangas-tilapia, shrimp (overseas value chain) and shrimp (domestic value chain) respectively. For major carp, pangas and tilapia, major cost is borne by *paikers* (32.03% of total cost) and major net profit is earned by retailers (51.98% of total net profit). However, when fish moves through value chains, every intermediary adds some extra costs with the purchase price as part of their involvement or profit. But farmers receive relatively higher share of the retail value for all species under study except for hilsha.

In the value chain analysis of the Egyptian aquaculture, Macfadyen (2011) found that the value-chain for farmed fish was comprised by three main stakeholder groups before fish reaches the consumer. There were virtually no exports of farmed fish, and so the value-chain is short and simple compared to aquaculture value-chains in some other countries. This is especially true given that there is no processing at all of farmed fish, that is, all fish is sold in whole form (either live, fresh on ice, or fresh without ice), and there is no value-

addition either through primary processing into fillets or into other secondary processed products (for example, ready meals).

Chenyambuga*et al.*, (2012) also did value chain mapping of farmed Nile tilapia in Morogoro region in Tanzania. The researcher found that Nile tilapia value chain was very short; it involves few actors; fingerlings producer, Nile tilapia farmers and consumers. Shawn (2013) found that, in Egypt there were no exports of farmed fish, and so the value-chain was a very short and simple one compared to aquaculture value-chains in some other countries. Also fish farmers obtain high percentages of the final consumer price, due to the lack of any exports, the short-supply chain, and the lack of value-addition in the value-chain. Feed costs represent a very high percentage in all governorates of operational costs for the farming subsector (67% of operational costs).

While value chain of farmed fish seem to be short, that of wild fish is long with some value addition. Kadigi *et al.* (2007) did Nile perch value chain and other fishery chains of artisanal fisheries and other jobs created by fisheries in Mwanza and Mara regions. From the study, the complete Nile perch value chain extended from Lake Victoria to industrial processors to exporters. The Nile perch value chain in Tanzania was characterized by a complex system of supply chain that operate at three main levels. Production and localized trading within the lake zone and markets in the other regions within Tanzania, cross-border trade between Tanzania and neighboring countries of Kenya, Uganda Zambia, The Democratic Republic of Congo (DRC) and International exports to the EU and other developed countries' markets.

Value addition to farmed fish is very short as Macfadyen(2011) in another study in Egypt found that, farmed fish was being sold as a low-value bulk commodity product with virtually no value-addition, results decline in real prices for farmed fish, and coupled with rises in production costs in recent years, with increasing pressure on the profitability of the fish farming sector. The authors also reported that market for farmed fish in Egypt is not at all well understood, particularly in terms of the presence, size and demand requirements of different market segments. There is also no understanding of the relative margins and value-added in the different market segments. Rutaisire *et al.* (2009) found that Cost-benefit ratios will depend on the species being cultured, the availability of quality feeds, and other input costs and it is not possible to predict probable profit margins for all production systems.

Chenyambuga *et al.*, (2012) in Malawi also found that fish retailers were able to rip more benefits than the rest of the chain actors (fishers and wholesalers) while fish wholesalers were second to rip more of the chain's benefits and fishers were the least. Also fish retailers had control over the chain basing on the benefits that they were able to enjoy and apart from this they could not allow fish wholesalers to have stalls from where wholesalers could directly sell their fish to consumers. Fisher's marketing margin was the same as fisher's marketing profit and this was due to the fact that fishers were selling fish at the beach and could not incur marketing costs as was the case with fish retailers and wholesalers.

Apu (2014) in Bangladesh reported that, fish farmers harvest and sell at the pond site to fish traders or use professional fisher teams to harvest on cash payment or against 15–20% of the harvest. The author defined market chain for freshwater prawn from producer to

consumer was the field workers, prawn traders, agents and processing companies. A fish farmer receives 56% of the price paid by the final consumer; in other words 44% of the retail price is taken by the various intermediaries. Also the retail price of Silver carp and Nile tilapia was only 14% higher than the wholesale price, the profit rate is low but their high volume sale means they generate most earnings of the day, and most buyers of these fish were the vast low-income households.

In calculating the margin for each actor in the value chain Ferdous *et al. (*2012) pointed out that, the margin must cover the costs involved in transferring produce from one stage to the next and provide a reasonable return to those doing the marketing activities. The marketing margin is the price of all utility adding activities and functions that are performed by the intermediaries. A marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. It is also termed as price spread as it represents the difference between the buying and selling price. Total marketing margin is the difference between the price received by the fish Farmers and the price paid by the final consumers. Moreover Omowa (2013) defined marketing margin as the difference in the value of physical qualities at the various levels of the marketing process. He further explained that, it represents the difference between farm gate and wholesale prices, or between wholesale and retail prices. Therefore marketing margin shows the value added and profit through the chain.

2.7 Income Distribution among Culture Fish Value Chain Actors

Many studies has been conducted by some few researchers such as Antonio and silvia (2014), (Catherine*et al.*, 2017), and (Ruby, 2008). Have contributed that fish production is a profitable venture, though a larger proportion of total cost is needed for the variable cost

(majorly feed and fingerlings). (Abosede, 2013) posited that small scale fish farming generates considerable profit, prove flexibility in terms of shock and crisis; and make significant contributions to poverty alleviation (income) and food security.

Phiri *et al.* (2013) in a study in Malawi pointed out that, the retailers had slightly lower total fish volume than wholesalers and the net income for the retailers was the highest since their total costs were lower than those of wholesalers, by computation of profitability indices, marketing margins and inequality indices. The authors then concluded that, reducing of costs by all actors in the chain could help to narrow the income inequality gap among different actors, and also noted that fishers had the highest wage bill which also affected their profits, retailers were also reaping more of the consumer' price than the rest of the actors (fishers and wholesalers) and wholesalers had the second largest share of the consumer's price. Fishers and fish retailers since they had lower marketing costs than wholesalers resulted in having comparatively better marketing profits.

Kareem *et al.* (2012) in a study on technical allocate and economic efficiency of different pond systems in Ogun State, Nigeria revealed returns to every naira invested on earthen pond system of fish farming to be ₦8.00 while that of concrete pond was ₦6.50. Result further revealed that the total variable cost constituted majority of the total cost for concrete pond and more for earthen pond system. In a similar study Adebayo and Adesoji (2008), it was reported that the total cost of about ₦191,000 was incurred for earthen ponds in the study area and ₦199,000 for concrete ponds with ₦264,000 and ₦252,000 gross income from earthen and concrete ponds respectively. Profit margin was ₦73,000 for earthen ponds and ₦52,000 for concrete ponds.

Kudi *et al.* (2008) in a study on fish production in Kaduna State reported that the variable cost constitute about ninety seven percent of the total cost among which the major cost incurred are those of fingerlings forty eight percent, feed and hired labour whereas fixed cost constitute about three percent. It was further revealed that cost of production was ₦571,321.76, total revenue was ₦5,853,625.64 and net income was ₦5,282,393.85 which indicated that fish production is a profitable venture in the area.

2.8 Factors Influencing Profit of SMEs

Adewuyi *et al.* (2010) in their studies on profitability of fish farming in Ogun State showed that sampled fish farmers in the study obtained a profit of ₦320,650 with a rate of return of 1.55 which implied a profit of ₦0.55 on each naira invested. In a study in Osun State, Agboola (2011) indicated that about eighty percent of total variable costs are on feed, labour and fingerlings while fixed cost constituted only 1.3% on large scale, for medium and small scale the fixed cost component account for 6.3% and 4.9% respectively. The study further revealed that large scale fish farming makes a profit of about ₦16,190,291 while medium and small scale fish farms make a profit of ₦2,884,843.3 and ₦151,732.66 respectively.

Oluwemimo and Damilola (2013) in a study on socio-economic and policy issues determining sustainable fish farming in Nigeria obtained an average variable cost of ₦480,755.55 constituting about 78% of the total cost of production which was ₦610,442.55. The average revenue of the farmers was ₦938,083.30 with a gross margin of ₦457,327.75 and a benefit-cost ratio of 1.51 indicating a profitable venture as every ₦1 earns ₦0.51. Olaoye *et al.* (2013) indicated a total cost of ₦2,883,515 accrued by

respondents in Oyo State out of which 86.68% accounted for variable cost. Total revenue of ₦4,873,521.29 was realized with a returning gross margin of ₦2,376,616.36 and a net farm income of ₦1,990,006.21 indicating that the enterprise is profitable. A gross margin ratio of 0.59 indicated a return of 59kobo (₦0.59) on every naira spent.

Olasunkanmi and Yusuf (2014) also in a study on small-scale fish farming in Osun State reported a return to naira invested of 1.67 which indicated that for every one naira spent a profit of ₦0.69 is realized showing that the enterprise is profitable. Issa *et al.* (2014) in their study of profitability of small-scale catfish in Kaduna State revealed an average variable cost of 59.2% and 40% average fixed cost of the average total cost with an average income of ₦1,053,887.3 yielded a profit of ₦581,451.02.

2.9 Constraints Faced by SMEs in Culture Fish Farming

It is important to note that one of the major problems limiting the production and development of the aquaculture industry in Nigeria has been the scarcity of brood-stocks which has resulted into a shortfall in fingerlings production and the major factor hindering the production of high quality and quantity fish seed is weather and water related problems which are concerns that has limited the sporadic growth of this sub-sector. According to Adewumi and Olaleye (2011), it was noted that problems militating against fish farmers in Nigeria amongst others are: poor management skills, inadequate supply of good quality fish seed, inadequate capital, and high cost of quality fish feed, faulty data collection, lack of environmental impact consideration and marketing of products.

Abiona *et al.* (2011) highlighted the constraints associated with SMEs fish farmer to include capital, access to credit, market price risk, production risk, inadequate incentive for

maintenance of water infrastructure, epileptic power supply, capital assets and social attitude (exploitation by middlemen). Shitote *et al.* (2012) studied the challenges faced in the development of fish farming and discovered from a sample survey of 192 fish farmers that high cost of feed, shortage of water during drought, flooding, scarcity of fingerlings, poor security, siltation of ponds and pond maintenance were problem faced by fish farmers. In a study undertaken by Olaoye *et al* (2013), it was reported that insufficient fund, fluctuation in market price and high cost of feed, non-availability/high cost of fingerlings, poaching, lack of preservation and processing facilities, high cost of construction materials, water shortage, disease and pest infestation, distance of extension officer to the farm and lack of technicality were the major constraints faced by the fish farmers in the study area.

Yuguda *et al.* (2013) identified inadequate finance as a major constraint indicated by 50.43% of the respondents in the study area. The study also revealed that the respondents indicated to unattractive price of fish and high cost of input materials as constraints. Issa *et al.* (2014) also revealed in their study in Kaduna State that inadequate capital, poor marketing, pests and diseases, high cost of inputs and lack of government support were major hindrances to successful fish farming. Successful catfish production has been marred by inadequate capital, shortage of trained personnel, water poisoning, shortage of power, cost of feed and lack of required equipment's as indicated by respondents in a study carried out by Nwachi and Begho (2014).

Absence of extension officer in term of selection of site and pond construction, insufficient fund in the course of production, high cost of feed, price fluctuation and flooding during

raining season were revealed from a study by Olasunkanmi and Yusuf (2014) as constraints to fish farmers. From a study of 90 sampled fish farmers, James *et al.* (2014) revealed insufficient fund, fluctuation in market prices, high input prices, seasonality of availability of fish, inadequate technical knowledge and fish spoilage due to post harvest handling were indicated were the major constraints to the farmers.

Hossian and Islam (2014) also found that fish farmers are constraint in the aspect of credit facilities, high input cost and operating as well as scientific knowledge. Ibemere and Ezeano (2014) and Sadiq and Kolo (2015) in their separate studies of problems and prospects of small scale fish farming in Niger State, revealed that a major constraint encounter by the fish farmers in that area are scarcity of quality brooding stock, paucity of capital and high cost of feed lesser perceived problem are high labour costs, poor storage facility, inadequate water supply and mortality rate due to diseases.

Mwaijande and Lugendo (2015) pointed out that, constraints affecting the farmed fish value chain in Tanzania such as input, production, post-harvest and marketing factors. Critical input factors include non-availability of quality fish feeds, poor quality of fish breeding, poor water quality of water, feeds, and technology, limited best management practice for growing Tilapia, farm layout and design about feed use and fish health management.

2.10 Theoretical Framework

2.10.1Approaches of value chain analysis

There are three approaches used in estimating value chain in products; price distribution approach, activity value addition approach and input-output approach.

Price distribution approach, more often, value-added at the various levels of the distribution chain is the final price of the product per unit measure (price/kg). This approach works with the assumption that any improvement in the quality of the product will lead to an improvement in the price of the product. However, this approach overlooks differences in production costs as well as being unpredictable (some actors add a higher margin).

Value addition approach, the second approach which is activity value addition uses the ranks of all value addition in the chain to estimate the value chain model using designed scale. Often shares of retail value-added or final retail-price serve as proxies for the division of value-added or economic surplus (Keane, 2008). This approach also overlooks differences in production costs as well as being unpredictable (since some retailers add a higher margin).

The input-output approach looks at the input/output ratio of the production process of the different actors involved in the chain. Undertaking firm level 'input-output' analysis is costly and time consuming, but nevertheless advocated by some (Keane, 2008). However, the approach assumes firms produce in a vacuum and that a change to the tune of x will result in an increase of value added of y. The approach may be relevant if considering firms in isolation and independent of global markets. Ayee *et al.,* (2008) posits that the

input-output approach is the best method of value addition estimation as it does not overlook differences in production cost at each level of the distribution channel.

Value chain analysis consists of two major steps Brown *et al*., (2010). The first involves the assessment of existing market(s) to put the chain analysis within the proper context. The second step is value chain mapping aimed at answering six key questions: (a) Who are the key customers and what are their product requirements in terms of species, volume, quality, packaging, delivery schedules, as well as grades and standards? (b) Who are the key players in the chains and what are their respective roles? (c) What are the activities and processes along the chain? (d) What is the flow of product, information and payment along the chain? (e) What are the logistic issues?

(f) What are the external influences (e.g., ordinances, regulatory requirements, policies, etc.)? For fish, the functions of each link in the chain involve production, processing and marketing product to the next link in the chain.

A value chain is defined as a chain of activities required to bring a product or service from production (involving a combination of physical transformation and input of various producer services), through delivery to final consumer and final disposal after use (Kaplinsky and Morris, 2001). It represents an analytical framework that helps to understand how the trade world functions. Depending on the researcher's objectives, a value chain framework can be used to increase commercial profit, improve the competitiveness of a specific target group in a market or reduce poverty.

The value chain approach was developed by Michael Porter in the 1980s, and described in his book Competitive Advantage: Creating and Sustaining Superior Performance (Getnet, 2009).The concept of value added in the form of a value chain has been used to build up an

industry's sustainable competitive advantage in the business field. The entire industry is formed of activities that link together to develop the value of the business, and together these activities form the industry's value chain. Such activities included product manufacturing, and activities of purchasing, distribution and marketing of the company's products (Lynch, 2003). Since the value chain framework is used as a powerful analytic tool for the strategic planning of an organisation, it aims to maximise value creation while minimising costs.

Value chains are synonymously referred to as market chains, supply chains, market channels or value-added chains. At each stage in the value chain, the product changes hands through chain actors and costs are incurred at each transaction. Generally, some form of value is added (Louw et al., 2008). A large body of literature on agricultural markets argues that the presence of high transaction costs affect the performance of the market (Smith et al., 2005).

A number of recent studies examine market performance as a function of: farmers' access to market (Stevenson and Pirog, 2013). A different but related body of literature examines the performance of a market based on the cost components of the market chain, omitting non-cost indicators of market chain performance Isma'ila (2015). A major limitation of these different strands of literature is their lack of connection with the entire market chain as a system. They do not offer a systematic view of market chains, as single indicators cannot adequately measure a market chain, which needs to be measured at multiple levels.

(Webber and Labaste 2010) observes, performance of a market chain can be measured at three levels: the individual level, the system's level as a whole and the relationship between a supply chain and the internal and external environments in which it operates.

Lee (2014) differentiates performance measurement by business process. He distinguishes those processes that are appropriate at the strategic, operational and tactical levels, and between cost and non-cost measures (i.e. time, quality flexibility and innovativeness). This distinction is particularly important, since relying exclusively on cost indicators can produce a misleading picture of market chain performance. Measure of time and quality of supply chains reflect the ability of a market chain to deliver high customer services.

2.10.2 Conceptual framework

This consists of concepts that are placed within a logical and sequential design and represent less formal structure. Getachew et al. (2014) views conceptual model as a broad system of explanation which is founded not so much on prior research finding but largely on untested and unproved assumptions about social realities. Furthermore,(Kindie, 2007).Reported that these relationships and functions can be represented schematically or mathematically.

The conceptual framework of this study shows the relationships between intervening, independent and dependent variables. The independent variables of the study include socio-economic characteristics such as age, level of education, membership of cooperation, pond size, gender, income, and years of fishing experience etc., SMEs such as hatchery, processors, marketers, feed millers, and input dealers etc. Income disparities among SMEs include income of producers, income of processors, and income of marketers. Constrain faced by the SMEs include limited access to credit, poor extension services, unavailability of technology, inadequate labour supply and poor transportation facilities. Intervening variables includes government policies, cultural values attitude and value chain system.

These variables will likely have direct and indirect effect on the involvement in aquaculture value chain which is the dependent variables.

The socio-economic characteristics such as age are expected to have direct negative effect on the dependent variable. Young people bring energy, vitality, and innovation into the work force and youth have potentials to overcome some major constraints in fish farming activities but adult fish farmers decrease in physical and mental strength as they grow older which can lead to low productivity when other factors are held constant. Invariably, increase in age will result to decrease in their involvement in aquaculture fish farming if all things being equal. On the other hand, increase in level of education is expected to increase productivity of farmers leading to rise in production because higher level of education is an advantage for adoption of modern technologies and access to credit facilities for better production.

Furthermore, education would significantly enhance farmer's ability to make accurate and meaningful management decisions, it could also enhance the knowledge of improved techniques such as how to read and interpret recommended ways of processing and production. In other words, the level of awareness and subsequent adoption of agricultural innovations are affected by the literacy status of farmers and those who are literate are expected to be more innovative because of their ability to get information more quickly and take more risk. Therefore a rise in level of education will definitely result to rise in productivity level and subsequent rise in their involvement in aquaculture.

Membership of cooperative will enable farmers to interact with other farmers, share their experiences and assist themselves. Such interaction is mostly avenue through which innovation diffusion can occur. Again, some agricultural development programmes such as

National Accelerated Food Production Programme (NADEPP) and Anchor Borrower Programme (ABP) disbursed funds through cooperative societies for on-lending to farmers. Therefore, farmers who are not members of cooperative do not benefit much from such programme. Therefore, membership of cooperative is likely going to have direct positive effect on farmer's performance and rise in their involvement in aquaculture. Pond size is another soci-economic feature that is assumed to have direct effect on the dependent variable. Farmers with small pond size or plastic size is always an impediment to fish production because there will not be enough space for sorting when they are growing bigger, fish are said to be carnivorous in nature so when growing they are expected to be separated by sorting out the bigger ones from the smaller ones. Therefore increase in pond size or plastic size will improve production and avoid losses.

In gender, it is expected that male farmers will have better livelihood than their female counterparts. This is because male farmers have greater access to farm land (especially communal land), credit facilities, extension services, and other productive assets than female farmers. They will take advantage of every opportunity in the programme with their available resources to increase their production level unlike female farmers who are always at the government. Women's weak bargaining position within the family and in the labour market will definitely result to low productivity, low standard of living. Therefore, gender of farmers is expected to have direct effect on their involvement in fish farming activities. Researchers have shown that majority of the beneficiaries in agricultural development programmes were male farmers.

Experience they said is the best teacher, thus the more years of fish farming experience a farmer has, the more the farmer can properly allocate scare resource in other to avert risk.

Again, experienced farmers will be more efficient in their decision-making processes, more willing to take risks associated with adoption of innovation, manage factors that affect the business and be in a better position to invest wisely and increase production. Therefore, years of farming experience is expected to have direct positive effect on farmer's performance in fish farming which will result to better standard of living. It is assumed that large household size is a good and economical way of maximizing farm returns by the use of family labour.

On the other hand, the problem of poor funding, political interference, and policy instability, absence of availability of market, high labour cost, lack of extension services, and lack of storage facilities will likely have effect on their involvement in aquaculture. Other challenges that can hinder fish farming production, processing and marketing include counterpart funding problem, conflict among user groups, lack of cooperation among members, inadequate land, and unavailability of technology.

This relationship between dependent and independent variables will be further affected by other factors that are will be investigated in this study which are intervening variables like cultural values, government policies, attitude and value chain system. These variables are expected to have direct and indirect relationship with dependent variables and expected outcomes. The overall interaction of these variables will affect the involvement of farmers in aquaculture business. The proposition is that the farmer's socio-economic characteristics, various SMEs, income disparities of various SMEs, constraints faced by various SMEs,and intervening variables will either have direct or indirect effect on the involvement in aquaculture business. This in turn determines the expected outcomes which

are income, improved well-being of farmers and their households, improved education, change in access to market, and overall change in economic growth of the country.

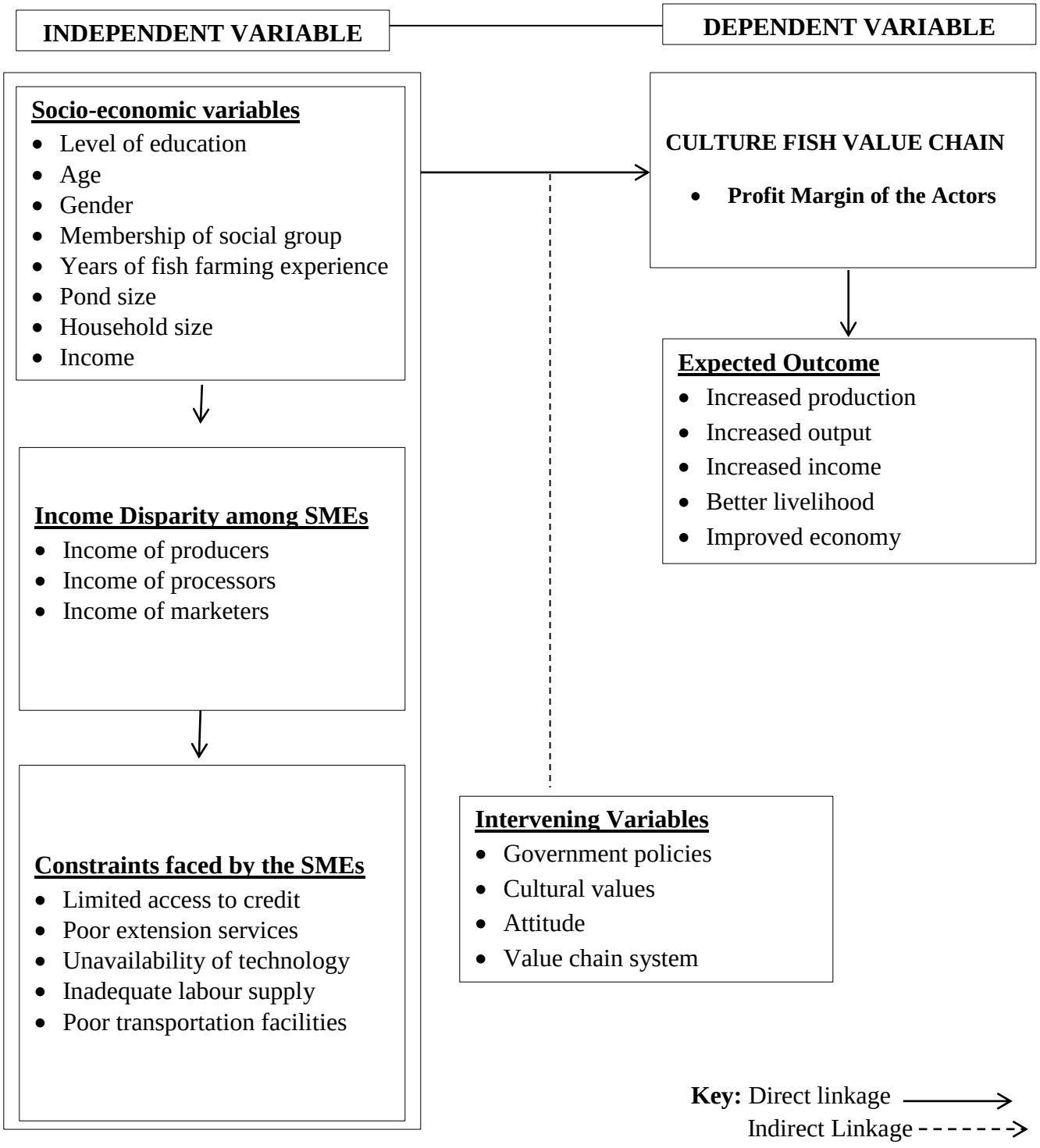

Figure 2.1: Conceptual framework on small and medium scale enterprises in culture fish Value Chain

CHAPTER THREE

METHODOLOGY

3.1 Study Area

This study was taken in some selected Local Government Areas of Niger State, Nigeria. Niger State is in the Southern Guinea Savannah of Nigeria, it is located between Latitudes 8°11′N to 11°20′N of the equator and Longitudes 4°39′E to 7°15′E (Niger State Bureau of Statistics, 2012). The State has 25 constitutionally administered local government areas and is divided into three agricultural Zones, namely: Zone1, with headquarters at Bida, Zone II, with headquarters at Kuta and Zone III, with headquarters at Kontagora. The Zonal L.G.A. distribution comprise: Zone 1-Mokwa, Edati, Lavun, Gbako, Bida, Katcha, Agaie and Lapai; Zone 11- Suleja, Tafa, Paikoro, Chanchaga, Bosso, Gurara, Shiroro, Munya, and Rafi; and Zone111 - Wushishi, Mariga, Magama, Mashegu, Agwara, Kontagora, Borrgu and Rijau.

Nupe, Gwari, Koro, Kadara and Hausa are the major languages in the State. Other tribal groups include -Baraba, Kakanda, ganagana, Dibo, Kambari, Kamuku, Pangu, Dukkawa, Gwada and IngwaiIt covers an estimated land area of 76,363 square kilometres. The State had a population of 3,918,332 in 2006 (National Population Commission (NPC), 2006) which was projected to be 5,540,869 as at 2019. The State experiences two distinct seasons: the dry and wet seasons. The annual rainfall varies from about 1,600mm in the south to 1,200mm in the north. The duration of the rainy season ranges from 150 to 210 days or more from the north to the south and the mean maximum temperature remains high throughout the year, hovering at about 32°C, particularly in March and June (Yusuf and Nwachukwu, 2015).

The people of Niger State are predominantly Muslims and Christians with very few Traditional Religionists and Atheists. Niger State possesses fertile land as a cherished asset and the potentials are yet to be fully exploited (Yusuf and Nwachukwu, 2015). The soil types in Niger State are two: Ku soil and Ya soil. The Ku soil has little erosion hazards, while the Ya soil has better water holding capacity. The majority (85%) of the populace in the State are farmers, while others constituting (15%) are involved in vocations such as white-collar jobs, business, craft and arts (Niger State Bureau of Statistics, 2012). Agriculture is one of the major occupations of the populace with a large proportion of the people being smallholders who are predominantly involved in farming and trading. They grow arable crops which include yam, rice, maize, sorghum, cowpea and soybean among others.

Some natural and mineral resources found in the State include: Talc, Gold, Ball clays, Silica, Sand, Marble, Copper, Iron, Felsper, Lead, Kaolin, Casserole, Columbite, Mica, Quartzite, and Limestone. The three Hydro Electric Power Stations in the Country (Kainji, Jebba and Shiroro) are all situated in Niger State. The Tourist attractions of the State are Zuma Rock, Gurara falls, Baro Empire Hill, Lord Lugard Colonial ruins at Zungeru, Nagwamatse Well and Kainji Lake National Park.

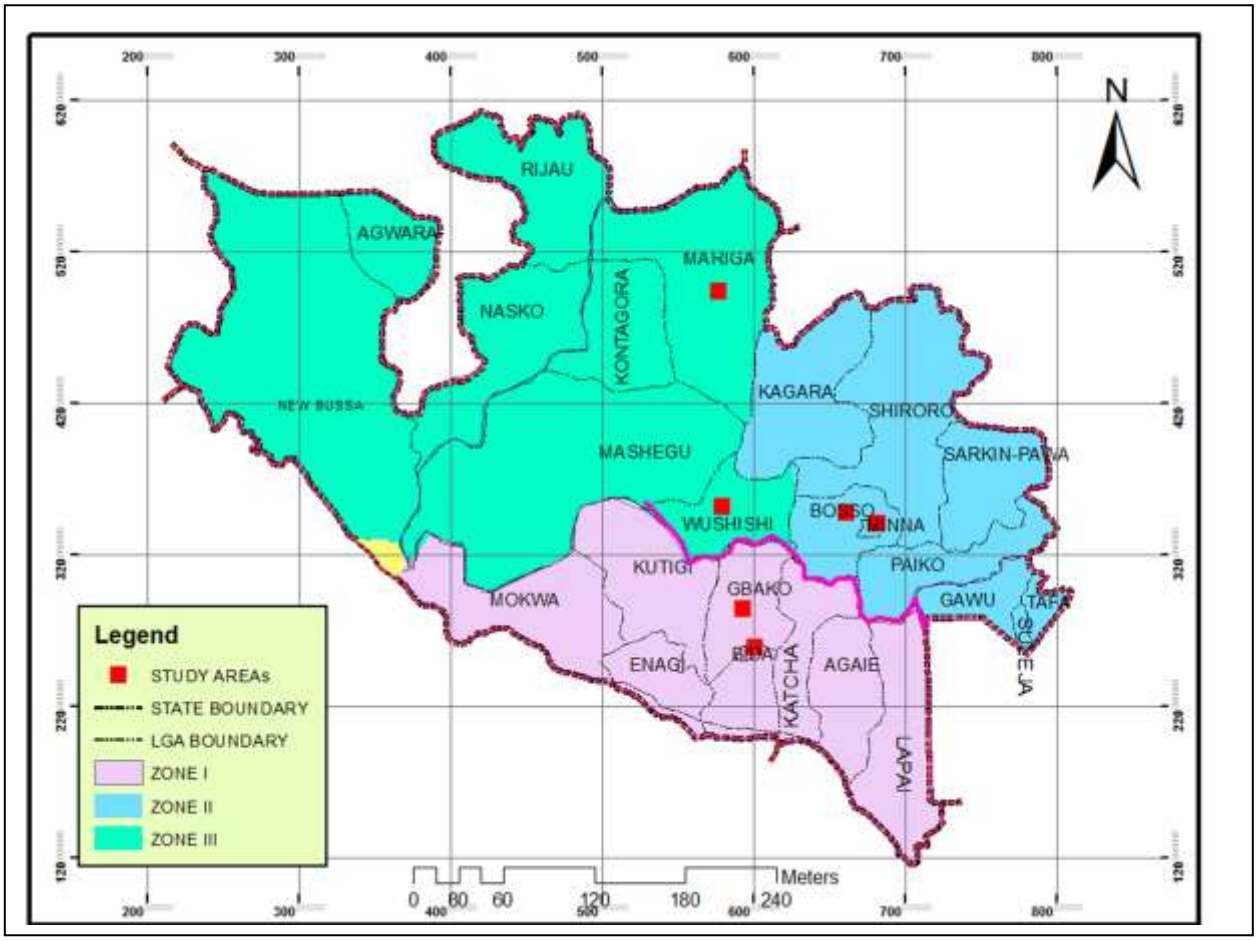

Figure 3.1: Map of Niger State showing the LGAs selected

3.2 Sampling Procedures and Sample Size

The target population for this study comprises of fish value chain actors in Niger States which make up the sample frame. The actors are basically the producers, processors, and marketers. A multi-stage sampling procedure was used to select respondents for this study. In the first stage Agricultural Zone I was randomly selected based on the preponderance of fish value chain actors according to report from Green House, Minna, Niger State. The second stage involved the random selection of 6 Local Government Areas (LGAs). The third stage entailed the random selection of Wards from each of the LGAs, while the last

stage of sampling involved the selection of fish farmers, processors, and marketers selected proportionate to size of the population from the wards based on sample frame of 79 fish farmers, 75 processors and 62 marketers respectively. The list of registered fish farmers, processors and marketers was obtained from the Green House, Minna, Niger State. The total respondents sampled was derived using the Yamane formular (1967) in Eboh, 2012 given by the formula,

$$n = \frac{N}{1 + N(e)2}$$

Where;

n= sample size,

N= the finite population,

e = limit of tolerable error at 0.07 probability level and

1= unity.

Table 3.1: Sample frame and size of registered Fish farmers under FMARD Niger State, Nigeria

Agricultural Zones	**Local Government**	**Producers**		**Processors**		**Marketers**	
		Sampling Frame	**Sampling Size**	**Sampling Frame**	**Sampling Size**	**Sampling frame**	**Sampling size**
Zone I	Gbako	22	13	22	14	20	14
	Bida	22	13	21	13	13	9
Zone II	Bosso	24	15	18	11	14	10
	Chanchaga	23	14	18	11	16	11
Zone III	Mariga	19	12	25	16	14	10
	Wushishi	19	12	16	10	12	8
	Total	**129**	**79**	**120**	**75**	**89**	**62**

Source: Federal Ministry of Agriculture and Rural Development (FMARD), (2019)

3.3 Method of Data Collection

Primary data was used for this study. The primary data was collected using structured questionnaire with interview schedule the researcher with the assistance of well-trained enumerators in the localities and the period of data collection lasted for three months between October to December 2019.

3.4 Test of Instrument for Data Collection

3.4.1 Validity of instrument for data collection

Both face and content validity was applied to the instruments; which means that the instruments for data collection were given to the supervisors and other experts in the field to ascertain its validity. They make their inputs before the instruments were taken to the field.

3.4.2 Reliability of instrument for data collection

In course of this study, a period of two weeks was allowed before the instrument for data collection was retested. Sampled responses from the test-retest were analyzed using Pearson Product Moment Correlation (PPMC) and correlation coefficient of 0.83 was obtained which implied that the instrument for data collection was reliable.

3.5 Measurement of Variables

Dependent variable (Y) is the profit realized by SMEs involved in Culture fish value chain.

Independent variables are as follows

i. Age: Respondents actual age was recorded in years**.**

ii. Sex: Respondents indicate whether they were male or female (male=1, female=0)

iii. Educational level: Respondents indicate their level of education such as: primary, secondary, tertiary, adult and non-formal education.

iv. Size of pond: Respondents indicate the pond size in square meter, or plastic in meters

ix. Household size: This is the total number of people living in a respondent's house including children and dependents.

x. Marital status: Respondents indicate their marital status, whether they were married, single divorced, widow(er) and separated**.**

xi. Farming experience: respondents indicate their years of experience in farming.

xii. Labour: respondents indicate whether family, hired labour or both

xiii. Access to credit: respondents indicate whether they had access to loan from Government or from family or friends.

xiv. Extension contact: respondents indicate if they had been visited by any extension agent or not. If yes number of times visited

xv. Quantity of fish produced: respondents indicate the quantity of fish produced in kilogrames (Kg)

xvi. Quantity of fish processed: respondents indicate the quantity of fish processed in kilogrames (Kg)

xvii. Cost of storage: respondents indicate in naira the cost of storage

xviii. Cost of energy: respondents indicate by stating the type of energy (fire wood) and how much each cost in naira (₦).

xix. Cost of transportation: respondents indicate the cost of transportation in naira

xx. Cost of shop rentage: respondents indicate in naira (₦) the cost of renting a shop

xxi. Cost of packaging: respondents indicate in kg the cost of packaging.

xxii. Distance to market: respondents indicate the distance in k/ms.

xxiii. Constraints: this was measured using 3 points Likert type rating scale of very severe = 3, severe = 2, and not severe = 1.

3.6 Method of Data Analysis

Data collected for this study was analyzed using descriptive statistics, flow chart, farm budgeting technique and multiple regression analysis. Meanwhile, the t – values from the multiple regression analysis was used to test for hypothesis I and t – test statistics was used to test for hypothesis II

Objectives I and v were achieved using descriptive statistics such as percentage, frequency distribution and mean. The severity of the constraints was operationalize using 3 – point Likert type rating scale of very severe = 3, severe = 2, and not severe = 1. The mean score was obtained by adding the scores (3 + 2 + 1 = 6) together and divide by the total number of points which is three (3). This gave the mean score value of 2.0. The decision rule therefore was that computed value of greater than 2.0 implies severe constraint, while value of less than 2.0 implies not severe constraint.

Objective ii was achieved using descriptive statistics and flow chart showing the inter-relationship among the SMEs of culture fish value chain

Objective iii was achieved using farm budgeting technique which included gross margin analysis with the total variable cost and fixed cost being taken into considerations.

Objective iv was achieved using multiple regressions showing relationships between dependent and independent variables as it involves profit margin of the SMEs.

3.7 Model specification

3.7.1 Farm budgeting technique

Objective iii was achieved using farm budgeting technique. The farm budgeting technique is specified in equations 1 and 2.

$$GM = TR - TVC \quad 3.1$$

$$NI = GM - TFC \quad 3.2$$

Where;

GM= Gross Margin (₦);

NI = Net Income (₦);

TR = Total Revenue (₦);

TVC= Total Variable Cost incurred (₦);

TFC = Total Fixed Cost incurred (₦)

This model was used for each of the actors, to determine the cost and returns along the various actors in the value chain at each stage.

3.7.2 Multiple Regression Analysis

Multiple regression analysis was used in determining the factors influencing the profit margin of SMEs in the study area. It was used in achieving objective iv. The model is expressed in implicit form as in equation (3):

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_n, \mu) \quad 3.3$$

However, four functional forms of the multiple regression analysis namely Linear, Cobb-Douglas (Double-log), Semi-Log and Exponential were tried, and the model of best fit was

chosen based on the magnitude of the coefficient of determination (R^2)as well as signs and significance of the estimated regression coefficients. The four functional forms were expressed for the major value chain actors as used in the study. Thus, the explicit form of the models is expressed as in equation 4 to 7:

Linear

$$Y = a + b_1X_1, +b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_nX_n + \mu \quad 3.4$$

Cobb-Douglas

$$\text{Log } Y = a + b_1\text{Log}X_1 + b_2\text{Log}X_2 + b_3\text{Log}X_3 + b_4\text{Log}X_4 + b_5\text{Log}X_5 + b_6\text{Log}X_6 + b_7\text{Log}X_7 + b_n\text{Log}X_n + \mu \quad 3.5$$

Semi – Log

$$Y = a + b_1\text{Log}X_1 + b_2\text{Log}X_2 + b_3\text{Log}X_3 + b_4\text{Log}X_4 + b_5\text{Log}X_5 + b_6\text{Log}X_6 + b_7\text{Log}X_7 + b_n\text{Log}X_n + \mu \quad 3.6$$

Exponential

$$\text{Log}Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_nX_n + \mu \quad 3.7$$

Where;

$X_1 – X_n$ = independent variables

$b_1 – b_n$ = regression coefficients to be estimated

a = constant term and

μ = error term

Model specification for producers:

Y = Profit from fish farming (~~₦~~)

X_1 = Age (in years)

X_2 = Educational level (years)

X_3 = Experience (years)

X_4 = Labour (man-days)

X_5 = Sex (1= Male, 0 = Female)

X_6 = Access to credit (1= had access, 0 = No access)

X_7 = Membership of co-operative (number=1, otherwise=0)

X_8 = Extension contact (per annual)

X_9 = Quantity of fingerlings (number)

X_{10} = Cost of feeds (₦)

X_{11} = Household size (numbers)

X_{12} = Size of fishpond (M^2)

X_{13} = Cost of fingerlings (₦)

X_{14} =Sorting (kg)

X_{15} = Cost of feed (₦)

X_{16} = Cost of medications (₦)

X_{17} = Cost of stocking (₦)

Model specification for Processors:

Y = Profit from fish processing (₦)

X_1 = Age (in years)

X_2 = Educational level (years)

X_3 = Experience (years)

X_4 = Labour (man-days)

X_5 = Sex (1= Male, 0 = Female)

X_6 = Access to credit (1= had access, 0 = No access)

X_7 = Household size (Number)

X_8 = Processing fish produce (1 = fry, 0 = others)

X_9 = Access to credit (Naira)

X_{10} = Quantity of fish processed (kg)

X_{11} = Cost of storage (₦)

X_{12} = Capital depreciation (₦)

X_{13} = Cost of fire wood (₦)

X_{14} = Processing equipment (number)

Model specification for Marketers:

Y = profit from marketing (₦)

X_1 = Age (in years)

X_2 = Educational level (years)

X_3 = Experience (years)

X_4 = Labour (mandays)

X_5 = Sex (1= Male, 0 = Female)

X_6 = Experience of marketing (years)

X_7 = Quantity marketed (kg)

X_7 = Distance to market (km)

X_8 = Occupation (marketing as primary =1, marketing as secondary = 0)

X_9 = Access to credit (1= had access, 0 = No access)

X_{10} = Commission agent fee (₦)

X_{11} = Marketing dues (₦)

X_{12} = Storage cost (₦)

X_{13} = Cost of transportation (₦)

X_{14} = Cost of packaging (kg)

X_{15} = Capital depreciation (₦)

X_{16} = Cost of shop rentage (₦)

3.7.3 Test for Hypotheses

3.7.3.1Test for Hypothesis (I)

Hypothesis (I) which states that there is no significant relationship between the selected socio-economic (age, gender, household, education and experience) characteristics of the major SMEs in culture fish value chain and profit realized was tested using t- values of the variable coefficients realized from the multiple regression analysis performed to achieve objective (iv).

The implicit form of the regression model was stated as follows;

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_n, \mu) \quad 3.8$$

Y = Profit from fish farming (₦)

X_1 = Age (in years)

X_2 = Educational level (years)

X_3 = Experience (years)

X_4 = Sex (1= Male, 0 = Female)

X_5 = Household size (Number)

3.7.3.2Test for Hypothesis (II)

t-test was used to test for the hypothesis (II) which stated that there is no significant difference in the profit realized among the various SMEs in culture fish value chain in the study area. The z – test model is presented as in equation (9):

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

3.9

$\bar{X}_1 =$ Mean profit of the culture fish value chain actors

$\bar{X}_2 =$ Mean profit of the culture fish value chain actors

$\sigma_1^2 =$ Profit variance of the culture fish value chain actors

$\sigma_2^2 =$ Profit variance of the culture fish value chain actors

$n_1 =$ Number of the culture fish value chain actors

$n_2 =$ Number of the culture fish value chain actors

Table 3.2: *Apriori* expectation of the variables used in the model

Variables	Measurement	Expected signs
Age	Years	+
Pond size	Measure in sqm	+
Market price	(Naira/Kg)	+
Sex	Dummy (0= female, 1= Male)	+/-
Land size	(number of hectare)	+
Farming experience	Years	+
Access to credit	1 for access; 0 otherwise	+
Distance to market	Distance of farmers' residence to farm (km)	-
Household size	Number of people living under the same roof	+/-
Educational status	Dummy (1= literate, 0= Illiterate)	+
Quantity produced	(Kg/Ha)	+
Quantity processed	(Kg)	+
Quantity sold	(Kg)	+
Access to extension service	Dummy (1= yes, 0= No)	+
Members of co-operative	1 for member; 0 for otherwise	+
Ownership of market transport facilities	Dummy (1= Yes, 0= No)	+
Cost of production	(Naira)	-
Price of fish Fingerling/ table size	(Naira)	+

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of Cultured Fish Farmers

The core actors in the cultured fish value chain were fish farmers, processors and marketers which are discussed in this chapter based on results from the analysis according to their involvement along the value chain. The socio-economic characteristics of each actor in the value chain discussed include gender, marital status, household, education and experience.

4.1.1 Gender of the respondents

The results in Table 4.1 showed that majority 93.8 % of the producers, 68.0% of the processors and 71.2% of the marketers were male while 6.2% of the producers, 32.0% of the processors and 28.8% of the marketers were female. This implies that majority of the culture fish farmers were male. This result agrees with those of Ayanwuyi *et al.* (2010) who in separate studies in Oyo State, found that male were more involved in fish farming production than their female counterparts.

4.1.2 Age of the respondents

The result from Table 4.1 shows that 66.6 % of the producers, 48.0 % of the processors, and 51.5 % of the marketers were between 31-50 years. This implies that most of the culture fish value chain actors were in their active age. The mean age for producers was 42 years, while processors were 40 years and marketers were 42 years. The mean age for producers, processors and marketers implies that culture fish value chain actors were still in there productive age. The ability to meet up with demand and procurement of fish

farming to meet consumers demand is energy demanding and therefore requires energetic and young farmers. This is in line with the findings of Sikiru *et al.* (2009), Ayanwuyi *et al.* (2010) and Bolorunduro (2008) who in separate studies observed that farmers between age group of 30-50 years are the most active fish farmers. This implies that these value actors are mature and of age, productive and innovative and may adopt new techniques for increased level of production. This is expected to result in a positive influence in fish farming production level.

4.1.3 Marital Status of the respondents

Table 4.1 revealed that majority 86.4% of the producers, 81.3% of the processors and 89.4% of the marketers were married while 13.6% of the producers, 16.0% of the processors and 10.0% of the marketers were single, fish farming is a source of employment to the teaming population of the unemployed youths since there are limited white collar jobs (Ben-Chendo *et al.,* 2013). Only a few 2.7% of the processors were widows. This finding is in consonance with Akintonde (2009) who found that individuals who are married have more complex homes and therefore need to explore more opportunities potential of this business, because majority of the married people depend on it for their economic stability and thus improving the farming industry and also improve income. More so marital status is a factor that suggests a high level of responsibility and great capability for sound decision making among farmers.

4.1.4 Household head of the respondents

The result in Table 4.1 showed that majority 93.8% of the producers, 89.3% of the processors and 89.4% of the marketers were male while 2.5% of the producers, 10.7% of the processors, and 10.6% of the marketers were female. This implies that majority of the

household head were male which is a reflection of Nigeria society, men are the head of the household and takes decision in regarding the affairs of the family members. This is in line with Akintonde (2009) who found that farming is mostly practice by the men.

4.1.5 Household size of the respondents

From the result in Table 4.1 it was observed that most 48.2% of the producers, 61.3% of the processors, 62.2% of the marketers had a household size of about 6-15. And mean household size of producers 7, processor 7, and marketers 8. This implies that when household size is large labour cost will reduce. This result agrees with Adebayo *et al.* (2013) and Ladu *et al.* (2013) who in their separate studies found that family size can serve as source of free and cheap labour as children of different sexes engage in helping their parents or guardians to market different forms of fish. The involvement of these children in marketing of processed fish helps in timely marketing thereby reducing post-harvest loss. The average family size implies that respondents spend moderate amount on feeding, clothing and hospital bills.

4.1.6 Educational status of the respondents

Table 4.1 shows that education, ranged from non-formal to tertiary, the distributions differed from one actor to another, but in general, majority 44.4% of the producers, 4.0% of the processors and 6.1% of the marketers had tertiary education, while 25.9% of the producers, 32.0% of the processors and 43.9% of the marketers had Quranic education. Furthermore, 19.8% of the producers, 21.3% of the processors, and 18.2% of the marketers had secondary education. Also, 25% of the processors and 19.7% of the marketers do not have formal education and lastly 9.9% of the producers, 17.3% processors and 12.1% of the marketers had primary education. The mean years spent in school for producers was 12

years while, marketers were 10 years and processors were 9 years. These results imply that the producers, processors and marketers in the culture fish value chain in Niger State were enlightened and appreciate education as a necessity to improve on the quality of fish as well as increase their income from fish production. Educational enlightenment also implies that the culture fish farmers will be more receptive to information from extension agents and other means on the adoption of best practice for improved species. This finding is line with William and Robinson (2012) who in his studies found that farmers with more years of schooling tend to be technically efficient than the farmers with no education.

4.1.7 Experience of the respondents

The result in Table 4.1 shows that majority 40.8% of the producers, 56% of the processors and 45.4% of the marketers of culture fish value chain actors had experience ranges between 6-15 years with the mean experience years of processors 11.4years, marketers 10years and producers 8years. More experienced farmers are knowledgeable on the best production systems to adopt and also maximize output and reduce cost. In addition, experienced farmers' are better able to adopt technologies extended to them to enhance their productivity and efficiency. This result is in consonance with the findings of William and Robinson (2012) and Akinrotimi, O.A. who in their study of brackish water aquaculture status in Rivers State found that the ability to manage fish pond efficiently depends on the years of experience.

Table 4.1: Socio-economic characteristics of the respondents

Variables	Producers Frequency (%)	Processors Frequency (%)	Marketers Frequency (%)
Gender			
Female	5 (6.2)	24 (32.0)	19 (28.8)
Male	76 (93.8)	51 (68.0)	47 (71.2)
Marital status			
Single	11 (13.6)	12 (16.0)	7 (10.6)
Married	70 (86.4)	61 (81.3)	59 (89.4)
Widowed	0 (0)	2 (2.7)	0 (0)
Age (Years)			
<31	13 (16.0)	24 (32.0)	15 (22.7)
31-40	27 (33.3)	22 (29.3)	19 (28.8)
41-50	27 (33.3)	14 (18.7)	15 (22.7)
>50	14 (17.3)	15 (20.0)	15 (25.8)
Mean	**42**	**40**	**42**
Household head			
Female	2 (2.5)	8 (10.7)	7 (10.6)
Male	76 (93.8)	67 (89.3)	59 (89.4)
Household size			
<6	23 (28.4)	27 (36.0)	20 (30.3)
6-10	39 (28.4)	33 (44.0)	31 (47.0)
11-15	16 (19.8)	13 (17.3)	10 (15.2)
>15	3 (3.7)	2 (2.7)	5 (7.6)
Mean	**7**	**7**	**8**
Educational status			
Non-Formal	0 (0)	19 (25.3)	13 (19.7)
Quranic	21 (25.9)	24 (32.0)	29 (43.9)
Primary	8 (9.9)	13 (17.3)	8 (12.1)
Secondary	16 (19.8)	16 (21.3)	12 (18.2)
Tertiary	36 (44.4)	3 (4.0)	4 (6.1)
Mean	**12**	**9**	**10**
Experience			
< 6	40 (49.4)	17 (22.7)	22 (33.3)
6 – 10	19 (23.5)	30 (40.0)	22 (33.3)
11 – 15	14 (17.3)	12 (16.0)	8 (12.1)
> 15	8 (9.9)	16 (21.3)	14 (21.2)
Mean	**8**	**11.4**	**10**

Source: Field Survey, 2019

4.1.8 Institutional Variables Accessed By the Respondents

(i) Secondary occupation

Table 4.2 revealed that few 32.1% of the producers, most 64.0% of the processors and few 45.5% of the marketers had no secondary occupation, while 12.3% of the producers, 12.0% of the processors and 24.2% of the marketers were involve in marketing of other products. Furthermore, 35.8% of the producers, 22.7% of the processors and 18.2% of the marketers were involved in other farming activities. Also, 13.6% of the producers and 10.6% of the marketers were civil servant, while 4.9% of the producers and 1.5% of the marketers were involved in non-agribusiness. Lastly, 1.3% of the processors were wage labourers and 1.2% of the produces were into agri-business. This finding reveals that the fish farming business can also be taken up as a part-time business depending on the capability of the farmer and the scale of production he desires to operate.

(ii) Access to Credit

Among the factors of production is capital which was mostly needed by the actors in culture fish value chain. The result in Table 4.2 showed that majority (96.3%) of the producers had access to credit, while few (10.6%) of the marketers also had access to credit. However, all the processors have no access to credit in the study area.

(iii) Sources of Credit

Table 4.2 showed that majority (92.6%) of the producers who had access to credit sourced their credit through personal savings, while few (3.7%) of the producers sourced their through financial institutions. Also, 9.1% of the marketers sourced their credit though personal savings and 1.5% through financial institution. This implies that personal savings is the main source of generating income for investment in cultured fish value chain in the

study area. This finding is in line with Jacinto and Pomeroy (2011) who reported that personal savings can also be a good source of credit for small and medium scale fish farmers.

(iv) Cooperative Membership

Cooperatives are associations that help farmers to procure inputs, access credit facilities, market information and extension services. Table 4.2 showed that majority (70.4%) of the producers, 84.0% of the processors and 63.6% of the marketers were not members of any cooperative, while 29.6% of the producers, 16.0% of the processors and 36.4% of the marketers were members of cooperative society. This implies that majority of the actors in culture fish value chain were not members of cooperative society. This is in line with the study of Nwiro (2012) who reported that most of the respondents in their study area were not member of cooperative society.

(v) Sources of Labour Use

Results from Table 4.2 shows that more than half (56.8%) of the producers, 49.3% of the processors and 66.7% of the marketers makes use of hired labour in culture fish value chain, while few (12.3%) of the producers, 40.0% of the processors and 24.2% of the marketers uses family labour, and 30.9% of the producers, 10.7% of the processors and 9.1% of the marketers used both labour (i.e family and hired labour) in culture fish value chain.

(vi) Sources of Land

Table 4.2 showed that majority (63.0%) of the producers purchased their land for fish production while 23.5% used inherited land and 13.6% rented the land. Purchased land by

the fish farmers is very important since fish pond is a permanent structure, this will significantly reduce cost of production.

Table 4.2: Institutional variables accessed by the respondents

Variables	Producers Frequency (%)	Processors Frequency (%)	Marketers Frequency (%)
Secondary occupation			
None	26 (32.1)	48 (64.0)	30 (45.5)
Marketing	10 (12.3)	9 (12.0)	16 (24.2)
Other farming activities	29 (35.8)	17(22.7)	12 (18.2)
Wage labourer	0 (0)	1 (1.3)	0 (0)
Civil service	11 (13.6)	0 (0)	7 (10.6)
Non-agric. Business	4 (4.9)	0 (0)	1 (1.5)
Agric. Business	1 (1.2)	0 (0)	0 (0)
Access to credit			
Yes	78 (96.3)	0 (0)	7(10.6)
No	3 (3.7)	75 (100.0)	59 (89.4)
Sources of credit			
None	3 (3.7)	75 (100.0)	59 (89.4)
Personal Savings	75 (92.6)	0 (0)	6 (9.1)
Financial Institutions	3 (3.7)	0 (0)	1 (1.5)
Cooperative membership			
Yes	24 (29.6)	12 (16.0)	24 (36.4)
No	57 (70.4)	63 (84.0)	42 (63.6)
Sources of labour usage			
Family labour	10 (12.3)	37 (40.0)	44 (24.2)
Hired labour	46 (56.8)	30 (49.3)	16 (66.7)
Both	25 (30.9)	8 (10.7)	6 (9.1)
Sources of land			
Inherited	19 (23.5)	-	-
Rented	11 (13.6)	-	-
Purchased	51 (63.0)	-	-

Source: Field Survey, 2019

4.2 Small and Medium Enterprises in Fish Value Chain

There are lots of Small and Medium Scales involve in fish value chain in the study. SMEs are involved in Input supplies (such as feeds, fingerlings (Hatchery), equipment, etc), fish production, processing and marketing before it finally gets to the consumers. However, producers, processors and marketers are the key SMEs involved in fish value chain in the

study area. A general illustration of the SMEs involvement in fish value chain is presented in Figure 4.1. As shown in the Figure, it starts with input dealers responsible for technology support for resource management, a vital element of ensuring fish production. The production phase includes aquaculture which is farming of specific species of fish mostly catfish (*Claras gariepinus and heterobranchus spp*) and in some cases tilapia. At harvest, the fish produce are weighed and sorted before being collected from producers point either by auction or directly from aquaculture farm through contract or direct sales.

SMEs involvement in fish is one of the key stage for adding value to fisheries products which might include simply gutting, freezing or filleting, or more elaborate forms of processing, ranging from smoking and canning, right through to ready-made meals. Products from discards and fish waste may also undergo a process of adding value at this stage, such as producing fish meal from discards or leather from fish skin. This is in agreement with the finding of Getachew et al. (2014) who posited that Value-added fish products usually undergo some level of processing that will inactivate and /or kill bacteria and pathogens. This inactivation or reduction of bacteria in a food generally results in shelf-life extension and can also provide new market opportunities. SMEs are involved in packaging of processed fish products in small, medium or large quantities which are distributed to their final destinations. Fish products are sold, either directly to the final consumer, or through retail outlets and large-scale buyers, who will in turn sell them.

The ability of an SME to store its fishery products at different stages of the supply chain (examples live, smoked or frozen) is also extremely important if it is to control supply (volumes and timing) and thus maximize value from its products. The needs of SMEs in fishery sector may vary by the function they serve in the value chain in which they work.

For example, SMEs in agricultural inputs and technology may need laboratory testing facilities to test and validate their products. An SME that focuses on production may need financing for purchase of inputs at the beginning of a harvest cycle, whereas an SME in processing may need this capital at the end of harvest, to purchase produce for processing. They may also need access to high-value markets.

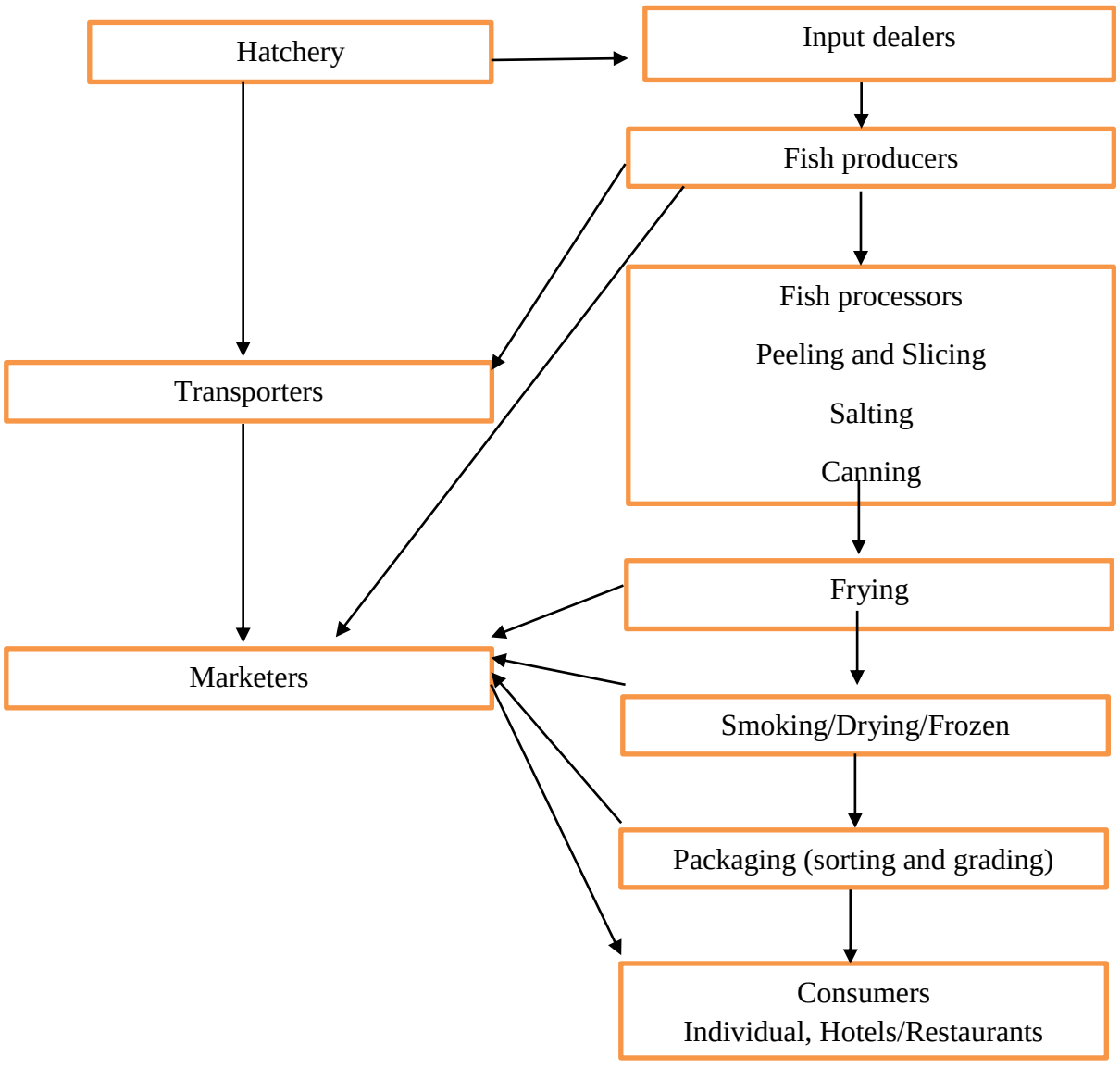

Figure 4.1: Info-graphic of SMEs involvement in Fish Value Chain in the study area
Source: Adopted and Modified from Michael and Martin (2009)

4.3.1 Costs and Returns Analysis of Fish Producers

The cost and returns analysis which indicate the production of fish in the study area is presented in Table 4.3. The cost and return analysis of fish production revealed that cost of purchasing fingerlings was ₦143,500.00, representing 20.55%, in the study area. The total variable costs during the production process include cost of labour, cost of fuel, Cost of water, cost of medication, cost of electricity, cost of transportation, cost of storage and levies/fees was ₦645,186.11, representing 92.41% of the total cost of production, while the total fixed cost which is depreciation on the fixed assets (equipment, machineries, land, building and ponds etc) was ₦698,203.09, representing 100% of the total cost of fish production in the study area. This implies that fixed cost in fish production is negligible as compared to the variable cost which represents 100% of the cost of fish production. However, the total revenue from fish production was found to be ₦821,300.00, while the gross margin and net income of the fish producers was ₦176,113.89 for gross margin, and ₦123,096.91 for net income. Therefore, the profitability ratio of the fish production was found to be ₦18. This implies that for every ₦1 invested in fish production by the producers, there was return of ₦18, which implies that investment in culture fish value chain and production of quality/fast growing species of fish is highly profitable. Nwiro (2012) and Emokaro and Ekunme (2010), Kareem *et al,* (2012) who in separate studies affirms to the fact that culture fish production business is a very profitable venture.

Table 4.3: Costs and returns analysis of fish producer

Items	Amount (₦)/1000 stocks	% of Total Cost
Variable costs		
Cost of fingerlings	143,500.00	20.55
Cost of labour	226,762.50	32.48
Cost of feeding	146,400.00	20.97
Cost of fuel	12,954.55	1.86
Cost of water	18,700.00	2.68
Cost of medication	7,443.75	1.07
Cost of electricity	31,843.42	4.56
Cost of transportation	21,716.67	3.11
Cost of storage	21,558.82	3.09
Cost of levies/fees	14,306.40	2.05
Total Variable Cost (TVC)	645,186.11	92.41
Fixed cost		
Depreciation on equipment and machineries	8,606.62	1.23
Depreciation on land, building and ponds	44,410.36	6.36
Total Fixed Cost (TFC)	53,016.98	7.59
Total cost	698,203.09	100.00
Revenue	821,300.00	
Gross Margin (GM) = R – TVC	176,113.89	
Net Farm Income (NFI) = GM – TFC	123,096.91	
Profitability Ratio (PR) = NFI/TC	0.18	

Source: Field Survey, 2019

4.3.2 Costs and returns analysis of fish processors

The cost and returns analysis which indicate the processing of fish in the study area is presented in Table 4.4. The cost and return analysis of fish processing revealed that cost of purchasing fish was ₦10,248.21, representing 53.99%, in the study area. The total variable costs during the processing process include cost of labour, cost of firewood, cost of oil, cost of transportation, cost of storage and cost of salt was ₦17,542.16, representing 92.43% of the total cost of processing, while the total fixed cost which is depreciation on

the fixed assets (Wooden/electric stove, bowl, etc) was ₦1,436.75, representing 100% of the total cost of fish purchase in the study area. This implies that fixed cost in fish production is negligible as compared to the variable cost which represents 100% of the cost of fish purchase. However, the total revenue from fish processing was found to be ₦51,239.00, while the gross margin and net income of the fish processors was ₦51,239.00 for gross margin, and ₦32,260.09 for net income. Therefore, the profitability ratio of the fish processing was found to be ₦1.70kobo. This implies that for every ₦1 invested in fish processing by the processors, there was return of ₦1.70 kobo, which implies that investment in fish processing is highly profitable. This is in agreement with Adewuyi *et al.* (2010) and Emokaro and Ekunme (2010) who in their separate work on profitability and viability of fish farming in Kogi State found that the fish processing venture is economically rewarding and profitable.

Table 4.4: Costs and returns analysis of fish processors

Items	**Amount (₦)/100kg**	**% of Total Cost**
Variable costs		
Cost of purchase of fresh fish	10,248.21	53.99
Cost of labour	1,100.00	5.80
Cost of firewood	1,079.71	5.69
Cost of oil	2,879.17	15.17
Cost of transportation	655.07	3.45
Cost of storage	1,400.00	7.38
Cost of salt	180.00	0.95
Total Variable Cost (TVC)	17,542.16	92.43
Fixed cost		
Depreciation of fixed assets (Wooden/electric stove, bowl, knife etc)	1,436.75	7.57
Total Fixed Cost (TFC)	1,436.75	7.57
Total cost	18,978.91	100.00
Revenue	51,239.00	
Gross Margin (GM) = R – TVC	51,239.00	
Net Farm Income (NFI) = GM – TFC	32,260.09	
Profitability Ratio (PR) = NFI/TC	1.70	

Source: Field Survey, 2019

4.3.3 Costs and returns analysis of fish marketers

The cost and returns analysis which indicate fish marketers in the study area is presented in Table 4.5. The cost and return analysis of fish marketers revealed that cost of purchasing fish was ₦26,867.92, representing 78.63%, in the study area. The total variable costs during the marketing process include cost of labour, cost of transportation, and cost of levies/fees was ₦32958.28, representing 96.45% of the total cost of marketing, while the total fixed cost which is depreciation on the fixed assets (Bowl, baskets and benches) was ₦34,171.68, representing 100% of the total cost of fish marketing in the study area. This implies that fixed cost in fish marketing is negligible as compared to the variable cost which represents 100% of the cost of fish purchase. However, the total revenue from fish marketing was found to be ₦59,523.08, while the gross margin and net income of the fish marketers was ₦26,564.80 for gross margin, and ₦25,351.40 for net income. Therefore, the profitability ratio of the fish marketing was found to be 74kobo. This implies that for every ₦1 invested in fish marketing by the marketers, there was return of 74kobo. Which implies that going into fish marketing is highly profitable. This also depicts that the various stages generate remunerative income to sustain the respective operation of their businesses with an increase in the rate of business turn over. Thus, the marketing of fish business is profitable and is worth venturing into. This is in disagreement with the findings of (Ifejika *et al*., 2007a). which stressed that fish marketing is not profitable and there is decrease in the rate of turn over because of high cost of production and processing equipment.

Table 4.5: Costs and returns analysis of fish marketers

Items	Amount (₦)/100kg	% of Total Cost
Variable costs		
Cost of purchase	26,867.92	78.63
Cost of labour	2,047.22	5.99
Cost of levies/fees	1,141.58	3.34
Cost of transportation	2,901.56	8.49
Total Variable Cost (TVC)	32958.28	96.45
Fixed cost		
Depreciation of fixed assets (Bowls, baskets, benches, etc)	1,213.40	3.55
Total Fixed Cost (TFC)	1,213.40	3.55
Total cost	34,171.68	100.00
Revenue	59,523.08	
Gross Margin (GM) = R – TVC	26,564.80	
Net Farm Income (NFI) = GM – TFC	25,351.40	
Profitability Ratio (PR) = NFI/TC	0.74	

Source: Field Survey, 2019

4.4.1 Factors influencing profit of the producers

Table 4.6 showed the results of regression estimation of the factors that influence profit earned by producers in culture fish production in Niger State. Four functional forms of the multiple regression models (Linear, Semi-log, Double-log and Exponential forms) were tried and the results showed that the exponential form was the lead function because it had the highest R^2 value of 0.6761 and the highest F-value of 11.83. The F-statistic is significant at 1%level of probability indicating the overall significance of the model. The empirical result is consistent with the theoretical postulations of the model. The coefficient of multiple determination of 0.6761 indicates that about 68% of the variation in profit of producers in the study area was explained by the joint action of the explanatory variables in the model, while the unaccounted 32% could be due to some externalities beyond the control of the researcher. This clearly showed that the model is reliable and has predictive ability

Table 4.6: Regression estimates of factors influencing profit of the producers

Variables	Coefficient	Standard Error	t-value
Gender	0.2462	0.3698	0.67
Age	-0.0037	0.0169	-0.20
Household	0.0511	0.0456	1.12
Education	0.0459	0.0230	1.99**
Experience	-0.0081	0.0247	-0.33
Cooperative	0.0785	0.0382	2.05**
Extension	-0.0074	0.0362	-0.05
Fish stocks	1.59^{-4}	2.86^{-5}	5.57***
Credit	1.34^{-5}	4.35^{-6}	0.08***
Labour cost	2.19^{-5}	4.49^{-5}	0.49
Feed	1.04^{-4}	4.98^{-5}	2.09**
Transport	2.87^{-5}	6.18^{-5}	0.46
Constant	9.0182	0.7341	12.28***
R^2	**0.6761**		
R^2 Adjusted	**0.6189**		
F – statistics	**11.83*** **		

Source: Field Survey, 2019

Note: *** implies statistically significant at 1%, ** implies statistically significant at 5%, * implies statistically significant at 10%.

The coefficient of education (0.0459) was significant at 5% and had a positive relation to profit of the culture fish farmers. This agrees with a priori expectation. The positive sign implies that an increase in education of the cultured fish farmers will lead to higher profits. Education in cultured fish farming over the years would enable the farmers adopt best practices that would result to increased profit. This finding is in line with the work of (Stevenson and Pirog, 2013).who found that high education among cultured fish farmers was found to influence their profitability in fish farming as it enhance good understanding and better means on the adoption of best practice for improved species.

The coefficient of cooperative (0.0785) was statistically significant at 5% probability level and positive; implying that a unit increase in cooperative membership by the respondents

will increase the profit cultured fish farmers. This is because participation in cooperative help in the share of vital information that could help fish production for better revenue. This finding is in line with the work of Oluwemimo and Daramola (2013) who reported in their work effects of membership of cooperative organization and determinants on farmers' income in rural area of Anambra State, that cooperative membership was positive and significant at 5% probability level. Therefore, membership of cooperative adds value to members' farm produce (fish farming), enabling diversity of marketable products as well as enhanced income sources.

The coefficient of fish stocks (1.59^{-4}) was found to be positive and statistically significant at 1% probability level, implying that an increase in numbers of fish stocked by the respondents will increase their profit. A higher stocking density of fish in the pond will yield higher returns and higher profit. This finding is in line with the findings of Ejiola and Yinka (2012) in a related study in Osun state found that fish stocks was statistically a significant determinant for fish production.

The coefficient of credit (1.34^{-5}) was found to be positive and statistically significant at 1% probability level, implying that an increase in access to credit by the respondents will increase their profit. This is because accessibility to credit helps increase production in which higher profit could be realized. This finding is in line with Jacinto and Pomeroy (2011) who reported that inadequate access to credit can negatively affects production for small and medium scale fish farmers and reduces their production rate. The consequence appeared to be more devastating on the famers in terms of reducing their profitability.

The coefficient of feed (1.04^{-4}) was positive and statistically significant at 5% probability level; this implies that unit increases in feed intake will enhance fast growth thereby yielding more profit. This is because feed is the most important and critical input to achieving success in culture fish production. This is in line with the study of (Bruton, 2010).

4.4.2 Factors influencing profit of the processors

Four functional forms of the multiple regression model (Linear, Semi log, Double log and Exponential forms) were tried and the results in Table 4.7 showed that the exponential form was the lead function because it has the highest number of significant variables, R^2 value of 0.6066 and an F-value of 7.23 which was significant at 1% level of probability, indicating a regression of good fit. The coefficient of multiple determination of 0.6066 indicates that about 61% of the variation in factors influencing profit of the processors in the study area has been captured by the explanatory variables in the model.

The coefficient of transportation cost (-8.96^{-5}) was negative and statistically significant at 5% probability level, implying that a unit increase in the transportation cost during fish processing will lead to decrease in the profit fish processors. This is because cost of transportation usually has significant effect on processing and marketing.

The coefficient of energy cost (3.63^{-4}) was positive and statistically significant at 5% level. This implies that fish processors who use traditional mechanized equipment like firewood, charcoal are more efficient in their processing process.

The coefficient of education (0.0547) was significant at 5% and had a positive relation to profit of fish processors. This agrees with a priori expectation. The positive sign implies

that an increase in education of the fish processors will lead to higher profits. Education in fish processing over the years would enable the farmers adopt best practices and also the use of modern technology that would result to increased input. This finding is in line with the work of William and Robinson (2012) who found that farmers with more years of schooling tend to be technically efficient than the farmers with no education.

Table 4.7: Regression estimates of factors influencing profit of the processors

Variables	Coefficient	Standard Error	t-value
Gender	-0.1581	0.1522	-1.04
Age	-8.71^{-4}	0.0153	-0.06
Household	0.0584	0.0390	1.50
Education	0.0547	0.0225	2.44**
Experience	-0.0073	0.0208	-0.35
Cooperative	0.1249	0.0544	2.29**
Fish processed	9.64^{-5}	2.92^{-5}	3.30***
Credit	1.35^{-5}	5.73^{-6}	2.36**
Labour cost	6.07^{-5}	3.23^{-5}	1.88*
Energy cost	3.63^{-4}	1.75^{-4}	2.07**
Transportation cost	-8.96^{-5}	3.73^{-5}	-2.40**
Depreciation	-7.87^{-5}	1.14^{-4}	-0.69
Storage	-4.60^{-5}	8.42^{-5}	-0.55
Constant	7.9394	0.5926	13.40***
R^2	**0.6066**		
R^2 Adjusted	**0.5222**		
F – statistics	**7.23*** **		

Source: Field Survey, 2019

Note: *** implies statistically significant at 1%, ** implies statistically significant at 5%, * implies statistically significant at 10%.

The coefficient of cooperative (0.1249) was statistically significant at 5% probability level and positive; implying that a unit increase in the cooperative membership of the respondents will increase their involvement in fish processing processes. This implies that cooperative membership had enhanced orientation of the respondents toward involving in

fish processing. They also get added advantage in accessing funding from financial institutions, government and private institutions. It will be easy to have access to credit facilities, market information and extension access.

The coefficient of fish processed (9.64^{-5}) was statistically significant at 1% probability level and positive, implying that a unit increase in processed fish by the respondents will enhance increase in the output of processed fish. Increased in the output of processed fish would lead to increased portions supplied to the market even after own consumption has been met. This was in line with the studies of Bamiro and Aloro (2013) who posit that improving in output of processed fish could have a significant effect on processed fish and will influence the profit of fish processors.

The coefficient of labour cost (6.07^{-5}) was also statistically significant at 10% level and positive. This implies that higher use of labour will increase the profit of processors and reduce the cost of labour. Processing of fish is a tedious and laborious activity. Some fish processors engage hired labour to complement family labour used in the processing process. The positive sign of the labour cost coefficient is contrary to a priori expectation. However, the use of more labour for fish processing would reduce labour cost which invariably would bring higher profits to the fish processors.

4.4.3 Factors influencing profit of the marketers

Four functional forms of the multiple regression model (Linear, Semi log, Double log and Exponential forms) were tried and the result in Table 4.8 showed that the exponential form was the lead equation because it had the highest number of significant variables, a high R^2 value of 0.7871 and F-value of 13.47 which was significant at 1% level. The value of the

F-statistic signifies a regression of good fit. The coefficient of determination value of 0.7871 indicates that about 79% of the variation in profit of the fish marketers in the study area is explained by the explanatory variables in the model.

The coefficient of gender (-0.2435) was negative and statistically significant at 5% level of probability meaning that a unit increase in the gender of the respondents will decrease involvement in the fish marketing processes. The coefficient of transportation cost (-1.30^{-4}) was negative and statistically significant at 1% probability level, implying that a unit increase in the transportation cost during marketing will lead to decrease in the profit. This is because cost of transportation usually has significant effect marketing.

The coefficient of levies (-1.34^{-4}) was negative and statistically significant at 5% probability level, implying that a unit increase in levies during marketing will lead to decrease in the profit. The coefficient of shop cost (-1.31^{-4}) was negative and statistically significant at 5% probability level, implying that a unit increase in the cost of shop will lead to decrease in profit. This is in conformity with the *a priori* expectation, as the aim of every rationale marketer is to minimize cost in order to maximize profit, hence reducing the cost of shop will help raise the profit realized from marketing.

Table 4.8 Regression estimates of factors influencing profit of the marketers

Variables	Coefficient	Standard Error	t-value
Gender	-0.2435	0.1206	-2.02**
Age	-0.0071	0.0150	-0.47
Household	0.0662	0.0307	2.16**
Education	0.0429	0.0183	2.34**
Experience	-0.002	0.0184	-0.01
Cooperative	-0.0246	0.0304	-0.81
Fish marketed	1.06^{-4}	2.77^{-5}	3.81***
Credit	1.08^{-5}	4.57^{-6}	2.35**
Labour cost	-2.28^{-5}	3.04^{-5}	-0.75
Transportation cost	-1.30^{-4}	4.88^{-5}	-2.67***
Levies	-1.34^{-4}	5.90^{-5}	-2.28**
Cost of shop	-1.31^{-4}	5.78^{-5}	-2.26**
Cost of packaging	1.39^{-4}	6.79^{-4}	0.20
Depreciation	-9.24^{-5}	9.54^{-5}	-0.97
Constant	10.7753	0.7898	13.64***
R^2	**0.7871**		
R^2 Adjusted	**0.7287**		
F__ratio	**13.47*** **		

Source: Field Survey, 2019

Note: *** implies statistically significant at 1%, ** implies statistically significant at 5%, * implies statistically significant at 10%. Figures in parenthesis are the t – values.

The coefficient of education (0.0429) was positive and significant at 5% level of probability meaning that a unit increase in the educational level of the respondents will increase the profit of the marketers. Education tends to have positive influence on individuals increasing their ability to communicate with buyers and suppliers. Abraham (2013) observed that education give individuals the necessary knowledge that can be used to collect information, interpret the information received, and make productive and marketing decision.

The coefficient of household (0.0662) was positive and significant at 5% level of probability, implying that a unit increase in household of the respondents will increase the profit of the marketers. Higher number of members of the household contributes to family labour. The burden of hiring labour for all activities in marketing will reduce. Hence, extra family labour leads to a reduction in cost and increase in profit, as some labour activities can be shared among the family members. This result is in line with the findings of Nwalieji (2016) who found a relationship between household and output of fish marketers. The coefficient of fish marketed (0.0001) was statistically significant at 1% probability level and positive, implying that a unit increase in fish marketed by the respondents will leads to high profit realized.

The coefficient of credit (1.08^{-5}) was found to be positive and statistically significant at 5% probability level, implying that an increase in access to credit by the respondents will increase their profit. This is because accessibility to credit helps increase output in which higher profit could be realized. This finding is in line with Jacinto and Pomeroy (2011) who reported that inadequate access to credit can negatively affects production for small and medium scale fish farmers and reduces their marketing income. The consequence appeared to be more devastating on the famers in terms of reducing their profitability.

4.5.1 Constraints faced by producers

Table 4.9 shows that major constraints faced by producers in culture fish value chain include lack of ready market ($\bar{X} = 2.25$)which ranked first among the severe constraints, according to the respondents was due to competition in the market and this leads to huge lost because it will increase the cost of feeding. Followed by poor extension service ($\bar{X} = 2.23$), which is the second severe constraints, respondents lamented poor extension

services as there are very few or no extension agents to bring home innovative practices/skills so as to increase their level of productivity.

Other constraints perceived to be severe by the respondents include Unavailability of labour($\bar{X} = 2.15$) , Lack of storage facilities ($\bar{X} = 2.15$), shortage of ponds' ($\bar{X} = 2.14$),shortage of water normally occurs especially during the drought seasons. This calls for site evaluation assistance to ensure availability of water throughout the year, fish culture inputs too costly ($\bar{X} = 2.11$)high cost of fingerlings ($\bar{X} = 2.05$),and Limited access to credit and high interest rate ($\bar{X} = 2.02$), ranked 3^{th}, 4^{th}, 5^{th}, 6^{th},7^{th} and 8^{th}respectively. This is in line with the findings of Oluwemimo and Daramola (2013) who also stated that the major constraints hindering the promotion and development of the culture fish production industry in Nigeria has been lack of ready market, poor extension service, high cost of feed, the scarcity of fish fingerlings and that the major factors militating against the production of high quantity of fish seed are energy and water quality related problems arising from skills gap in the industry. If the associated problems of production, especially the twin issue of feed production and fingerling supply are tackled, then Nigeria will soon become an exporter of fish in no distant time.

However, poor price for products ($\bar{X} = 1.59$), shortage of feed for ponds($\bar{X} = 1.58$), according to the respondents shortage of feed was due to few feed producers, suppliers and high cost of available feed , Inadequate access to improved species ($\bar{X} = 1.65$), and shortage of fertilizer for pond ($\bar{X} = 1.42$), It was suggested by the researcher that they can go for the in-organic fertilizer like the poultry dumbs. 9^{th}, 10^{th}, 11^{th} and 12^{th}, respectively were the constraints perceived not severe by the respondents. This result is in consonance with Olagunju *et al.* (2007) who in separate studies identified shortage of feed for ponds,

shortage of fertilizer as a major setback to profits realizable from culture fish farming business venture

Table 4.9: Constraints faced by producers

Constraints	VS(3)	S(2)	NS(1)	WS	WM	Rank	Remark
Lack of ready market	47 (58.02)	7 (8.64)	27 (33.33)	182	2.25	1st	Severe
Poor extension services	45 (55.56)	10 (12.35)	26 (32.10)	181	2.23	2nd	Severe
Lack of storage facilities	32 (39.51)	29 (35.80)	20 (24.6)	174	2.15	3rd	Severe
Unavailability of labour	36 (44.44)	21 (25.93)	24 (29.63)	174	2.15	3rd	Severe
Shortage of ponds' water	41 (50.62)	10 (12.35)	30 (37.04)	173	2.14	5th	Severe
Fish culture inputs too costly	34 (41.98)	22 (27.16)	25 (30.86)	171	2.11	6th	Severe
High cost of fingerlings	37 (45.68)	11 (13.58)	33 (40.74)	166	2.05	7th	Severe
Limited access to credit and high interest rate	30 (37.04)	23 (28.40)	28 (34.57)	164	2.02	8th	Severe
Poor price for products	13 (16.05)	22 (27.16)	46 (56.79)	129	1.59	9th	Not severe
Shortage of feed for ponds	12 (14.81)	23 (28.40)	46 (56.79)	128	1.58	10th	Not severe
Inadequate access to improved species	18 (22.22)	17 (20.99)	46 (56.79)	134	1.65	11th	Not severe
Shortage of fertilizer for pond	6 (7.41)	22 (27.16)	53 (65.43)	115	1.42	12th	Not severe

Source: Field Survey, 2019

Note: VS = Very Severe (3), S = Severe (2), NS = Not Severe (1), WS = Weighted Sum and WM = weighted mean. Figures in parenthesis are the percentages.

Thus, mean score of < 2.0 implies Not Severe, while mean score of ≥ 2.0 implies Severe.

4.5.2 Constraints faced by processors

Table 4.9 shows the major constraints faced by processors in culture fish value chain include Poor market information ($\bar{X} = 2.52$),which is ranked the first, among the severe constraints majority of the respondents who were affected by poor market information was due to lack of proper means of communication. This result is in consonance with (Nwiro, 2012) who in his studies also identified inadequate information as a major constraints to fish processing. Followed by Limited access to credit and high interest rate ($\bar{X} = 2.45$),which is ranked the 2nd, among the severe constraints, Access to credit can facilitate production by enabling farmers to purchase the needed inputs and in adequate quantities. Credit can be sourced from both formal and informal institutions. However, the inherent risk in agricultural production has been reported to affect the ability of farmers to obtain credit from formal institutions. The Nigerian government as part of value chain financing introduced the Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) to promote the agricultural value chain, so that banks can lend with confidence to the agricultural sector and offer value chain actors strong incentives and technical assistance with low interest rate. This is in consonance with Sikiru *et al.* (2010) who identified inadequate finance, inadequate infrastructure as one of the major constraints in fish processing business. However, Lack of storage facilities ($\bar{X} = 2.28$),which is ranked the 3rdsevere constraints respondents complained of not having electricity outage, which leads to high cost either of using generators, or storing in a cold room and it results to getting loss of rotten fish.

Other constraints perceived to be severe by the respondents include inadequate infrastructural facilities ($\bar{X} = 2.23$), Lack of equipment for fish processing ($\bar{X} =$

2.20), Reluctance of financial institutions to lend money ($\bar{X} = 2.16$), Lack of ready market($\bar{X} = 2.15$),Unavailability of adaptable processing equipment ($\bar{X} = 2.12$),Problem of manpower capacity development ($\bar{X} = 2.11$),Limited access to credit and high interest rate($\bar{X} = 2.09$), and Problem of modern technology($\bar{X} = 2.08$), was ranked 4^{th},5^{th},6^{th},7^{th},8^{th},9^{th},10^{th} and 11^{th} respectively of the severe constrain.

However, Problem of post-harvest handling in processing ($\bar{X} = 1.72$),Challenges in prices of harvested ($\bar{X} = 1.69$),and Lack of standardized weight/measures($\bar{X} = 1.44$), ranked 12^{th},13thand 14^{th} respectively were the constraints perceived not severe by the respondents.

Table 4.10: Constraints faced by processors

Constraints	VS (3)	S (2)	NS (1)	WS	WM	Rank	Remark
Poor market information	56(74.67)	2 (2.67)	17(22.66)	189	2.52	1st	Severe
Limited access to credit and high interest rate	51(68.00)	7 (9.33)	17(22.67)	184	2.45	2nd	Severe
Lack of storage facilities	44(58.67)	8 (10.67)	23(30.66)	171	2.28	3rd	Severe
Inadequate infrastructural facilities	39(52.00)	14 (18.67)	22(29.33)	167	2.23	4th	Severe
Lack of equipment for fish processing	41(54.67)	8 (10.67)	26(34.66)	165	2.20	5th	Severe
Reluctance of financial institutions to lend money out	41(54.67)	5 (6.67)	29(38.66)	162	2.16	6th	Severe
Lack of ready market	37(49.33)	12 (16.00)	26(34.67)	161	2.15	7th	Severe
Unavailability of adaptable processing equipment	33(44.00)	18 (24.00)	24(32.00)	159	2.12	8th	Severe
Problem of manpower capacity development	37(49.33)	9 (12.00)	29(38.67)	158	2.11	9th	Severe
Problem of modern technology	35(46.67)	11 (14.67)	29(38.66)	156	2.08	10th	Severe
Problem of post-harvest handling in processing	21(28.00)	12 (16.00)	42(56.00)	129	1.72	11th	Not severe
Challenges in prices of harvested fish	15(20.00)	22 (29.33)	38(50.67)	127	1.69	12th	Not severe
Lack of standardized weight/measures	5 (6.67)	23 (30.67)	47(62.66)	108	1.44	13th	Not severe

Source: Field Survey, 2019

Note: VS = Very Severe (3), S = Severe (2), NS = Not Severe (1), WS = Weighted Sum and WM = weighted mean. Figures in parenthesis are the percentages.

Thus, mean score of < 2.0 implies Not Severe, while mean score of ≥ 2.0 implies Severe.

4.5.3 Constraints faced by marketers

Table 4.9 shows the major constraints faced by marketers in culture fish value chain include Challenges in prices of harvested fish ($\bar{X} = 1.69$),which is ranked the 1st, among the severe constraints according to the respondents was due to competition in the market there is high demand for fresh fish, people now substitute fresh fish for meat because it is highly rich in protein, Lack of storage facilities ($\bar{X} = 2.39$), which is ranked the 2nd, among the severe constraints according to the respondents was due to high cost of purchasing equipment for storage/renting of storage materials. Fish price are unstable ($\bar{X} = 2.39$), which is also ranked the 2nd, among the severe constraints the instability of fish price is due to high demand in the market the higher the demand the higher the price vise-versa. This is in-line with the study of Eyo (2001), who stated that fish prices tend to rise by using sophisticated processing, handling, packaging and transportation methods, thus for higher returns, there is a need to spend more time and money on processing and marketing, this in turn gives room for better prices in the markets. High cost of transportation ($\bar{X} = 2.24$), which is ranked the 4th, among the severe constraints according to the respondents high cost of transportation was due to bad roads, high tax levied and no network roads, they call on Government to help in constructing good roads.

Other constraints perceived to be severe by the respondents include Lack of ready market ($\bar{X} = 2.23$), Inadequate infrastructural facilities ($\bar{X} = 2.18$),Limited access to credit and high interest rate ($\bar{X} = 2.15$), Problem of taxes collection at different government levels ($\bar{X} = 2.09$), High cost of labour ($\bar{X} = 2.08$), Inadequate market infrastructure($\bar{X} = 2.03$), and Lack of transportation facilities ($\bar{X} = 2.02$), ranked 5th,6th,7th, 8th,9th,10th and 11threspectively.

Furthermore, Too much interference from middlemen ($\bar{X} = 1.83$),Absence of government support to improve marketing ($\bar{X} = 1.82$),Poor market information ($\bar{X} = 1.80$), and Lack

of standardized weight/measures ($\bar{X} = 1.61$) ranked 12^{th}, 13^{th}, 14^{th} and 15^{th}, respectively were the constraints perceived not severe by the respondent

Table 4.11: Constraints faced by marketers

Constraints	VS (3)	S (2)	NS (1)	WS	WM	Rank	Remark
Challenges in prices of harvested fish	43 (65.15)	10(15.15)	13(19.70)	162	2.45	1st	Severe
Fish price are unstable	42 (63.64)	8 (12.12)	16(24.24)	158	2.39	2nd	Severe
Lack of ready market	38 (57.58)	6 (9.09)	17(25.76)	158	2.39	2nd	Severe
High cost of transportation	36 (54.55)	10(15.15)	20(30.30)	148	2.24	4th	Severe
Lack of storage facilities	43(65.15)	5 (7.58)	23(34.84)	147	2.23	5th	Severe
Inadequate infrastructural facilities	39 (59.09)	0 (0.00)	27(40.91)	144	2.18	6th	Severe
Limited access to credit and high interest rate	33 (50.00)	10(15.15)	23(34.85)	142	2.15	7th	Severe
Problem of taxes collection at different government levels	29 (43.94)	14(21.21)	23(34.85)	138	2.09	8th	Severe
High cost of labour	30 (45.45)	11(16.67)	25(37.88)	137	2.08	9th	Severe
Inadequate market infrastructure	28 (42.42)	12(18.18)	26(39.39)	134	2.03	10th	Severe
Lack of transportation facilities	27 (40.91)	13(19.70)	26(39.39)	133	2.02	11th	Severe
Too much interference from middlemen	19 (28.79)	17(25.76)	30(45.45)	121	1.83	12th	Not severe
Absence of government support to improve marketing	22 (33.33)	10(15.15)	34(51.52)	120	1.82	13th	Not severe
Poor market information	15 (22.73)	23(34.85)	28(42.42)	119	1.80	14th	Not severe
Lack of standardized weight / measures	13 (19.70)	14(21.21)	39(59.09)	106	1.61	15th	Not severe

Source: Field Survey, 2019

Note: VS = Very Severe (3), S = Severe (2), NS = Not Severe (1), WS = Weighted Sum and WM = weighted mean. Figures in parenthesis are the percentage. Thus, mean score of < 2.0 implies Not Severe, while mean score of ≥ 2.0 implies Severe

4.6 Test of hypotheses

4.6.1 Hypothesis 1

The null hypothesis stated that there is no significant relationship between some socio-economic characteristics of (age, gender, household, education and experience) of SMEs value chain and profit realized. The results presented in Table 4.12 indicate that the estimated t-values of education (1.99) at 5% probability level were significant in culture fish value chain and the profit realized. This implies that there is a significant relationship between education and the profit realized. Therefore, the null hypothesis stated for education was rejected, while the alternative hypothesis that there is a significant relationship between education was accepted. However, the estimated t-values of age (-0.20), experience (-0.33), gender (0.67) and household size (1.12) were not significant, hence the null hypothesis on age, experience, gender and household size were accepted implying that there was no significant relationship between age, experience, gender and household of the producers and profit realized.

Similarly, Table 4.12 indicates the estimated processors t-values for education (2.44) at 5% probability level were significant in culture fish value chain and the profit realized. This implies that there is a significant relationship between education and the profit realized. Therefore, the null hypothesis stated for education was rejected, while the alternative hypothesis that there is a significant relationship between education was accepted. However, the estimated t-values of age (-0.06), gender (-1.04), experience (-0.35), and household size (1.50) were not significant, hence the null hypothesis on age, experience, gender and household size were accepted implying that there was no significant

relationship between age, experience, gender and household of the producers and profit realized.

Furthermore, Table 4.12 indicates the estimated marketers t-values for gender (-2.02) at 5%, household size (2.16) at 5% and education (2.34) at 5% probability level were significant in culture fish value chain and the profit realized. This implies that there is a significant relationship between these variables and the profit they realized. Therefore, the null hypothesis stated for these variables was rejected, while the alternative hypothesis that there is a significant relationship between these selected socio-economic characteristics (education, gender and household size) of the marketers and the profit realized was accepted. However, the estimated t-values of age (-0.47) and experience (-0.01) were not significant, hence the null hypothesis on age and experience were accepted implying that there was no significant relationship between age and experience of the marketers and profit realized.

Table 4.12: T-test estimate for hypothesis I

Variables	Producers	Processors	Marketers
	Coefficient(t-value)	Coefficient(t-value)	Coefficient(t-value)
Gender (sex)	0.2462(0.67)	-0.1582(-1.04)	-0.2435(-2.02**)
Age (years)	-0.0033(-0.20)	-0.0009(-0.06)	-0.0071(-0.47)
Household-size (numbers)	0.0511(1.12)	0.0585(1.50)	0.0662(2.16**)
Education (years)	0.0459(1.99**)	0.0547(2.44**)	0.0429(2.34**)
Experience (years)	-0.0081(-0.33)	-0.0074(-0.35)	-0.0001(-0.01)

Source: Field survey, 2019 ** = significant at 5% probability level

4.6.2 Hypothesis II

The null hypothesis II tested for this study was that there is no significant difference in the profit of the various SMEs in fish value chain in the study area. The result of the pair-wise t – test is presented in Table 4.13 and it showed t – statistic value of 1.741 at 10% level of probability. This implies that there was a significant difference in the mean profit of the producers and processors. The null hypothesis was therefore rejected, while the alternative hypothesis which stressed that there is a significant difference in the mean profit was accepted. Similarly, t – statistic value of 1.634 showed that there was no significant difference in the mean profit of the producers and marketers. Thus, the null hypothesis was therefore accepted, while the alternative hypothesis which stressed that there is a

significant difference in the mean profit was rejected. Furthermore, showed t – statistic value of -0.192 showed that there was no significant difference in the mean profit of the processors and marketers. The null hypothesis was therefore accepted, while the alternative hypothesis which stressed that there is a significant difference in the mean profit was rejected.

Table 4.13: T-test estimate for hypothesis II

	Mean	**Standard dev.**	**t – value**	**Decision**
Producers' Profit	1,214,961	605,420	1.741*	Reject
Processors' Profit	101,787	50,117		
Mean difference	1,113,174	555,303		
Producers' Profit	1,214,961	605,420	1.634	Accept
Marketers' Profit	116,381	57,099		
Mean difference	1,098,580	548,321		
Processors' Profit	101,787	50,117	-0.192	Accept
Marketers' Profit	116,381	57,099		
Mean difference	-14,593	-6,982		

Source: Field survey, 2019 * = significant at 10% probability level

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study involves the small and medium scale enterprises of cultured fish value chain in Niger State Nigeria. Value chain actors performed different functions from production, processing and marketing in the study area. Returns to value chain confirms that culture fish farming is highly profitable.

A statistical significant relationship existed between education and profit realized in production of culture fish value chain, while age, experience, gender and household size were not significant. Similarly a statistical significant relationship existed between education and profit realized in processing of culture fish value chain, while age, experience, gender and household size were not significant. However, statistical significant relationship existed between education, gender and household size of the marketers and the profit realized. While age and experience where not significant in marketing and profit realized.

The major constraints faced by cultured fish value chain actors include: Lack of ready market, Shortage of ponds' water, Poor extension services, and high cost of fingerlings. Processors constraints are majorly Poor market information, Limited access to credit and high interest rate, Challenges in prices of harvested fish, Reluctance of financial institutions to lend money out, Inadequate infrastructural facilities, Lack of storage facilities, and Lack of equipment for fish processing. Marketing constraints are Challenges in prices of harvested fish, Lack of ready market, High cost of transportation, Fish price are unstable, Lack of transportation facilities, Poor legal system for contract enforcement,

Lack of storage facilities, Limited access to credit and high interest rate, Inadequate infrastructural facilities, and Absence of government support to improve marketing.

Based on the findings of the study, it is also conclude that involvement of small and medium scale cultured fish value chain has helped to increase shelf-life, open new market opportunities for producers by increasing the economic return of the producer, processor and marketers also enhanced the income level of the value chain actors, increase job creation down the value chain which in turn reduces poverty.

5.2 Recommendations

Based on the findings of this study, the following recommendations were made in order to improve culture fish farming business.

- Banks and other financial institutions should assist small and medium scale fish farmers with loans and affordable interest rate.
- There should be active use of extension agents to bring farmers innovative ideas and technologies.
- Due to high cost and availability of manufactured feed, farmers should be trained how to produce their own fish feed from locally sourced feed ingredients. Feed and fingerlings suppliers must improve their products quality and should improve quality of feed and fingerling which can grow fast to marketable size.
- Farmers' income obtained from fish farming is not encouraging due to challenges they face such as fish not growing to good marketable size among other challenges. For farmers to sell their culture fish to marketers/processors it needs them to produce quality fish, larger size and enough amounts. Therefore farmers must be organized in groups and be trained on good pond management to achieve this.

5.3 Contribution to Knowledge

This research study, Involvement of small and medium scale enterprises in cultured fish value chain in Niger State, Nigeria; incorporates producing, processing and marketing of cultured fish as a lucrative and profitable business enterprises. It also establishes the fact that more income is accrued at each level value is added to the product.

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APPENDIX

Questionnaire

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE.
SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY
DEPARTMENT OF AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT TECHNOLOGY.

Dear respondent,

Questionnaire on small and medium scale enterprise involvement in fish and culture value chain in Niger State, Nigeria.Is purely for academic purpose. Kindly supply the requested information.

QUESTIONNAIRE ON SMALL AND MEDIUM SCALE ENTERPRISES INVOLVEMENT IN FISH AND CULTURE VALUE CHAIN IN NIGER STATE, NIGERIA.

CATEGORY OF RESPONDENT: FISH PRODUCERS

STUDY INFORMATION

Date of interview _____
Time of interview_____
Enumerators name _____
Name of Village/ Town _____
Name of L.G.A._____
Name of respondent _____

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS

1. Gender: Male ( ) Female ( )
2. Marital Status? Single ( ) Married ( ) windowed ( ) separated ( ) others _____
3. Age of farmer _____
4. Marital Status: (a) married (b) single (c) widowed (d) divorced (e) separated
5. Head of household: Male( ) Female( )
6. Household size: Men _____Women_____Children (1- 10 YEARS)_____ Children (10- 20 YEARS)_____ Children (ABOVE 20 YEARS)_____Total_____
7. Do you have formal education?: Yes ( ) No( )
8. What is your highest level of education (a) Quranic (b) Primary education (c) Secondary education (d) tertiary education (OND, NCE, HND, Degree, Higher Degree (e) Adult education
9. How many years did you spend in school? _____
10. For how long have you been into fish farming? _____-
11. Source of land: Inheritance ( ) Rent ( ) Purchased ( ) Gift ( ) other options _____
12. What is the distance of your farm from the market? _____
13. How many ponds do you have? _____
14. What is average pond size? _____
15. What is the average cage size (M^3)? _____

16. What fish species do you stock? (check all that apply)

Fish specie(s)	Amount
Tilapia	
Catfish	
Mixed	
Other	

17. How much fish do you harvest in a year (Kg or other)
    Tilapia _____ Catfish _____
    Other_____

18. What is your main Occupation: Student ( ) Farmer( ) Civil Servant ( ) Business people ( ) Non-agricultural trading business ( ) Agricultural trading business ( ) Professional e.g Lawyer, Doctor ( ) Working for other farmers ( ) Drivers ( ) Cobbler ( ) Hunting ( ) Processing farm produce ( ) Knitting (Handicraft) ( ) Blacksmith ( ) Livestock ( ) Transport business ( ) Others (specify) _____
19. Do you have access to credit? Yes ( ) No( )
20. If yes, did you receive as credit during the last cropping season and how much?₦ _____
21. Source of Capital: Own saving ( ) Formal credit ( ) Others (specify) _____
22. If formal credit, where do you get it from? Bank ( ) Cooperative ( ) Agricultural bank ( ) others _____
23. Do you pay interest on the formal credit? Yes ( ) No ( )
24. If yes, how much interest do you pay? _____
25. Other Occupation in addition: Student ( ) Farmer( ) Civil Servant ( ) Business people ( ) Non-agricultural trading business ( ) Agricultural trading business ( ) Professional e.g Lawyer, Doctor ( ) Working for other farmers ( ) Drivers ( ) Cobbler ( ) Hunting ( ) Processing farm produce ( ) Knitting (Handicraft) ( ) Blacksmith ( ) Livestock ( ) Transport business ( ) Others (specify) _____
26. What is the income you get from other occupation

S/No	Occupation	Amount received / Month
1	Student	
2	Farmer	
3	Civil Servant	
4	Business people	
5	Non-agricultural trading business	
6	Agricultural trading business	
7	Professional e.g Lawyer, Doctor	
8	Working for other farmers	
9	Drivers	
10	Cobbler	
11	Hunting	

12	Processing farm produce	
13	Knitting (Handicraft)	
14	Blacksmith	
15	Livestock	
16	Transport business	
17	Others	

SECTION B: PRODUCTION INPUT INFORMATION

27. What assets are owned by the economic unit?

Assets	Quantity
Land (hectares)	
Permanent Buildings	
Mechanized farm equipment	
Vehicle	
Livestock /farm animals	
Others (Specify)	

28. What is the source of the following inputs? Check all that apply)

	Own	Government	Other Aquaculturist	Other (Specify)
Fingerlings				
Organic fertilizer				
Feed				
Associated animals				
Labour for operation				

29. What is the source of water for the pond(s)? (A) Spring (B) seepage from water table (C) River (D) Reservoir/ Dam (E) Other
30. What are your main costs of production?

Item	Quantity	Cost / Unit (₦)	Total cost (₦)
Fingerlings			
Feed			
Labour (hired)			
Labour (own and family)			
Electricity			
Taxes			
Licensing cost			
Rentals			

Transport			
Others (Specify)			
Total			

SECTION C: RETURNS, DISPOSAL AND INCOMES

31. What is the purpose of fish farming? (A) Household use (B) Fish to sell (C) Recreational purpose (D) Others
32. How do you market your fish (Check all that apply)
    Farm gate _____ Distribution plant _____ Customer delivery _____

Please provide the following information for the fish you cultivated.

Total Output (Kg)	Quantity consumed (Kg)	Quantity sold (Kg)	Pfish/ fish (₦)	Gross income from sales

SECTION D: PROBLEMS ENCOUNTERED IN FISH PRODUCTION

Constraints	Very severe	Severe	Not severe
High cost of fingerlings			
Inadequate access to improved species			
Shortage of ponds' water			
Limited access to credit and high interest rate			
Lack of ready market			
Lack of storage facilities			
Shortage of feed for ponds			
Shortage of fertilizer for pond			
Fish culture inputs too costly			
Unavailability of labour			
Poor price for products			
Poor extension services			

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Questionnaire on small and medium scale enterprise involvement in fish and culture value chain in Niger State, Nigeria. Is purely for academic purpose. Kindly supply the requested information.

QUESTIONNAIRE ON SMALL AND MEDIUM SCALE ENTERPRISES INVOLVEMENT IN FISH AND CULTURE VALUE CHAIN IN NIGER STATE, NIGERIA.

CATEGORY OF RESPONDENT: FISH PROCESSORS

STUDY INFORMATION

Date of interview _____
Time of interview_____
Enumerators name _____
Name of Village/ Town _____
Name of L.G.A._____
Name of market _____
Name of respondent _____

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS

Gender: Male ( ) Female ( )

33. Marital Status? Single ( ) Married ( ) windowed ( ) separated ( ) others _____
34. Age of marketer _____
35. Marital Status: (a) married (b) single (c) widowed (d) divorced (e) separated
36. Head of household: Male( ) Female( )
37. Household size: Men _____Women_____Children (1- 10 YEARS)_____ Children (10- 20 YEARS)_____ Children (ABOVE 20 YEARS)_____Total_____
38. Do you have formal education?: Yes ( ) No( )
39. What is your highest level of education (a) Quranic (b) Primary education (c) Secondary education (d) tertiary education (OND, NCE, HND, Degree, Higher Degree (e) Adult education
40. How many years did you spend in school? _____
41. What is your main Occupation: Student ( ) Farmer( ) Civil Servant ( ) Business people ( ) Non-agricultural trading business ( ) Agricultural trading business ( ) Professional e.g Lawyer, Doctor ( ) Working for other farmers ( ) Drivers ( ) Cobbler ( ) Hunting ( ) Processing farm produce ( ) Knitting (Handicraft) ( ) Blacksmith ( ) Livestock ( ) Transport business ( ) Others (specify) _____
42. Do you have access to credit? Yes ( ) No( )
43. If yes, did you receive as credit during the last cropping season and how much?₦ _____

44. Source of Capital: Own saving ( ) Formal credit ( ) Others (specify) _____
45. If formal credit, where do you get it from? Bank ( ) Cooperative ( ) Agricultural bank ( ) others _____
46. Do you pay interest on the formal credit? Yes ( ) No ( )
47. If yes, how much interest do you pay? _____
48. Other Occupation in addition: Student ( ) Farmer( ) Civil Servant ( ) Business people ( ) Non-agricultural trading business ( ) Agricultural trading business ( ) Professional e.g Lawyer, Doctor ( ) Working for other farmers ( ) Drivers ( ) Cobbler ( ) Hunting ( ) Processing farm produce ( ) Knitting (Handicraft) ( ) Blacksmith ( ) Livestock ( ) Transport business ( ) Others (specify) _____
49. What is the income you get from other occupation

S/No	Occupation	Amount received / Month
1	Student	
2	Farmer	
3	Civil Servant	
4	Business people	
5	Non-agricultural trading business	
6	Agricultural trading business	
7	Professional e.g Lawyer, Doctor	
8	Working for other farmers	
9	Drivers	
10	Cobbler	
11	Hunting	
12	Processing farm produce	
13	Knitting (Handicraft)	
14	Blacksmith	
15	Livestock	
16	Transport business	
17	Others	

SECTION B: PROCESSING INFORMATION

50. What type of labour do you use? Family labour ( ) Hired labour ( )
51. Number of labour used? Men_____Women_____children_____
52. Where do you buy the fish from? Pond Farmers ( ) fishermen ( ) fellow processors ( ) Others (specify)_____
53. Where do you sell your processed fish? Urban market ( ) Retail market ( ) At home ( ) Super market ( ) Shade ( )
54. Who do you sell the processed fish to? Fish Farmers ( ) Wholesalers ( ) Retailers ( ) Consumers ( )
55. How much quantity do you buy? _____kg _____ Cartoon _____Others (specify)

56. Which method do you use in selling? Kg ( ) Cartoon ( ) Others (specify) _____
57. What processing technique do you use? _____
58. What type of processing method do you use? Traditional ( ) Mechanized ( )
59. Where is the source of your processing equipment? _____
60. If yes, when are the peak and off-peak periods and duration (in Months)?
    a. Peak period _____
    b. Off Peak period _____
61. What is the capacity of the fish you process? _____
62. What quantity of fish do you process in a day? _____
63. How many days of the week do you process fish? _____

SECTION C: COST AND RETURNS FROM FISH PROCESSING

64. What is the total quantity of fish processed on daily basis?_____
65. At what cost do you process/ Kg?₦ _____
66. What is the total quantity of fish processed in a month? _____
67. At what cost do you process/ kg/month?₦ _____
68. What is the cost of purchasing raw materials? ₦_____
69. What is the cost of purchasing raw harvested fish? ₦ _____
70. What is the cost of firewood?₦ _____
71. What is the cost of transporting the fish? ₦ _____
72. What is the cost of labour/day? Men _____Women_____ Children _____
73. What is the Cost on oil? ₦ _____
74. What is the Cost on storage?₦_____
75. What is the cost of frying pan? ₦ _____
76. What is the cost of salt? ₦ _____
77. What is the cost of fixed cost? ₦ _____
78. What is the cost of handling? ₦ _____
79. Please provide information on the following variable cost of parboiling a100kg bag of paddy

Input	**Quantity**	**Unit pfish**	**Total cost**	**Source**
Fish				
Energy(specify)				
Water				
Salt				
Others				

80. Please give the following information on your fixed assets

Type of equipment	**Date Purchased (yr)**	**Purchase value(₦)**	**Source**	**Expected lifespan(yrs)**	***Capacity**
Wooding stove					
Bowls/frying pan					
Electric stove					
Others (specify)					

81. Do you consume part of your products? Yes ( ) No ( )
82. If yes, what quantity do you consume? _____
83. What quantity of fish is sold? _____
84. How do you sell? Kg ( ) Cartoon ( ) Others (specify) _____
85. What is the selling price? Kg_____ Cartoon _____ others(specify)_____
86. When do you normally sell your products? Immediately after processing ( ) When the price is at its peak ( ) When I need money ( ) When I have a buyer ( ) Others (specify)_____
87. Do you take your products to the market? (a) Yes ( ) (b) No ( )
88. Who is responsible for fixing the price of processedfish? (a) Based on market price ( ) Based on marketers demand ( ) Based on quality of fish processed ( ) Based on cost of raw paddy ( ) Others (specify) _____

SECTION D: PROBLEMS FACING FISH PROCESSING

Constraints	Very severe	Severe	Not severe
Lack of ready market			
Lack of storage facilities			
Lack of equipment for fish processing			
Unavailability of adaptable processing equipment			
Challenges in prices of harvested fish			

Inadequate infrastructural facilities			
Lack of standardized weight/measures			
Limited access to credit and high interest rate			
Reluctance of financial institutions to lend money out			
Problem of manpower capacity development			
Problem of post-harvest handling in processing			
Problem of modern technology			
Poor market information			

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Dear respondent,

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QUESTIONNAIRE ON SMALL AND MEDIUM SCALE ENTERPRISES INVOLVEMENT IN FISH AND CULTURE VALUE CHAIN IN NIGER STATE, NIGERIA.

CATEGORY OF RESPONDENT: FISH MARKETERS

STUDY INFORMATION

Date of interview _____
Time of interview_____
Enumerators name _____
Name of Village/ Town _____
Name of L.G.A._____
Name of market _____
Name of respondent _____

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS

1. Category of marketer? (A) Wholesaler (B) Retailer
2. Gender: Male ( ) Female ( )
3. Marital Status? Single ( ) Married ( ) windowed ( ) separated ( ) others _____
4. Age of marketer _____
5. Marital Status: (a) married (b) single (c) widowed (d) divorced (e) separated
6. Head of household: Male( ) Female( )
7. Household size: Men _____Women_____Children (1- 10 YEARS)_____ Children (10- 20 YEARS)_____ Children (ABOVE 20 YEARS)_____Total_____
8. Do you have formal education?: Yes ( ) No( )
9. What is your highest level of education (a) Quranic (b) Primary education (c) Secondary education (d) tertiary education (OND, NCE, HND, Degree, Higher Degree (e) Adult education
10. How many years did you spend in school? _____
11. What is your main Occupation: Student ( ) Farmer( ) Civil Servant ( ) Business people ( ) Non-agricultural trading business ( ) Agricultural trading business ( ) Professional e.g Lawyer, Doctor ( ) Working for other farmers ( ) Drivers ( ) Cobbler ( ) Hunting ( ) Processing farm produce ( ) Knitting (Handicraft) ( ) Blacksmith ( ) Livestock ( ) Transport business ( ) Others (specify) _____
12. Do you have access to credit? Yes ( ) No( )
13. If yes, did you receive as credit during the last cropping season and how much?₦ _____

14. Source of Capital: Own saving ( ) Formal credit ( ) Others (specify) _____
15. If formal credit, where do you get it from? Bank ( ) Cooperative ( ) Agricultural bank ( ) others _____
16. Do you pay interest on the formal credit? Yes ( ) No ( )
17. If yes, how much interest do you pay? _____
18. Other Occupation in addition: Student ( ) Farmer( ) Civil Servant ( ) Business people ( ) Non-agricultural trading business ( ) Agricultural trading business ( ) Professional e.g Lawyer, Doctor ( ) Working for other farmers ( ) Drivers ( ) Cobbler ( ) Hunting ( ) Processing farm produce ( ) Knitting (Handicraft) ( ) Blacksmith ( ) Livestock ( ) Transport business ( ) Others (specify) _____
19. What is the income you get from other occupation

S/No	Occupation	Amount received / Month
1	Student	
2	Farmer	
3	Civil Servant	
4	Business people	
5	Non-agricultural trading business	
6	Agricultural trading business	
7	Professional e.g Lawyer, Doctor	
8	Working for other farmers	
9	Drivers	
10	Cobbler	
11	Hunting	
12	Processing farm produce	
13	Knitting (Handicraft)	
14	Blacksmith	
15	Livestock	
16	Transport business	
17	Others	

SECTION B: MARKET INFORMATION

20. Are there different types of fish products sold on the market? Yes/No
21. If yes, list them below

Fish product	Quantity
Fresh fish	
Smoked fish	
Fried fish	

22. Where do you buy the fish from? Fish farmers ( ) fellow marketer ( ) processors ( ) Others (specify)_____
23. Which unit do you use in selling? Kg ( ) Mudus ( ) Others (specify) _____
24. What are your income/ year from non-agricultural sources? ₦ _____
25. What type of labour do you use? Family labour ( ) Hired labour ( )
26. Number of labour used? Men_____Women_____children_____
27. What is your major means of transportation? (a)Bus ( ) (b) Motorcycle ( ) (c) Bicycle( ) (d) Trekking ( ) (e) Others (specify) _____

SECTION C: COST AND RETURNS OF MARKETERS

28. Do you store fish before selling? (A) Yes (B) No
29. If yes, where do you store it? (A) Fridge (B) cool room (C) market Fridge (D) others……
30. If hired, how much do you pay? ……..
31. Who own the storing device? ……..
32. Do you move fish from village/home to the store/market? (A) Yes (B) No
33. What is the distance of you village/home to the marker? ……..
34. How much do you pay per kilo to the market? ……
35. What are your means of transportation to the market? .....
36. How much do you pay for transporting a specified unit? .....
37. Are there formal transport tariffs related to the fish? .....
38. If yes, how much? .....
39. Any other fees not listed in processing and marketing

Fees	**Costs**
Security fee	
Transportation cost	
Storage cost	
Handling cost	
Cost of buying fish/ bag	
Other charges	

40. Do you actually seek for market information? (a) Yes (b) No
41. If yes, how do you obtain market information, especially pfishs and demand?.....
.....
42. To whom do you normally sell your fish and how much? (Use the table below).

Category of buyer	**Pfish per Bag/carton**	**Pfish/kg**	**Quantity**

Wholesalers			
Retailers			
Consumers			

SECTION C: PROBLEMS ENCOUNTERED IN FISH MARKETING

Constraints	Very severe	Severe	Not severe
Lack of ready market			
Lack of storage facilities			
High cost of labour			
Inadequate infrastructural facilities			
Lack of standardized weight / measures			
Poor market information			
Lack of transportation facilities			
Problem of taxes collection at different government levels			
High cost of transportation			
Inadequate market infrastructure			
Absence of government support to improve marketing			
Fish price are unstable			
Challenges in prices of harvested fish			
Too much interference from middlemen			
Limited access to credit and high interest rate			