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Abstract- Fishing is predominantly the major occupation of Rivers State people, and there is the general belief that it has the prospects of booming their welfare. Unfortunately, the vibrancy and growth of the sector are yet to be realized due to certain constraints. Thus, most fishermen had to join the various cooperative societies as a way of mitigating the challenges of fishing business in order to harness the profitability of the sector. This study investigated the profitability of fish production among members of cooperative societies in Rivers State, Nigeria. The study is based on survey research design where data were collected using questionnaires as the instrument of data collection. A total of 400 copies of the questionnaire were distributed to cooperative fish farmers in Sixteen (16) LGAs of four (4) Agric zones in Rivers State. Based on data from the field survey, the study employed the Cost and Return Analysis as well as Descriptive Statistics to determine the profitability of fish production, the Pearson Product Moment Correlation Analysis to establish the strength and direction of relationship between fish profitability and fish output, while inferential (OLS regression) statistical method was used to analyse data in line with the objectives of the study. The results show that fish production among members of cooperative societies in Rivers State is a highly profitable venture, and that fish profitability and fish output are positively correlated to a higher degree. The study further shows that fishery investment and revenues contribute positively to the profit of cooperative fish farmers, whereas high cost of fishing inputs; lack of sufficient capital; poor catch; poor sales and oil/industrial pollution are the major fish production constraints in the area. Based on these findings, the study recommends among other things that the government of Rivers State should make provisions for fish production subsidies such as fund and some strategic modern fishing inputs while encouraging investment in fishery business through the provision of low-interest loans to the cooperatives.

Keywords: fish production, fishing, fishermen, cooperative fish farmers, cooperative societies, profitability, fish profitability, fishing inputs, cost and return analysis, and investment in fishery business.

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I. Introduction

a) Background of the Study

Inland and marine small-scale fisheries provide over one-third of the world's food fish supplies. They offer employment and livelihood to millions of fishermen, their families and associated workers. In contrast to company-owned and other large-scale industrialized fisheries, they use more indigenous resources and demand less expenditure in energy, equipment, infrastructure, and foreign currency. They often show a better cost/benefit ratio than the large-scale fisheries, more effectively contribute to national self-reliance and the national economy and, in most cases, produce more social benefits (George, 2020).

Fisheries constitute an important sector in Nigerian agriculture, providing valuable food and employment to millions and also serving as a source of livelihoods mainly for rural dwellers in coastal communities. Fishing is also an important contribution to world protein as it serves as a supplement for animal protein especially as the cost of affording animals seems to be beyond the reach of an average income earner (Kimathi, Ibuathu & Guyo, 2013). Nigeria has a coastline of 3,122km (Earth trends, 2003) shared by 8 states (Lagos, Ogun, Ondo, Delta, Bayelsa, Rivers, Akwa-Ibom and Cross River) out of a total of 36 states in the country, and this coastal fisheries are important and contribute at least 40 percent of fish production from all sources in Nigeria between 1995 and 2008 (FAO, 2010).

According to the Fisheries Society of Nigeria (2013), small scale fisheries provide more than 82 percent of the domestic fish supply, giving livelihoods to one million fishermen and up to 5.8 million fisher folks in the secondary sector comprising processing, preservation, marketing, and distribution. The total contribution of fisheries to Nigeria's gross domestic product is estimated at about US $1 billion (CBN, 2015). In any case, the demand for fish in Nigeria mostly outstrips the local production. Nigeria is the largest fish consumer in Africa and among the largest fish consumers in the world with over 1.5 million tons of fish consumed annually. Yet, Nigeria imports over 900,000 metric tons of fish while its domestic catch is estimated at 450,000 metric tons/year (Ozigbo, Anyadike, Forolunsho, Okechuckwu & Kolawole, 2013).

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The fishery activities in Nigeria are mainly done by the artisanal sector, the coastal and the brackish water constitutes the major areas of production, followed by the inland rivers and lakes. Aquaculture production and industrial fishing are still at its very low ebb (William, 2006). Consequent to this, domestic fish supply usually fell short of demand, accounting for a high import of about 50 percent fish consumed in Nigeria. In actual fact, since 1987, there has been a yawning gap between domestic demand of 1.5 million metric tons and domestic supply of 0.5 million metric tons (CBN, 2015). Initially, this demand-supply gap was not noticeable when the economy was buoyant as a result of the importation of frozen fish. However, the present economic recession and scarcity of foreign exchange to pay for imports have necessitated the need to step-up production through aquaculture. The huge import bill on frozen fish by the Federal Government of Nigeria which amounted to N30 billion ($400m) in the year 2002 alone calls for urgent attention in the area of artisanal and aquaculture. In the same vein, the growing urbanization, improved market integration and the concurrent supply crises from capture fisheries, small and larger-scale investment are gaining interest in aquaculture production which provides a source of income rather than simple subsistence, and can be incorporated into local agricultural systems to diversify production base (Baruwa, Tijani & Adejobi, 2012).

However, the needed vibrancy and growth in the sector have not been realized due to certain constraints. Easily identifiable here are poor infrastructures, high level of rural poverty (over 80% of rural poor live below the poverty line), environmental problems (e.g. pollution in coastal areas arising from gas flaring, oil spills and industrial wastes), civil unrest in the Niger Delta, climate change effects (sea-level rise, coastal erosion and flooding, increased environmental temperatures and wind storms) and degradation of coastal areas through human action (e.g. sand filling that destroys breeding grounds). Indeed, these may have been responsible for the reluctance of investors to move into the sector. However, high prices of the various fish species such as catfish and tilapia and the size of the fish consuming population are indicators that fish farming could still be a viable and worthwhile investment. Attempts made to identify constraints affecting the aquaculture subsector in Nigeria (FAO, 2000) revealed the tendency to consider fish farming as a foreign donor-driven technology, characterized by multi-dimensional in-built constraints. Similarly, In yang (2001) noted that these purported constraints were site-specific and that the envisaged solutions to them were deemed to be above the ability and circumstances of the largely small-scale fish farmers who were more familiar with artisanal and inland fishing activities.

It is against this background that the study examines the profitability of fish production among members of cooperative societies in Rivers State, Nigeria.

b) Statement of the Problem

The Nigerian government has recognized the importance of the fishery sub-sector and has, over the years, made several attempts to increase its fish output and productivity of fishermen through institutional reforms and various economic measures aimed at addressing challenges bedevilling the sub-sector. Indeed, there is a subsisting policy of the government to make fishery and fishing in the country profitable. However, in spite of these efforts, there is a paucity of investments and a low level of fish production (FAO, 2014). Many believe that the low level of fish production is due to resource use constraints such as feed supplies, low managerial skills, low start-up capital, etc, which have retarded the pace of development in the fish farming sub-sector. Other constraints include poor infrastructures, high level of rural poverty (over 80% of rural poor live below the poverty line), environmental problems (e.g. pollution in coastal areas arising from gas flaring, oil spills and industrial wastes), civil unrest in the Niger Delta, climate change effects (sea-level rise, coastal erosion and flooding, increased environmental temperatures and wind storms) and degradation of coastal areas through human action (e.g. sand filling that destroys breeding grounds). Also, attempts made to identify constraints affecting the aquaculture subsector in Nigeria (FAO, 2000) revealed the tendency to consider fish farming as a foreign donor-driven technology, characterized by multi-dimensional in-built constraints. Similarly, Inyang (2001) noted that these purported constraints were site-specific and that the envisaged solutions to them were deemed to be above the ability and circumstances of the largely small-scale fish farmers who were more familiar with artisanal and inland fishing activities.

Fishing is traditionally the major occupation of Rivers people, and there is the general belief that it has the prospect of booming the welfare of the youths in the area. However, the needed vibrancy and growth in the sector have not been realized due to certain constraints. The most prominent constraints are the perish ability of fresh fish and lack of information about the management of the industry by the artisans (Sarch & Allison, 2000). For instance, small-scale fishers may not have the financial management skill to adequately manage their resources to optimize their revenue, and hence their profit. Indeed, these constraints may have been responsible for the reluctance of investors to move into the sector. However, high prices of the various fish species such as catfish and tilapia, as well as the size of fish consuming population are indicators that fish farming could still be a viable and worthwhile investment. Taking this situation into consideration, there is no doubt that Nigeria needs to rise beyond the

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level of subsistence to a higher level of profitability through more efficient use of its productive resources. Interestingly, a platform for this is presently being offered by the plethora of fishery cooperatives in the area. Many people joined cooperative as a means of mitigating the challenges of fishing business and there is the conventional belief that fishery cooperatives have a big role to play in raising the profitability of artisanal fishers.

Since many fishermen joined cooperative as a means of increasing their profitability, there is a need to investigate the profitability of fish production among members of cooperative societies in Rivers State. However, a number of studies have been carried out on the profitability of fish production in some states in Nigeria like Abia, Kwara, Ogun, Oyo, Imo, Osun, Kano, Delta, and Kaduna states (see Iheke & Nwagbara, 2014; Adewumi, Ayinde, Adenuga & Zacchaeus, 2012; Adewuyi, Phillip, Ayinde, & Akerele, 2010; Ajao, 2006; Anene, Ezeh& Oputa, 2010; Awoyemi & Ajibye, 2011; Dambatta, Sogbesan, Tafida, Haruna & Fagge, 2016; Ezeh, Anene & Anya, 2008; Nandu, Gunn, Adegboye & Mongalaku, 2014); Kudi, Bako & Atala, 2008), but there seems to be dearth of studies on fish production among cooperative societies, especially in Rivers state. Hence, the present study is considered timely and important because of the limited literature on fish farming among cooperatives in River state. More importantly, a study of this nature has not been done in Rivers State despite its peculiar fishing context.

c) Objectives of the Study

The broad objective of the study is to determine the profitability of fish production among members of cooperative societies in Rivers State, Nigeria.

The specific objectives are to:

i. Analyse the socioeconomic characteristics of cooperative fish farmers in Rivers state.
ii. Determine the profitability of fish business among cooperative fish farmers in Rivers state.
iii. Examine the influence of fishery investments and revenues on the profit of the fish farmers in Rivers state.
iv. Evaluate the influence of members' socio-economic characteristics on the profit of the fish farmers in Rivers state.
v. Ascertain the effect of fish production constraints on the profit of the fish farmers in Rivers state.

d) Research Questions

This study was guided by the following research questions:

i. What are the socioeconomic characteristics of the cooperative fish farmers in Rivers state?
ii. What is the profitability of fish business among cooperative fish farmers in Rivers state?
iii. To what extent is profit margin influenced by fishery investments and revenues in Rivers state?
iv. To what extent is profit margin influenced by the socio-economic characteristics of members in Rivers state?
v. To what extent is profit margin affected by fish production constraints in Rivers state?

e) Study Hypotheses

The following hypotheses were formulated to guide the study.

H_0: Fish business does not significantly generate profit to cooperative fish farmers in Rivers state.
H_1: Fish business significantly generates profit to cooperative fish farmers in Rivers state.
H_0: Fishery investments and revenues have no significant influence on profit margin in Rivers state.
H_1: Fishery investments and revenues have a significant influence on profit margin in Rivers state.
H_0: Members' socio-economic characteristics do not have a significant effect on profit margin in Rivers state.
H_1: Members' socio-economic characteristics have a significant effect on profit margin in Rivers state.
H_0: Fish production constraints do not have a significant effect on profit margin in Rivers state.
H_1: Fish production constraints have a significant effect on profit margin in Rivers state.

f) Significance of the Study

The study tries to determine the profitability of fish production among cooperative members in Rivers State, Nigeria. The study is of both theoretical and empirical significance. Theoretically, the study is expected to add to what is already known about the theory of collaboration and its direct implication for cooperative fishery societies. Empirically, the study is relevant since it collected and analysed data on fish production and its relationship with cooperative membership which shows the efforts of cooperatives in promoting fishing in Rivers State.

The study is considered to be useful to individuals, including policymakers, lenders, and researchers. It serves as reference material for policymakers who are looking for a more effective way of promoting fish production among smallholder fishers. Also, researchers and scholars will benefit from it since it will add to the existing literature on fishing and cooperative activities.

g) Scope of the Study

The study is focused on the determination of profitability of fish production among cooperative and non-cooperative fishermen with an emphasis on profitability indicators and socioeconomic variables that influence fishing investment. The geographical scope is Rivers State. The period scope is restricted to fishing records of fishermen from 2017 – 2018.

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h) Limitations of the Study

One of the major problems facing this study is the problem of finance. A Study of this nature requires adequate finance to cover its field survey. Another problem encountered is the usual uncooperative attitudes of the respondents especially in filling the questionnaires. This problem was solved by putting calls across to the respondents to get their opinion on the questions that were not properly filled. Most of the fishermen are less than ten years as members of the co-operative society and some are migrant fishermen who migrate from one fishing settlement to another.

II. Review of Related Literature

a) Conceptual Review

i. *Concept of Profitability*

When a seed is planted, it germinates the reason for it germinating is increase potential that is inside the seed. In the same way, when money is committed to a project or business it is expected to germinate. The element of germination inside the committed money is profit.

Profitability is the primary goal of all business ventures. Without profitability, the business will not survive in the long run. So, measuring current and past profitability and projecting future profitability is very important.

Profitability is measured with income and expenses. Income is money generated from the activities of the business. For example, if crops and livestock are produced and sold, income is generated. However, money coming into the business from activities like borrowing money does not create income. This is simply a cash transaction between the business and the lender to generate cash for operating the business or buying assets. Expenses are the cost of resources used up or consumed by the activities of the business. For example, seed corn is the expense of a farm business because it is used up in the production process. Resources such as a machine whose useful life is more than one year are used up over a period of years. Repayment of a loan is not an expense, it is merely a cash transfer between the business and the lender Profitability is measured with an "income statement"

Whether you are recording profitability for the past period or projecting profitability for the coming period, measuring profitability is the most important measure of the success of the business. A business that is not profitable cannot survive. Conversely, a business that is highly profitable has the ability to reward its owners with a large return on their investment

According to Ezeh (2006), Profit is the addition to resources when it is committed to the business or investment; it is realized after accounting for all expenses that helped to generate the income. Normally when money is invested there is an expectation of return which is the expected return or income and it is from here the profit is derived. It determines the performance of the business and project. Sometimes it is added to the capital to increase revenue; this is the capital structure of a firm.

In order to make profits, the firm must create more cash flow than it uses. In other words, the cash coming in from the various activities must be more than the money invested by the firm. This increase in the cash flow over a period of time is called profit, which is usually calculated over one-year, half-year or a quarter of a year (Olagunju, Adesiyan & Ezekiel, 2017).

In order to generate more profits, the firm can take up what is called cost reduction. In cost reduction, by using new machinery, or new ways of production, the firm tries to reduce the cost of production to the extent possible. Cost reduction is considered to be one of the best techniques for profit maximization.

In order that cost reduction and increased production take place, a firm must utilize highly economic ways of production such as the utilization of efficient techniques in production and procurement of materials in bulk from suppliers, etc. All these techniques are known to decrease the cost of production and increase the profitability of the firm (Kimathi, Ibuathu & Guyo, 2013).

However, the profitability of fish farming can be measured through several economic methods such as partial measures, production function, profit function, and linear programming. Profit function can be determined by budgetary analysis in ascertaining cost and returns in fish marketing. Additionally, we will look at the contribution of cooperative and their role in the return of the fishing group.

ii. *Fishery and Fish Resources*

Generally, a fishery is an entity engaged in raising or harvesting fish which is determined by some authority to be a fishery. According to the FAO, a fishery is typically defined in terms of the "people involved, species or type of fish, area of water or seabed, method of fishing, class of boats, the purpose of the activities or a combination of the foregoing features. The definition often includes a combination of fish and fishers in a region, the latter fishing for similar species with similar gear types.

A fishery may involve the capture of wild fish or raising fish through farming or aquaculture. Directly or indirectly, the livelihood of over 500 million people in developing countries depends on fisheries and aquaculture. Overfishing, including the taking of fish beyond sustainable levels, is reducing fish stocks and employment in many world regions.

The fishery sector is crucial to food security, poverty alleviation and well being. In 2008 the world consumed 115 million tons of fish and demand is

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expected to rise, fish and fishery products are a vital and affordable source of food and high-quality protein (FAO, 2010). They also stated that fish as food reaches an all-time high of nearly 17kg per person supply over 3 billion people with at least 15 percent of their annual protein intake. Today fish is the only imported food source that is still primarily gathered from the wild rather than farm with marine culture. Historically accounting for greater than 80% of the world's fish supply recently, however, capture fishery has not been able to keep pace with the growing demand and many marine species have already overfished. Nearly half of the known ocean is completely exploited (FAO, 1999) and 70% are in need of urgent management.

Basically, Fish production in Nigeria is either by capture fisheries, artisanal fish farming (fish farming) or by importation. Capture fisheries involve the harvesting of naturally existing stocks of wild fish. This can be done either by small scale/artisanal fishers or by industrial/commercial trawlers. In artisanal fisheries, production is achieved by an individual or by small groups by the use of labour-intensive gears. Characteristically artisanal fishers operate from the dugout, wooden canoes that are more often than not unmotorized (Coates, 2000; Anene, Eze and Oputa, 2010). Artisanal fishing accounts for more than 80 percent of the total fish production in Nigeria. According to Matthew (2001), 'traditional', 'small-scale' or artisanal fisheries are used to characterize those fisheries that were mainly non-mechanized with a low level of production. The term particularly applies to coastal or island ethnic groups using traditional techniques such as rod and tackle, arrows and harpoons, throw nets and drag nets and traditional fishing boats.

iii. *Method of Fishing*

The method of fishing can be single fishing, paired fishing and group fishing. They go individually, in two or group of 3 or more; generally, one is the leader and he takes the largest share. The use gears such as net, hook, basket, spear therefore Method of Fishing can be the approach to the fishing, and the gear they use that is to say we also have method which could be the use of net and hook which can cast net, drift net , stationed hook and drift hook which are applicable on deep sea, river, creek and stream. Any of the procedure has its unique features which the people living in coastal area always apply as they go out in search of fish.

The method includes throwing net, dragging net along the current flow or against it, they throw spear, they sink hook either singly or as a group of hook line

iv. *Single Approach*

This is when a single fisherman goes out for fishing without any company. He can use any of the gear whether net or hook with boat and paddle using his experience to observe the breeding pattern of fish.

v. *Group Approach*

Here, fishermen go out to fishing in groups which could be group of two, three or four or even more and one must be the leader of the group who will be responsible for the group the leader sometimes is the owner of the boat. In the traditional setting fishermen observe the fish breeding method, it's movement and movement of the river to make the capture, they waiting for fish to move into the net or hook before they can drag them.

vi. *The Net Method*

The net is used to trap the fish; this method can be divided into cast net and drift net.

a) *Cast net:* the net is thrown on on-coming fish for capture.

b) *Drift net:* this method is used to cover a wide area for the fish to flow into, the drift net flows with the water and on-coming fish are trapped between the tread of the net. dragging net along the current flow or against it

vii. *The Hook Method*

The hook is like a trap which are submerged with bait for the fish to eat, and this can be divided into stationed hook and drift hook; they throw spear to big fish that tries to give them tough time.

a. *Stationed hook:* the hook is submerged with bait for the fish and the fisherman wait patiently for the fish to eat the bait.

b. *Drift hook:* here the hook kept in the river and allowed to flow while the fisherman return back later to check on the hooks.

viii. *Fish timing method*

There is another important aspect of fishing method; this is fish timing. Most of the fishermen take long trip into the coastal area in search for fish; sometimes they stay days, weeks or even month and when they return, they sell their catch to waiting women. They study the tide and the period fish will be available. The knowledge of this makes fishermen to make fishing exploit.

ix. *Women in Fish Production*

Women in fish production had been mainly in the marketing of fishery products than processing or active fishing. Their involvement includes picking of shell fishes such as oyster, periwinkle at low tide than fishing in creeks and rivers. Fish processing in these communities are done mostly by smoking using a standing oven which can dry a lot of fish at a time. The marketing strategies adopted by most women in selling their fishery products in the area are open market display and hawking, although, some sell their catch at landing jetties to buyers. Lack of credit facilities, poor transportation network and upsurge in criminal activities have been identified as major constraints facing women involvement in fishery activities in these areas. There is

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therefore, the need to empower the women fisher folks in these areas through granting of loans and credit facilities, capacity building, introduction of new technologies and improved transport network systems. These will go a long way in boosting fish production, improve their livelihood and enhance socio-economic status of the women fisher folks in the coastal communities.

The fisheries sub-sector is a significant source of fish food and livelihood for many people living in the coastal communities, as it supplies animal protein necessary for growth and income for many households in these rural communities (Akinrotimi *et al*., 2007). According to Akinrotimi, et al (2015) Women have been reported to play a vital role in fishery related activities around the world, especially in the coastal environment, where these activities are classified majorly in three ways; fishing, processing and marketing (Olufayo, 2012). Though, fish production is customarily considered as masculine venture, women role in fish related activities is though supportive, is imperative and indispensable (Cliffe *et al*., 2011); their role in food production, like coastal fishery has become more relevant as a way of reducing poverty and enhancing food security (Akinrotimi, et al 2015).

This had been noted in fishing communities of how women participate actively in fisheries and also play a part in the maintenance of their families (Nwabeze *et al*., 2013) and in many parts of the world, that women have engaged actively in fish business even in European countries for instance, women control 39% of the fish industry, making a huge amount of money for themselves and their families (Aquilar, 2002).

However, their role is repeatedly being ignored and relegated, consequent of primordial systems of social setting, that is prevalent in the rural areas of many developing countries like Nigeria (Ibrahim *et al*., 2011).

Fisheries is an important activity, that is predominant in the coastal areas of Rivers State, the role of women in fisheries related activities in these areas are very crucial and critical to the overall economy of the state but policy maker usually overlook the important role that women play in fisheries activities.

x. *Marketing of Fish Product*

Fish marketing is to ensure the flow of fish from fish farmers to consumer in the form, time and place that will be convenient. This involves some other players along the fish distribution channel especially the middlemen (Lawal and Idege, 2004). According to Kottler (2002) marketing is a societal process through which individual and group obtain what they need and want through creating offering and freely exchanging of product and services of value with others. Adekanye (1988) opined that marketing is a method used to bring the interpersonal forces of demand and supply together irrespective of the location of the market. This can be sustained by the application of various pricing criteria on sales of fish which depends on efficiency with which the marketing system transit information among fish mongers as it passes through middlemen

Marketing of fish passes through market participation in some exchange arrangement to reach the final consumer; the participant are the wholesaler and retailer who are market intermediaries. These are agent of distribution who plays a major role in the marketing system as they tend to pack the fish or unpack it to meet consumer's demand. In spite of the importance of fish and the fishery industry; fish is an extremely perishable product as it get spoilt immediately the fish dies due to enzymatic and microbial action, resulting in disagreeable taste, smell and texture, thereby reducing consumer acceptability (Brigitte et al, 1994; Garrow and James, 1994). To them a high ambient temperature of the topic is a major environmental factor promoting rapid spoilage of fish. While Maddison et al (1993) suggest that refrigerating is a means of preventing the fast rate of deterioration in fish. To them careful handling is an essential step to overcoming the problem of rapid fish spoilage. Therefore, to maintain freshness the fish need to be preserved or processed. There are several fish processing methods which include fermentation, drying, frying, canning, salting and smoking.

xi. *Cost of Fishing*

Olomola (1991) found out that the costs of capture of fisheries in Nigeria were higher than those of aquaculture except for the opportunity cost of family labour. Therefore, capture fisheries are more labour intensive than aqua culture. Availability of fish to consumer at right time and place requires an effective marketing system.

The cost of fishing includes the effort, the fishing gears and the craft. However, strength of searching for fish is an un imputed cost that had not been recognized. The cost of fishing can be separated into capital and variable as the craft and gear is the major capital cost while the food they eat and use as bait as well as maintenance cost are the variable cost. These costs fluctuate with time and it depends on the fishermen.

Though their cost had limited their effort but fishery occupies a unique position in the agricultural sector in Nigeria economy. In terms of Gross Domestic Product (GDP) the fishery sub-sector has recorded the fastest growth rate in agriculture to the GDP. The contribution of fishery sub-sector at 2001 current factor cost rose from N76.76 billion to N162.61 billion in 2005 (CBN, Report, 2005). Nigeria has vast network of inland water like rivers flood plain, natural and manmade Lake Reservoirs (Shimang, 2005). According to him the inland waters mass is estimated to be about 12.5 million hectares of inland water capable of producing 512,000

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metric ton of fish annually. The cost are as follows; fish craft and gear cost.

xii. *Fish Craft*

Like fishing gear craft have passed through many development stage from trunk to wood, floating calabash and papyrus raft to woody dugout craft, planked craft and canoes made up of fibre. All these are attempt to increase the efficiency match water condition and types of gear engaged in fishing (Ambrose et al, 2001). Consequently, craft are designed to match water current, shore landing, ability to keep afloat and stabilize on the water as well as accommodate catch or capture. It also depends on the size of crew, gear and distance covered.

a. Fishing Gears

Fishing gear include the net such as seine net, gill net, drift net, hook, basket. All these gears are very important in fishing and they pose a cost to fishing effort. There description is as follows:

b. Seine net

This is a kind of net in which one end of the net is fixed to an anchorage while the free end is moved along to surround certain area. The net is then pulled to close the fish within the area.

c. Gill net

This is a fabricated net. It is a type of fishing gear (net) used in catching fishes in the river. It is like a surrounding net but that of surrounding net is very large and it has a bag net and towing lines. Gillnet is a rectangular piece of netting fixed with a head line on top and usually a foot-rope at the bottom. The headline is lifted with floats while the foot-pole is weighed with lead, stones and the combination of floats and weights makes it possible for the net to stay upright in water.

d. Trap net

This is a type of net used mainly for catching shrimps, small fishes and crabs. The fishes are usually caught in wicker baskets containing baits. These baskets are usually lowered into swallow coastal water and left for one or two days before they are hauled up. Salmons which are returning to breed in rivers are sometimes caught by traps placed in the mouth of rivers.

A trap net consists of a line of wooden stakes driven into the sea bed at the end of which is the trap. A platform is usually built over the trap to enable fishermen to haul the catch.

e. Bag net

These consist of bags of netting materials usually synthetic with the mouth of the bag kept open through total or partial tanning. Nets of this kind vary from the small hard or scoop net used in removing fishes from drained ponds and drying up flood plains to the advanced mechanically propelled trawl nets used in industrial fisheries.

f. Cast net

This type of fishing net is conical in shape and mainly used on fishes that are easily baited e.g. Tilapia and surface swimming fishes. In using this net, cassava roots are put in several locations in water and these locations are pegged to the bottom water with sticks. The net is then cast in the locations where the bait (cassava roots) are put.

g. Drift net

This is another type of gill net. It normally hangs vertically in the water and weighted along the bottom edge and supported along the top edge by floats. Drift net are usually set without anchors and they drift with the water currents. Fishes are caught by their gill becoming entangled in the mesh of the nets.

h. Hook and lines

There is a decline in the use of this method, but fishermen who use this method only engage in it mostly to catch fish for domestic consumption. The fishermen numbering about 3-4 are in a relatively small boat which have attached hooks at intervals of short distances to a line. Baits like earthworms, rotten fish are attached firmly to the hooks for the attraction of the fish. Any fish trying to swallow the baits attached to the hooks gets itself hooked up.

i. Surrounding net

This is fabricated like a set net (gill net) but is very large and has bag net and towing lines. When a good fishing ground is located, the net is set to surround such a spot in form of a closed ring. This net is operated by 20-30 fishermen. The float line is pulled by some group of fishermen and the headline is pulled by another group of fishermen while they go into their closure to pulse at the bottom of the net. After pulsing, any fish within the surrounded enclosure will be caught through the bag net. It takes about 3-4 canoes to operate the surrounding net.

j. Trawlers

A trawler is a large wide mouthed net which is dragged along the bottom of the sea. Trawlers are very expensive thus they are not commonly owned by individual or small companies. They are mostly purchased by State or Federal Fisheries Boards e.g. Lagos State Fisheries Board. The largest conventional trawlers owned by Lagos State Fisheries Board do not exceed 100 ft in length. On these trawlers are large fish holds for keeping the fishes. These vessels can travel several miles away from their home base holding big fishes like tilapia, cat fish, etc.

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xiii. *Types of Fishing*

There are many types of fishing they include three types:

a. Up-country fishing in rivers and lakes

Nigerian rivers and lakes abound in a large variety of fishes which have different local names. They are caught either with fishing nets or lines. The catch is sold locally since the coastal supply does not always arrive fresh in land; the local catch from the main source of fresh fish supplies the interior.

b. Fishing creeks

The local fishing industries depend on creeks. The Okrika fishermen are well known in this industry. They use trap, nets and hooks while waiting for the fish to run into their gears; using mixture of method sometimes gives them cooperative advantage put bait on hooks and net in the water appear to be a trap for the fish which becomes easy prey for the fishermen. The catch is either eaten locally or smoked in special fish ovens for commercial purposes.

c. Lagoon and offshore fishing

Since fishing in the lagoon is carried out by the same people, fishing in the lagoon and Open Ocean go hand in hand. The fishermen stay in the lagoon during the day and go to the sea after the super. They return the following morning with their vessel loaded with the catch. The mid-morning visitors can buy fish directly and more cheaply from the fishermen than they can in the town. Vessels equipped with refrigerators are used in this type of fishing.

xiv. *Implication of Fishing Techniques and Effects of crude techniques*

As earlier discussed, crude method was the main fishing technique used by traditional or local fishermen in catching their fishes from the water. However, both the technique and the fishing gears employed pose some hazards to the fishes, the aquatic environment and the society at large.

The use of poisons or chemicals like gamalin 20, Didimore 25 and poisonous leave, roots and fruits of some toxic plants cause water pollution thereby making the water unsafe for human use.

The use of hooks, spears, cutlasses inflicts physical damage on the fishes and this accelerates the rate of decay of the fishes as a result of bacterial invasion on the damage parts.

The volume of catch is also reduced by the use of hook and line method. It is also time-consuming as fishermen have to spend a long time on boat only to catch few fishes.

The use of local fish nets whose mesh sizes are not regulated or nets with undersized meshes poses dangers for small young fishes especially the fingerlings, which may likely be scooped out of water prematurely.

xv. *Effects of modern techniques*

This method involves the use sophisticated modern equipment as fishing gears. It includes the use of fishing nets with regulated mesh sizes, motor propelled machines, diesel marine engines, trawlers and ships for commercial fishing.

With the use of these modern fishing equipment

a. More catch is registered at faster rate.
b. The fishes caught are safe for human consumption.
c. The purity or quality of water is not affected since the water is not polluted. Thus, the water is safe for drinking and for other domestic uses.
d. Fishes can be stored for longer period and well preserved in mobile refrigerator fishing vessels.

xvi. *Investments in fishery*

Investment is using the money to purchase assets in the hope that the asset will generate income over time or appreciate over time. Consumption, on the other hand, is when you purchase something with the immediate intent of personal use and with no expectation that it will generate money or increase in value. Investment also helps grow the economy because it creates economic activity, such as the buying and selling of goods and services and employing people. Employed people get paid and either save, invest, or spend their money. If they spend their money, businesses make more profits. Businesses can then reinvest the profits in further business activities that expand the economy.

Of course, too much of a good thing can be bad. If everyone is investing, then no one is consuming. If no one is consuming, consumer-orientated businesses, such as restaurants and retail establishments, will suffer. This may lead to layoffs. The key is to find the proper balance between investment and consumption.

The fishing industry is evolving and for most fishermen, knowing how to catch is no longer enough. New regulations, growing demand from consumers to know where their food comes from, rising fuel prices, and increasing globalization have changed the business dynamic of fishing. At the same time, with many fisheries in decline, fishermen must develop new ways to fish without depleting the resource on which they depend. They must innovate to survive. To be successful, they need to focus on developing their businesses as well as fishing techniques. This then calls for an appropriate investment response from fishermen, especially in the marine capture fisheries sub-sector.

Marine capture fisheries support a vital economic sector that generates significant value, employment, and food security, as well as many other non-financial benefits. From an economic perspective, wild fisheries contribute more than US$270 billion to global GDP, which increases by a further US$160 billion per year when related activities, such as fish processing

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and boat building, are included (World Bank, 2012). This amounts to approximately 1% of global GDP. At the national level, the economic value of fisheries can be much higher, representing 30% of GDP in Seychelles for example. Fish is a highly traded commodity and as such generates valuable foreign exchange, particularly in developing countries. Fisheries also contribute to economies through tax revenue both at the production level and through the activity of supporting sectors such as canning, processing, and distribution. Globally, fisheries employ approximately 260 million people, both directly as fishers and within the value chain (Teh and Sumaila, 2013). Furthermore, given the role of fishing as an important subsistence and safety-net activity for many of the world's poorest communities, it is likely that millions of more people are involved in, or indirectly dependent on, fishing activities than appear in official statistics. In addition to their economic importance, fisheries are critical for food security, providing approximately three billion people worldwide with at least 20% of their total animal protein (FAO, 2014). In some countries where there is a lack of alternatives, or where a preference for fish has developed, the relative importance of fish is much higher. For example, in Japan, nearly 40% of animal protein consumed is from seafood products (FAO, 2013) and the catching and eating of fish plays a significant role within culture and society. Similarly, in the Maldives, a country where the marine exclusive economic zone (EEZ) is over 3,000 times larger than the available landmass, fish play a vital role in society, contributing over 70% of animal protein consumed (FAO, 2014). The ability of wild fisheries to continue to produce fish is predicated on the continued viability of the marine ecosystems in which they exist and the appropriate management of fish stocks to ensure their sustainability. The wider marine environment supports fish stocks by providing breeding and nursery grounds and stable 11 food webs. Healthy ecosystems are critical for the maintenance of fishing activity and, in turn, where fishing takes place, sustainable management is essential for the maintenance of healthy ecosystems. In addition, healthy marine ecosystems also directly benefit global populations in many other ways – for example, through regulation of climate, flood defence, and tourism revenue – and therefore the importance of maintaining their health through sustainable practices goes further than just fish production (Pauly, Alder, Bakun, Heileman, Kock, Mace, and Worm (2005). However, despite their importance, global fisheries are an underperforming asset. The economic, social and ecological functions they provide are threatened by widespread mismanagement of fishing activity. According to the Food and Agriculture Organization of the United Nations (FAO), overexploitation of fish stocks has depleted 30% of the world's assessed fisheries to an unproductive state (FAO, 2014). Another study estimates that as the majority of fisheries have not been formally assessed, it is possible that as much as two-thirds of all global fisheries are overfished (Costello, Ovando, Hilborn, Gaines, Deschenes & Lester, 2012). The effects of mismanagement have already materialised in many places: communities have suffered a loss of food and livelihoods; local economies have declined and the marine environment has experienced fundamental changes to ecosystem functioning. For example, the collapse of the iconic cod fishery of the Canadian Grand Banks, a fishery once thought to be limitless, resulted in a fundamentally changed ecosystem where it is unlikely cod will recover to its historic abundance without significant intervention. As a result, the region experienced a significant economic downturn and a loss of over 20,000, directly and indirectly, related jobs (Gien, 2000), as well as the disappearance of a unique element of Newfoundland's cultural heritage. In the Philippines, a recent study has shown that only 10% of the fish stocks remain compared to 40 years ago. This has implications for millions of people who depend on fishing and are already on the poverty line. Multiple international treaties and agreements recognise unsustainable fishing practices as a major global issue1 and there is a growing response taking place to encourage the transition to sustainability in multiple regions. This effort is primarily (although not exclusively) being coordinated and undertaken by NGOs 1. For example, major agreements include the UN Code of Conduct for Responsible Fisheries and the UN International Plan of Action for the Management of Fishing Capacity. Key treaties include the UN Convention on the Law of the Sea and UN Agreement on Straddling and Highly Migratory Fish Stocks, and many activities are also carried out through regional treaties. and governmental and intergovernmental organisations that have developed extensive knowledge around the types of intervention that are needed to establish sustainable fisheries. It is, however, clear that regulation and governance alone cannot solve the global issue of fisheries sustainability (McClurg, 2014). The transition to sustainable fisheries will not only prevent the further deterioration of fish stocks, but it can also help global fisheries reset to a higher, more productive and more profitable level. Research indicates that the global harvest from wild-caught fish could be up to 40% higher and that global fish abundance could increase by 50% if sustainable management were introduced and marine capture fisheries were allowed to recover (Costello et al., 2012). According to The World Bank (2010), global fisheries could be worth an additional US$50 billion annually. In other words, the upside benefit of sustainable fisheries is huge and should be considered a 'no-regrets option.' Clearly, this a justification for sustained investments in the sector.

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xvii. *Fish Production in Nigeria*

Nigerians are large consumers of fish and it remains one of the main products consumed in terms of animal protein. Investors have the opportunity to establish fish farming businesses in several locations across the country. Only around 50% of the demand for fish is currently being met by local supply. The fisheries sector is estimated to contribute 3.5% of Nigeria's GDP and provides direct and indirect employment to over six million people (Adeola 2006). Nigeria has many rivers and water bodies which would serve as good locations to set-up fish farms. Opportunities exist in various areas of the fishing sub-sector, these include the production of stable fish, construction of fish farms, storage, processing and preservation of captured fish, fish seed multiplication, transport, and financing. It was stated that early fish farmers in Nigeria raised their fish in burrow pits, abandoned minefields and in earthen ponds on an extensive production system (Oresegun et al 2007). The introduction of concrete tanks allows for manageable pond size and modification of the environment through a water flow-through system and supplementary feeding thus allowing for higher fish yield. The advent of the indoor water re-circulatory system (WRS) has ushered in a new prospect for aquaculture. The introduction of WRS has created a turning point in the production of fish in Nigeria especially catfish.

A recirculatory system (RAS) is an intensive fish farming system that incorporates the treatment and reuse of water with less than 10% of the total volume of water replaced per day. As a result, less water is needed for the aquaculture operation system. There is also complete environmental control of the system and all-year availability of controlled harvested fish. The basic concept of RAS is to reuse a volume of water through continual treatment and delivery to the organisms being cultured. Although the re-circulatory system requires high initial investment, high risk and compels technical skills, its offers a number of potential advantages for aquaculture including: Production of fish in locations where limited water is available, Bio-security, Ability to locate the operation close to markets to reduce product transport time and costs, Improved feed conversion, and Year-round production. Ponds are essential components of most fish and aquaculture farms. Lowlands or valleys less suited to other agricultural development are usually selected as sites for these ponds and this is often the decisive consideration in selecting the site for the entire project. The ponds are normally shallow, cover relatively large areas and are surrounded or impounded in the majority of cases by low earth dykes or dams. The ponds are usually filled and drained through open canals; other methods, such as filling through a pipeline, being exceptional.

xviii. *Cooperative and Fishery Cooperative*

Working alone or in isolation can be dangerous and disadvantageous as one may not be able to observe the whole area but working with someone both can share the responsibility to observe different areas; thus, giving more advantages. The need to work together cannot be overemphasized; this has been a component of man from time immemorial as man is a social being; as he likes to associate, share views, ideas, and resources in a form of cooperation. One single individual cannot have all the resources needed to complete a process as well as the challenges confronting one cannot be solved alone but when there is cooperation among individual' limitations can be overcome that is sharing resources with another, in way of ideas, money, material can be very supportive and strengthens your limitation; this is the brain behind co-operative society.

The prevailing challenges in marine fish capture which include the changing environment, fishing habit, fish breeding pattern and their movement as well as inability to raise fund to acquire fishing gear and the destruction of fishing gear on the sea by sea truck; it has become necessary to pull resources together to confront these challenges. Consequently, the prevailing reduction of individual fish capture in the riverine community had put them under pressure in their fishing exploited, especially due to low income, low yield, and shrinkage of agricultural labour (Franklin et al, 2014). According to them, these difficulties can be addressed by the collective effort of farmers coming together and pool resources to achieve the common goal of productivity.

Co-operative societies had touched the lives of local farmers and fishermen alike. As they had support by contributing resources in acquiring gears, marketing, raise money for a project and reach out to support groups like government and non-profit organisations on behalf of their members. They also confront issues of an accident on the sea especially as boats do hit down their canoe and destroy their gears. Also, they encourage group fishing as they can corroborate to apprehend people confronting them while discouraging the bad practice and apart from satisfying members' needs, co-operative members share risk and profit (Igben&Eyo, 2002). This is the idea that led the founding father of co-operative to activate the need to work in co-operative association to relieve individuals of their challenges and oppression. Since then co-operative societies have continued to touch lives by eliminating and reducing the suffering of people as well as bad practices.

xviii. *Constraints to fishery*

Sustainability of smallholder fishery in Nigeria appears to be threatened by both macro and micro-level constraints. Macro-level constraints include degradation

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of the natural base stimulated by heavy dependence on natural resources by the majority of the population in the country, as well as other natural and economic environmental factors such as climate change. However, there are also constraints of a micro-level nature that smallholder farmers continue to face. These include limited access to credit and information; unavailability and poor access to fishing inputs and fishing gears.

Lassen (1998) has reported that fisheries in Africa and Nigeria, in particular, are constrained by the processes in each subsystem of biological or economic constraints' while other constraints related to the social structure of the fishing sector and others again are defined politically.

These latter constraints are often specific to the fishery. Examples of constraints and their interdependence are (Lassen, 1998):

a. Biological subsystem: Stock productivity limitations depend on the exploitation policy defined either externally in the system or in the fisheries economic subsystem.
b. Economic subsystem: Available capital (vessels and other capital goods) is limited. Economic feasibility depends on the available technology and investments depend on the expected fishing possibilities. Exploitation must be below levels where the stock becomes (commercially) extinct.
c. Social structures: The type of fishery possible is related to the fishing communities in the region. If there is a surplus of fishing possibilities, there may be distant water fleets operating in the fishery.

The social structure depends on the economy of the fisheries but also on the technology available, e.g. the maximum duration the vessels can operate.

a. Technological subsystem: Technical interactions between the catch of the different species depends both on the technology (selective vs unselective gears) and on how fish are mixed in the sea (biological subsystem). The available technology may leave certain species uneconomical to exploit, e.g. widely dispersed small pelagic like myctophids.

The constraints have in many instances been defined as limitations given by the subsystem. This has been very clear for the biological subsystem, where the attitudes largely have been to allow status quo fishing as long as there were no signs of recruitment failure. The basic attitude in the "precautionary approach" is to more actively ascertain that exploitation is kept within certain limits, such limits being defined as to avoid recruitment failure at least recruitment failures, caused by too low Spawning Stock Biomass. Strictly speaking, this is not the biological constraint but the limit is below the biological constraint (where the stock fails to reproduce) and the level is politically defined.

Amire (2008) in his lead paper to a conference of the Fisheries Society of Nigeria asserted that Nigerian marine fishing industry has faced great challenges including rising operational cost due to the prohibitive price of Automotive Gas Oil (AGO), and the high incidence of sea armed robbery and pirate attacks on fishing vessels. In the year 2004, there were also pirate attacks on fishing vessels; in 2005, 34 nos. cases were reported; in 2006, 53 cases were reported; while in 2007, 107 nos. cases were reported. So far, in 2008 no cases have been reported. The level of sophistication of the attacks on fishing vessels at fishing grounds is getting higher leading to loss of lives, communication equipment, fish and shrimp products, etc. The losses are not easily quantifiable. Most of the attacks take place at the eastern sea-board of the Nigerian coastline.

Indeed, the challenge of piracy in the marine sector of the Nigerian fishing industry is a key hindrance to the viability of investments. In the past months, there have been confirmed reports of attacks by pirates on fishing and shrimping vessels at fishing grounds. Lives and properties have been lost thus creating fears and apprehension amongst fishing vessel operators. There are reported cases of pirates hijacking fishing vessels and using them to attack oil tankers and merchant's vessels. This is very disturbing and a great threat to the growth of the Nigerian marine fishing industry. In fact, the level of new investments in the industry is dwindling. Unless urgent steps are taken by the Federal Government of Nigeria and other stakeholders to address the issue, the industry may collapse thereby leading to food insecurity, unemployment, loss of livelihoods, deeper poverty, and greater restiveness in the coastal communities including the Niger Delta.

b) Empirical Review

A number of studies have been reported on fish production in Nigeria and around the world. Elhendy and Alzoom (2001) assessed the cost of tilapia farming in the central region of Saudi Arabia. The study showed that the minimum average cost of production occurs for 201 tons of tilapia per year per farm and profit is maximized for a production of 300 tons annually per farm. All farms operate at less than a profit-maximizing scale and most operate at less than a minimum efficient scale.

Also, Yesuf, Ashiru, and Adewuyi (2002) assessed the economics of fish farming in Ibadan Metropolis, Nigeria. The study revealed that most farmers with secondary education and above operate at a small-scale level with an average of three (3) ponds. Fish farmers practised polyculture fish farming. Clariasspp is the most raised fish species followed by Heteroclariasspp. The gross margin analysis revealed that medium-scale farmers derived the highest return of ₦1.55 for every one naira expended. This is followed by large-scale farmers at ₦1.52 for every one Naira

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compared with only ₦1.34 for every 1Naira spent by small-scale farmers. On a productive level,

Ajao (2006), found that 80% of fish farmers in Oyo State, Nigeria, operated less than two (2) ha which could not capture the economy of size. More than 90% of the respondents distributed their fish at the site while 60% had little access to extension agents. Meanwhile, fish farming was found to be profitable.

Gill, Mcconney, and Mahon (2007) conducted a study on the socio-economic profile of fishers in the Grenadine Islands. The study utilized survey design, and data was gathered through extensive interviews at all of the major fishing villages in the Grenadines. During this stage, 267 fishers were interviewed. Over 75% of the fishers interviewed in the study rely on fishing as their major income source and less than half have an alternative livelihood. The findings showed that handling for demersal is by far the most widely practised fishing technique in the Grenadines. Again, the most common boat type is the small wooden bow and stern. Boats are not specific and are used in many types of fishery in the area. It was also revealed that due to lack of a reliable source of income, many continue to fish well beyond retirement age. This suggests a possible vulnerability within the fishing community, especially within the older population.

Kudi, Bako, and Atala (2008) examined the resources, cost and returns and other factors affecting fish production in Kaduna State, Nigeria. The study revealed that land, water, labour, and capital were the main resources employed in fish production. The costs and returns analysis indicated that variable cost constituted 97.63% of the total cost of fish production in the study area, while the fixed cost constituted 2.37%. Amongst the variable inputs, fingerlings/juveniles (42.82%) and feed (34.70%) constituted the highest (77.52%) to the cost of production, while hired labour constitutes 16.91%. The cost of production was ₦571, 231.79, the total revenue of ₦5, 853, 625.64 and the net income was ₦5, 282, 393.85 indicating that fish production was highly profitable.

El-Naggar, Nasr-Alla, and Kareem (2008) examined the economics of fish farming in Behera Governorate of Egypt. They found out that, high prices of fish feed; declining fish prices and lack of finance were the top-ranking serious constraints facing fish farmers in that area. Feed costs per kg of fish were LE 3.87, representing 58.9% of the production costs. The break-even analysis showed that average production costs of LE 6.57 per kilogram of fish while the sales price is LE 7.5 /kg. The findings also reveal that the quantity of fish seeds is a notable and significant factor contributing to the fish farming enterprise in the study area. That is, combining rice and fish farming is complimentary.

Raufu, Adepoju, Salau, and Adebiyi (2009) adopted of simple random sampling in selecting the respondents to examine the determinant of yield performance in small scale fish farming. A structural interview schedule was used to obtain information from eighty (80) respondents. Descriptive analysis was used to analyse the socio-economic characteristics, while budgetary analysis was used to determine the profitability, and multiple regression analysis was the inferential statistic used. The result showed that about 70.0 percent of the fish farmers produce above 5000 kilograms per year, while a mean of 5150.75 kilograms per year was obtained. The budgetary analysis revealed that the average total cost of production per annum was N3, 694, 586. 00 while the total revenue was ₦12, 680, 490. 00; which gives a net farm income of N8, 985, 904. 00per annum. The profitability ratio gives a benefit-cost ratio of 3.43, and a gross margin ratio of 1.41. This indicates the profitability of small-scale fish farming in the study area. The significant variables of sex and age are positively related to output resulting in more than a tone and 13 tonnes increase respectively in output difference in male to female fish farm and an older fish farmer's pond while educational level of the respondents, family and hired labour were negatively related to output, each resulting in not less than 2 tonnes decrease in output with their unit increase. The study, therefore, recommends, among others, that seminars and training should be held at intervals so as to update small scale fish farmers' knowledge on fish farming procedures and practices.

Nieves, Pelea, Bradecina, Pereyra, Morooka, Shinbo and Rivero (2009) conducted a study that was designed to evaluate the socio-economic conditions, the status of the fisheries and adaptive capacities of households and communities in the Kuroshio province of Philippines. The study was carried out in 2007. The random sampling technique was used to draw 1,035 fishing household respondents in San Miguel Island, Philippines. Participatory resource assessment (PRA) methods and multi-stakeholder processes (MSP) tools were used in data collection from a cross-section of all sectors in the community. Key findings showed that the island economy depends largely on agriculture (44%) and fisheries (28%). Forty-six percent (46%) of the population are actively earning while about 68% of wives are unemployed, some 17% are earning an average of Php. 6,200 per annum from mat making. The per capita income distribution corresponds to 79% poverty incidence with 66% of the surveyed population falling below the food threshold. Using the international standard of a dollar a day per capita, 86% of the population earns less than a dollar a day. The mean household size is 5.7 with a relatively higher dependency ratio of 60% and the majority of the population has only reached an elementary level of education. Again, about 84% fishers are fulltime, 57% own boats that are either motorized (43%) or non-motorized (57%) and the remaining 43% are renter-

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borrowers. Fishing is affected by southwest (November to March) and northeast monsoons (June to October) and is generally good from April to May. Fishing is characterized by low catch per unit effort.

Adewuyi, Ayinde, and Akerele (2010) analysed the profitability of fish farming in Ogun State Nigeria. The study made use of both primary and secondary data. The main instrument for collecting the primary data was structured questionnaire. The descriptive analysis showed that a large proportion (68%) of the fish farmer had formal (tertiary) education and financed their fish production through personal savings. Equally evident from the result is that an average total cost of ₦394, 380 was incurred per annum by fish farmers while gross revenue of ₦715030.30 was realized with a gross margin of ₦574314 and a profit of ₦320650. The rate of return on investment of 0.55 implies that for every one naira invested in Fish production by farmers, a return of ₦1.55 and a profit of ₦0.55 were obtained. The multiple regression results revealed that fish output was significantly determined by pond size, labour used, cost of feeds, cost of lime and cost of fingerlings. The coefficient of determination, R2 value of 0.462 indicates that 46.2% of the variation in the value of fish output was explained by pond size, quantity of labour used, cost of feed, cost of lime and cost of fingerlings The degree of responsiveness of the value of fish output to changes in the independent variables shows that a percent increase in the values of pond size, labour, feeds, fertilizer, lime, fixed input, and fingerlings will lead to 0.029%, 0.057%, 0.005%, 0.534%, 0.007%, 0.79% and 0.001% in the value of fish produced respectively. The study concluded that fish production in the study area is economically rewarding and profitable. It is capable of creating employment, augmenting income and improving the standard of living of the people. Therefore, it recommended government participation in fish farming to boost the quantity of fish available for consumption.

Awoyemi and Ajiboye (2011) investigated the profitability of fish farming among women in Osun State. A simple random sampling technique was employed to selecting 62 farmers from the sampling frame obtained from the list of Agricultural Development Programme (ADP) contact farmers in four Local Governments Areas (LGAs) of Egbedore, Olorunda, Ede South and Ife Central, which made up the study area. The main instrument for collecting the primary data was structured questionnaire. It is evident from the result that an average total cost of ₦371486.35 was incurred per annum by fish farmers while gross revenue of ₦791242.52 was realized with a gross margin of ₦574314 and a profit of ₦419756.17. The rate of return on investment of 0.58 implies that for every one naira invested in Fish production by farmers, a return of ₦1.5 and a profit of 58k were obtained. The multiple regression results revealed that fish output was significantly determined by pond size, labour used, cost of feeds, cost of lime and cost of fingerlings. The study concluded that fish production in the study area is economically rewarding and profitable.

Also, Kassli, Baruwa, and Mariama (2011) analysed the economics of inland fishing, aquaculture and fish marketing in Niamey and Tillabery areas of Niger Republic. The study showed that both the aquaculture and inland fish production was profitable with a rate of return of 61% and 320% respectively while two types of fish marketing channels were identified.

Adewumi, Ayinde, Adenuga, and Zacchaeus (2012) investigated the profitability of artisanal fishing in river Asa in Asa Local Government Area of Kwara State, Nigeria. A total of 80 respondents were randomly selected for the study. Data were collected by the use of a structured set of questionnaires. Three research questions guided the study. Results of profitability analysis showed that an average fisherman makes a Gross Margin of ₦52883.99/fisherman/month. The problems of artisanal fishing included lack of storage facilities, lack of government support and seasonal change in the volume of the river. The study recommends among others; fishermen should be given adequate training and the required assistance on modern fishing techniques and the use of modern fishing equipment to ensure sustainability. There is also the need to organize the farmers into cooperatives to enable them to have better access to government programmes and credits. It is also recommended that the government should build mini cold rooms with good storage facilities to help the fishermen overcome the problem of fish spoilage which reduces the quality of their products.

Adeogun, Alimi, and Adeyemo (2012) summarized the aquaculture practices in Nigeria and compares productivity, costs, and benefits across various types of enterprises. The study was based on a field survey conducted between 2008 and 2009, with data drawn from 700 fish farmers. More than half (58.3 %) of the fish farmers raised fish in concrete tanks. Monoculture of Clarias species was the most dominant culture practice by 75.0% of fish farmers in the study area. Economic analysis of the production systems using various farming enterprises revealed that the profit margin was found to be as low as N207.92 per kilogram of fish inflow techniques to ₦314.00 per kilogram in the stagnant system. The mean overall profitability was 4.7. The F-value (6.08) showed a significant difference in the profitability ratio of different fish farming enterprises. This shows that fish farming in Lagos State achieved on the average some levels of profitability that should guarantee its economic sustainability.

Aheto, Asare, Quaynor, Tenkorang, Asare, and Okyere (2012) carried out a study that tried to assess the sustainable fishing livelihoods in coastal communities of Ghana. The study gathered data

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through interviews that were conducted among 60 fishermen between February and March 2010. Economic assessment of small-scale fishing activities was done using questionnaires based on direct market pricing and contingent valuation methods. The results indicate that highly profitable fish species include Epinephelusaeneus, Sparus caeruleostictus, Dentex angolensis and Lutjanusgoreensis valued at US$2.97, US$2.87, US$2.85 and US$2.63 per kilogram respectively. The less profitable species include Dasyatis margarita, Caranxcrysos and Sardinella aurita valued at US$0.34, US$0.66 and US$ 0.85 per kilogram respectively. Although Sardinella aurita was among the less valuable fish species, it was the main species driving profits for the fishermen due to its high share volume among the fish catches. Findings from this study suggest high rates of exploitation, in that stocks generally cannot provide for increased economic return in the face of increased investment. This is a clear indicator that the open-access nature of Ghanaian fisheries is not sustainable, and management reform is well overdue.

Olaoye, Ashley-Dejo, Fakoya, Ikeweinwe, Algbeleye, Ashaolu and Adelaja (2013) assessed the socio-economic analysis of fish farming in Oyo State, Nigeria. A multistage random sampling technique was used to select 222 fish farmers from all the four agricultural zones in the state. Data collected were analysed using descriptive statistics, budgetary analysis, and profitability ratios. The study revealed that the mean age, household size, and fish farming experience were 46 years, 6 persons per household and 9.3 years respectively. The result of the budgetary analysis shows that the average total cost (TC) of ₦2,883, 515.08 was incurred, total revenue (TR) of ₦4,873,521.29 was realized and a returning gross margin (GM) of ₦2,376,616.36. The profitability ratio gave a benefit-cost ratio of 1.69, rate of return of 0.69 gross revenue ratios (GRR) of 0.59 and expense structure ratio (ESR) of 0.15. This is an indication that fish farming is profitable in the study area. Constraints perceived by most of the farmers include the high cost of fish feed and market price fluctuation. The significant level of profit obtained from the study is evidence that it has the potential in alleviating household poverty in the country thus; government should provide credit facilities with the small interest rate to fish farmers.

Nandu, Gunn, Adegboye, and Mongalaku (2014) conducted a study on the assessment of fish farmers' livelihood and poverty status in Delta state. Their findings suggest that the livelihood status of the farmers has improved in terms of socio-economic conditions, quality of food consumed, housing condition and savings among others, yet, the farmers are relatively poor. The positive social and environmental attributes of aquaculture make it an attractive entry point to improve the livelihoods and exterminate poverty among the poor rural fishing households. Adequate fishing can ease under-nutrition, improve income status and serve as a means of agricultural diversification to alleviate poverty and ameliorate standard of living. Even though the study found that improvement in the livelihood status of fishing households was recorded, their livelihood status is still below the annual minimum income of an average Nigerian, with a high poverty gap. It is adjudged that the poverty alleviation programmes targeting fish farmers have not impacted positively on the livelihood status of fish farmers. With the high level of petroleum exploration in the State, the government and other organizations have not provided many basic facilities to enhance livelihood status and expunge poverty in the area.

Iheke and Nwagbara (2014) analysed the profitability and viability of catfish farming in the Abia state of Nigeria. The study used a structured questionnaire and personal interview methods to collect data from a sample of 50 catfish farmers. The data were analysed using net profit analysis and benefit-cost ratio (BCR). The results show that on the average, an initial capital of ₦779, 200 was used in setting up each of the catfish business and the average farm size is 0.25 ha. An average annual gross revenue of ₦1, 325,000 and an average annual profit of N545, 800 accrued to the catfish farmers, indicating that catfish farming is a profitable business in the area. The study further shows that catfish farms are viable enterprises in the area given the BCR of 1.33.

Issa, Abdulazeez, Kezi, Dare and Umar (2014) analysed the profitability of small-scale catfish farming in Kaduna State, Nigeria. Sixty respondents were randomly selected and interviewed using an interview schedule to elicit information through a multistage sampling technique. The data were analysed using frequency percentages, mean and ranking while budgetary analysis (gross margin) was used to determine the profitability of catfish farming. The result shows that the majority (70%) used the concrete pond of an average of 200m^2. The source of their capital was mainly from personal savings (48.3%). The number of fingerlings raised ranges from 500 – 6000 at 20 fingerlings/m^2. The majority (55%) of the, raised between 3000 and 6000 fish per cycle at 6 to 8 tons/ha year. Quantity of fish raised and consumed had contributed positively to respondents' household income. However, savings from catfish farming has contributed about 20 to over 75% of the total income of the respondents. The result of profitability reveals that respondents had an average of about ₦774,223.05 and a net gross percentage of 73.4% per production cycle. Inadequate capital, scarcity of fingerlings, and inadequate extension services were the major problems facing catfish farmers. The study recommended that catfish farmers should be encouraged to form and manage functional cooperatives as a way to pool their resources for individual development within the fish farming industry.

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Okpeke and Akarue (2015) assessed the profitability of fish farming in the Warri South Local Government Area of Delta State, Nigeria. A purposively sampling technique was used to select fifty (50) fish farmers from the study area. Data collected were analysed using descriptive statistics- frequency, percentages, while budgetary and gross margin was used to determine Farm Net Income (FNI). The study indicated that variable cost accounted for (72.95%) of the total cost while the fixed cost of production accounted for 27.05%. The result shows that a total cost (TC) of N592, 316 was incurred by a respondent per farming season while total revenue (TR) of N976, 622 was realized with a returning gross margin (GM) of N544, 528 and a net farm income (NFI) of ₦384, 306 per farmer per annum, thus indicating that fish farming is profitable in the study area. Constraints encountered by the farmers include insufficient funds, high cost of feed, lack of processing/preservation/storage facilities and market price fluctuation. The study recommended that government and other stakeholders should help provide cheap sources fish feed, while also making funds available amongst others.

Tunde, Kuton, Oladipo, and Olasunkanmi (2015) examined the economic analysis of fish farming in the Saki-East Local Government Area (LGA) of Oyo State, Nigeria. A structured questionnaire was administered to randomly selected respondents to represent the fish farming community in the study area. Data collected were analysed using descriptive statistics, costs and budgetary analysis and multiple regression analysis. The results of a Cost and Return Analysis of the fish farming in the study area showed that the total revenues were N244364.30 per cycle, whereas the total cost was ₦129379.52 per cycle. This implies that fish farming was profitable and is expected to continue to operate. In addition, Benefit-Cost Ratio (BCR) was 1.9, the fish farming is therefore considered to be profitable. The rate of Return on Investment was 0.8887, meaning, for every N1 invested; there will be a return of 88.8.

Yisa, Adebayo, Mohammed and Anaweta (2015) conducted a study in the Suleja Local Government Area of Niger State to assess the profitability of catfish production. Forty (40) catfish farmers were selected from the study area using simple random sampling techniques. A structured questionnaire was used to collect data from the respondents. The analytical tools used include descriptive statistics, net farm income analysis, and profitability ratios and multiple regression functions. The result of the analysis showed that the average total cost per kilogram of fish was ₦321.23k and the average total revenue per kg of fish was ₦501.31. This gives a net farm income of ₦180.08k per kilogram of fish farming. The study also showed that the sum total of elasticity of variables was less than one (0.994), this indicates that catfish farming in the study area is in stage II, which is the rational stage of production. Double-log functional model was chosen as the lead equation. The value of R^2 was 0.998. The number of ponds (X_1) and the number of fingerlings (X_3) was significant at 1%, while labour(X_5) was significant at 5% levels of significance. The F-ratio of 2964.370 was significant at P (< 0.01). The study noted that the major problems faced by catfish farmers include; water, high cost of feed and capital.

Omobepade, Adebayo, Amos, and Adedokun (2015) utilized primary data collected from 80 respondents selected via a multistage sampling procedure to analyse the cost and return of aquaculture production in Ekiti State, Nigeria. A predictive multiple regression model was estimated to determine the influence of the cost of inputs on the farmer's revenue. Profitability parameters such as Gross margin, Benefit-Cost Ratio (BCR), Return on Investment (ROI) and Percentage Profitability (PP) were used to estimate the profitability of aquaculture. The result revealed personal savings (42.50%) as the major source of working capital and about 91.60 % of the production cost is incurred on feed, fingerlings, and labour. Also, about 69% of the variation in net revenue in aquaculture production was accounted for by the costs of water, feed, fuel, labour, fingerlings, and other costs. The values of the Gross Margin (₦390, 942.80), Benefit-Cost Ratio (1.74), Return on Investment (0.74) and Percentage Profitability) (74.38) indicated that aquaculture is profitable in the study area. The result further revealed that 40.00 % of the respondents made a profit within the range of ₦201,000 to ₦300,000. Based on the findings, it is recommended that aqua culturists should learn how to formulate quality feeds from locally available ingredients to complement their usual supply Aqua culturists should also endeavour to organize themselves into cooperatives to facilitate their access to credit facilities. Public awareness is needed to further arouse the interest of individuals, especially youth to consider fish farming as a wealth creation venture in the state.

Dambatta, Sogbesan, Tafida, Haruna & Fagge (2016) conducted research that assessed the profitability and constraints of fishermen in three selected zones of Kano State in accordance with the existing Agricultural Development programme (ADPs) Zones. Purposive sampling technique was used for sampling the respondents in the study area. Primary data were collected from 30 fishermen, 30 processors and 20 consumers using questionnaires and analysed statistically. The result of the study showed that male-dominated fishing (52.3%), while female processing (47.5%). The gross margin analysis showed profitability values of ₦74,350 for fishermen during the raining period. The study also revealed that both male and female were involved in all activities of fishing such as fishing, processing, marketing and consumption with the male having the majority (52.5%), while female

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constitute (47.5%) of the respondents; although female participate in processing and marketing than other activities.

Setsoafia, Owusu, and Danso-Abbeam (2017) evaluated the profit efficiency of artisanal fishing in the Pru District of Ghana by explicitly computing profit efficiency levels, identifying the sources of profit inefficiency, and examining the constraints of artisanal fisheries. Cross-sectional data were obtained from 120 small-scale fishing households using a semi-structured questionnaire. The stochastic profit frontier model was used to compute the profit efficiency level and identify the determinants of profit inefficiency while the Garrett ranking technique was used to rank the constraints. The average profit efficiency level was 81.66% which implies that about 82% of the prospective maximum profit was gained due to production efficiency. That is, only 18% of the potential profit was lost due to the fishers' inefficiency. Also, the age of the household head and household size increase the inefficiency level while experience in artisanal fishing tends to decrease the inefficiency level. From the Garrett ranking, access to credit facility to fully operate the small-scale fishing business was ranked as the most pressing issue followed by unstable prices while perish ability was ranked last among the constraints. The study, therefore, recommends that group formation should be encouraged to enable easy access to loans and contract sales to boost profitability.

Agu-Aguiyi, Onyia, Umebali, and Sotonye (2018) appraised the performance of fishery cooperative societies in Rivers State. Data were obtained from 360 cooperative fishermen, from 12 purposively selected Local Government Area of Rivers State. Data obtained were analysed with both descriptive and inferential statistics. The findings revealed that the respondents were of low educational qualification as such affected their initiative to improve the technique in the fish production as well as management of the fishing experience, had a significant influence on the fishermen return as fishermen who went for more catch. Also, the findings from the study gave evidence that; there are three major sources used in the fishing exploit namely: deep-sea approach, the riverside, and the creek. The study showed that more fishermen prefer the creek as fishes tend to hide at the creek followed by the riverside approach with few exploiting the deep sea. The study added that fishermen are faced with various degrees of challenges which range from pollution, climate change/bad weather, financial challenge; storage and processing facility; as well as the high cost of fishing tools.

Busari (2018) carried out an economic analysis of homestead aquaculture in Olorunda local government area, Osun State, Nigeria. A multistage sampling procedure using a random sampling technique was used to select one hundred and twenty (120) aquaculture farmers as a representative sample for the study. Data were collected through a personal interview with the aid of a structured interview schedule. The results of descriptive analysis showed that the aquaculture farmers were middle-aged, smallholder catfish farmers, married males, with tertiary education. The indicators used to measure the economic performance were gross margin (GM) net farm income (NFI), rate of return on investment (RRI) and operating profit margin ratio (OPMR). The result revealed that GM and NFI were ₦475342.51 and ₦468451.18 respectively. The rate of return on investment was 71.02% showing that homestead fish farming is a profitable venture in the study area. Results of regression analysis showed that the cost of fingerlings and pond maintenance were significant determinants of gross margin from homestead aquaculture production in the study area. The study concluded that although homestead aquaculture is a profitable venture in the study area, there is still the need for the farmers to increase their scale of production in order to maximize their gross margin.

Iruo, Onyeneke, Eze, Uwadoka and Igberi (2018) used farm and household level data gathered from 360 randomly selected smallholder fish producers to analyse the economics of smallholder fish farming as relates to poverty reduction in the Niger Delta area. Using enterprise budgeting, Foster-Greer-Thorbecke and Tobit regression models, the study found that fish farming in the region is profitable and the depth of poverty on fish farming households is high. The effects of socioeconomic variables, farm size, and assets on poverty were generally negative, indicating several interactions between poverty and the variables analysed. Fish production significantly reduced poverty in the region.

Table 2.1: Summary of Empirical Literature Reviewed

S./N.	Author(s)/Date	Purpose of the Study/Location	Method of Data Collection/Instrument	Method of Data Analysis	Findings
1	Elhendy&Alzoom (2001)	To assess the cost of tilapia farming in the central region of Saudi Arabia.	Survey Design/Questionnaire	Cost-Profit Optimization Method, Net Profit Analysis and Benefit-Cost Ratio (BCR).	The study showed that the minimum average cost of production occurs for 201 tons of tilapia per year per farm and profit is maximized for a production of 300 tons annually per farm.

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2	Yesuf, et al. (2002)	To assess the economics of fish farming in Ibadan Metropolis, Nigeria.	Survey Design/Questionnaire	Descriptive Method	The study revealed that most farmers with secondary education and above operate at a small-scale level with an average of three (3) ponds.
3	Ajao (2006)	To assess the economics of fish farming in Oyo state, Nigeria.	Survey Design/Questionnaire	Descriptive Method	The study found that 80% of fish farmers in Oyo State, Nigeria, operated less than two (2) ha which could not capture the economy of size. More than 90% of the respondents distributed their fish at the site while 60% had little access to extension agents. Meanwhile, fish farming was found to be profitable.
4	Gill, et al. (2007).	To analyse the socio-economic profile of fishers in the Grenadine Islands.	Survey Design/Interview	Descriptive Method	The findings showed that handling for demersal is by far the most widely practiced fishing technique in the Grenadines.
5	Kudi, et al. (2008)	To examine the resources, cost and returns and other factors affecting fish production in Kaduna State, Nigeria.	Survey Design/Questionnaire	Descriptive Method/Net Profit Analysis and Benefit-Cost Ratio (BCR).	The study revealed that land, water, labour, and capital were the main resources employed in fish production. The costs and returns analysis indicated that variable cost constituted 97.63% of the total cost of fish production in the study area, while the fixed cost constituted 2.37%.
6	El-Naggar, et al. (2008)	To examine the economics of fish farming in Behera Governorate of Egypt.	Survey Design/Questionnaire	Descriptive Method/Break-Even Analysis	They found out that, high prices of fish feed; declining fish prices and lack of finance were the top-ranking serious constraints facing fish farmers in that area. The break-even analysis showed that average production costs of LE 6.57 per kilogram of fish while the sales price is LE 7.5 /kg. The findings also reveal that the quantity of fish seeds is a notable and significant factor contributing to the fish farming enterprise in the study area. That is, combining rice and fish farming is complimentary.
7	Raufu, et al. (2009)	To examine the determinant of yield performance in small scale fish farming.	Survey Design/Interview	Descriptive Method/ Multiple Regression	The result showed that about 70.0 percent of the fish farmers produce above 5000 kilograms per year, while a mean of 5150.75 kilograms per year was obtained. The budgetary analysis revealed that the average total cost of production per annum was ₦3,694,586.00 while the total revenue was ₦12,680,490.00; which gives a net farm income of ₦8,985,904.00 per annum. The profitability ratio gives a benefit-cost ratio of 3.43, and a gross margin ratio of 1.41. This indicates the profitability of small-scale fish farming in the study area. The significant variables of sex and age are positively related to output resulting in more than a tone and 13 tonnes increase respectively in output difference in male to female fish farm and an older fish farmer's pond while educational level of the respondents, family and hired labour were negatively related to output, each resulting in not less than 2 tonnes decrease in output with their unit increase.
8	Nieves, et al. (2009)	To evaluate the socio-economic conditions, the status of the fisheries and adaptive capacities of households and communities in the Kuroshio	Participatory Resource Assessment (PRA) and Multi-Stakeholder Processes (MSP)	Descriptive Method, Net Profit Analysis and Benefit-Cost Ratio (BCR).	Key findings showed that the island economy depends largely on agriculture (44%) and fisheries (28%). Forty-six percent (46%) of the population are actively earning while about 68% of wives are unemployed, some 17% are earning an average of Php. 6,200 per annum from mat making. The per capita income distribution corresponds to 79% poverty incidence with 66% of the surveyed population falling below the food threshold.

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		province of the Philippines.			
9	Adewuyi, et al. (2010)	To analyze the profitability of fish farming in Ogun State Nigeria.	Survey Design/Questionnaire	Descriptive Method, Regression Analysis	The descriptive analysis showed that a large proportion (68%) of the fish farmer had formal (tertiary) education and financed their fish production through personal savings. Equally evident from the result is that an average total cost of ₦394,380 was incurred per annum by fish farmers while gross revenue of ₦715030.30 was realized with a gross margin of ₦574314 and a profit of ₦320650. The rate of return on investment of 0.55 implies that for every one naira invested in Fish production by farmers, a return of ₦1.55 and a profit of ₦0.55 were obtained. The multiple regression results revealed that fish output was significantly determined by pond size, labour used, cost of feeds, cost of lime and cost of fingerlings.
10	Awoyemi&Ajiboye (2011)	To investigate the profitability of fish farming among women in Osun State, Nigeria.	Survey Design/Questionnaire	Descriptive Method, Regression Analysis	It is evident from the result that an average total cost of ₦371486.35 was incurred per annum by fish farmers while gross revenue of ₦791242.52 was realized with a gross margin of ₦574314 and a profit of ₦419756.17. The rate of return on investment of 0.58 implies that for every one naira invested in Fish production by farmers, a return of ₦1.5 and a profit of 58k were obtained. The multiple regression results revealed that fish output was significantly determined by pond size, labour used, cost of feeds, cost of lime and cost of fingerlings. The study concluded that fish production in the study area is economically rewarding and profitable.
11	Kassli, et al. (2011)	To analyze the economics of inland fishing, aquaculture and fish marketing in Niamey and Tillabery areas of Niger Republic.			The study showed that both the aquaculture and inland fish production was profitable with a rate of return of 61% and 320% respectively while two types of fish marketing channels were identified.
12	Adewumi, et al. (2012)	To investigate the profitability of artisanal fishing in river Asa in Asa Local Government Area of Kwara State, Nigeria.	Survey Design/Questionnaire	Descriptive Method, Net Profit Analysis and Benefit-Cost Ratio (BCR).	Results of profitability analysis showed that an average fisherman makes a Gross Margin of ₦52883.99/fisherman/month.
13	Adeogun, et al. (2012)	To summarize the aquaculture practices in Nigeria and compares the productivity, costs, and benefits across various types of enterprises in Lagos State, Nigeria.	Survey Design/Questionnaire	Descriptive Method/Multiple Regression	More than half (58.3 %) of the fish farmers raised fish in concrete tanks. Monoculture of Clarias species was the most dominant culture practice by 75.0% of fish farmers in the study area. Economic analysis of the production systems using various farming enterprises revealed that the profit margin was found to be as low as ₦207.92 per kilogram of fish inflow techniques to ₦314.00 per kilogram in the stagnant system. The mean overall profitability was 4.7. The F-value (6.08) showed a significant difference in the profitability ratio of different fish farming enterprises. This shows that fish farming in Lagos State achieved on the average some levels of profitability that should guarantee its economic sustainability.
14	Aheto, et al. (2012)	To assess the sustainable fishing	Survey Design/		The results indicate that highly profitable fish species include Epinephelusaeneus, Sparus

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		livelihoods in coastal communities of Ghana.	Questionnaire based on Direct Market Pricing and Contingent Valuation Methods.		caeruleostictus, Dentex angolensis and Lutjanusgoreensis valued at US$2.97, US$2.87, US$2.85 and US$2.63 per kilogram respectively. The less profitable species include Dasyatis margarita, Caranxcrysos and Sardinella aurita valued at US$0.34, US$0.66 and US$ 0.85 per kilogram respectively.
15	Olaoye, et al. (2013)	To assess the socio-economic analysis of fish farming in Oyo State, Nigeria.	Survey/Questionnaire	Descriptive Method/ Budgetary Analysis and Profitability Ratios.	The study revealed that the mean age, household size, and fish farming experience were 46 years, 6 persons per household and 9.3 years respectively. The result of the budgetary analysis shows that the average total cost (TC) of ₦2,883, 515.08 was incurred, total revenue (TR) of ₦4,873,521.29 was realized and a returning gross margin (GM) of ₦2,376,616.36. The profitability ratio gave a benefit-cost ratio of 1.69, rate of return of 0.69 gross revenue ratios (GRR) of 0.59 and expense structure ratio (ESR) of 0.15. This is an indication that fish farming is profitable in the study area. Constraints perceived by most of the farmers include the high cost of fish feed and market price fluctuation.
16	Nandu, et al. (2014)	To assess fish farmers' livelihood and poverty status in Delta state.	Survey Design/Questionnaire	Descriptive Method	Findings suggest that the livelihood status of the farmers has improved in terms of socio-economic conditions, quality of food consumed, housing condition and savings among others, yet, the farmers are relatively poor.
17	Iheke&Nwagbara (2014)	To analyse the profitability and viability of catfish farming in the Abia state of Nigeria.	Survey Design/Questionnaire	Net Profit Analysis and Benefit-Cost Ratio (BCR).	The results show that on the average, an initial capital of ₦779,200 was used in setting up each of the catfish business and the average farm size is 0.25ha. An average annual gross revenue of ₦1,325,000 and an average annual profit of ₦545,800 accrued to the catfish farmers, indicating that catfish farming is a profitable business in the area. The study further shows that catfish farms are viable enterprises in the area given the BCR of 1.33.
18	Issa, et al. (2014)	To analyse the profitability of small-scale catfish farming in Kaduna State, Nigeria.	Survey/Interview	Descriptive Method/BCR Analysis	The result shows that the majority (70%) used the concrete pond of an average of 200m^2. The source of their capital was mainly from personal savings (48.3%). The number of fingerlings raised ranges from 500 – 6000 at 20 fingerlings/m^2. The majority (55%) of the, raised between 3000 and 6000 fish per cycle at 6 to 8 tons/ha year. Quantity of fish raised and consumed had contributed positively to respondents' household income. However, savings from catfish farming has contributed about 20 to over 75% of the total income of the respondents. The result of profitability reveals that respondents had an average of about ₦774,223.05 and a net gross percentage of 73.4% per production cycle.
19	Okpeke&Akarue (2015)	To assess the profitability of fish farming in Warri South Local Government Area of Delta State, Nigeria.	Survey Design/Questionnaire	Descriptive Method	The study indicated that variable cost accounted for (72.95%) of the total cost while the fixed cost of production accounted for 27.05%. The result shows that a total cost (TC) of ₦592,316 was incurred by a respondent per farming season while total revenue (TR) of ₦976,622 was realized with a returning gross margin (GM) of N544,528 and a net farm income (NFI) of ₦384,306 per farmer per annum, thus indicating that fish farming is profitable in the study area.
20	Omobepade, et	To analyse the	Survey/Questi	Descriptive Method,	The result revealed personal savings

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	al. (2015)	cost and return of aquaculture production in Ekiti State, Nigeria.	onnaire	Multiple Regression and BCR Analysis.	(42.50%) as the major source of working capital and about 91.60 % of the production cost is incurred on feed, fingerlings, and labour. Also, about 69% of the variation in net revenue in aquaculture production was accounted for by the costs of water, feed, fuel, labour, fingerlings, and other costs. The values of the Gross Margin (₦390,942.80), Benefit-Cost Ratio (1.74), Return on Investment (0.74) and Percentage Profitability) (74.38) indicated that aquaculture is profitable in the study area. The result further revealed that 40.00 % of the respondents made a profit within the range of ₦201,000 to ₦300,000.
21	Tunde, et al. (2015)	To examine the economic analysis of fish farming in the Saki-East Local Government Area (LGA) of Oyo State, Nigeria.	Survey/Questionnaire	Descriptive Method/ Costs and Budgetary Analysis and Multiple Regression Analysis.	The results of a Cost and Return Analysis of the fish farming in the study area showed that the total revenues were ₦244364.30 per cycle, whereas the total cost was ₦129379.52 per cycle. This implies that fish farming was profitable and is expected to continue to operate. In addition, Benefit-Cost Ratio (BCR) was 1.9, the fish farming is therefore considered to be profitable. The rate of Return on Investment was 0.8887, meaning, for every ₦1 invested; there will be a return of 88.8.
22	*Yisa, et al. (2015)*	to assess the profitability of catfish production in the Suleja Local Government Area of Niger State.	Survey/Questionnaire	Descriptive Method/ Profitability Ratios and Multiple Regression	The result of the analysis showed that the average total cost per kilogram of fish was ₦321.23k and the average total revenue per kg of fish was ₦501.31. This gives a net farm income of N180.08k per kilogram of fish farming. The study also showed that the sum total of elasticity of variables was less than one (0.994), this indicates that catfish farming in the study area is in stage II, which is the rational stage of production. Double-log functional model was chosen as the lead equation. The value of R^2 was 0.998. The number of ponds (X_1) and the number of fingerlings (X_3) was significant at 1%, while labour(X_5) was significant at 5% levels of significance. The F-ratio of 2964.370 was significant at P (< 0.01).
23	Dambatta, et al. (2016)	To assess the profitability and constraints of fishermen in three selected zones of Kano State in accordance with the existing Agricultural Development programme (ADPs) Zones.	Survey Design/Questionnaire	Descriptive Method	The result of the study showed that male-dominated fishing (52.3%), while female processing (47.5%). The gross margin analysis showed profitability values of ₦74,350 for fishermen during the raining period. The study also revealed that both male and female were involved in all activities of fishing such as fishing, processing, marketing and consumption with the male having the majority (52.5%), while female constitute (47.5%) of the respondents; although female participate in processing and marketing than other activities.
24	Setsoafia, et al. (2017)	To evaluate the profit efficiency of artisanal fishing in the Pru District of Ghana	Survey Design/Questionnaire	Stochastic Profit Frontier Model/ Garrett Ranking Technique.	The average profit efficiency level was 81.66% which implies that about 82% of the prospective maximum profit was gained due to production efficiency. That is, only 18% of the potential profit was lost due to the fishers' inefficiency. Also, the age of the household head and household size increase the inefficiency level while experience in artisanal fishing tends to decrease the inefficiency level. From the Garrett ranking, access to credit facility to fully operate the small-scale fishing business was ranked as the most pressing issue followed by unstable prices

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					while perishability was ranked last among the constraints.
25	Busari (2018)	To carry out an economic analysis of homestead aquaculture in Olorunda local government area, Osun State, Nigeria.	Survey/Interview	Descriptive Method/Multiple Regression	The results of descriptive analysis showed that the aquaculture farmers were middle-aged, smallholder catfish farmers, married males, with tertiary education. The result revealed that GM and NFI were ₦475342.51 and ₦468451.18 respectively. The rate of return on investment was 71.02% showing that homestead fish farming is a profitable venture in the study area. Results of regression analysis showed that the cost of fingerlings and pond maintenance were significant determinants of gross margin from homestead aquaculture production in the study area.
26	Agu-Aguiyi, et al. (2018)	To appraise the performance of fishery cooperative societies in Rivers State.	Survey/Questionnaire	Descriptive Method/Multiple Regression	Findings revealed that the respondents were of low educational qualification as such affected their initiative to improve the technique in the fish production as well as management of the fishing experience, had a significant influence on the fishermen return as fishermen who went for more catch.
27	Iruo, et al. (2018)	To analyse the economics of smallholder fish farming as relates to poverty reduction in the Niger Delta area.	Survey/Questionnaire	Enterprise Budgeting, Foster-Greer-Thorbecke, and Tobit regression models.	Fish farming in the region is profitable and the depth of poverty on fish farming households is high. The effects of socioeconomic variables, farm size, and assets on poverty were generally negative, indicating several interactions between poverty and the variables analysed. Fish production significantly reduced poverty in the region.

Source: Researcher's Compilation

c) Gap in the Literature

Clearly, a modest number of research works exist in the literature, both conceptually and empirically. There are studies on both pond fish production and activities of artisanal fishermen in different parts of the world and Nigeria. There are also studies on the profitability of fishing and pond fish production in different parts of the world. However, there is the paucity of studies that have focused on the economics of fish production and/or profitability of fish production among cooperative societies Rivers State. Also, none of the studies reviewed captured the effect of investment and revenues on profitability of fish production, as well as identify the various constraints to fish production. This presents a gap in knowledge and therefore necessitates the need for the present study.

d) Theoretical Framework

The present study will be anchored on the theory of collaboration. Collaboration is a promising mode of human engagement but in order to become more than a passing fad, a theoretical structure and framework are needed to guide individuals and groups toward successful collaboration (John-Steiner, 2002). Conceptually, collaboration is a recursive process where two or more people or organizations work together in an intersection of common goals - for example, an intellectual endeavour that is creative in nature - by sharing knowledge, learning and building consensus. Most collaboration requires leadership, although the form of leadership can be social within a decentralized and egalitarian group. In particular, teams that work collaboratively can obtain greater resources, recognition, and reward when facing competition for finite resources. Collaboration is also present in opposing goals exhibiting the notion of adversarial collaboration, though this is not a common case for using the term.

Collaboration has of recent assumed increasing attention following the advocacy by many for cooperative engagements as a means of solving many global challenges including poverty eradication, growth promotion, and job creation. The need in society to think and work together on issues of critical concern has increased (Austin 2000a; Welch, 1998) shifting the emphasis from individual efforts to group work, from independence to the community (Leonard & Leonard 2001b). In this age of collaboration, the phenomenon is described in a variety of ways: systems (Austin 2000b; Noam 2001), dialogue (Clark et al. 1996; Senge 1990), creative problem solving (John-Steiner 1992), and inter-organizational relationships involved in information technology (Black et al., 2002).

The rationale behind the use of the theory of collaboration is basically to evaluate the credit repayment behaviour of cooperative members. The theory will enhance our understanding and analysis of the reason why farmers endeavour to repay the credits they sourced from their cooperatives. Indeed, members understand that when they repay borrowed funds, it

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affords another member of the collaborative group to have his own access to credit. A cooperative society as conventionally known is an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise (ICA, 1995). Thus, cooperative organizations, including fish farmers' cooperatives have all the attributes of collaborative institutions. Therefore, our knowledge of cooperatives would be enhanced when examined from the perspectives offered by the theory of collaboration.

The theory of collaboration can be used to predict and influence member behaviours, analyse member perceptions of equity, provide an insight into reasons for the cooperative spirit and improve member participation in the cooperative institution, and in particular on why credit productive usage and repayment are prioritized by members.

e) Other Relevant Theories of Profit

i. *The Frictional Theory of Profits*

This theory was propounded by Prof. G.J. Stigler, according to which, there exists a normal rate of profit which is a return on capital that must be paid to the owners of capital as a reward for saving and investment of their funds rather than to consume all their income or hoard them. In a static economy where no unanticipated changes in demand or cost conditions occur, in long-run equilibrium the firms would be earning only normal rate of profit on their capital and entrepreneurial talent.

Under these conditions economic profits would not accrue to the firms. Frictional theory of profit explains that shocks or disturbances occasionally occur in an economy as a result of unanticipated changes in product demand or cost conditions which cause disequilibrium conditions. It is these disequilibrium conditions that brings into existence positive or negative economic profits for some firms. Thus, according to frictional theory, economic profits exist for some time because of frictional factors which prevent an instantaneous adjustment of the system to the new conditions. When economic profits are made in the short run, more firms will enter the industry in the long run until all economic profits are driven down to zero (that is, firms will be making only normal return or profits on their capital investment). On the other hand, when firms are making losses (i.e. negative profits), some firms will leave the industry. This will cause price of the product to rise so that losses are eliminated and the remaining firms make only normal profits.

ii. *Monopoly Theory of Profits*

This theory was propounded by Robinson, J., Chamberlin, E. H. and Kalecki, M. where they associated super-normal profits with monopoly power enjoyed by some firms. According to this theory, firms with monopoly power restrict output and charge higher prices than under perfect competition. This causes above-normal profits to be earned by the monopolistic firms, because of strong barriers to the entry of new firms, monopoly firms can continue to earn economic profits even in the long run. Monopoly power may arise due to sole control over some essential raw material required for the production of a commodity, from economies of scale, from legal sanction or from ownership patents, from Government restrictions on the import of a commodity.

iii. *Innovations Theory of Profits*

This theory was propounded by Joseph Schumpeter. The theory explains that economic profits arise because of successful innovations introduced by the entrepreneurs. According to the theory, the main function of the entrepreneur is to introduce innovations in the economy and profits are reward for his performing this function. Innovation, as used by Schumpeter, has a very wide connotation. Any new measure or policy adopted by an entrepreneur to reduce his cost of production or to increase the demand for his product is an innovation. Thus, innovations can be divided into two categories. First types of innovations are those which reduce cost of production. In this first type of innovations are included the introduction of a new machinery, new and cheaper technique or process of production, exploitation of a new source of raw materials, a new and better method of organising the firm, etc.

Second types of innovations are those which increase the demand for the product. In this category are included the introduction of a new product, a new variety or design of the product, a new and superior method of advertisement, discovery of new markets etc. If an innovation proves successful, that is, if it achieves its aim of either reducing the cost of production or increasing the demand for a product, it will give rise to profits. Profits emerge because due to successful innovations either cost falls below the prevailing price of the product or the entrepreneur is able to sell more and at a better price than before. It is here worth mentioning that profits caused by a particular innovation tend to be competed away as others imitate and also adopt it. An innovation ceases to be new or novel, when others also come to know of it and adopt it. When an entrepreneur introduces a new innovation, he is first in a monopoly position because the new innovation is confined to him only, He therefore makes large profits. When after some time others also adopt it in order to get a share, profits will disappear.

III. Research Methodology

This study is based on the survey and analysis of the profitability of fish production among members of

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cooperative societies in Rivers State, Nigeria. The chapter describes the design of the study, area of the study, population, sample size determination and sampling techniques, the research instrument, and method of data analysis.

a) Research Design

The study used a descriptive survey research design. The choice of this design is because it enables the gathering of data from a large number of respondents who constituted the sample which is representative of the population of interest. The generated data helped to understand better facts and events, give interpretation and explanation as well as make predictions about variables easy. Research design is the framework or plan that is used as a guide in collecting and analysing the data for the study (Baridam, 2001).

b) Area of the Study

The area of the study is Rivers State. Rivers State is one of the 36 states of Nigeria. According to the National Population Commission (NPC, 2006), the State has a population of 5,185,400, making it the sixth most populous state in the country. Its capital is Port Harcourt, which is one of the largest cities in the country and it is economically significant as the centre of Nigeria's oil industry (Demographia, 2016). Rivers State is bounded on the South by the Atlantic Ocean, to the North by Imo, Abia and the Anambra States, to the East by Akwa Ibom State and to the West by Bayelsa and Delta States. It is home to many indigenous ethnic groups, such as Ikwerre, Ibani, Opobo, Okrika, Kalabari, Etche, Ogba, Ogoni, Engenni and others. The inland part of Rivers State consists of tropical rainforest; towards the coast, the typical Niger Delta environment features with many mangrove swamps. The state was named after the many rivers that border its territory, and it was part of the Oil Rivers Protectorate of 1885 to 1893 when it became part of the Niger Coast Protectorate. In 1900 the region was merged with the chartered territories of the Royal Niger Company to form the colony of Southern Nigeria. The State was formed in 1967 with the split of the Eastern Region of Nigeria. Until 1996, the State contained the area which is now in Bayelsa State.

Rivers State currently consists of 23 Local Government Areas, all of which handle local administration under an elected Chairman. The state has maintained its importance as a leading supplier of wealth to the nation for centuries. In 2007 the State ranked 2nd nationwide with a Gross Domestic Product (GDP) of $21.07 billion and per capita income of $3.965m. Rivers is famous for its vast reserves of crude oil and natural gas. It was perhaps the richest and most important section of the African zone of the British Empire. Rivers State has two major oil refineries, two major seaports, airports, and various industrial estates spread across the land. More than 60% of the country's output of crude oil is produced in the State. Other natural resources found within its boundaries are silica sand, glass sand, and clay.

Prior to the discovery of oil in commercial quantity in 1951, agriculture was the primary occupation of the good people of Rivers State. Around the 19th century when the industrial revolution reached its peak in England, the area was then referred to as Oil Rivers Protectorate. This was due to its abundant palm oil and kernel which basically constituted the main revenue source of the country. In a sample survey carried out by the Federal Ministry of Agriculture and Natural Resources, about 40% of the rural inhabitants were committed to farming in 1983. Rivers State is one of the leading states in the production of yam, cassava, cocoyam, maize, rice, and beans. About 39% (760,000 hectares) of the State's total landmass, particularly in the upland area is suitable for cultivation. Major cash crops produced are oil palm products, rubber, coconut, raffia palm, and jute. Other crops grown for food include vegetables, melon, pineapples, mango, pepper, banana, and plantain. The fishing industry is an important sector in Rivers State. Besides being lucrative, fishing is also a favourite activity of many. There are approximately 270 species of fish existing; with many artisanal fishermen in the riverine areas. The State provides valuable seafood such as crabs, oysters, shrimps, and sea snails, among others. Vertebrates like birds, mammals, and reptiles are also found in the region.

c) Population of the Study

The population of the study is 21,282 cooperative members from 206 registered cooperative societies in the state. This data was obtained from the Rivers State Ministry of Agriculture and the State's Department of Cooperative Societies ([RMASDCS], 2018).

d) Sample Size Determination and Sampling Procedure

The sample size of the study is 400 fishermen of cooperative societies. This was generated from the population using Taro Yamane (1967) formula, which is stated thus;

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

Where; n = Sample size

N = Population

e = error of sample $(.05)^2$

1 = unity or constant

Therefore;

$$n = \frac{21282}{1+21282(.05)^2}$$

$$\frac{21282}{1+53.205}$$

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$$\frac{21282}{54.205}$$

n = 392.621

Note: The sample size was adjusted to 400 to avoid having fractions in the allocation of respondents to the 80 selected cooperatives.

Table 3.4.1: Distribution of Selected Respondents by LGAs and their Agric Zones

Selected LGAs & their Agric zones	No of Selected fishery cooperative in LGAs	No of Selected fishermen (5fishermen in each coop.)
Port Harcourt zone (A)		
Okrika	5	5 x 5 = 25
Ogu/Bolo	5	5 x 5 = 25
Port Harcourt Adoni	5 5	5 x 5 = 25 5 x 5 = 25
Degema zone (B)		
Bonny	5	5 x 5 = 25
Asari – Toru	5	5 x 5 = 25
Akuku-Toru Opobo/Nkoro	5 5	5 x 5 = 25 5 x 5 = 25
Ahoada zone (C)		
Ahoada West	5	5 x 5 = 25
Ahoada East	5	5 x 5 = 25
Ogba/Egbema/Ndoni Abua/Odua	5 5	5 x 5 = 25 5 x 5 = 25
Ikwerre zone (D)		
Ikwerre	5	5 x 5 = 25
Etche Omuma Obio-Akpo	5 5 5	5 x 5 = 25 5 x 5 = 25 5 x 5 = 25
Total = 16 LGAs	80 Fishery Coops.	400 fishermen

Source: Field Survey, 2019

You may note that each co-operative society has a minimum of fifteen (15) active members and five members are selected from each co-operative society.

The study adopted multistage sampling techniques. Stage one involved the selection of 16 out of the 23 LGAs in the state. The selection and choice of the 16 LGAs were purposive, based on the advice of the Rivers State Fisheries Department, due to the high concentration of fishing activities and accessibility of the fishing communities in the LGAs. In stage two, the five most viable fishery cooperative societies in each LGA were also purposively selected based on their 2018 revenue figures (RMASDCS, 2018). This gave a total of 80 cooperative societies. Finally, the researcher used a simple random sampling procedure to select five fishermen from each of the selected cooperative societies totalling 400 which served as the study sample.

e) Sources of Data

Data were collected through primary and secondary sources. The primary source was based on structured questionnaire. On the other hand, the secondary information was from textbooks, journals, conference papers, and internet publications.

f) Method of Data Collection

Data were collected through a structured questionnaire that was designed for this purpose. Copies of the questionnaire were distributed to the 400 cooperative fishermen who served as the sample. The questionnaire has three sections. Section A contains socioeconomic information about the respondents, while section B focus on data relating to fishery investments, fish output, revenue, cost of production and overhead cost. Section C obtained information relating to fish production constraints that affect the members.

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Fishery production constraints were identified and assessed through the use of five-point Likert scale types that ranged from 'Very severe' with a score of 5; 'severe '= 4; undecided = 3; 'not severe' = 2; to 'not very severe '= 1. A factor is considered severe when it's mean score ≥ 3.00 and otherwise if it was ≤ 3.00. The weighted score of 3.00 was determined as follows: [(5+4+3+2+1) ÷5].

The instrument was administered by the researcher and four research assistants.

g) Validation of the Research Instrument

The questionnaire was validated (face and content) by issuing copies to the measurement and research specialists at the Faculties of Education and Management Sciences, Nnamdi Azikiwe University, Awka for their comments and suggestions. Their views on the extent to which the items addressed the issues of interest in the research were taken into consideration and necessary modifications made on the questionnaire.

h) Reliability of the Instrument

The reliability of the research instrument was verified by distributing twenty copies of the questionnaire to twenty members of a fishery cooperative in Port Harcourt Municipal Council for them to complete and return. The completed forms were thereafter subjected to Cronbach Analysis. A Cronbach Alpha of 0.848 (Table 3.1) was obtained, thereby attesting to the reliability of the research instrument.

Table 3.1: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.848	0.863	32

Source: survey data, 2018.

i) Tools of Data Analysis

Data obtained from respondents were analysed using the descriptive statistics such as frequency distribution, means, percentages, and tables. The cost-return analysis was undertaken to determine the profitability of fish production in the area. In addition, inferential statistics such as regression analysis was employed to address and test the postulated hypotheses.

j) Cost and Return Analysis

Cost and return analysis were carried out to assess the profitability of fish production by the respondents. The procedure involves the determination of gross margin, return to fishery investment by respondents and operating ratio.

Gross margin is the difference between the gross value of fish revenue (GFR) and the Total Variable Cost (TVC). Gross margin is a useful planning tool in situations where fixed capital is just a negligible portion of the farming enterprises (Olukosi, Isitor & Ode, 2006; Omotesho, Falola, Muhammad-Lawal & Oyeyemi, 2012).

GM = GFR – TVC

Where

GM = Gross Margin,

GFR = Gross Fish Revenue (gross value of fish output in Naira),

TVC = Total Variable Cost in Naira.

Operating Ratio is directly related to the farm variable input usage (Okeowo, Agunbiade&Odeyem, 1999). The lower the value of OR, the higher the profitability of fish business.

OR = TOC/GFR

Where

OR = Operating Ratio,

TOC = Total Operating Cost in Naira and

GFR = As earlier defined

Return to Fishery Investment is defined as gross margin divided by total variable cost

RFI = GM/TVC

Where

RFI = Return to fishery investments

GM = as earlier defined, and

TVC = as earlier defined

Multiple Regression Analysis

Two multiple regression models of the Ordinary Least Square (OLS) type were used to analyse the extent to which members' socio-economic characteristics influence profit margin, and to analyse the effect of fish production constraints on profit margin. The choice of the OLS technique is built on the premise that OLS among other estimators is efficient such that it provides the study with unique estimates of the

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parameters of economic relationship that have the smallest standard errors. The OLS method is also unique and simple, and is preferred to other estimators because of its properties of Best, Linear and Unbiased Estimates (BLUE) and consistency.

The necessary models in ii above are functionally specified as:

$$PM = f(AG, GD, ED, LM, IV, TI) \quad \text{Equation 1}$$

$$PM = f(FI, SC, SP, SF, PC, PS, OP) \quad \text{Equation 2}$$

Independent Variables are:

AG = Age of the member in years
GD = Gender (Dummy: 1 = male, 0 = female)
ED = Educational level attained in years
LM = Length of membership in cooperative in years
IV = Total investment in Naira in 2018
TI = Total income of member in Naira in 2018
FI = High cost of fishing inputs (Mean rating)
SC = Lack of sufficient capital (Mean rating)
SP = Storage problems (Mean rating)
SF = Spoilage of fish (Mean rating)
PC = Poor catch (Mean rating).
PS = Poor sales
OP = Oil/industrial pollution

For all the equations above we assumed that there are approximately linear relationships between the dependent variables and the independent variables. Therefore, equations 1 and 2 are explicitly specified as:

$$PM = \alpha + \beta_1 AG + \beta_2 GD + \beta_3 ED + \beta_4 LM + \beta_5 LC + \beta_6 TI + \varepsilon \quad \text{.Equation 3}$$

$$PM = \alpha + \beta_1 FI + \beta_2 SC + \beta_3 SP + \beta_4 SF + \beta_5 PC + \beta_6 PS + \beta_7 OP + \varepsilon \quad \text{.Equation 4}$$

where α = intercept term showing the value of y when each of the values of the independent variables is zero. That is, the value of the dependent variable in each of the equations is predicted to have when all the independent variables are equal to zero.

b_1 *to* b_7 = the coefficients or multipliers that describe the size of the effect the independent variables are having on the dependent variable y.

The tests of hypotheses were accomplished through an examination of the t-statistics and F-ratios of the multiple regression estimates and the decision rule was based on the 5% level of significance.

All the calculations and estimations of the regression models will be done using version 25 of the Statistical Package for Social Sciences (SPSS).

IV. Data Presentation, Analysis and Discussion of Findings

This section is dedicated to the presentation, analysis and discussion of findings based on data collected from the field study, using descriptive and inferential statistical methods. The data were analysed, and presented on the basis of the objectives earlier formulated for the study. This chapter is discussed under different subsections such as socioeconomic characteristics of the cooperative fish farmers in Rivers State; profitability of fish business among cooperative fish farmers in Rivers State; influence of fishery investments and revenues on the profit of the fish farmers in Rivers State; influence of members' socio-economic characteristics on the profit of the fish farmers in Rivers State, as well as the effect of fish production constraints on the profit of fish farmers in Rivers State.

a) Data Presentation and Analysis

In carrying out the field survey, a total of 400 questionnaires were distributed to randomly selected cooperative fish farmers in Rivers state. The data for analysis were retrieved from 400 valid respondents which is 100% return-rate. The data collected were analysed using SPSS version 25 presented below.

i. *Socioeconomic Characteristics of Cooperative Fish Farmers*

It is part of the objectives of this study to examine the socioeconomic characteristics of

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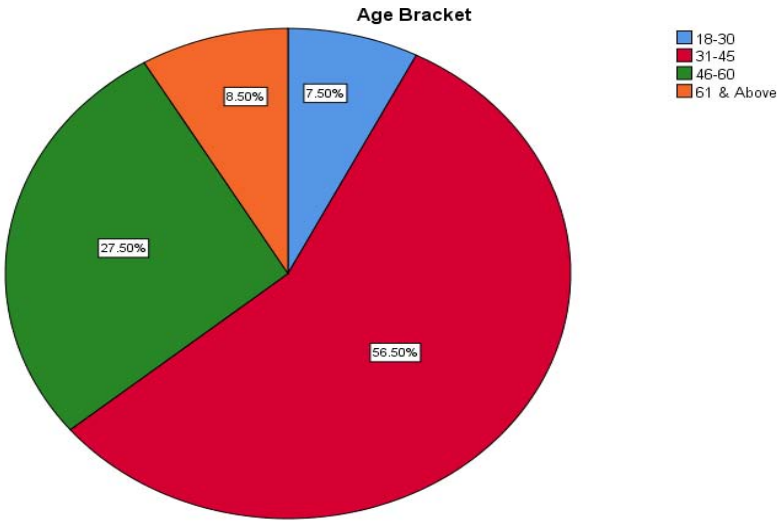
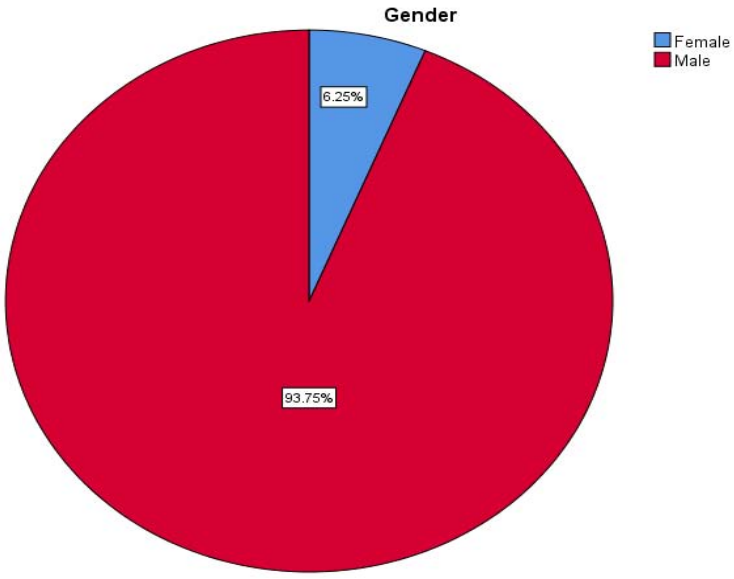
cooperative fish farmers in Rivers State. In this subsection, we present, with the aid of charts, the distribution of respondents by age group, gender, marital status, educational attainment, years in fishing, years in cooperative and income group.



Source: Author's Computation from the Field Study (2019)

Figure 4.1: Distribution of Respondents by Age Bracket (%)

Fig. 4.1 shows the distribution of the respondents by age bracket. Majority of the respondents, that is, 226 (56.5%) of the cooperative fish farmers are between the ages of 31 - 45 years old, while about 110 (27.5%) of them are between 46 - 60 years old. Few cooperative fish famers, that is, 34 (8.5%) are between 18 - 30 years, while those above 61 years old are just 30 (7.5%) of the respondents. The age bracket level between 31 – 60 years has the highest number of cooperative fish farmers, implying that 84% of the total sampled cooperative fish farmers are predominantly middle aged. These age groups are known to be energetic and economically active. The implication is that a large percentage of farmers in this sector agriculture are economically active and possibly contribute maximally to the growth of the sector in Rivers State.



Source: Author's Computation from the Field Study (2019)

Figure 4.2: Distribution of Respondents by Gender (%)

Fig. 4.2 shows the distribution of respondents by gender. Expectedly, majority of cooperative fish farmers, that is, 375 (93.75) are male, while very few of them, 25 (6.25%) are female. Therefore, fish farming in Rivers state is predominantly the male activity sector.

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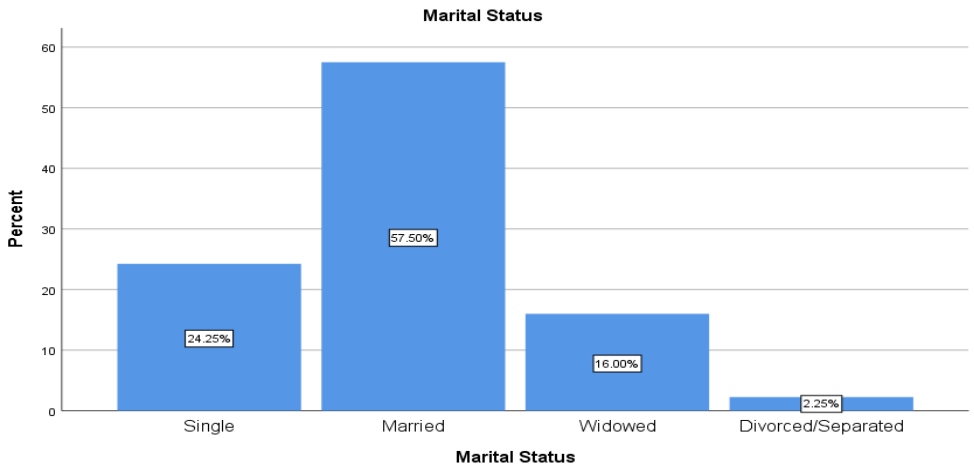
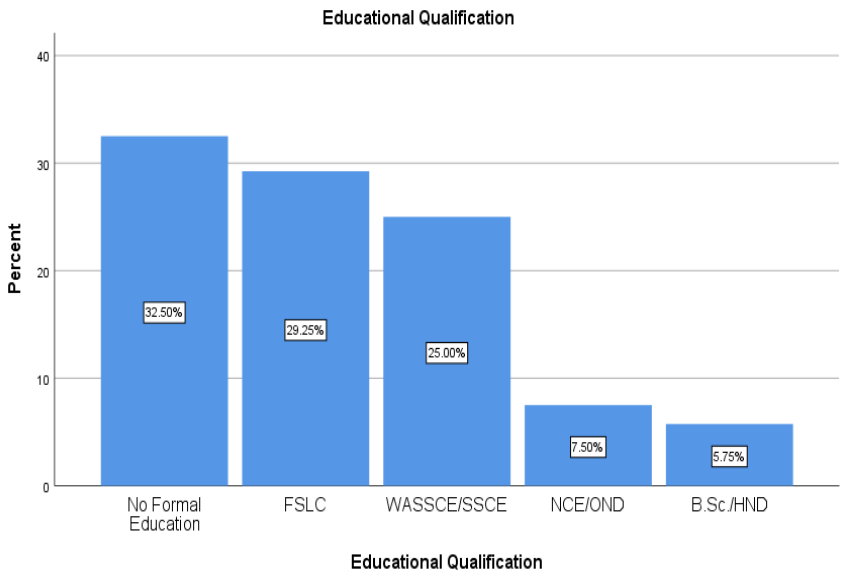


Source: Author's Computation from the Field Study (2019)

Figure 4.3: Distribution of Respondents by Marital Status (%)

Figure 4.3 provides information on the marital status of the respondents. Among the cooperative fish farmers, 97 (24.25%) are single, 230 (57.5%) are married, 64 (16%) are widowed, while 9 respondents, representing 2.25% are either divorced or separated persons. It was observed that majority of the respondents are married, implying that cooperative fish farmers have to combine running their fishing business with taking care of their various households.



Source: Author's Computation from the Field Study (2019

Figure 4.4: Distribution of Respondents by Education Attainment (%)

Fig. 4.4 shows the classification of the respondents according to the level of their educational qualifications. The survey revealed that among the cooperative fish farmers, 130 (representing 32.5%) had no formal education, 117 (representing 29.25%) had basic primary education, 100 (25%) had completed secondary education, some of the cooperative fish farmers, 30 (7.5%) had advanced level (A' Level) certificates like NCE/OND, while the remaining 23 (5.75%) had tertiary education. This shows that the respondents to a large extent are illiterates since 247 representing 61.75% of the respondents are either with no formal education or had only the basic primary education, while the remaining 153 cooperative fish farmers representing 38.25% had either secondary education, advanced or tertiary education. The distribution shows that most of the cooperative fish farmers did not attain higher level of education.

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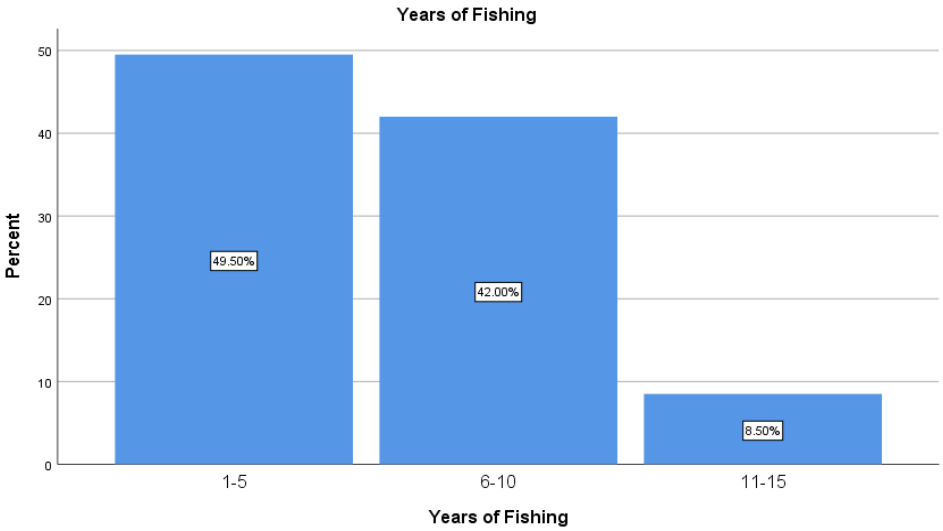
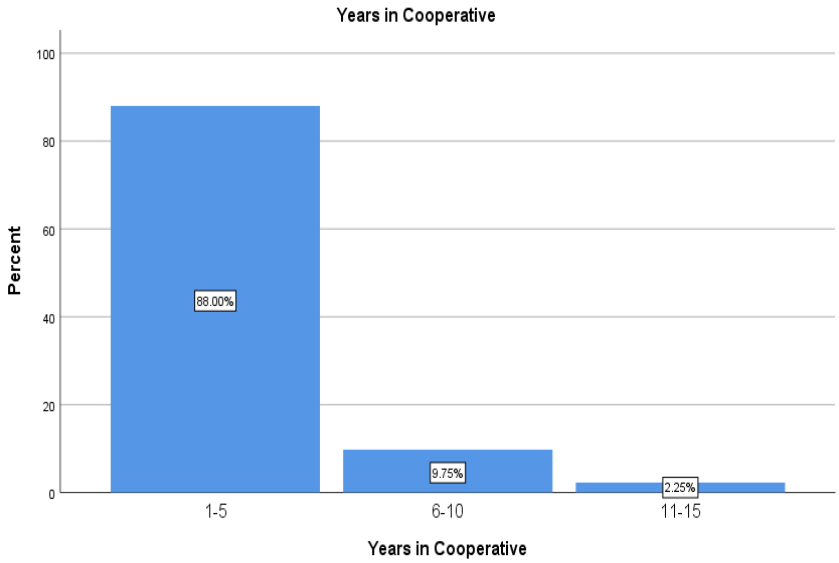


Source: Author's Computation from the Field Study (2019)

Figure 4.5: Distribution of Respondents by Years in Fishing

Fig. 4.5 shows the distribution of respondents based on years in fishing business. It was gathered that 198, representing 49.5% of the cooperative fish farmers have spent from 1 – 5 years in the business, while 168 (42%) cooperative fish farmers have been in the business from 6 – 10 years. The figure also shows that very few cooperative fish farmers, 34, representing 8.5% of the total have spent 11 – 15 years in the business. It could be inferred that majority 91.5% (366) of the cooperative fish farmers have spent 1 – 10 years in the business. This suggests that most of the cooperative fish farmers have, on the average, 5 years' experience in fishing business in the state.



Source: Author's Computation from the Field Study (2019)

Figure 4.6: Distribution of Respondents by Years in Cooperative

Fig. 4.6 shows the distribution of the respondents by years in cooperative. As shown in the figure, majority of the fish farmers, 352 (88%) have spent 1 – 5 years in cooperative, while 39 fish farmers, representing 9.75% have spent 6 – 10 years in cooperative. It was also found that very few fish farmers, 9 (2.25%) have spent 11 – 15 years in cooperative. This suggests that majority of the fish farmers have 1 – 5 years cooperative membership.

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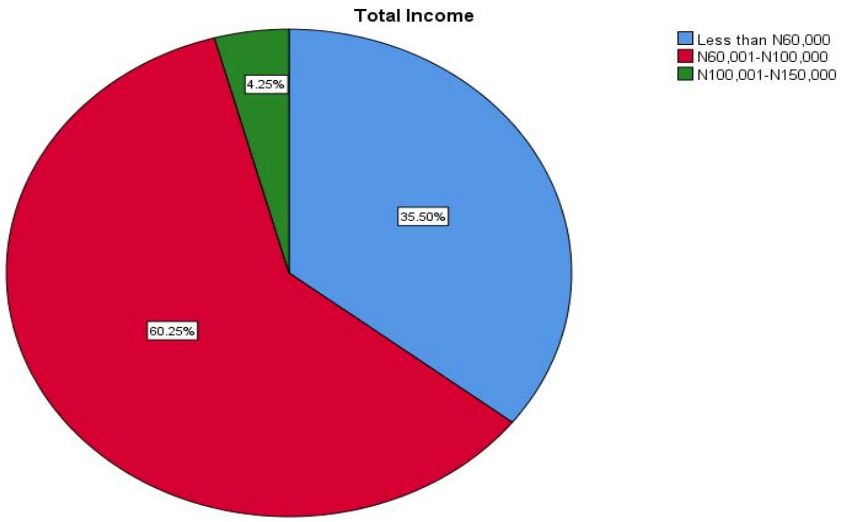
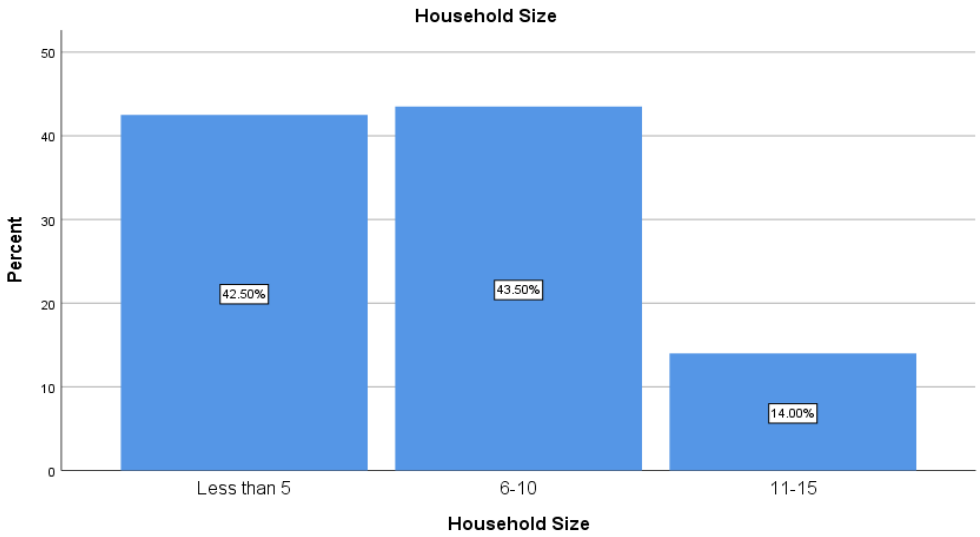


Source: Author's Computation from the Field Study (2019)

Figure 4.7: Distribution of Respondents by Income Group

Fig. 4.7 shows the distribution of the respondents by monthly income group. It is evident that majority of the cooperative fish farmers, 241 (60.25%) belong to the income group that earn N60,001 – N100,000 per month. This is followed by 142 (35.5%) cooperative fish farmers who earn less than N60,000 monthly income. It was gathered that very few cooperative fish farmers, 17 representing 4.25% of the total earn between N100,001 and N150,000 per month. It could be inferred that majority of the cooperative fish farmers earn less than N100,000 per month, meaning that most of the cooperative fish farmers belong to the middle-income group.



Source: Author's Computation from the Field Study (2019)

Figure 4.8: Distribution of Respondents by Household Size

Fig. 4.8 presents the distribution of the respondents by household size. As shown in the figure, 170 representing 42.5% of the cooperative fish farmers have family size less 5 persons, while 174 representing 43.5% are in the household of between 6 and 10 persons, and only few cooperative fish farmers belong to the household of 11 – 15 persons. Thus, majority of the cooperative fish farmers have household size less than 10 persons.

ii. *Profitability of Fish Business among Cooperative Fish Farmers in Rivers State*

One of the major objectives (second objective) of this study is to determine the profitability of fish business among cooperative fish farmers in Rivers State. As earlier outlined in the previous chapter, cost and return analysis was used for this purpose, and this is based on obtaining that gross margin (difference between the gross fishery revenue and total variable

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cost), return to fish investment and operating ratio (ratio of total operating cost to gross fish revenue).

$$GM = GFR - TVC = 475,279,000 - 119,072,500 = 356,206,500$$

$$OR = TOC/GFR = 150,822,500/475,279,000 = 0.32$$

$$RFI = GM/TVC = 356,206,500/119,072,500 = 2.99$$

Based on the calculation above, it could be inferred that fish business among cooperative in Rivers State is highly profitable. This is because the coefficient of the Operating Ratio (OR) which is defined by the ratio of the Total Operating Cost (TOC) to Gross Fishery Revenue (GFR) is significantly less than 1 (i.e. $0.32 < 1$). As a confirmatory analysis, this finding was supported by the coefficient of the Return to Fish Investment (RFI) which is defined by the ratio of the Gross Margin to Total Variable Cost (TVC) that is significantly greater than 1 (i.e. $2.99 > 1$).

iii. *Results of Multiple Regression Analyses*

As part of the objectives of this study, the Ordinary Least Squares (OLS) regression was carried out to determine: (i) the influence of fishery investments and revenues, as well as the members' socio-economic characteristics on the profit of the fish farmers in Rivers state (see results in Table 4.1), and (ii) the effect of fish production constraints on the profit of the fish farmers in Rivers state (see results in Table 4.2). This was done in two distinct multiple regression models using SPSS version 25 as reported in Tables 4.1 and 4.2. The OLS results in Tables 4.1 and 4.2 are considered robust and do not suffer any econometric problem such as autocorrelation, heteroskedasticity, multicollinearity and weak explanatory powers. This is because the estimated models each has considerably high coefficient of determination, defined by the values of the R-squared and Adjusted R-squared. The R-squared measures how well the actual data is fitted to the specified model which translates to goodness of fit, as well as the percentage of total variations in the dependent variable that was accounted for by variations in the independent variables. The Durbin-Watson statistic is another important test-statistic for estimated model diagnostic and justification. This test-statistic is used to test for the presence of serial correlation problem (autocorrelation) in an estimated model. One of the assumptions of the OLS technique is that the residuals of the estimated model are not serially correlated, meaning that the violation of this assumption implies that an estimated model may not be relied upon for drawing inferences.

In the case of this study, the values of the R-squared for the estimated models in Tables 4.1 and 4.2 are 0.803 and 0.743 respectively, meaning that the explanatory variables accounted for about 80.3% (see Table 4.1) and 74.3% (see Table 4.2) of the total variations in the dependent variable (profit margin). This is an evidence of a good fit in each model which implies that the estimated models are robust for making inferences. Additionally, the values of Durbin-Watson (DW) statistic for the two models (2.069 for Table 4.1 and 1.885 for Table 4.2) were satisfactory and suggestive of no autocorrelation in the estimated models. This is because both 2.069 and 1.885 are proximate to 2, and a DW value of 2 means absence of autocorrelation in the residuals of the estimated model. This also suggests that the estimated models are robust for prediction and forecasting. Thus, we can safely report the estimated coefficients in line with the objectives of the study.

Table 4.1: OLS Regression for Equation 3

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-181735.673	62191.026		-2.922	.004
	Age Bracket	6441.454	638.450	.015	10.089	.000
	Gender	1798.938	21659.483	.002	.083	.934
	Educational Qualification	694.378	371.799	.002	1.868	.064
	Years in Cooperative	3481.116	9735.325	.008	.358	.721
	Total Investment	.035	.010	.020	35.867	.000
	Total Income	18223.032	1373.671	.030	13.266	.000
	Total Revenue (Sales)	.942	.024	.897	39.573	.000

a. Dependent Variable: Profit Margin

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Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.896[a]	.803	.800	214584.331	2.069

a. Predictors: (Constant), Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income
b. Dependent Variable: Profit Margin

Source: Author's Computation using SPSS 25

iv. *Influence of Fishery Investments and Revenues on Profit of Cooperative Fish Farmers*

The third objective of this study is to examine the influence of fishery investment and revenues on profit cooperative fish farmers in Rivers State. With regards to Table 4.1, the standardized coefficients of total investment and total revenue were 0.020 and 0.897 respectively. These coefficients were both positive and statistically significant at 5% since their p-values were both less than 0.05. This suggests that more investment in fish business would significantly result to more profit to the cooperative fish farmers in Rivers State, and more revenue from fish business leads to more profit in the state. The implications of these findings are that those who invest more on fish business have higher profit than those who invest less, and similarly, those who make higher revenue also have higher profit margin. Thus, any policy action of the Rivers State government geared towards encouraging more investment and revenue from fishery business is expected to translate to more profit to cooperative fish farmers in the state.

v. *Influence of Members' Socioeconomic Characteristics on Profit of Fish Farmers*

The fourth objective of this study is to evaluate the influence of cooperative members' socioeconomic characteristics on profit of the fish farmers in Rivers State. The relevant socioeconomic characteristics for this purpose are age, gender, educational level and length of cooperative membership (years in cooperative). The results in Table 4.1 show that all the aforementioned socioeconomic characteristics of cooperative fish farmers have positive coefficients, meaning that they all relate positively with profit margin. However, only the age bracket is statistically significant at the 5% level since its p-value is less than 0.05. The positive influence of age of members on their profit margin is theoretically meaningful since older farmers have more experience in the business and are more likely to learn from past experiences and tend to take correct their past mistakes for a better performance. Other socioeconomic attributes of cooperative fish farmers such as gender, educational qualification and years in cooperative have positive, but not significant determinants of the level of profit margin for the cooperative fish farmers in Rivers state. Thus, age bracket is the only socioeconomic attribute of the cooperative fish farmers that positively and significantly influence their profit margin in the state.

vii. *Effect of Fish Production Constraints on the Profit of Fish Farmers in Rivers State.*

The fifth and last objective of this study is to ascertain the effect of fish production constraints on the profit of fish farmers in Rivers state. Based on field survey, the study identifies high cost of fishing inputs, lack of sufficient capital, storage problem, spoilage of fish, poor catch and oil/industrial pollution as the major fish production constraints to the cooperative fish farmers in the state. In order to draw meaningful conclusions regarding the significance of the aforementioned fish production constraints, a model of the profit margin of the cooperative fish farmers was specified and estimated as a function of these constraints and the results are reported in Table 4.2.

Table 4.2: OLS Regression for Equation 4

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1037134.155	223487.712		4.641	.000
	High cost of fishing inputs	-22620.738	1655.644	-.069	-13.663	.000
	Lack of sufficient capital	-19938.986	8772.599	-.035	-2.273	.039
	Storage problems	-7100.295	21716.166	-.016	-.327	.744
	Spoilage of fish	-22475.463	16597.594	-.068	-1.354	.176
	Poor catch	-6686.288	2082.166	-.016	-3.211	.003
	Poor sales	-35045.332	2158.999	-.082	-16.232	.000
	Oil/Industrial pollution	-52260.682	2945.772	-.089	-17.741	.000

a. Dependent Variable: Profit Margin

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Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.862[a]	.743	.722	477194.145	1.885

a. Predictors: (Constant), Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch

b. Dependent Variable: Profit Margin

Source: Author's Computation using SPSS 25

As shown in Table 4.2, all the identified fish production constraints have negative effect on the profit of the cooperative fish farmers and this is consistent with the theoretical expectation of the study, meaning that the more these constraints persist, the lesser the profit accruable to the cooperative fish farmers in the state. Also, with the exception of storage problems and spoilage of fish, the rest of the constraints are individually statistically significant at the 5% level of significance. This suggests that storage problems and spoilage of fish are not serious constraints to fish production among cooperative fish farmers in the state. Therefore, fish production among cooperative fish farmers are significantly constrained by factors such as high cost of fishing inputs, lack of sufficient capital, poor catch, poor sales, and oil/industrial pollution in Rivers State.

b) Evaluation of Research Hypotheses

In the beginning of this study, some testable hypotheses were formulated to guide the study towards addressing the research problems. In this subsection, we evaluate these hypotheses based on the results of empirical investigation presented earlier.

H_0: Fish business does not significantly generate profit to cooperative fish farmers in Rivers State.

H_1: Fish business significantly generates profit to cooperative fish farmers in Rivers State.

Based on the result from the Cost and Return Analysis, the coefficient of OR and RFI were 0.32 and 2.99 respectively. Recall that when the value of OR is small and reasonably less than one, we conclude in favour of high profitability of the business and vice versa. On the other hand, when the value of RFI is greater than one, we conclude in favour of high profitability of the business. In the case of this study, we therefore reject the null hypothesis, and conclude that fish business significantly generates profit to cooperative fish farmers in Rivers State.

H_0: Fishery investments and revenues have no significant influence on profit margin in Rivers State.

H_1: Fishery investments and revenues have a significant influence on profit margin in Rivers State.

With regards to Table 4.1, it was found that the coefficients of fishery investment and revenues are positive and statistically significant at the 5% level of significance since their corresponding p-values are less than 0.05. Thus, we reject the null hypothesis and conclude that fishery investment and revenues have a significant influence on profit margin in Rivers State.

H_0: Members' socio-economic characteristics do not have a significant effect on profit margin in Rivers State.

H_1: Members' socio-economic characteristics have a significant effect on profit margin in Rivers State.

Following from the results in Table 4.1, only the coefficient of age of members is statistically significant at the 5% level, while the coefficients of other members' socioeconomic characteristics are statistically insignificant at the 5% level of significance. Thus, we could not reject the null hypothesis that members' socioeconomic characteristics do not have a significant effect on profit margin, rather we posit that only age bracket of members have a significant effect on their profit margin, while other socioeconomic attributes do not have a significant effect on profit margin in the State.

H_0: Fish production constraints do not have a significant effect on profit margin in Rivers State.

H_1: Fish production constraints have a significant effect on profit margin in Rivers State.

With reference to the results in Table 4.2, all fish production constraints as revealed by the cooperative fish farmers have a significant effect on profit margin, except storage problems and spoilage of fish. Thus, we reject the null hypothesis and conclude that fish production constraints such as high cost of fishing inputs, lack of sufficient capital, poor catch, poor sales, and oil/industrial pollution have a significant effect on profit margin in Rivers State.

c) Discussion of Findings

This study empirically examined the profitability of fish production among cooperative fish farmers in Rivers State. Based on data from field survey, the study employed Cost and Return Analysis to determine the profitability of fish production, as well as descriptive (charts) and inferential (OLS regression) statistical methods to determine the influence of fishery investments and revenues on the profit of the fish farmers; the influence of members' socio-economic characteristics on the profit of the fish farmers, as well as the effect of fish production constraints on the profit of fish farmers in Rivers state.

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The results of the socioeconomic characteristics of the cooperative fish farmers, using descriptive method, show that majority of them (84%) are of middle age. This finding is consistent with the finding by Busari (2018) who concluded that majority of aquaculture farmers in Olorunda local government area of Osun State, Nigeria was middle-aged. The study also found that majority (93.75%) of the cooperative fish farmers in Rivers State is male. This finding also supports that of Dambatta, et al. (2016) who concluded that fishing is a male dominated venture. Consistent with the finding by Busari (2018) that majority of aquaculture farmers are married males, the study revealed that majority (57.5%) of the cooperative fish farmers, who are mostly male, are married persons. It was also discovered that majority of the cooperative fish farmers do not have formal education, while some of them have either primary or secondary education, and very few have tertiary. While this finding supports that of Agu-Aguiyi, et al. (2018), it stands in contrast to that of Adewuyi, et al. (2010) who disclosed that a large proportion (68%) of fish farmers in Ogun State have formal (tertiary) education. The study further revealed that majority (91.5%) of the cooperative fish farmers have spent 1 – 10 years in the business, while majority (88%) of them have spent 1 – 5 years in cooperatives.

The result of the Cost and Return Analysis led to the rejection of the null hypothesis that fish business does not significantly generate profit to cooperative fish farmers in Rivers State. Hence, the study concludes that fish business in Rivers is a highly profitable venture. This conclusion stands in supports of the finding by Raufu, et al. (2009); Awoyemi and Ajiboye (2011); Kassli, et al. (2011); Adewumi, et al. (2012); Adeogun, et al. (2012); Aheto, et al. (2012); Olaoye, et al. (2013); Iheke and Nwagbara (2014); Issa, et al. (2014); Okpeke and Akarue (2015); and Tunde, et al. (2015) whose conclusions affirmed the profitability of fish business in their respective case studies. This finding underscores the need to encourage fish production among cooperative fish farmers in Rivers State.

The OLS regression results revealed that fishery investment and revenues have significant positive influence on profit margin, implying that more investment and revenues would bring about more profit to the cooperative fish farmers in Rivers State. This led to the rejection of the null hypothesis that fishery investment and revenue do not significantly influence the profit margin. Incidentally, none of the previous studies reviewed had any information regarding the influence of fishery investment and revenue on profit margin, and this is another way this study has contributed to knowledge. The implication of this finding is that if investment in fish business is encouraged by the government, then the cooperative fish farmers would make more profit. On the other hand, higher revenue can be made possible through the creation of market for fish farmers by the government. Thus, the cooperative fish farmers are expected to make more profit when they make higher revenues.

The study could not totally reject the null hypothesis that members' socioeconomic characteristics do not significantly influence profit margin, rather the study posits that only the age bracket of members influences profit margin. In other words, ages of cooperative members has positive and significant effect on profit margin. This finding seems not peculiar to us as it is theoretically plausible to note that the older the cooperative fish famer, the more experienced he becomes, and tends to adjust his operations based on past mistakes. Thus, the more experienced cooperative fish farmers are more likely to perform better than those with less experience and new to the business. This information was not captured in the previous studies as reviewed in this study, and thus forms another contribution to knowledge by this study.

In determining the major fish production constraints, the study found that high cost of fishing inputs; lack of sufficient capital; poor catch; poor sales, and oil/industrial pollution are the major fish production constraints in Rivers State. High cost of inputs has always been a problem to virtually every business in Nigeria. Even Busari (2018) concluded in affirmative that the cost of fingerlings and pond maintenance were significant determinants of gross margin from homestead aquaculture in Olorunda local government area, Osun State, Nigeria. Lack of sufficient capital had been a major problem of both small and medium-scale businesses around the world, and in the case of this study, lack of sufficient capital has significant negative effect on profit margin. This implies that the cooperative fish farmers are severely constrained by lack of sufficient capital, meaning that if the government of Rivers State can make provision for low-interest credit facilities, the cooperative fish farmers would make more profits. Poor catch and poor sales are serious impediment to the ability of the cooperative fish farmers to maximize profit. This could be due to lack of adequate fishing instruments that will facilitate their catches, as well as poor market for their products due to higher prices. Another serious constraint to fish production in Rivers state is oil/industrial pollution. It is in no doubt that Rivers State is a place of strong industrial and oil production activities which tend to spill over to those Rivers where fishing activities are taking place. Pollution, especially from oil spillage and industrial gas emission, could be poisonous to fishes in the river and tend to kill and reduce their sizes, leading to scarcity of fishes, and hence the poor catch. Incidentally, the previous studies as reviewed in this study did not capture the effect of other fish production constraints on profit margin, except for the high cost of inputs found in Busari (2018).

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V. Summary of Findings, Conclusion and Recommendations

This section summarizes the main findings of the study followed by the conclusion and the recommendations which is drawn from the findings.

a) Summary of Findings

The main aim of this study is to evaluate the profitability of fish production among cooperative fish farmers in Rivers State, Nigeria. Some specific objectives were stated such as to: analyse the socioeconomic characteristics of the cooperative fish farmers; determine the profitability of fish business among cooperative fish farmers; examine the influence of fishery investments and revenues on the profit of the fish farmers; evaluate the influence of members' socio-economic characteristics on the profit of the fish farmers, as well as to determine the effect of fish production constraints on the profit of fish farmers in Rivers state. In line with these objectives, some testable hypotheses were formulated to guide the study towards addressing the research questions.

The study made adequate review of conceptual, theoretical and empirical literature from where the knowledge gaps were identified, as well as gaining useful insights into the core issues around the subject matter. The study is based on survey research design where data were collected through primary source using questionnaire as the instrument of data collection. A total of 400 copies of questionnaire were distributed to cooperative fish farmers in 16 LGAs of 4 agric zones in Rivers State. Based on data from field survey, the study employed Cost and Return Analysis to determine the profitability of fish production, as well as descriptive (charts) and inferential (OLS regression) statistical methods to analyse data in line with the objectives of the study. On the course of this study, the following findings were made:

Majority of cooperative fish farmers in Rivers State are male (93.75%), who are in their middle age (84%), married (57.5%) but mostly illiterates (with no formal education or have only primary education), and have spent between 6-10 years in fishing business and 1-5 years in cooperatives.

Majority (60.25%) of the cooperative fish farmers earn between N60,001 – N100,000 per month from the fishing business.

The profitability analysis based on Cost and Return Analysis revealed that fish production among cooperatives fish farmers is a profitable venture.

Fishery investment and revenues contribute positively to the profit of cooperative fish farmers in Rivers State.

Older cooperative fish farmers are more likely to earn more profit than the younger ones in Rivers State.

High cost of fishing inputs; lack of sufficient capital; poor catch; poor sales, and oil/industrial pollution are the major fish production constraints in Rivers State.

VI. Conclusion

The study examined the profitability of fish production among cooperative fish farmers in Rivers State, Nigeria. Some specific objectives were stated such as to: analyse the socioeconomic characteristics of the cooperative fish farmers; determine the profitability of fish business among cooperative fish farmers; examine the influence of fishery investments and revenues on the profit of the fish farmers; evaluate the influence of members' socio-economic characteristics on the profit of the fish farmers, as well as to determine the effect of fish production constraints on the profit of fish farmers in Rivers state. The study is based on survey research design where data were collected through the primary source using questionnaire as the instrument of data collection. A total of 400 copies of questionnaire were distributed to cooperative fish farmers in 16 LGAs of 4 agricultural zones in Rivers State. Based on data from field survey, the study employed Cost and Return Analysis to determine the profitability of fish production, as well as descriptive (charts) and inferential (OLS regression) statistical methods to analyse data in line with the objectives of the study. Based on its findings, the study concludes that majority of cooperative fish farmers in Rivers state are male, who are in their middle age, married but mostly illiterates with either no formal education or have only primary education, and have spent between 6-10 years in fishing business and 1-5 years in cooperatives; fish production among cooperatives fish farmers is a profitable venture in Rivers state; fishery investment and revenues contribute positively to the profit of cooperative fish farmers in the state, and high cost of fishing inputs; lack of sufficient capital; poor catch; poor sales, and oil/industrial pollution are the major fish production constraints in Rivers State.

VII. Recommendations

Based on the findings of this study, the following recommendations are proffered:

Fish production by the cooperative fish farmers is a profitable venture where farmers earn between N60,001 and N100,000 per month, averaging The instrument was administered by the researcher and four research assistants.

a) Validation of the Research Instrument

The questionnaire was validated (face and content) by issuing copies to the measurement and research specialists at the Faculties of Education and Management Sciences, Nnamdi Azikiwe University, Awka for their comments and suggestions. Their views on the extent to which the items addressed the issues of

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interest in the research were taken into consideration and necessary modifications made on the questionnaire.

b) Reliability of the Instrument

The reliability of the research instrument was verified by distributing twenty copies of the questionnaire to twenty members of a fishery cooperative in Port Harcourt Municipal Council for them to complete and return. The completed forms were thereafter subjected to Cronbach Analysis. A Cronbach Alpha of 0.848 (Table 3.1) was obtained, thereby attesting to the reliability of the research instrument.

Table 3.1: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.848	0.863	32

Source: survey data, 2018.

c) Tools of Data Analysis

Data obtained from respondents were analysed using the descriptive statistics such as frequency distribution, means, percentages, and tables. The cost-return analysis was undertaken to determine the profitability of fish production in the area. In addition, inferential statistics such as regression analysis was employed to address and test the postulated hypotheses.

d) Cost and Return Analysis

Cost and return analysis were carried out to assess the profitability of fish production by the respondents. The procedure involves the determination of gross margin, return to fishery investment by respondents and operating ratio.

Gross margin is the difference between the gross value of fish revenue (GFR) and the Total Variable Cost (TVC). Gross margin is a useful planning tool in situations where fixed capital is just a negligible portion of the farming enterprises (Olukosi, Isitor& Ode, 2006; Omotesho, Falola, Muhammad-Lawal & Oyeyemi, 2012).

GM = GFR – TVC
Where
GM = Gross Margin,
GFR = Gross Fish Revenue (gross value of fish output in Naira),
TVC = Total Variable Cost in Naira.

Operating Ratio is directly related to the farm variable input usage (Okeowo, Agunbiade & Odeyem, 1999). The lower the value of OR, the higher the profitability of fish business.

OR = TOC/GFR
Where
OR = Operating Ratio,
TOC = Total Operating Cost in Naira and
GFR = As earlier defined

Return to Fishery Investment is defined as gross margin divided by total variable cost

RFI = GM/TVC
Where
RFI = Return to fishery investments
GM = as earlier defined, and
TVC = as earlier defined

Multiple Regression Analysis

Two multiple regression models of the Ordinary Least Square (OLS) type were used to analyse the extent to which members' socio-economic characteristics influence profit margin, and to analyse the effect of fish production constraints on profit margin. The choice of the OLS technique is built on the premise that OLS among other estimators is efficient such that it provides the study with unique estimates of the parameters of economic relationship that have the smallest standard errors. The OLS method is also unique and simple, and is preferred to other estimators because of its properties of Best, Linear and Unbiased Estimates (BLUE) and consistency.

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The necessary models in ii above are functionally specified as:

$$PM = f(AG, GD, ED, LM, IV, TI) \quad \text{Equation 1}$$
$$PM = f(FI, SC, SP, SF, PC, PS, OP) \quad \text{Equation 2}$$

Independent Variables are:

AG = Age of the member in years
GD = Gender (Dummy: 1 = male, 0 = female)
ED = Educational level attained in years
LM = Length of membership in cooperative in years
IV = total investment in Naira in 2018
TI = Total income of member in Naira in 2018
FI = High cost of fishing inputs (Mean rating)
SC = Lack of sufficient capital (Mean rating)
SP = Storage problems (Mean rating)
SF = Spoilage of fish (Mean rating)
PC = Poor catch (Mean rating).
PS = Poor sales
OP = Oil/industrial pollution

For all the equations above we assumed that there are approximately linear relationships between the dependent variables and the independent variables. Therefore, equations 1 and 2 are explicitly specified as:

$$PM = \alpha + \beta_1 AG + \beta_2 GD + \beta_3 ED + \beta_4 LM + \beta_5 LC + \beta_6 TI + \varepsilon \quad \text{Equation 3}$$
$$PM = \alpha + \beta_1 FI + \beta_2 SC + \beta_3 SP + \beta_4 SF + \beta_5 PC + \beta_6 PS + \beta_7 OP + \varepsilon \quad \text{Equation 4}$$

where α = intercept term showing the value of y when each of the values of the independent variables is zero. That is, the value of the dependent variable in each of the equations is predicted to have when all the independent variables are equal to zero.

b_1 *to* b_7 = the coefficients or multipliers that describe the size of the effect the independent variables are having on the dependent variable y.

The tests of hypotheses were accomplished through an examination of the t-statistics and F-ratios of the multiple regression estimates and the decision rule was based on the 5% level of significance.

All the calculations and estimations of the regression models will be done using version 25 of the Statistical Package for Social Sciences (SPSS).

VIII. Data Presentation, Analysis and Discussion of Findings

This section is dedicated to the presentation, analysis and discussion of findings based on data collected from the field study, using descriptive and inferential statistical methods. The data were analysed, and presented on the basis of the objectives earlier formulated for the study. This chapter is discussed under different subsections such as socioeconomic characteristics of the cooperative fish farmers in Rivers state; profitability of fish business among cooperative fish farmers in Rivers state; influence of fishery investments and revenues on the profit of the fish farmers in Rivers state; influence of members' socio-economic characteristics on the profit of the fish farmers in Rivers state, as well as the effect of fish production constraints on the profit of fish farmers in Rivers state.

a) *Data Presentation and Analysis*

In carrying out the field survey, a total of 400 questionnaires were distributed to randomly selected cooperative fish farmers in Rivers state. The data for analysis were retrieved from 400 valid respondents which is 100% return-rate. The data collected were analysed using SPSS version 25 presented below.

b) *Socioeconomic Characteristics of Cooperative Fish Farmers*

It is part of the objectives of this study to examine the socioeconomic characteristics of cooperative fish farmers in Rivers state. In this subsection, we present, with the aid of charts, the distribution of respondents by age group, gender, marital status, educational attainment, years in fishing, years in cooperative and income group.

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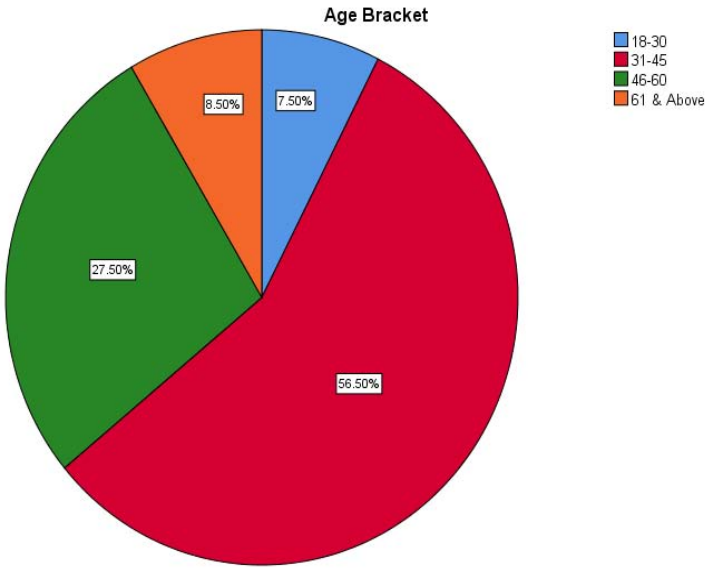
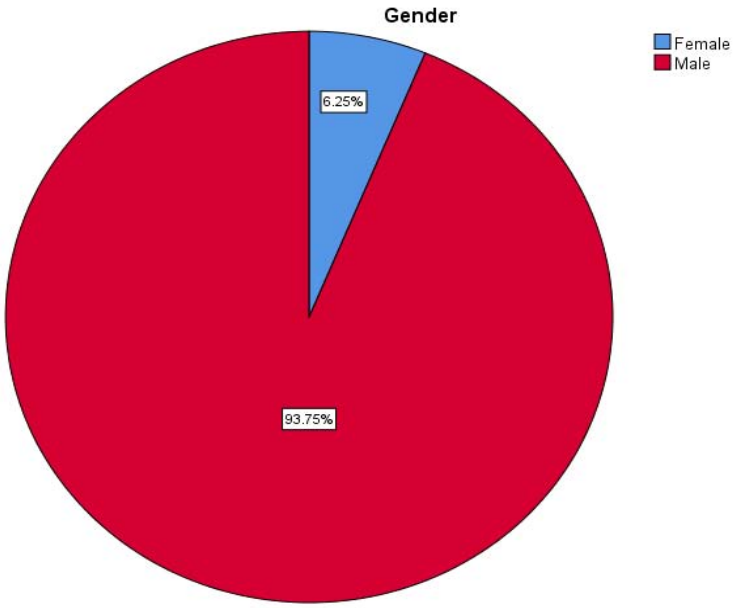


Source: Author's Computation from the Field Study (2019)

Figure 4.1: Distribution of Respondents by Age Bracket (%)

Fig. 4.1 shows the distribution of the respondents by age bracket. Majority of the respondents, that is, 226 (56.5%) of the cooperative fish farmers are between the ages of 31 - 45 years old, while about 110 (27.5%) of them are between 46 - 60 years old. Few cooperative fish famers, that is, 34 (8.5%) are between 18 - 30 years, while those above 61 years old are just 30 (7.5%) of the respondents. The age bracket level between 31 – 60 years has the highest number of cooperative fish farmers, implying that 84% of the total sampled cooperative fish farmers are predominantly middle aged. These age groups are known to be energetic and economically active. The implication is that a large percentage of farmers in this sector agriculture are economically active and possibly contribute maximally to the growth of the sector in Rivers State.



Source: Author's Computation from the Field Study (2019)

Figure 4.2: Distribution of Respondents by Gender (%)

Fig. 4.2 shows the distribution of respondents by gender. Expectedly, majority of cooperative fish farmers, that is, 375 (93.75) are male, while very few of them, 25 (6.25%) are female. Therefore, fish farming in Rivers state is predominantly the male activity sector.

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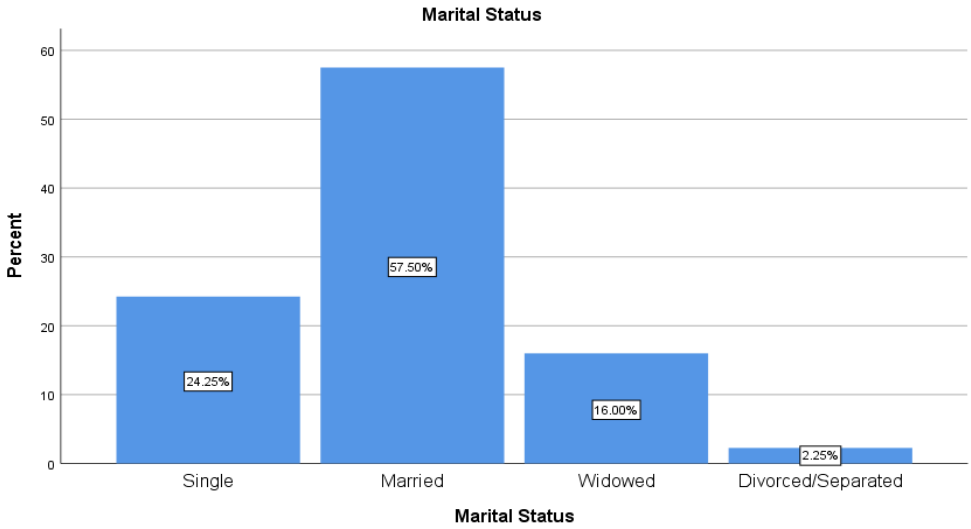
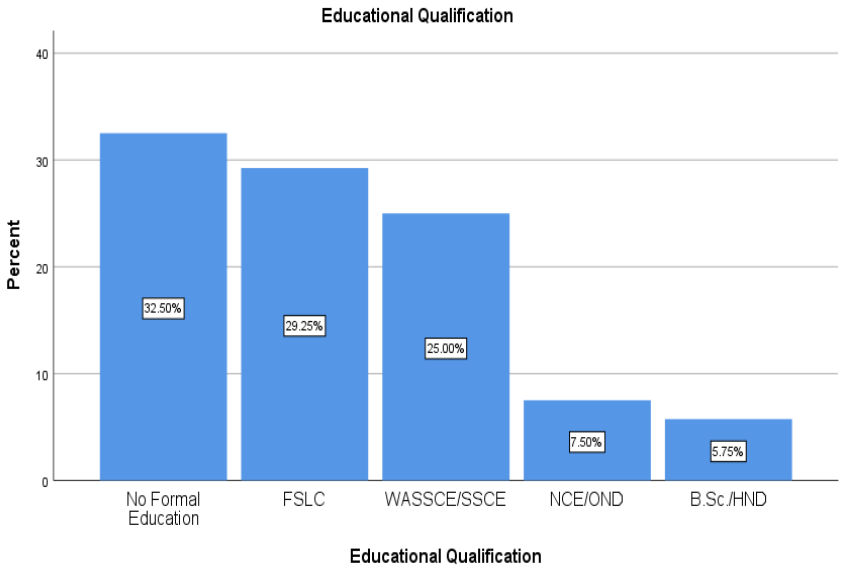


Source: Author's Computation from the Field Study (2019)

Figure 4.3: Distribution of Respondents by Marital Status (%)

Figure 4.3 provides information on the marital status of the respondents. Among the cooperative fish farmers, 97 (24.25%) are single, 230 (57.5%) are married, 64 (16%) are widowed, while 9 respondents, representing 2.25% are either divorced or separated persons. It was observed that majority of the respondents are married, implying that cooperative fish farmers have to combine running their fishing business with taking care of their various households.



Source: Author's Computation from the Field Study (2019)

Figure 4.4: Distribution of Respondents by Education Attainment (%)

Fig. 4.4 shows the classification of the respondents according to the level of their educational qualifications. The survey revealed that among the cooperative fish farmers, 130 (representing 32.5%) had no formal education, 117 (representing 29.25%) had basic primary education, 100 (25%) had completed secondary education, some of the cooperative fish farmers, 30 (7.5%) had advanced level (A' Level) certificates like NCE/OND, while the remaining 23 (5.75%) had tertiary education. This shows that the respondents to a large extent are illiterates since 247 representing 61.75% of the respondents are either with no formal education or had only the basic primary education, while the remaining 153 cooperative fish farmers representing 38.25% had either secondary education, advanced or tertiary education. The distribution shows that most of the cooperative fish farmers did not attain higher level of education.

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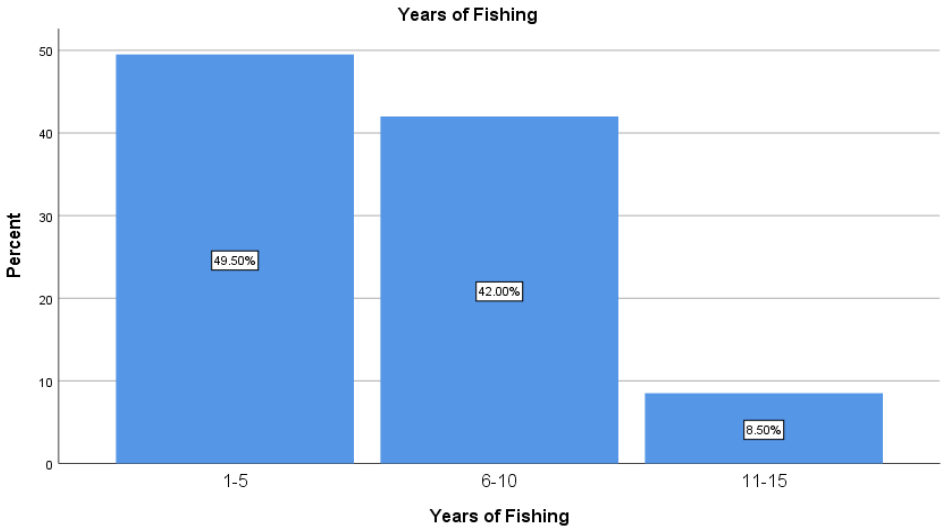
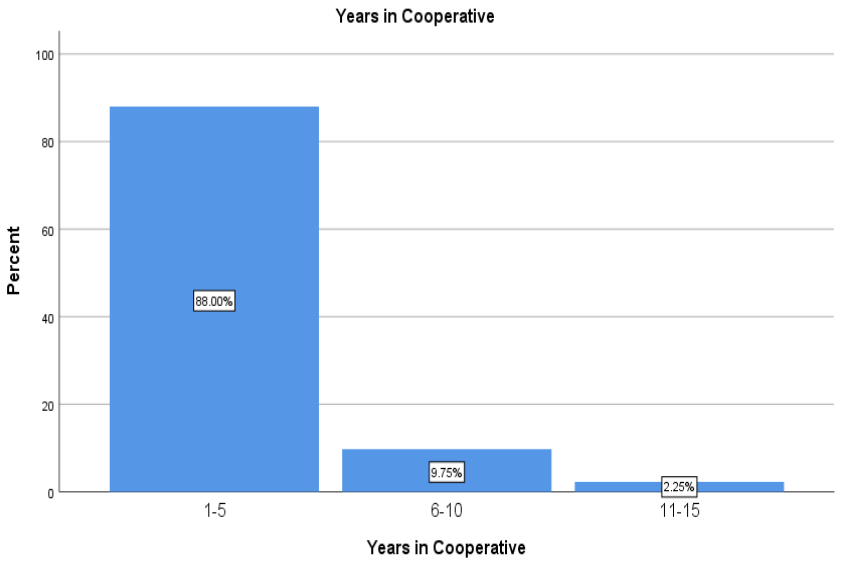


Source: Author's Computation from the Field Study (2019)

Figure 4.5: Distribution of Respondents by Years in Fishing

Fig. 4.5 shows the distribution of respondents based on years in fishing business. It was gathered that 198, representing 49.5% of the cooperative fish farmers have spent from 1 – 5 years in the business, while 168 (42%) cooperative fish farmers have been in the business from 6 – 10 years. The figure also shows that very few cooperative fish farmers, 34, representing 8.5% of the total have spent 11 – 15 years in the business. It could be inferred that majority 91.5% (366) of the cooperative fish farmers have spent 1 – 10 years in the business. This suggests that most of the cooperative fish farmers have, on the average, 5 years' experience in fishing business in the state.



Source: Author's Computation from the Field Study (2019)

Figure 4.6: Distribution of Respondents by Years in Cooperative

Fig. 4.6 shows the distribution of the respondents by years in cooperative. As shown in the figure, majority of the fish farmers, 352 (88%) have spent 1 – 5 years in cooperative, while 39 fish farmers, representing 9.75% have spent 6 – 10 years in cooperative. It was also found that very few fish farmers, 9 (2.25%) have spent 11 – 15 years in cooperative. This suggests that majority of the fish farmers have 1 – 5 years cooperative membership.

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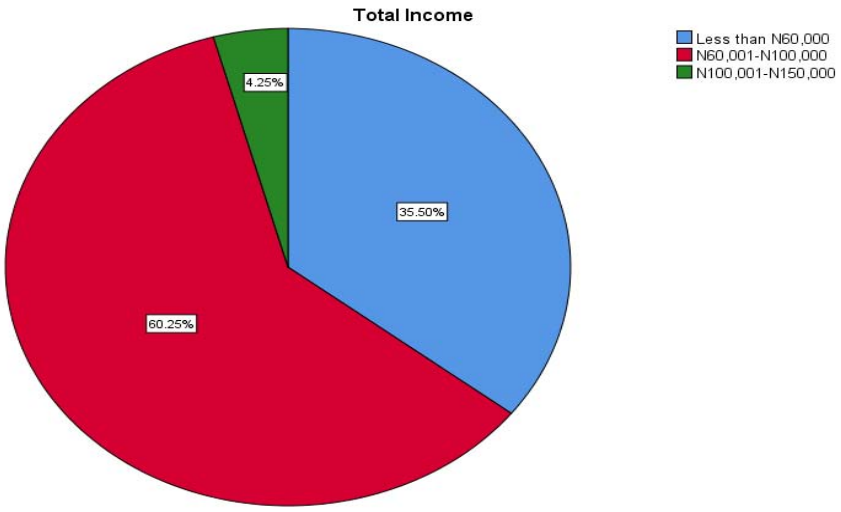
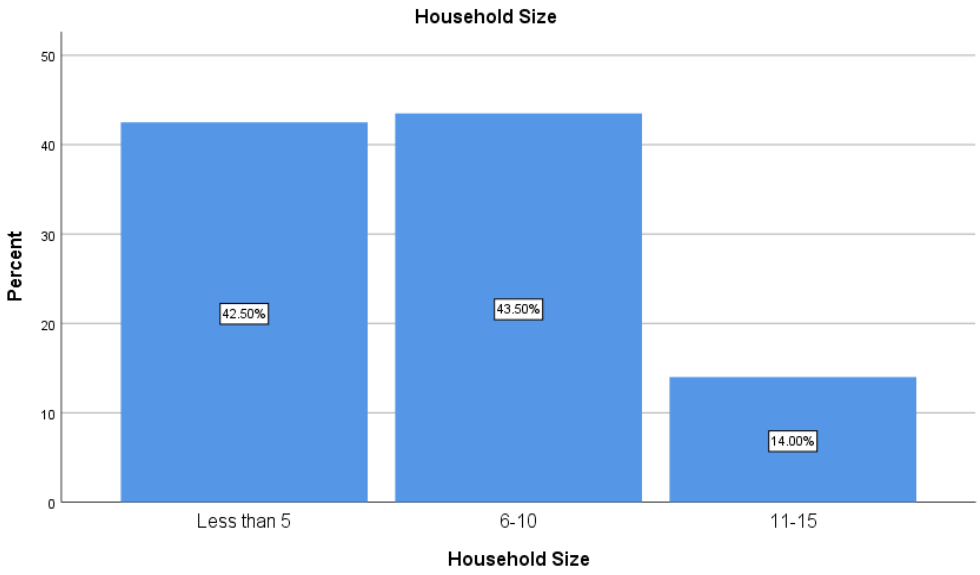


Source: Author's Computation from the Field Study (2019)

Figure 4.7: Distribution of Respondents by Income Group

Fig. 4.7 shows the distribution of the respondents by monthly income group. It is evident that majority of the cooperative fish farmers, 241 (60.25%) belong to the income group that earn N60,001 – N100,000 per month. This is followed by 142 (35.5%) cooperative fish farmers who earn less than N60,000 monthly income. It was gathered that very few cooperative fish farmers, 17 representing 4.25% of the total earn between N100,001 and N150,000 per month. It could be inferred that majority of the cooperative fish farmers earn less than N100,000 per month, meaning that most of the cooperative fish farmers belong to the middle-income group.



Source: Author's Computation from the Field Study (2019)

Figure 4.8: Distribution of Respondents by Household Size

Fig. 4.8 presents the distribution of the respondents by household size. As shown in the figure, 170 representing 42.5% of the cooperative fish farmers have family size less 5 persons, while 174 representing 43.5% are in the household of between 6 and 10 persons, and only few cooperative fish farmers belong to the household of 11 – 15 persons. Thus, majority of the cooperative fish farmers have household size less than 10 persons.

c) Profitability of Fish Business among Cooperative Fish Farmers in Rivers State

One of the major objectives (second objective) of this study is to determine the profitability of fish business among cooperative fish farmers in Rivers State. As earlier outlined in the previous chapter, cost and return analysis was used for this purpose, and this is based on obtaining that gross margin (difference between the gross fishery revenue and total variable

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cost), return to fish investment and operating ratio (ratio of total operating cost to gross fish revenue).

$$GM = GFR - TVC = 475,279,000 - 119,072,500 = 356,206,500$$
$$OR = TOC/GFR = 150,822,500/475,279,000 = 0.32$$
$$RFI = GM/TVC = 356,206,500/119,072,500 = 2.99$$

Based on the calculation above, it could be inferred that fish business among cooperative in Rivers State is highly profitable. This is because the coefficient of the Operating Ratio (OR) which is defined by the ratio of the Total Operating Cost (TOC) to Gross Fishery Revenue (GFR) is significantly less than 1 (i.e. $0.32 < 1$). As a confirmatory analysis, this finding was supported by the coefficient of the Return to Fish Investment (RFI) which is defined by the ratio of the Gross Margin to Total Variable Cost (TVC) that is significantly greater than 1 (i.e. $2.99 > 1$).

d) Results of Multiple Regression Analyses

As part of the objectives of this study, the Ordinary Least Squares (OLS) regression was carried out to determine: (i) the influence of fishery investments and revenues, as well as the members' socio-economic characteristics on the profit of the fish farmers in Rivers state (see results in Table 4.1), and (ii) the effect of fish production constraints on the profit of the fish farmers in Rivers state (see results in Table 4.2). This was done in two distinct multiple regression models using SPSS version 25 as reported in Tables 4.1 and 4.2. The OLS results in Tables 4.1 and 4.2 are considered robust and do not suffer any econometric problem such as autocorrelation, heteroskedasticity, multicollinearity and weak explanatory powers. This is because the estimated models each has considerably high coefficient of determination, defined by the values of the R-squared and Adjusted R-squared. The R-squared measures how well the actual data is fitted to the specified model which translates to goodness of fit, as well as the percentage of total variations in the dependent variable that was accounted for by variations in the independent variables. The Durbin-Watson statistic is another important test-statistic for estimated model diagnostic and justification. This test-statistic is used to test for the presence of serial correlation problem (autocorrelation) in an estimated model. One of the assumptions of the OLS technique is that the residuals of the estimated model are not serially correlated, meaning that the violation of this assumption implies that an estimated model may not be relied upon for drawing inferences.

In the case of this study, the values of the R-squared for the estimated models in Tables 4.1 and 4.2 are 0.803 and 0.743 respectively, meaning that the explanatory variables accounted for about 80.3% (see Table 4.1) and 74.3% (see Table 4.2) of the total variations in the dependent variable (profit margin). This is an evidence of a good fit in each model which implies that the estimated models are robust for making inferences. Additionally, the values of Durbin-Watson (DW) statistic for the two models (2.069 for Table 4.1 and 1.885 for Table 4.2) were satisfactory and suggestive of no autocorrelation in the estimated models. This is because both 2.069 and 1.885 are proximate to 2, and a DW value of 2 means absence of autocorrelation in the residuals of the estimated model. This also suggests that the estimated models are robust for prediction and forecasting. Thus, we can safely report the estimated coefficients in line with the objectives of the study.

Table 4.1: OLS Regression for Equation 3

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-181735.673	62191.026		-2.922	.004
	Age Bracket	6441.454	638.450	.015	10.089	.000
	Gender	1798.938	21659.483	.002	.083	.934
	Educational Qualification	694.378	371.799	.002	1.868	.064
	Years in Cooperative	3481.116	9735.325	.008	.358	.721
	Total Investment	.035	.010	.020	35.867	.000
	Total Income	18223.032	1373.671	.030	13.266	.000
	Total Revenue (Sales)	.942	.024	.897	39.573	.000
a. Dependent Variable: Profit Margin						

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Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.896[a]	.803	.800	214584.331	2.069

a. Predictors: (Constant), Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income
b. Dependent Variable: Profit Margin

Source: Author's Computation using SPSS 25

e) *Influence of Fishery Investments and Revenues on Profit of Cooperative Fish Farmers*

The third objective of this study is to examine the influence of fishery investment and revenues on profit cooperative fish farmers in Rivers State. With regards to Table 4.1, the standardized coefficients of total investment and total revenue were 0.020 and 0.897 respectively. These coefficients were both positive and statistically significant at 5% since their p-values were both less than 0.05. This suggests that more investment in fish business would significantly result to more profit to the cooperative fish farmers in Rivers State, and more revenue from fish business leads to more profit in the state. The implications of these findings are that those who invest more on fish business have higher profit than those who invest less, and similarly, those who make higher revenue also have higher profit margin. Thus, any policy action of the Rivers State government geared towards encouraging more investment and revenue from fishery business is expected to translate to more profit to cooperative fish farmers in the state.

f) *Influence of Members' Socioeconomic Characteristics on Profit of Fish Farmers*

The fourth objective of this study is to evaluate the influence of cooperative members' socioeconomic characteristics on profit of the fish farmers in Rivers State. The relevant socioeconomic characteristics for this purpose are age, gender, educational level and length of cooperative membership (years in cooperative). The results in Table 4.1 show that all the aforementioned socioeconomic characteristics of cooperative fish farmers have positive coefficients, meaning that they all relate positively with profit margin. However, only the age bracket is statistically significant at the 5% level since its p-value is less than 0.05. The positive influence of age of members on their profit margin is theoretically meaningful since older farmers have more experience in the business and are more likely to learn from past experiences and tend to take correct their past mistakes for a better performance. Other socioeconomic attributes of cooperative fish farmers such as gender, educational qualification and years in cooperative have positive, but not significant determinants of the level of profit margin for the cooperative fish farmers in Rivers state. Thus, age bracket is the only socioeconomic attribute of the cooperative fish farmers that positively and significantly influence their profit margin in the state.

g) *Effect of Fish Production Constraints on the Profit of Fish Farmers in Rivers State.*

The fifth and last objective of this study is to ascertain the effect of fish production constraints on the profit of fish farmers in Rivers state. Based on field survey, the study identifies high cost of fishing inputs, lack of sufficient capital, storage problem, spoilage of fish, poor catch and oil/industrial pollution as the major fish production constraints to the cooperative fish farmers in the state. In order to draw meaningful conclusions regarding the significance of the aforementioned fish production constraints, a model of the profit margin of the cooperative fish farmers was specified and estimated as a function of these constraints and the results are reported in Table 4.2.

Table 4.2: OLS Regression for Equation 4

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1037134.155	223487.712		4.641	.000
	High cost of fishing inputs	-22620.738	1655.644	-.069	-13.663	.000
	Lack of sufficient capital	-19938.986	8772.599	-.035	-2.273	.039
	Storage problems	-7100.295	21716.166	-.016	-.327	.744
	Spoilage of fish	-22475.463	16597.594	-.068	-1.354	.176
	Poor catch	-6686.288	2082.166	-.016	-3.211	.003
	Poor sales	-35045.332	2158.999	-.082	-16.232	.000
	Oil/Industrial pollution	-52260.682	2945.772	-.089	-17.741	.000

a. Dependent Variable: Profit Margin

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Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.862[a]	.743	.722	477194.145	1.885

a. Predictors: (Constant), Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch
b. Dependent Variable: Profit Margin

Source: Author's Computation using SPSS 25

As shown in Table 4.2, all the identified fish production constraints have negative effect on the profit of the cooperative fish farmers and this is consistent with the theoretical expectation of the study, meaning that the more these constraints persist, the lesser the profit accruable to the cooperative fish farmers in the state. Also, with the exception of storage problems and spoilage of fish, the rest of the constraints are individually statistically significant at the 5% level of significance. This suggests that storage problems and spoilage of fish are not serious constraints to fish production among cooperative fish farmers in the state. Therefore, fish production among cooperative fish farmers are significantly constrained by factors such as high cost of fishing inputs, lack of sufficient capital, poor catch, poor sales, and oil/industrial pollution in Rivers State.

h) Evaluation of Research Hypotheses

In the beginning of this study, some testable hypotheses were formulated to guide the study towards addressing the research problems. In this subsection, we evaluate these hypotheses based on the results of empirical investigation presented earlier.

H_0: Fish business does not significantly generate profit to cooperative fish farmers in Rivers state.

H_1: Fish business significantly generates profit to cooperative fish farmers in Rivers state.

Based on the result from the Cost and Return Analysis, the coefficient of OR and RFI were 0.32 and 2.99 respectively. Recall that when the value of OR is small and reasonably less than one, we conclude in favour of high profitability of the business and vice versa. On the other hand, when the value of RFI is greater than one, we conclude in favour of high profitability of the business. In the case of this study, we therefore reject the null hypothesis, and conclude that fish business significantly generates profit to cooperative fish farmers in Rivers State.

H_0: Fishery investments and revenues have no significant influence on profit margin in Rivers state.

H_1: Fishery investments and revenues have a significant influence on profit margin in Rivers state.

With regards to Table 4.1, it was found that the coefficients of fishery investment and revenues are positive and statistically significant at the 5% level of significance since their corresponding p-values are less than 0.05. Thus, we reject the null hypothesis and conclude that fishery investment and revenues have a significant influence on profit margin in Rivers State.

H_0: Members' socio-economic characteristics do not have a significant effect on profit margin in Rivers state.

H_1: Members' socio-economic characteristics have a significant effect on profit margin in Rivers state.

Following from the results in Table 4.1, only the coefficient of age of members is statistically significant at the 5% level, while the coefficients of other members' socioeconomic characteristics are statistically insignificant at the 5% level of significance. Thus, we could not reject the null hypothesis that members' socioeconomic characteristics do not have a significant effect on profit margin, rather we posit that only age bracket of members have a significant effect on their profit margin, while other socioeconomic attributes do not have a significant effect on profit margin in the State.

H_0: Fish production constraints do not have a significant effect on profit margin in Rivers state.

H_1: Fish production constraints have a significant effect on profit margin in Rivers state.

With reference to the results in Table 4.2, all fish production constraints as revealed by the cooperative fish farmers have a significant effect on profit margin, except storage problems and spoilage of fish. Thus, we reject the null hypothesis and conclude that fish production constraints such as high cost of fishing inputs, lack of sufficient capital, poor catch, poor sales, and oil/industrial pollution have a significant effect on profit margin in Rivers State.

i) Discussion of Findings

This study empirically examined the profitability of fish production among cooperative fish farmers in Rivers State. Based on data from field survey, the study employed Cost and Return Analysis to determine the profitability of fish production, as well as descriptive (charts) and inferential (OLS regression) statistical methods to determine the influence of fishery investments and revenues on the profit of the fish farmers; the influence of members' socio-economic characteristics on the profit of the fish farmers, as well as the effect of fish production constraints on the profit of fish farmers in Rivers state.

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The results of the socioeconomic characteristics of the cooperative fish farmers, using descriptive method, show that majority of them (84%) are of middle age. This finding is consistent with the finding by Busari (2018) who concluded that majority of aquaculture farmers in Olorunda local government area of Osun State, Nigeria was middle-aged. The study also found that majority (93.75%) of the cooperative fish farmers in Rivers State is male. This finding also supports that of Dambatta, et al. (2016) who concluded that fishing is a male dominated venture. Consistent with the finding by Busari (2018) that majority of aquaculture farmers are married males, the study revealed that majority (57.5%) of the cooperative fish farmers, who are mostly male, are married persons. It was also discovered that majority of the cooperative fish farmers do not have formal education, while some of them have either primary or secondary education, and very few have tertiary. While this finding supports that of Agu-Aguiyi, et al. (2018), it stands in contrast to that of Adewuyi, et al. (2010) who disclosed that a large proportion (68%) of fish farmers in Ogun State have formal (tertiary) education. The study further revealed that majority (91.5%) of the cooperative fish farmers have spent 1 – 10 years in the business, while majority (88%) of them have spent 1 – 5 years in cooperatives.

The result of the Cost and Return Analysis led to the rejection of the null hypothesis that fish business does not significantly generate profit to cooperative fish farmers in Rivers State. Hence, the study concludes that fish business in Rivers is a highly profitable venture. This conclusion stands in supports of the finding by Raufu, et al. (2009); Awoyemi and Ajiboye (2011); Kassli, et al. (2011); Adewumi, et al. (2012); Adeogun, et al. (2012); Aheto, et al. (2012); Olaoye, et al. (2013); Iheke and Nwagbara (2014); Issa, et al. (2014); Okpeke and Akarue (2015); and Tunde, et al. (2015) whose conclusions affirmed the profitability of fish business in their respective case studies. This finding underscores the need to encourage fish production among cooperative fish farmers in Rivers State.

The OLS regression results revealed that fishery investment and revenues have significant positive influence on profit margin, implying that more investment and revenues would bring about more profit to the cooperative fish farmers in Rivers State. This led to the rejection of the null hypothesis that fishery investment and revenue do not significantly influence the profit margin. Incidentally, none of the previous studies reviewed had any information regarding the influence of fishery investment and revenue on profit margin, and this is another way this study has contributed to knowledge. The implication of this finding is that if investment in fish business is encouraged by the government, then the cooperative fish farmers would make more profit. On the other hand, higher revenue can be made possible through the creation of market for fish farmers by the government. Thus, the cooperative fish farmers are expected to make more profit when they make higher revenues.

The study could not totally reject the null hypothesis that members' socioeconomic characteristics do not significantly influence profit margin, rather the study posits that only the age bracket of members influences profit margin. In other words, ages of cooperative members has positive and significant effect on profit margin. This finding seems not peculiar to us as it is theoretically plausible to note that the older the cooperative fish famer, the more experienced he becomes, and tends to adjust his operations based on past mistakes. Thus, the more experienced cooperative fish farmers are more likely to perform better than those with less experience and new to the business. This information was not captured in the previous studies as reviewed in this study, and thus forms another contribution to knowledge by this study.

In determining the major fish production constraints, the study found that high cost of fishing inputs; lack of sufficient capital; poor catch; poor sales, and oil/industrial pollution are the major fish production constraints in Rivers State. High cost of inputs has always been a problem to virtually every business in Nigeria. Even Busari (2018) concluded in affirmative that the cost of fingerlings and pond maintenance were significant determinants of gross margin from homestead aquaculture in Olorunda local government area, Osun State, Nigeria. Lack of sufficient capital had been a major problem of both small and medium-scale businesses around the world, and in the case of this study, lack of sufficient capital has significant negative effect on profit margin. This implies that the cooperative fish farmers are severely constrained by lack of sufficient capital, meaning that if the government of Rivers State can make provision for low-interest credit facilities, the cooperative fish farmers would make more profits. Poor catch and poor sales are serious impediment to the ability of the cooperative fish farmers to maximize profit. This could be due to lack of adequate fishing instruments that will facilitate their catches, as well as poor market for their products due to higher prices. Another serious constraint to fish production in Rivers state is oil/industrial pollution. It is in no doubt that Rivers State is a place of strong industrial and oil production activities which tend to spill over to those Rivers where fishing activities are taking place. Pollution, especially from oil spillage and industrial gas emission, could be poisonous to fishes in the river and tend to kill and reduce their sizes, leading to scarcity of fishes, and hence the poor catch. Incidentally, the previous studies as reviewed in this study did not capture the effect of other fish production constraints on profit margin, except for the high cost of inputs found in Busari (2018).

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IX. Summary of Findings, Conclusion and Recommendations

This section summarizes the main findings of the study followed by the conclusion and the recommendations which is drawn from the findings.

a) Summary of Findings

The main aim of this study is to evaluate the profitability of fish production among cooperative fish farmers in Rivers State, Nigeria. Some specific objectives were stated such as to: analyse the socioeconomic characteristics of the cooperative fish farmers; determine the profitability of fish business among cooperative fish farmers; examine the influence of fishery investments and revenues on the profit of the fish farmers; evaluate the influence of members' socio-economic characteristics on the profit of the fish farmers, as well as to determine the effect of fish production constraints on the profit of fish farmers in Rivers state. In line with these objectives, some testable hypotheses were formulated to guide the study towards addressing the research questions.

The study made adequate review of conceptual, theoretical and empirical literature from where the knowledge gaps were identified, as well as gaining useful insights into the core issues around the subject matter. The study is based on survey research design where data were collected through primary source using questionnaire as the instrument of data collection. A total of 400 copies of questionnaire were distributed to cooperative fish farmers in 16 LGAs of 4 agric zones in Rivers State. Based on data from field survey, the study employed Cost and Return Analysis to determine the profitability of fish production, as well as descriptive (charts) and inferential (OLS regression) statistical methods to analyse data in line with the objectives of the study. On the course of this study, the following findings were made:

Majority of cooperative fish farmers in Rivers state are male (93.75%), who are in their middle age (84%), married (57.5%) but mostly illiterates (with no formal education or have only primary education), and have spent between 6-10 years in fishing business and 1-5 years in cooperatives.

Majority (60.25%) of the cooperative fish farmers earn between N60,001 – N100,000 per month from the fishing business.

The profitability analysis based on Cost and Return Analysis revealed that fish production among cooperatives fish farmers is a profitable venture.

Fishery investment and revenues contribute positively to the profit of cooperative fish farmers in Rivers State.

Older cooperative fish farmers are more likely to earn more profit than the younger ones in Rivers state.

High cost of fishing inputs; lack of sufficient capital; poor catch; poor sales, and oil/industrial pollution are the major fish production constraints in Rivers State.

X. Conclusion

The study examined the profitability of fish production among cooperative fish farmers in Rivers State, Nigeria. Some specific objectives were stated such as to: analyse the socioeconomic characteristics of the cooperative fish farmers; determine the profitability of fish business among cooperative fish farmers; examine the influence of fishery investments and revenues on the profit of the fish farmers; evaluate the influence of members' socio-economic characteristics on the profit of the fish farmers, as well as to determine the effect of fish production constraints on the profit of fish farmers in Rivers state. The study is based on survey research design where data were collected through the primary source using questionnaire as the instrument of data collection. A total of 400 copies of questionnaire were distributed to cooperative fish farmers in 16 LGAs of 4 agric zones in Rivers State. Based on data from field survey, the study employed Cost and Return Analysis to determine the profitability of fish production, as well as descriptive (charts) and inferential (OLS regression) statistical methods to analyse data in line with the objectives of the study. Based on its findings, the study concludes that majority of cooperative fish farmers in Rivers state are male, who are in their middle age, married but mostly illiterates with either no formal education or have only primary education, and have spent between 6-10 years in fishing business and 1-5 years in cooperatives; fish production among cooperatives fish farmers is a profitable venture in Rivers state; fishery investment and revenues contribute positively to the profit of cooperative fish farmers in the state, and high cost of fishing inputs; lack of sufficient capital; poor catch; poor sales, and oil/industrial pollution are the major fish production constraints in Rivers State.

XI. Recommendations

Based on the findings of this study, the following recommendations are proffered:

i. Fish production by the cooperative fish farmers is a profitable venture where farmers earn between ₦60,001 and ₦100,000 per month, averaging ₦80,000 per month in a country where the minimum wage is ₦18,000 per month. However, fish production among cooperative fish farmers is severely constrained by high cost of fishing inputs. Thus, the government of Rivers State should make provision for fish production subsidies such as provision of fund and some strategic fishing inputs to the cooperative fish farmers in the state.

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ii. Investment in fishery contributes to the profit of the cooperative fish farmers in Rivers State, and there are usually high returns to fishery investment, but fish production in the state is highly constrained by lack of sufficient capital to invest in the business. Therefore, there is need for the government of Rivers State to collaborate with the various fish production cooperative societies to encourage investment in fishery through the provision of low-interest loans since it is usually difficult to obtain loans from the conventional banking institutions.

iii. Revenues from the sale of fishery products contribute to the growth of profit in fish production in Rivers State, but fish production is heavily constrained by poor sales. Revenues can be enhanced through the creation of market for the sales of fishery products. Thus, the government should set up a specific marketing board for fish production in order to engender rapid sales and turnover in fish production.

iv. There is need for the provision of adequate modern instruments to encourage bumper catch. The various cooperatives can unite and collaborate with the state government to secure enough modern fishing instruments so as to overcome the problem of poor catch. Poor catch may have also been caused by scarcity of fish in the river due to oil/industrial pollution that may have killed and reduced the quantity of fish in the river. In this case, the government should properly regular oil and industrial production activities in the state to reduce pollution.

v. 80,000 per month in a country where the minimum wage is N18,000 per month. However, fish production among cooperative fish farmers is severely constrained by high cost of fishing inputs. Thus, the government of Rivers State should make provision for fish production subsidies such as provision of fund and some strategic fishing inputs to the cooperative fish farmers in the state.

vi. Investment in fishery contributes to the profit of the cooperative fish farmers in Rivers state, and there are usually high returns to fishery investment, but fish production in the state is highly constrained by lack of sufficient capital to invest in the business. Therefore, there is need for the government of Rivers State to collaborate with the various fish production cooperative societies to encourage investment in fishery through the provision of low-interest loans since it is usually difficult to obtain loans from the conventional banking institutions.

vii. Revenues from the sale of fishery products contribute to the growth of profit in fish production in Rivers state, but fish production is heavily constrained by poor sales. Revenues can be enhanced through the creation of market for the sales of fishery products. Thus, the government should set up a specific marketing board for fish production in order to engender rapid sales and turnover in fish production.

viii. There is need for the provision of adequate modern instruments to encourage bumper catch. The various cooperatives can unite and collaborate with the state government to secure enough modern fishing instruments so as to overcome the problem of poor catch. Poor catch may have also been caused by scarcity of fish in the river due to oil/industrial pollution that may have killed and reduced the quantity of fish in the river. In this case, the government should properly regular oil and industrial production activities in the state to reduce pollution.

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Appendix one

General Statistics of Co-Operators Interviewed

S/n.	Age	Gender	Marital Status	Household Size	Educational Qualification.	Years of Fishing	Years in Coop.	Monthly Income
1	2	1	2	2	2	2	3	2
2	3	1	3	2	3	5	2	3
3	3	1	4	2	2	2	2	2
4	1	1	1	1	3	2	4	2
5	3	1	2	2	1	3	3	1
6	2	1	2	2	3	4	4	3
7	4	1	4	2	1	5	3	3
8	4	1	3	2	3	2	2	3
9	3	1	3	2	1	5	3	2
10	1	1	1	1	3	1	1	3
11	4	1	3	1	3	4	3	2
12	2	1	2	2	2	3	2	2
13	3	1	1	2	3	2	3	3
14	3	1	4	1	3	2	3	3
15	2	0	4	2	3	2	2	2
16	3	1	2	2	2	3	2	3
17	4	0	2	1	2	1	1	3
18	1	1	2	1	1	5	1	1
19	3	1	3	1	2	5	1	1
20	1	0	2	2	2	2	4	3
21	1	1	2	2	1	1	4	3
22	1	1	1	2	1	4	3	2
23	4	1	1	2	3	3	1	3
24	3	1	3	1	2	3	1	1
25	2	1	1	2	3	5	2	1
26	1	0	4	2	3	4	2	3
27	2	1	3	1	1	1	3	3
28	2	1	1	1	3	1	2	1
29	3	0	2	1	2	5	4	2
30	4	0	1	1	1	1	1	2
31	3	0	2	1	1	1	2	2
32	4	1	4	1	3	1	3	2
33	2	0	2	2	3	3	2	2
34	3	1	4	1	3	2	2	1
35	4	1	3	1	3	2	2	3
36	4	1	1	2	2	2	4	1
37	1	1	3	1	1	2	3	2
38	4	0	4	2	3	1	4	2
39	2	0	2	2	1	5	3	2

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40	4	1	3	2	1	1	3	3
41	3	1	2	2	1	3	2	2
42	3	1	2	2	3	4	4	1
43	4	0	4	2	1	4	2	1
44	1	1	3	1	2	3	1	2
45	4	0	4	2	1	1	1	2
46	4	1	3	2	3	3	1	1
47	1	1	1	1	3	3	2	1
48	2	0	3	1	3	5	1	3
49	3	0	2	1	1	4	2	1
50	3	0	1	2	3	5	4	3
51	2	1	1	1	1	4	4	2
52	2	1	3	1	1	5	4	1
53	1	0	2	1	2	4	4	3
54	2	0	4	1	3	4	4	3
55	2	0	3	1	2	4	3	2
56	1	0	1	2	3	5	3	3
57	2	1	2	2	1	3	2	3
58	2	1	4	1	3	5	3	1
59	2	0	3	2	2	4	1	1
60	2	0	4	1	1	1	1	1
61	2	1	3	2	3	5	3	1
62	3	0	2	2	3	2	4	2
63	4	0	4	2	2	5	1	3
64	2	1	2	2	1	4	1	2
65	1	0	4	2	3	1	3	3
66	2	1	4	2	1	4	1	2
67	2	1	1	1	3	1	1	2
68	4	1	1	2	2	4	1	2
69	1	1	3	2	2	3	1	2
70	3	0	2	2	1	2	3	2
71	4	1	3	2	1	4	3	3
72	1	1	1	2	1	3	2	3
73	3	0	4	1	3	3	2	3
74	2	0	3	2	3	3	1	1
75	1	0	3	1	1	2	1	2
76	2	0	4	1	2	5	1	3
77	1	1	4	1	3	2	2	2
78	2	1	3	1	3	1	2	2
79	2	1	3	2	1	1	1	2
80	3	1	1	2	1	1	1	2
81	2	0	3	2	2	3	4	3
82	2	1	1	2	1	2	4	1

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83	1	1	2	2	3	1	2	1
84	2	1	2	1	2	4	4	2
85	3	0	4	1	3	3	4	1
86	2	0	4	2	3	5	1	2
87	4	0	3	1	2	3	4	3
88	4	0	3	2	1	3	3	1
89	4	0	3	1	1	2	3	3
90	3	0	3	1	2	1	4	1
91	3	0	1	2	1	2	1	1
92	2	0	4	2	2	3	1	1
93	3	1	2	1	3	1	4	1
94	2	0	4	1	1	1	1	3
95	3	0	1	1	2	5	3	2
96	4	0	1	1	3	5	3	2
97	2	0	1	1	1	2	3	1
98	1	1	1	1	2	2	4	1
99	2	1	4	1	3	5	2	3
100	1	0	1	1	2	1	4	1
101	4	0	2	2	1	3	3	1
102	4	0	1	1	2	5	2	1
103	4	0	3	1	3	2	1	3
104	2	0	3	2	1	2	3	1
105	1	0	4	1	2	5	3	1
106	2	1	1	2	1	3	4	1
107	4	1	2	1	2	3	2	1
108	4	1	3	1	2	3	2	3
109	1	0	1	1	2	4	2	1
110	2	1	1	2	3	2	2	3
111	4	1	4	1	1	4	3	2
112	2	1	1	1	2	3	1	1
113	3	0	4	2	1	2	2	2
114	3	1	4	2	3	3	3	3
115	4	0	2	1	3	5	1	2
116	4	1	4	2	3	1	2	1
117	4	0	1	2	3	2	3	3
118	1	1	2	1	2	1	2	3
119	3	1	1	2	2	3	2	1
120	2	1	2	1	3	2	4	1
121	3	1	2	2	2	2	3	2
122	4	1	1	1	2	5	4	1
123	3	1	2	1	3	3	1	2
124	2	0	2	2	3	2	3	2
125	3	0	1	2	3	1	4	3

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126	4	1	4	2	3	2	3	3
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129	2	0	3	2	1	5	4	3
130	1	0	2	1	2	4	2	1
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146	3	1	1	1	2	2	2	1
147	3	1	2	2	1	1	3	3
148	2	1	4	2	1	5	4	1
149	4	1	2	1	2	3	3	2
150	2	0	4	2	2	4	1	1
151	4	1	3	1	1	2	3	2
152	1	1	1	2	2	3	1	3
153	3	0	3	1	3	5	1	1
154	2	1	4	1	1	4	1	1
155	4	0	1	2	1	1	1	2
156	2	0	4	2	2	3	4	3
157	3	1	4	2	1	4	3	1
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159	1	0	4	2	2	5	4	2
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161	3	1	3	2	2	5	1	1
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167	2	1	4	2	3	4	1	1
168	4	1	1	2	1	2	2	1

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169	2	1	2	1	3	3	2	1
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171	3	0	4	2	1	5	2	2
172	3	1	2	1	2	4	2	3
173	4	0	1	2	2	1	4	2
174	1	0	2	1	3	5	4	3
175	4	1	1	2	1	4	2	2
176	1	1	1	1	1	3	2	2
177	1	0	2	2	1	1	1	1
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186	2	0	2	2	2	1	4	2
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207	2	0	1	2	3	1	4	3
208	2	0	4	1	3	5	4	3
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210	4	1	2	1	3	1	1	2
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212	4	0	3	2	3	4	1	3
213	4	0	4	2	2	2	3	1
214	1	0	3	2	2	2	1	1
215	2	1	2	1	3	4	2	2
216	4	0	2	1	2	5	1	2
217	1	0	4	1	3	5	3	3
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227	3	1	2	2	3	1	4	2
228	3	0	4	1	1	5	1	2
229	2	0	4	2	3	3	1	1
230	3	0	4	1	3	4	3	3
231	2	1	3	3	3	3	4	3
232	2	1	1	2	3	3	4	1
233	3	0	4	2	3	3	4	2
234	4	0	3	2	2	1	4	3
235	2	0	1	2	2	2	3	1
236	3	1	3	3	1	5	4	1
237	4	1	3	3	3	5	1	1
238	1	1	3	3	3	1	2	2
239	1	0	2	1	1	2	1	2
240	2	0	4	3	2	1	2	3
241	2	0	1	2	2	5	1	3
242	2	0	2	1	2	3	3	3
243	1	1	1	1	3	1	4	1
244	4	1	2	2	2	5	2	1
245	4	1	3	2	1	2	1	1
246	3	0	4	1	1	5	2	3
247	4	1	4	1	4	2	2	1
248	3	0	4	2	2	5	1	3
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251	4	1	3	1	4	3	1	3
252	2	1	4	2	5	4	4	1
253	1	0	1	2	3	1	4	1
254	2	0	2	2	1	5	2	3

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255	3	1	2	3	1	5	4	3
256	3	0	3	1	5	3	1	3
257	2	0	3	1	5	1	3	1
258	3	1	4	1	1	4	1	3
259	3	0	4	1	2	1	1	1
260	2	0	1	3	5	3	1	3
261	1	0	3	2	1	4	3	3
262	4	1	1	3	4	4	3	2
263	4	1	1	1	1	4	4	3
264	4	0	3	3	3	5	1	1
265	4	1	3	1	3	5	4	2
266	1	1	2	1	1	4	1	3
267	4	1	1	2	4	4	1	1
268	2	0	1	3	1	5	3	1
269	2	0	2	2	1	5	2	1
270	3	1	4	1	5	3	3	3
271	1	1	2	2	2	2	4	1
272	4	1	1	1	5	3	2	2
273	4	0	2	1	1	1	2	1
274	3	1	2	2	2	3	3	1
275	1	1	2	2	4	3	4	1
276	3	0	3	2	2	4	3	2
277	3	0	1	1	5	1	1	3
278	2	0	1	2	4	1	3	2
279	1	0	3	3	1	1	4	1
280	4	1	2	1	4	2	1	1
281	1	1	1	2	3	2	1	2
282	3	0	3	2	1	3	4	1
283	2	1	4	3	1	2	2	1
284	1	1	4	2	4	3	1	3
285	4	1	2	3	4	2	1	2
286	2	0	4	3	2	2	3	1
287	2	1	1	1	3	1	4	1
288	1	1	2	3	2	2	2	2
289	1	1	4	2	4	2	3	1
290	4	0	1	3	5	1	2	1
291	4	1	3	3	4	5	2	3
292	1	1	3	2	2	3	3	1
293	4	1	2	1	2	2	4	2
294	3	1	2	3	1	2	2	1
295	4	1	4	2	1	1	2	1
296	1	0	2	1	5	2	3	2
297	3	1	2	3	1	5	3	1

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298	4	0	4	2	5	5	4	1
299	2	0	4	1	2	1	2	3
300	3	0	3	2	4	3	3	2
301	2	1	1	2	4	4	4	3
302	1	0	4	1	1	1	2	2
303	4	1	1	3	5	5	2	2
304	2	1	4	1	5	2	4	3
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306	1	0	1	1	3	5	1	3
307	4	0	2	2	4	2	1	1
308	4	1	4	1	4	4	4	3
309	4	0	3	3	5	4	4	3
310	3	0	1	2	2	1	3	3
311	3	0	1	3	2	3	2	3
312	3	0	1	1	5	2	3	2
313	3	1	4	1	1	1	4	1
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315	4	1	2	1	4	4	4	1
316	1	0	3	1	4	4	2	2
317	3	1	3	2	4	3	3	3
318	1	1	2	3	3	1	4	2
319	3	1	4	2	5	3	2	1
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321	2	1	4	3	1	5	4	1
322	4	1	4	1	4	1	4	1
323	1	0	3	1	2	4	1	2
324	4	1	3	2	4	2	3	1
325	1	0	1	2	5	5	1	2
326	3	1	1	2	5	2	1	2
327	1	1	2	3	1	3	1	1
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329	2	1	1	2	5	5	2	1
330	1	1	2	2	5	3	2	3
331	2	1	3	2	1	4	4	1
332	2	0	2	1	2	2	4	3
333	3	1	2	2	3	5	2	2
334	1	1	1	1	3	5	1	3
335	2	1	4	1	4	2	3	3
336	4	1	3	1	1	4	2	3
337	2	1	3	3	2	4	2	2
338	4	1	2	3	1	4	3	1
339	3	0	3	2	2	3	4	2
340	2	0	1	3	3	2	4	2

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341	3	1	2	2	2	4	2	3
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343	1	0	1	2	1	4	3	3
344	4	1	4	3	5	4	1	2
345	2	1	2	2	4	2	1	3
346	3	1	3	2	4	5	3	3
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348	2	0	4	2	1	1	1	2
349	2	0	1	3	1	3	2	3
350	1	0	2	3	2	5	2	2
351	3	1	1	1	5	5	2	3
352	3	0	2	2	5	1	2	1
353	1	1	3	1	1	4	4	3
354	3	1	1	3	2	5	3	2
355	1	1	2	1	1	2	3	3
356	1	0	2	1	4	5	3	3
357	3	0	1	2	4	4	1	1
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359	1	1	4	3	4	1	4	2
360	4	0	2	1	1	4	2	3
361	3	0	1	2	4	2	3	1
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363	2	1	4	3	4	4	2	3
364	2	1	3	1	5	1	2	3
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366	4	1	3	1	2	1	2	1
367	3	1	4	2	4	4	2	2
368	4	0	2	3	3	1	4	2
369	4	0	2	1	5	4	2	1
370	3	0	4	1	4	5	2	2
371	1	1	4	2	1	4	1	1
372	3	0	1	2	4	3	3	2
373	3	0	1	3	1	2	1	1
374	1	1	3	3	2	3	1	1
375	1	1	3	3	2	2	2	1
376	1	0	1	1	3	3	2	3
377	2	0	2	2	3	5	3	2
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380	2	0	1	1	5	3	4	3
381	4	1	2	1	2	5	2	2
382	4	0	3	2	5	1	2	1
383	1	0	1	1	4	1	2	1

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384	2	1	2	1	1	2	4	3
385	4	0	1	2	4	3	4	2
386	2	1	1	3	2	5	3	1
387	2	0	1	2	4	2	1	2
388	2	1	3	1	4	3	2	3
389	2	1	4	2	2	3	1	2
390	3	1	3	1	1	2	2	3
391	1	1	4	2	4	3	3	3
392	1	0	2	1	2	2	2	2
393	1	0	4	2	5	2	1	2
394	3	1	2	2	1	5	2	2
395	3	0	2	2	5	4	4	1
396	4	1	1	3	3	3	2	2
397	2	0	3	1	5	1	1	3
398	3	1	4	3	5	5	1	2
399	4	1	1	2	3	4	3	1
400	2	1	2	2	5	1	1	3

Appendix Two

Profitability Table of Co-Operators

S/n.	Investment	Sales	Total cost	Fixed Cost	Variable cost	Gross Margin
1	520000	900000	634000	20000	614000	286000
2	1040000	1600000	455000	25000	430000	1170000
3	500000	900000	448000	18000	430000	470000
4	250000	450000	478000	100000	378000	72000
5	140000	480000	469000	5000	464000	16000
6	820000	1600000	454000	15000	439000	1161000
7	695000	1550000	438000	10000	428000	1122000
8	815000	1400000	300000	20000	280000	1120000
9	325000	750000	367000	10000	357000	393000
10	285000	1500000	478000	15000	463000	1037000
11	952000	1194000	504000	63000	441000	753000
12	421000	1551000	330000	142000	188000	1363000
13	290000	1902000	680600	99000	581600	1320400
14	217000	803000	590100	134000	456100	346900
15	238000	525000	61900	23000	38900	486100
16	952000	1242000	33700	21000	12700	1229300
17	827000	1887000	450100	124000	326100	1560900
18	230000	1452000	405000	114000	291000	1161000
19	190000	1639000	410200	53000	357200	1281800
20	161000	633000	490400	57000	433400	199600
21	123000	979000	560400	62000	498400	480600

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22	939000	1156000	610100	136000	474100	681900
23	678000	1883000	65300	35000	30300	1852700
24	318000	1263000	330400	56000	274400	988600
25	410000	1219000	66700	36000	30700	1188300
26	347000	1609000	660500	81000	579500	1029500
27	515000	1164000	510900	99000	411900	752100
28	480000	735000	590400	86000	504400	230600
29	154000	1264000	350600	141000	209600	1054400
30	748000	1281000	370900	80000	290900	990100
31	296000	1490000	42200	17000	25200	1464800
32	632000	1878000	51900	48000	3900	1874100
33	227000	1793000	540300	77000	463300	1329700
34	123000	1472000	350700	122000	228700	1243300
35	955000	1749000	630000	65000	565000	1184000
36	252000	810000	370000	73000	297000	513000
37	418000	1291000	500500	127000	373500	917500
38	905000	1153000	60500	48000	12500	1140500
39	289000	1797000	370800	58000	312800	1484200
40	635000	1106000	320800	141000	179800	926200
41	733000	1599000	540400	120000	420400	1178600
42	982000	1957000	30900	10000	20900	1936100
43	717000	1261000	470400	58000	412400	848600
44	270000	1549000	540700	104000	436700	1112300
45	212000	1905000	33800	13000	20800	1884200
46	649000	1396000	330400	56000	274400	1121600
47	968000	868000	630700	136000	494700	373300
48	387000	900000	610100	126000	484100	415900
49	710000	1182000	50500	15000	35500	1146500
50	952000	1109000	480900	62000	418900	690100
51	409000	1667000	460600	53000	407600	1259400
52	238000	987000	63900	61000	2900	984100
53	911000	1972000	450000	123000	327000	1645000
54	830000	1538000	470600	136000	334600	1203400
55	718000	1509000	690700	87000	603700	905300
56	551000	1146000	540700	125000	415700	730300
57	440000	1331000	66600	11000	55600	1275400
58	406000	1646000	57100	18000	39100	1606900
59	771000	1593000	502000	87000	415000	1178000
60	545000	1913000	608100	70000	538100	1374900
61	146000	1692000	600300	23000	577300	1114700
62	675000	1446000	320600	106000	214600	1231400
63	422000	981000	33100	12000	21100	959900
64	100000	464000	48800	15000	33800	430200
65	483000	1734000	500900	94000	406900	1327100

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66	876000	1402000	55100	38000	17100	1384900
67	876000	1723000	540700	142000	398700	1324300
68	759000	648000	58900	51000	7900	640100
69	394000	1404000	470900	80000	390900	1013100
70	911000	1670000	360500	78000	282500	1387500
71	110000	555000	608000	85000	523000	32000
72	231000	1900000	558000	91000	467000	1433000
73	733000	522000	40200	40000	200	521800
74	163000	1529000	67800	47000	20800	1508200
75	739000	649000	683000	106000	577000	72000
76	754000	1746000	658000	137000	521000	1225000
77	445000	762000	343000	77000	266000	496000
78	275000	659000	643000	101000	542000	117000
79	105000	1947000	301000	89000	212000	1735000
80	147000	1829000	598000	124000	474000	1355000
81	220000	1643000	433000	134000	299000	1344000
82	479000	867000	363000	150000	213000	654000
83	715000	690000	655000	112000	543000	147000
84	452000	839000	392000	73000	319000	520000
85	906000	1587000	605000	66000	539000	1048000
86	755000	774000	451000	75000	376000	398000
87	534000	784000	458000	138000	320000	464000
88	541000	1547000	532000	89000	443000	1104000
89	994000	1289000	622000	82000	540000	749000
90	825000	1908000	64800	38000	26800	1881200
91	403000	971000	410400	111000	299400	671600
92	594000	1429000	580500	66000	514500	914500
93	600000	439000	540100	120000	420100	18900
94	827000	1174000	420700	117000	303700	870300
95	217000	615000	440700	136000	304700	310300
96	634000	537000	320500	142000	178500	358500
97	619000	1200000	420100	80000	340100	859900
98	166000	1257000	46600	16000	30600	1226400
99	590000	452000	320800	93000	227800	224200
100	811000	1693000	390900	148000	242900	1450100
101	190000	684000	400400	123000	277400	406600
102	467000	1879000	39200	18000	21200	1857800
103	417000	410000	36200	32000	4200	405800
104	913000	1433000	660400	126000	534400	898600
105	369000	668000	620400	112000	508400	159600
106	148000	1738000	310600	125000	185600	1552400
107	789000	1069000	350200	112000	238200	830800
108	949000	1296000	420600	44000	376600	919400
109	269000	963000	330600	145000	185600	777400

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110	765000	978000	300200	32000	268200	709800
111	437000	733000	320600	122000	198600	534400
112	829000	807000	370500	41000	329500	477500
113	404000	483000	310400	98000	212400	270600
114	532000	863000	310800	148000	162800	700200
115	695000	1498000	480800	56000	424800	1073200
116	490000	1166000	486000	149000	337000	829000
117	181000	1158000	69800	25000	44800	1113200
118	811000	731000	487000	88000	399000	332000
119	493000	1693000	46900	36000	10900	1682100
120	571000	1616000	68200	65000	3200	1612800
121	304000	1363000	328000	128000	200000	1163000
122	604000	1204000	559000	101000	458000	746000
123	661000	1599000	628000	138000	490000	1109000
124	720000	911000	521000	73000	448000	463000
125	331000	820000	648000	96000	552000	268000
126	729000	1298000	538000	77000	461000	837000
127	312000	1684000	33900	31000	2900	1681100
128	204000	1469000	550000	105000	445000	1024000
129	137000	1103000	51900	18000	33900	1069100
130	315000	1503000	665000	70000	595000	908000
131	272000	1748000	47400	31000	16400	1731600
132	271000	2000000	445000	113000	332000	1668000
133	232000	1568000	60800	60000	800	1567200
134	151000	1063000	402000	139000	263000	800000
135	962000	1539000	395000	122000	273000	1266000
136	296000	1304000	372000	128000	244000	1060000
137	681000	1462000	66700	51000	15700	1446300
138	680000	1373000	504000	80000	424000	949000
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140	852000	1278000	403000	149000	254000	1024000
141	444000	1995000	380000	136000	244000	1751000
142	336000	979000	670000	70000	600000	379000
143	317000	441000	31100	14000	17100	423900
144	261000	1185000	63300	32000	31300	1153700
145	191000	944000	542000	75000	467000	477000
146	342000	1476000	68700	48000	20700	1455300
147	884000	1072000	551000	69000	482000	590000
148	545000	1781000	319000	149000	170000	1611000
149	191000	752000	646000	80000	566000	186000
150	696000	1479000	436000	123000	313000	1166000
151	432000	877000	594000	93000	501000	376000
152	232000	1490000	351000	129000	222000	1268000
153	944000	782000	64500	17000	47500	734500

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154	189000	1164000	563000	126000	437000	727000
155	143000	1900000	57300	43000	14300	1885700
156	294000	1672000	485000	150000	335000	1337000
157	160000	1423000	431000	101000	330000	1093000
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160	661000	1071000	397000	47000	350000	721000
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162	215000	1878000	400000	47000	353000	1525000
163	282000	832000	55500	19000	36500	795500
164	788000	1588000	306000	55000	251000	1337000
165	163000	1745000	352000	74000	278000	1467000
166	380000	426000	498000	92000	406000	20000
167	461000	1817000	674000	129000	545000	1272000
168	734000	1743000	67100	54000	13100	1729900
169	415000	1283000	559000	124000	435000	848000
170	266000	943000	47700	44000	3700	939300
171	459000	1077000	37800	30000	7800	1069200
172	829000	1276000	631000	144000	487000	789000
173	118000	969000	313000	49000	264000	705000
174	800000	989000	407000	52000	355000	634000
175	515000	1642000	459000	143000	316000	1326000
176	658000	1939000	64200	47000	17200	1921800
177	455000	1157000	449000	131000	318000	839000
178	258000	1201000	463000	74000	389000	812000
179	386000	502000	458000	54000	404000	98000
180	902000	519000	524000	131000	393000	126000
181	290000	1171000	401000	116000	285000	886000
182	685000	1774000	45600	29000	16600	1757400
183	259000	2000000	378000	71000	307000	1693000
184	725000	1519000	52500	32000	20500	1498500
185	237000	706000	40700	36000	4700	701300
186	374000	1951000	628000	94000	534000	1417000
187	776000	540000	320000	147000	173000	367000
188	750000	734000	650000	147000	503000	231000
189	938000	1235000	31500	15000	16500	1218500
190	579000	841000	54700	46000	8700	832300
191	631000	884000	51200	29000	22200	861800
192	597000	1892000	573000	147000	426000	1466000
193	757000	417000	342000	147000	195000	222000
194	302000	1028000	310000	71000	239000	789000
195	528000	1310000	548000	58000	490000	820000
196	151000	1189000	315000	104000	211000	978000
197	771000	1037000	358000	144000	214000	823000

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198	406000	664000	306000	56000	250000	414000
199	675000	835000	481000	119000	362000	473000
200	736000	573000	30300	24000	6300	566700
201	875000	563000	546000	118000	428000	135000
202	859000	1107000	618000	135000	483000	624000
203	496000	1999000	62900	42000	20900	1978100
204	491000	582000	433000	47000	386000	196000
205	824000	1677000	59000	22000	37000	1640000
206	849000	1602000	429000	148000	281000	1321000
207	816000	434000	63400	25000	38400	395600
208	586000	1858000	43000	27000	16000	1842000
209	763000	1220000	623000	95000	528000	692000
210	375000	959000	433000	77000	356000	603000
211	922000	403000	472000	138000	334000	69000
212	386000	1442000	424000	76000	348000	1094000
213	853000	1019000	321000	147000	174000	845000
214	705000	691000	548000	123000	425000	266000
215	973000	1987000	694000	138000	556000	1431000
216	896000	1532000	405000	72000	333000	1199000
217	239000	1836000	454000	111000	343000	1493000
218	171000	707000	696000	149000	547000	160000
219	113000	1648000	512000	65000	447000	1201000
220	310000	427000	68900	55000	13900	413100
221	456000	659000	387000	124000	263000	396000
222	395000	557000	51500	44000	7500	549500
223	303000	593000	70000	25000	45000	548000
224	383000	1035000	453000	78000	375000	660000
225	166000	1693000	604000	96000	508000	1185000
226	120000	1356000	641000	86000	555000	801000
227	235000	651000	413000	123000	290000	361000
228	101000	1142000	554000	72000	482000	660000
229	183000	1936000	693000	94000	599000	1337000
230	596000	571000	371000	37000	334000	237000
231	954000	1232000	456000	70000	386000	846000
232	736000	1389000	427000	72000	355000	1034000
233	375000	554000	413000	110000	303000	251000
234	593000	1512000	603000	90000	513000	999000
235	844000	1036000	499000	98000	401000	635000
236	580000	835000	444000	107000	337000	498000
237	560000	1483000	520000	99000	421000	1062000
238	520000	441000	61200	22000	39200	401800
239	146000	1200000	304000	78000	226000	974000
240	963000	1507000	414000	143000	271000	1236000
241	383000	1472000	393000	147000	246000	1226000

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242	109000	1494000	688000	79000	609000	885000
243	927000	1746000	41900	19000	22900	1723100
244	200000	1720000	368000	97000	271000	1449000
245	474000	1344000	413000	73000	340000	1004000
246	863000	1140000	348000	138000	210000	930000
247	983000	1152000	58900	42000	16900	1135100
248	502000	1069000	37700	13000	24700	1044300
249	573000	1469000	61500	60000	1500	1467500
250	619000	1260000	314000	41000	273000	987000
251	516000	1410000	678000	108000	570000	840000
252	802000	1421000	68400	20000	48400	1372600
253	567000	1038000	497000	52000	445000	593000
254	982000	1646000	438000	104000	334000	1312000
255	948000	1404000	514000	90000	424000	980000
256	581000	1471000	429000	85000	344000	1127000
257	868000	1671000	600000	120000	480000	1191000
258	568000	1252000	421000	50000	371000	881000
259	155000	1493000	572000	76000	496000	997000
260	335000	1873000	59800	47000	12800	1860200
261	565000	737000	54900	36000	18900	718100
262	216000	671000	496000	107000	389000	282000
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Appendix Three

Results of Answers to Interiew Questionnaires

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395	4	5	2	3	5	2	3
396	4	3	2	1	3	4	3
397	5	4	2	5	2	3	4
398	4	5	4	2	4	5	3
399	3	3	2	5	4	5	3
400	2	3	5	2	2	4	3

Appendix Four

Results of Findings in Statistical Tables and Graphs

Age Bracket					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	30	7.5	7.5	7.5
	31-45	226	56.5	56.5	64.0
	46-60	110	27.5	27.5	91.5

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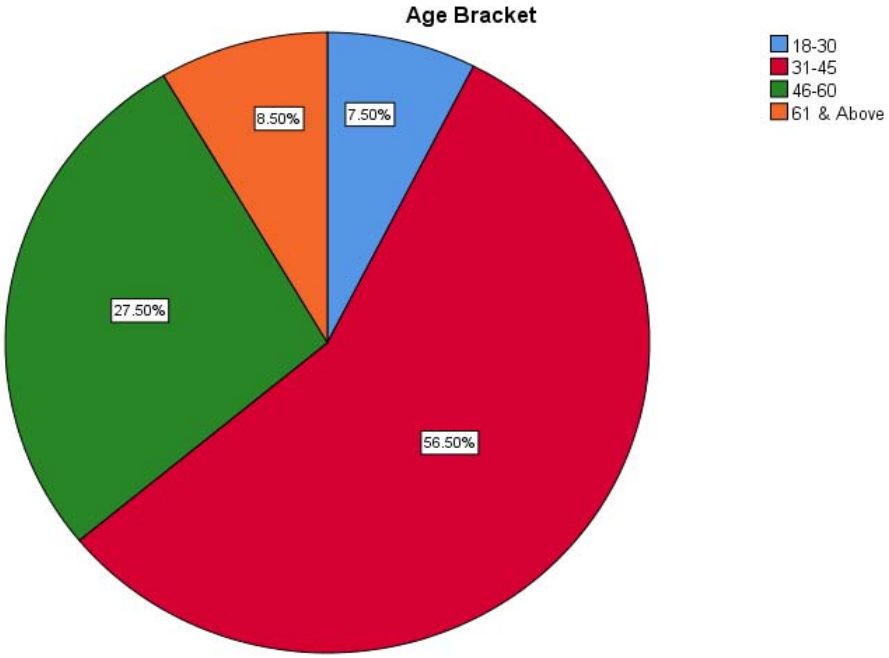
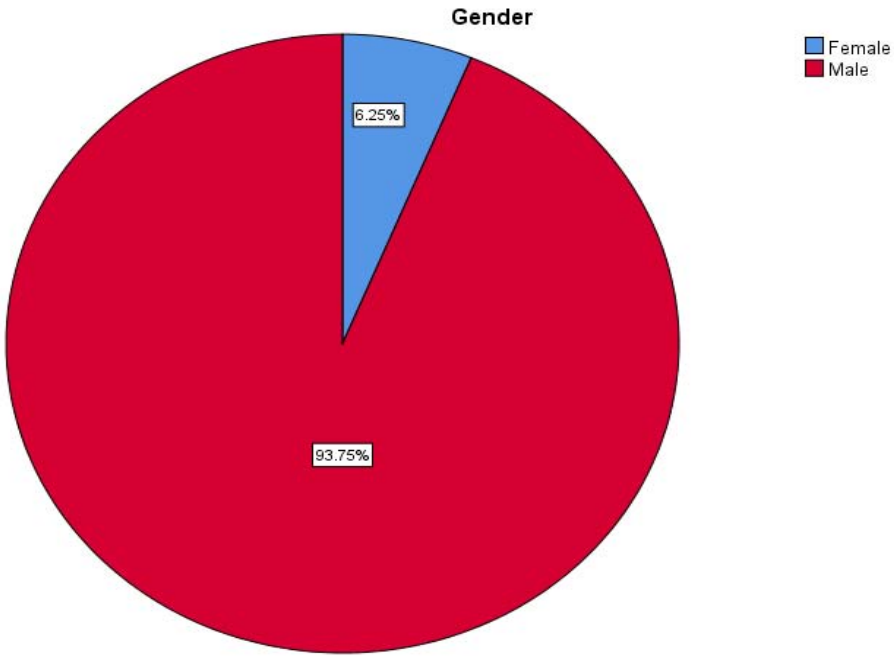
	61 & Above	34	8.5	8.5	100.0
	Total	400	100.0	100.0	



Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	25	6.3	6.3	6.3
	Male	375	93.8	93.8	100.0
	Total	400	100.0	100.0	



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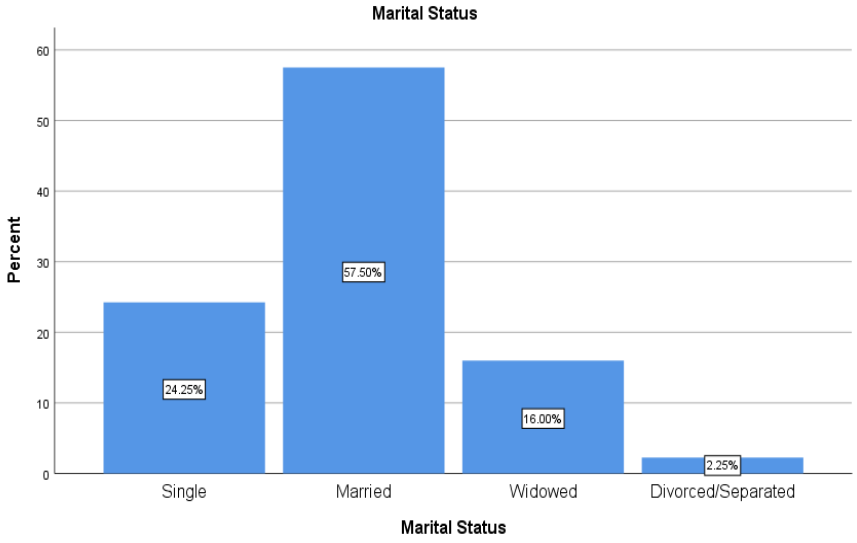
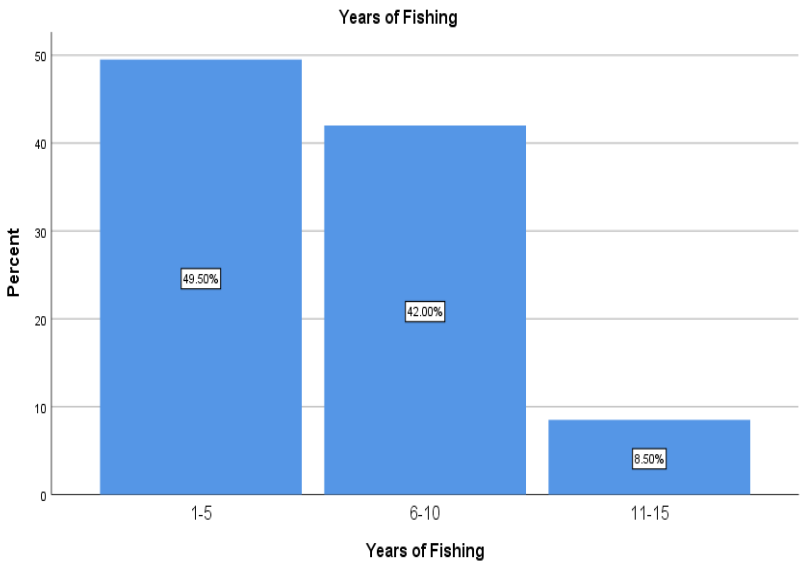
Marital Status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	97	24.3	24.3	24.3
	Married	230	57.5	57.5	81.8
	Widowed	64	16.0	16.0	97.8
	Divorced/Separated	9	2.3	2.3	100.0
	Total	400	100.0	100.0	



Years of Fishing					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5	198	49.5	49.5	49.5
	6-10	168	42.0	42.0	91.5
	11-15	34	8.5	8.5	100.0
	Total	400	100.0	100.0	



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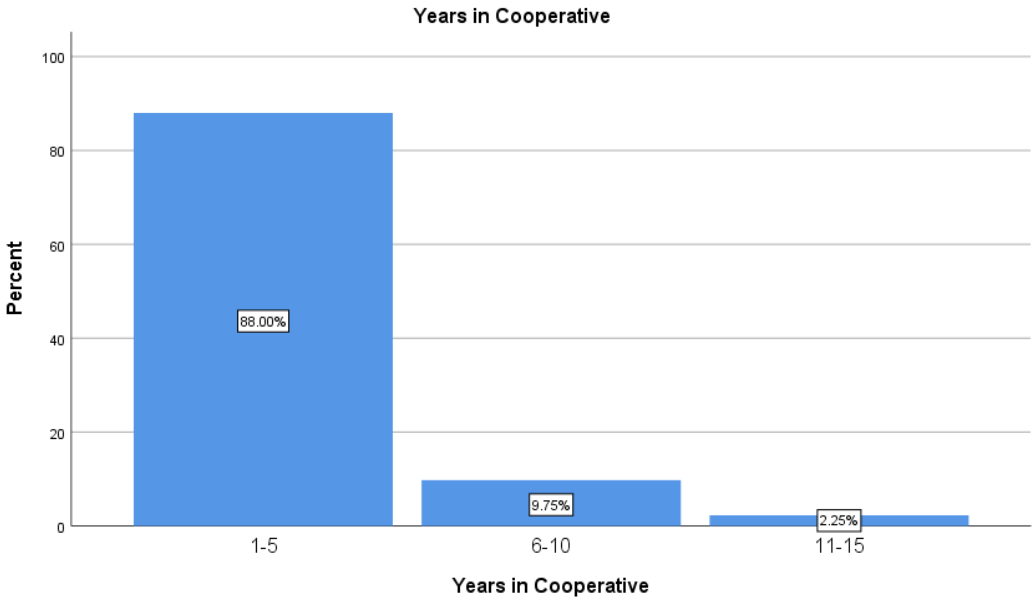
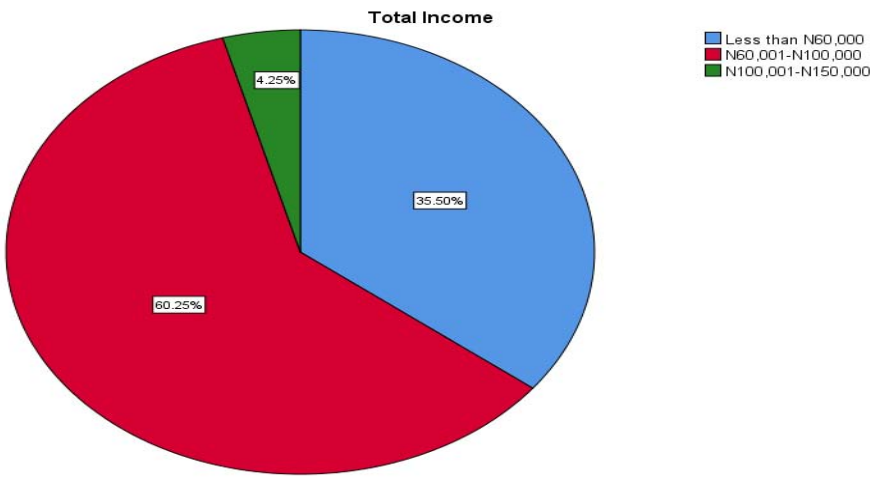
Years in Cooperative					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5	352	88.0	88.0	88.0
	6-10	39	9.8	9.8	97.8
	11-15	9	2.3	2.3	100.0
	Total	400	100.0	100.0	



Total Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than N60,000	142	35.5	35.5	35.5
	N60,001-N100,000	241	60.3	60.3	95.8
	N100,001-N150,000	17	4.3	4.3	100.0
	Total	400	100.0	100.0	



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Descriptive Statistics									
	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Total Investment	400	940000	100000	1040000	208377000	520942.50	13357.441	267148.826	71368495432.331
Total Revenue (Sales)	400	1597000	403000	2000000	475279000	1188197.05	22828.955	456579.106	208464479692.982
Total Cost	400	665700	30300	696000	150822500	377056.25	10520.697	210413.936	44274024622.494
Variable Cost	400	613800	200	614000	119072500	297681.25	9353.137	187062.739	34992468294.173
Fixed Cost	400	145000	5000	150000	31750000	79375.00	2061.516	41230.319	1699939223.058
Profit Margin	400	1966100	12000	1978100	356206500	910516.25	23964.393	479287.869	229716861364.348
Valid N (listwise)	400								

Variables Entered/Removed[a]			
Model	Variables Entered	Variables Removed	Method
1	Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income[b]		Enter
a. Dependent Variable: Profit Margin			
b. All requested variables entered.			

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.896[a]	.803	.800	214584.331	2.069
a. Predictors: (Constant), Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income					
b. Dependent Variable: Profit Margin					

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7360682507964 0.360	7	1051526072566 2.908	228.362	.000[b]
	Residual	1805020260473	392	46046435216.1		

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		4.637		60		
	Total	9165702768437 5.000	399			
a. Dependent Variable: Profit Margin						
b. Predictors: (Constant), Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income						

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-181735.673	62191.026		-2.922	.004
	Age Bracket	6441.454	638.450	.015	10.089	.000
	Gender	1798.938	21659.483	.002	.083	.934
	Educational Qualification	694.378	371.799	.002	1.868	.064
	Years in Cooperative	3481.116	9735.325	.008	.358	.721
	Total Investment	.035	.010	.020	35.867	.000
	Total Income	18223.032	1373.671	.030	13.266	.000
	Total Revenue (Sales)	.942	.024	.897	39.573	.000
a. Dependent Variable: Profit Margin						

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	157170.28	1683894.50	910516.25	429509.323	400
Residual	-363093.750	817791.000	.000	212693.684	400
Std. Predicted Value	-1.754	1.801	.000	1.000	400
Std. Residual	-1.692	3.811	.000	.991	400
a. Dependent Variable: Profit Margin					

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch[b]		Enter
a. Dependent Variable: Profit Margin			
b. All requested variables entered.			

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.862[a]	.743	.722	477194.145	1.885
a. Predictors: (Constant), Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch					
b. Dependent Variable: Profit Margin					

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ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2393041070775.250	7	341863010110.750	1.501	.165[b]
	Residual	89263986613599.750	392	227714251565.305		
	Total	91657027684375.000	399			
a. Dependent Variable: Profit Margin						
b. Predictors: (Constant), Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1037134.155	223487.712		4.641	.000
	High cost of fishing inputs	-22620.738	1655.644	-.069	-13.663	.000
	Lack of sufficient capital	-19938.986	8772.599	-.035	-2.273	.039
	Storage problems	-7100.295	21716.166	-.016	-.327	.744
	Spoilage of fish	-22475.463	16597.594	-.068	-1.354	.176
	Poor catch	-6686.288	2082.166	-.016	-3.211	.003
	Poor sales	-35045.332	2158.999	-.082	-16.232	.000
	Oil/Industrial pollution	-52260.682	2945.772	-.089	-17.741	.000
a. Dependent Variable: Profit Margin						

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	736539.75	1135564.25	910516.25	77444.152	400
Residual	-930119.313	1077451.875	.000	472989.709	400
Std. Predicted Value	-2.246	2.906	.000	1.000	400
Std. Residual	-1.949	2.258	.000	.991	400
a. Dependent Variable: Profit Margin					

Variables Entered/Removed[a]			
Model	Variables Entered	Variables Removed	Method
1	Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income[b]		Enter
a. Dependent Variable: Profit Margin			
b. All requested variables entered.			

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.896[a]	.803	.800	214584.331	2.069
a. Predictors: (Constant), Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income					
b. Dependent Variable: Profit Margin					

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ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7360682507964 0.360	7	1051526072566 2.908	228.362	.000[b]
	Residual	1805020260473 4.637	392	46046435216.1 60		
	Total	9165702768437 5.000	399			
a. Dependent Variable: Profit Margin						
b. Predictors: (Constant), Total Revenue (Sales), Age Bracket, Total Investment, Gender, Years in Cooperative, Educational Qualification, Total Income						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-181735.673	62191.026		-2.922	.004
	Age Bracket	6441.454	638.450	.015	10.089	.000
	Gender	1798.938	21659.483	.002	.083	.934
	Educational Qualification	694.378	371.799	.002	1.868	.064
	Years in Cooperative	3481.116	9735.325	.008	.358	.721
	Total Investment	.035	.010	.020	35.867	.000
	Total Income	18223.032	1373.671	.030	13.266	.000
	Total Revenue (Sales)	.942	.024	.897	39.573	.000
a. Dependent Variable: Profit Margin						

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	157170.28	1683894.50	910516.25	429509.323	400
Residual	-363093.750	817791.000	.000	212693.684	400
Std. Predicted Value	-1.754	1.801	.000	1.000	400
Std. Residual	-1.692	3.811	.000	.991	400
a. Dependent Variable: Profit Margin					

Variables Entered/Removed[a]			
Model	Variables Entered	Variables Removed	Method
1	Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch[b]	.	Enter
a. Dependent Variable: Profit Margin			
b. All requested variables entered.			

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.862[a]	.743	.722	477194.145	1.885
a. Predictors: (Constant), Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch					
b. Dependent Variable: Profit Margin					

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ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2393041070775.250	7	341863010110.750	1.501	.165[b]
	Residual	89263986613599.750	392	227714251565.305		
	Total	91657027684375.000	399			
a. Dependent Variable: Profit Margin						
b. Predictors: (Constant), Oil/Industrial pollution, Poor sales, Lack of sufficient capital, Storage problems, Spoilage of fish, High cost of fishing inputs, Poor catch						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1037134.155	223487.712		4.641	.000
	High cost of fishing inputs	-22620.738	1655.644	-.069	-13.663	.000
	Lack of sufficient capital	-19938.986	8772.599	-.035	-2.273	.039
	Storage problems	-7100.295	21716.166	-.016	-.327	.744
	Spoilage of fish	-22475.463	16597.594	-.068	-1.354	.176
	Poor catch	-6686.288	2082.166	-.016	-3.211	.003
	Poor sales	-35045.332	2158.999	-.082	-16.232	.000
	Oil/Industrial pollution	-52260.682	2945.772	-.089	-17.741	.000
a. Dependent Variable: Profit Margin						

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	736539.75	1135564.25	910516.25	77444.152	400
Residual	-930119.313	1077451.875	.000	472989.709	400
Std. Predicted Value	-2.246	2.906	.000	1.000	400
Std. Residual	-1.949	2.258	.000	.991	400
a. Dependent Variable: Profit Margin					

Appendix Five Questionnaire

Section A: Socio-Economic Characteristics of the Fishermen

Instruction: Kindly provide the answer to the under listed questions to the best of your knowledge by ticking [√] in each of the option boxes provided.

1. Which of these is your age bracket?
   18-30 [ ]
   31-45 [ ]
   46-60 [ ]
   61yrs & Above [ ].
2. What is your gender?
   Male [ ]
   Female [ ]
3. What is your marital status?
   Single [ ]
   Married [ ]
   Widowed [ ]
   Divorce/Separated [ ]
4. What is your household size?
   Less than 5 [ ]
   6-10 [ ]
   11-15 [ ]

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5. What is your educational qualification?
   No formal Education [ ]
   FSLC [ ]
   WASSC/SSCE [ ]
   NCE/OND [ ]
   B.Sc./HND [ ]
   M.Sc./Ph.D [ ]
   Other; specify:……...

6. How many years have you been fishing?
   1-5 [ ]
   6-10 [ ]
   11-15 [ ]
   16-20 [ ]
   Above 20yrs [ ]

7. How many years have you been a member of a cooperative?
   1-5 [ ]
   6-10 [ ]
   11-15 [ ]
   16-20 [ ]
   Above 20yrs [ ]

8. Which of these bests describes your monthly income in 2018?
   Less than N60, 000 [ ]
   N60, 001 – N100, 000 [ ]
   N100, 001 – N150, 000 [ ]
   N150, 001 and Above [ ].

9. Indicate the amount of your investment so far in fishery production as of 2018?
   Various nets [N]
   Motorized boat [N]
   Refrigerated storage room [N]
   Refrigerated van [N]
   Others (specify) [N]

Section B: Substantive Questions

1. How much did you realize from fish sales in 2018?

   N_____

2. What was your operational cost in 2018?
   Oil and petrol N _____
   Fish bets N_____
   Net repairs N_____
   Boat repairs N_____
   Labour N_____
   Other overheads N_____

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3. Please indicate the level of severity of the following fish production constraints as they affected you as per the table below by filling (Very severe [VS]; Severe [S]; Undecided [U]; Not severe [NS]; Not very severe [NVS]

Production constraints	VS	S	U	NS	NVS
High cost of fishing inputs					
Lack of sufficient capital					
Storage problems					
Spoilage of fish					
Poor catch					
Poor sales					
Oil/industrial pollution					
Other (specify)					
Other (specify)					
Other (specify)					

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