Online ISSN: 2249-4588
Print ISSN: 0975-5853
DOI: 10.17406/GJMBR

Global Journal

of Management and Business Research: B

Economics and Commerce

T-square and Control Chart

Profitability of Fish Production

Highlights

Structure and Fiscal Policy

A Review on Artificial Intelligence

Discovering Thoughts, Inventing Future

VOLUME 20 ISSUE 10 VERSION 1.0

Global Journal of Management and Business Research: B
Economics and Commerce

Global Journal of Management and Business Research: B
Economics and Commerce

Volume 20 Issue 10 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

*(A Delaware USA Incorporation with "Good Standing"; **Reg. Number: 0423089**)*

Sponsors: Open Association of Research Society
Open Scientific Standards

Publisher's Headquarters office

Global Journals® Headquarters
945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals Pvt Ltd
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin:452009, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investors@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Excluding Air Parcel Charges):

Yearly Subscription (Personal & Institutional)
250 USD (B/W) & 350 USD (Color)

Editorial Board

Global Journal of Management and Business Research

Contents of the Issue

i. Copyright Notice
ii. Editorial Board Members
iii. Chief Author and Dean
iv. Contents of the Issue

1. The Scope, Structure and Fiscal Policy Implication of West Africa Trade Zone. *1-8*
2. Investigating the Quality Performance of Production of Some Selected Drinks using Hotelling T-square and Control Chart. *9-22*
3. A Review on Artificial Intelligence (AI), Big Data and Block Chain: Future Impact and Business Opportunities. *23-33*
4. Leadership Impacts on Employee Motivation of the Kindergarten's Staffs in Rangpur. *35-40*
5. The Profitability of Fish Production by Co- Operative Society Members in Rivers State, Nigeria. *41-127*

v. Fellows
vi. Auxiliary Memberships
vii. Preferred Author Guidelines
viii. Index

Global Journal of Management and Business Research: B
Economics and Commerce
Volume 20 Issue 10 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

The Scope, Structure and Fiscal Policy Implication of West Africa Trade Zone

By Past. Prof. Abomaye-Nimenibo, Williams Aminadokiari Samuel & George, Sotonye M. D.

Obong University

Abstract- Regional economic integration has been an increasing priority among many African nations. Adequate information fosters better trade relations among nations. This paper investigated the scope, structure and fiscal policy implication of West Africa trade zone. Relevant data and information and materials for the study were obtained from Central Bank of Nigeria's Statistical bulletin, 2018, textbooks and published journal articles. Econometric analysis of Ordinary least square was used in the analysis. The result showed that the absence of formal contact and adequate market information was smooth trade relations amongst the West African countries. It was found that policies on trade partners in West Africa's Trade Zone have significant effects on the external performance of the Nigerian economy either positively or negatively. It was further revealed that tax a contractionary fiscal instrument can be used to regulate the external sector of the Nigerian economy in West Africa's Trade Zone.

Keywords: regional economic integration, trade relations, market information, trade partners, trade zone, free flow of trade, fiscal policy, fiscal instrument, economy.

GJMBR-B Classification: JEL Code: M20

Strictly as per the compliance and regulations of:

The Scope, Structure and Fiscal Policy Implication of West Africa Trade Zone

Past. Prof. Abomaye-Nimenibo, Williams Aminadokiari Samuel [α] & George, Sotonye M. D. [σ]

Abstract- Regional economic integration has been an increasing priority among many African nations. Adequate information fosters better trade relations among nations. This paper investigated the scope, structure and fiscal policy implication of West Africa trade zone. Relevant data and information and materials for the study were obtained from Central Bank of Nigeria's Statistical bulletin, 2018, textbooks and published journal articles. Econometric analysis of Ordinary least square was used in the analysis. The result showed that the absence of formal contact and adequate market information was smooth trade relations amongst the West African countries. It was found that policies on trade partners in West Africa's Trade Zone have significant effects on the external performance of the Nigerian economy either positively or negatively. It was further revealed that tax a contractionary fiscal instrument can be used to regulate the external sector of the Nigerian economy in West Africa's Trade Zone. The study suggests for removal of barriers against the free flow of trade among West African countries.

Keywords: regional economic integration, trade relations, market information, trade partners, trade zone, free flow of trade, fiscal policy, fiscal instrument, economy.

I. Introduction

Countries in West Africa appear as natural partners in the hob of trade in agriculture, food and general merchandise, as different sub-regions have different comparative advantages, with diverse ecosystems yielding a wide range of produce. The natural complementary among countries due to the agro-climatic conditions, promote sizeable agricultural trade flows between coastal countries and the Sahel-Sudan and Sahel countries. The latter are typically exporters of coarse grains (millet, sorghum), cowpeas and livestock while the coastal countries and the lower Sahelo-Sudanian Zones export maize, rice, roots, tubers and tropical fruits to land-locked countries (FAO, 2015). Both regional economic communities, ECOWAS and Members of the West African Economic and Monetary Union (also known by its French acronym, UEMOA) which include Benin, Burkina Faso, Côte D'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo, have developed trade policy frameworks to increase trade integration between their member states. This process was further advanced in UEMOA, as the customs union, and the abolition of tariffs or quotas on intraregional trade in domestic products approved by ECOWAS. However, ECOWAS has been catching up through its Trade Liberalization Scheme (ETLS) and the Common External Tariff (CET).

Regional economic integration has been an increasing priority among many African nations in recent years. For instance, the Continental Free Trade Area Negotiating Forum (CFTA), which was convened for the first time in Addis Ababa aimed at incorporating all 53 African Countries. Besides the scope, the structure and financial implication of the West African Trade Zone, borders on the single currency and trading infrastructure. To this end, many developing countries, mainly the African countries are today faced with public expenditure funding issue essential to meeting the growing needs of their populations. The difficulties associated with this plan are further compounded by the sluggish international economic environment, which increases their vulnerability to the official development assistance (ODA) and foreign debt which they are essentially dependent. Given the volatility of external financing and the urgency to reduce external dependence, these African countries need to change development funding strategy, mobilizing domestic resources, which appear to consider the best way to finance public spending. In this context, it is appropriate to use the internal tax resources, whose mobilization for development purposes can be performed without causing a debt process, allowing to prioritize the use of such resources to preserve the sustainability of public finances.

Besides, there is a need to mobilizing domestic resources to give more relevance to fiscal policy. The mobilization through the development of the private sector in the countries of the WAEMU zone is characterized by an insufficient number of companies able to sustainably contribute to the creation of wealth. Moreover, the existence of a limited number of companies is capable of making tax a fiscal tool to negative performance and unsustainable in the long term, to financially support the zone, due to an unfavourable economic environment. Various reforms have been carried out since 1990 which targeted a

Author α: Phd, M.Sc., B.Sc. Economics, Mba Management and Ud, Personnel Management and Industrial Relations, Director of Postgraduate Studies, School of Postgraduate Studies, Obong University, Obong Ntak, Etim Ekpo Lga, Akwa Ibom State. Nigeria. e-mail: wasanim2006@yahoo.com

Author σ: B.Sc. Accountancy, and PGD Business Management (RSU); M.Sc. Cooperative Economics and Management, and PhD, Co-Operative Economics and Management in View (UNIZIK). Department of Cooperative Economics and Management, Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, Enugu State.

reduction in the weight of tax structures which burdened economic growth. Taxes, therefore, sought to create a tax environment that encourages savings, investment, entrepreneurship and work.

i) *Taxes according to Bénassy-Quéré et al, (2009). affects:* individual decisions concerning savings, work and improvement in the level of education;
ii) business decisions on production, job creation, investment and innovation
iii) the choice of savings instruments and assets by investors.

OECD, (2009), stated that all these decisions are affected not only by the level of taxes but also by the way tax instruments are designed and combined to generate public revenues.

It is important to note that formal and informal cross-border trade can also be explained by longstanding relationships and indigenous patterns, which often pre-date colonial and post-colonial state boundaries. Cross-border trade is often conducted among people of the same clan or ethnicity group. The West African communities spread along the territorial boundaries, and they have a lot in common both culturally and socially. They speak the same or similar languages, they inter-marry and own land on either side of the borders. This alone provides an incentive to these communities to engage in trade to explore available opportunities on either side of the border. In the absence of formal contracts, adequate market information, and other important obstacles to formal trade, trust-based networks can play an important role in establishing trade relations, although informal (OECD, 2009). ODI, 2012) quoting Aker *et al.* (2010), stated that ethnic differences can act as a significant intra-national border between markets and suggest that ethnic similarities diminishing international border effects could enhance international market integration.

a) Statement of the problem

There are numerous unresolved issues bedevilling trade relations among the West African States, which points to the widespread nature of bribery in the region, especially, the prevalence of corrupt customs procedures and road harassments. Border bribes and roadblocks lead to long and costly delays in trade (World Bank, 2015). There are cases of import restrictions, export restrictions, and tariffs. Free and intra-regional trade is further hampered by complex, non-transparent or lengthy customs procedures, high costs of moving goods by road or rail within West Africa sub-region, as a result of poor infrastructure and governance of the transport sector, which affects prices of goods produced in rural areas. Transport prices per kilometre from farm gate to primary collection markets tend to be three to five times higher than those from secondary (often rural wholesale) markets to wholesale markets located in the country's capitals (FAO, 2015).The high cost of transportation negatively affects access to markets, because of the geographical distance between producers and consumers. The availability and quality of connecting infrastructure also hamper free trade in the West African suburb. Considering these numerous hindrances, it becomes pertinent to provide answers to questions such as: what is the cost implication of trading among West Africa countries and how free is the zone. To this end, we are poised at addressing the scope, structure and fiscal policy implication of West Africa Trade zone.

b) Study Hypothesis

The study is guided by the following formulated hypotheses:

H_{01}: There is no significant effect of ExR on FDI in West Africa Trade zone.
H_{02}: TOP does not significantly affect FDI in West Africa Trade zone.
H_{03}: There is no significant effect of NT on FDI in West Africa Trade zone.
H_{04}: NIP does not significantly affect FDI in West Africa Trade zone.
H_{05}: There is no significant effect of NExP on FDI in West Africa Trade zone.

The meaning of the above-used abbreviations are as follows: FDI is the total foreign direct investment, ExR is the exchange rate, TOP represents the trade openness, NT is net tax, NIP is the net import while NExP is the net export.

c) Significance of the study

The importance of this study will go a long way in educating researchers and the public in light of the following benefits:

i. Researchers will find this work rewarding at all times as a reference when seeking literature on West African Trade-related issues.
ii. The study will help researchers to realize the actual state of bilateral trade among Members of Economic Communities of West Africa (ECOWAS).
iii. The study will help the West African economies by revealing the stand of the economy in the face of challenges facing West Africa trade relations.
iv. The study stands to enlighten Policy Maker son the ways of finding the best policy to use when it comes to the issue of West African trade zone.

II. Literature Review

a) Conceptual Issues

i. *Trade Scope*

In every trade relation, there is always a defined scope that guides its operations, and applications. The simplification, harmonization, standardization and modernization of trade procedures. It seeks to reduce

trade transaction costs at the interface between business and government and is an agenda item within many custom related activities (Baxa, (2010).

ii. *Trade Structure*

According to Martinez-Lopez (2005), trade structure is independent of the level of the trade itself, which has an important effect on the rate of economic growth. It is the trade constituents, what it is made up of.

iii. *Fiscal Policy*

Fiscal Policy is how a government adjusts its spending levels and tax rates to monitor and influence a nation's economy usually through the controlled spending, taxation and transfer payment to influence aggregate demand and therefore real income (Blankenau & Simpson (2004).

Fiscal policy, therefore, is undoubtedly one of the most important tools used by the government to achieve macroeconomic stability of the economy of most developing countries (Siyan and Adebayo, 2005).

Fiscal policy according to Abomaye-Nimenibo (2017) is the use of government spending and taxation policies to influence the level of economic activity, inflation and economic growth. Fiscal means having to do with taxation, public revenue or public debt. He went to say that, to stabilize prices of goods and services in the country, the government may use a fiscal tool of contractionary fiscal policy to combat price induced inflation.

b) Theoretical Framework

The theoretical framework is based on several empirical studies which have produced mixed results on the effect of fiscal policy on economic growth. To understand the main channels through which fiscal variables affect the rate of economic growth, the neoclassical model of Solow (1956), which identifies five channels was considered:

i) High taxes may discourage investment by decreasing net capital;
ii) Taxation can weaken labour supply, by distorting the choice between work and leisure, between training and the low-skilled;
iii) Taxation can slow production growth by discouraging investment in research and development, or in high technology;
iv) Taxation can have an impact on the marginal productivity of capital, especially if it promotes a shift in investment towards sectors where taxes are lowest and where productivity is lower (Skinner, 1987);
v) High taxes on labour supply can discourage the efficient use of human capital, to discourage work in high productivity and high tax areas.

Economists of supply conclude from their analysis that reducing the tax burden should lead initially to accelerating economic growth and secondly to enable the State to increase the amount of revenue.

The pioneering work on endogenous growth (Romer, 1986; Lucas, 1988) helped to capture the effects of taxation on growth. The work allows verifying that when taxes are used to finance public investment in infrastructure, education and health, they may be favourable to growth (Lucas, 1988; Barro, 1990).

Considering a growth model with productive public spending, Barro (1990) emphasizes the existence of a Laffer curve between tax rates and economic growth rates. This curve shows that up to a certain tax threshold, tax policy encourages growth, but beyond that threshold, it generates negative externalities that retard growth.

Kocherlakota and Yi (1997) find that the effects of taxes on economic growth are permanent as provided by the endogenous growth model. However, when taxes exceed a certain level, they generate negative externalities on the economy. From a general equilibrium model calibrated on the multiregional WAEMU countries,

Cadot *et al*. (2013) show that following the enlargement of the tax base of value-added tax (VAT) associated with a significant decrease in rates for the same level of VAT revenue, GDP increases by 1 to 2 percent according to the country.

Easterly and Rebelo (1993), in a study to show the relationship between the various fiscal policy measures, the level of development and the rate of economic growth, among others conclude that the impact of taxes on growth depends on its structure, and only the marginal tax rate on income significantly explains the growing disparities.

c) Empirical Review

The pioneering work on endogenous growth (Romer, 1986; Lucas, 1988) helped to capture the effects of taxation on growth. The work allows verifying that when taxes are used to finance public investment in infrastructure, education and health, they may be favourable to growth (Lucas, 1988; Barro, 1990). Considering a growth model with productive public spending, Barro (1990) emphasizes the existence of a Laffer curve between tax rates and economic growth rates. This curve shows that up to a certain tax threshold, tax policy encourages growth, but beyond that threshold, it generates negative externalities that retard growth.

Kocherlakota and Yi (1997) find that the effects of taxes on economic growth are permanent as provided by the endogenous growth model. However, when taxes exceed a certain level, they generate negative externalities on the economy.

From a general equilibrium model calibrated on the multiregional WAEMU countries, Cadot *et al*. (2013) show that following the enlargement of the tax base of

value-added tax (VAT) associated with a significant decrease in rates for the same level of VAT revenue, GDP increases by 1 to 2 percent according to the country.

Easterly and Rebelo (1993), in a study to show the relationship between the various fiscal policy measures, the level of development and the rate of economic growth, among others conclude that the impact of taxes on growth depends on its structure, and only the marginal tax rate on income significantly explains the growing disparities.

Eaton (1981) showed that taxes may reduce growth in the endogenous growth model. Work by Chambas (1994) concluded the adverse effects of tax rates on productive activity in African countries. For him, the tax rate generally applied in Africa is the source of incentives to reduce consumption.

Lee and Gordon (2005) and Martinez Lopez (2005), using the endogenous growth model, lead to the conclusion that the increase in the tax rate on income leads to lower growth rates. Milesi- Ferretti and Roubini (1995) also showed that direct taxes hurt growth. Using the framework of the neoclassical growth model, Milesi-Ferretti and Roubini (1998) show that changes in tax rates can not affect the long-term growth rate. Some authors believe that the impact of fiscal policy on growth is negligible (Harberger, 1964), Mendoza, Milesi-Ferretti and Asea, 1995), and conclude that growth requires substantial changes in the tax system (Mendoza, Milesi- Ferretti & Asea, 1995).

Rivas (2003) shows that if the government uses taxes to finance certain public services such as infrastructure, education, health, the legal system, respect for property rights, the relationship between taxation and growth becomes ambiguous. By using the endogenous growth model, Tomljanovich (2004) showed that the relationship between fiscal policy and growth becomes more uncertain.

III. Method of Study

The econometric analysis was implored in the data analysis in which step by step analysis followed the adoption of Augmented Dickey-Fuller, bound co-integration test, vector error correction model and Engle-Granger Causality test.

In analysing the scope, structure and fiscal policy implication of West Africa trade zone, an econometric model was built on the functional form:

$$FDI = f(ExR, TOP, NT, IMP, ExP) \quad \ldots\ldots 1$$

Where FDI is the total foreign direct investment, ExR is the exchange rate, TOP represents the trade openness, NT is net tax, NIP is the net import while NExP is the net export.

The ordinary least squares linear regression equation based on the above functional relation is;

$$FDI = \beta_0+\beta_1 ExR + \beta_2 TOP + \beta_3 NT + \beta_4 IMP + \beta_5 ExP \quad \ldots\ldots 2$$

Transforming the equation into linear form;

$$LnFDI = Ln\beta_0+\beta_1 ExR_t + Ln\beta_2 TOP_t + Ln\beta_3 NT_t + Ln\beta_4 IMP_t + Ln\beta_5 ExP_t + e_t \quad \ldots\ldots 4$$

Where:

FDI	= dependent variable
ExR, TOP, NT, IMP, ExP	= independent or explanatory variables
β_0	= regression constant
$\beta_1, \beta_2, \beta_3, \beta_4$	= regression coefficients of the explanatory variables
u_t	= Error term

a) A priori theoretical expectation

A Priori Theoretical Expectations, the coefficients of the parameter estimates are:

$$(\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0).$$

IV. Analysis and Discussion of Results

Table 1: Data for Analysis

a) Data Presentation

Year	Foreign Direct Investment, FDI (N' Billion)	Exchange Rate, ExR (NPer USD)	Trade Openness (TOP)	Net Tax, NT (N' Billion)	Net Import, NIP (N' Billion)	Net Export, NExP (N'Billion)
1981	4475.062	0.6	0.00156	1.85696	12.8396	11.0233
1982	1100.485	0.7	0.001268	1.65584	10.7705	8.2064

1983	704.1846	0.7	0.001184	1.63183	8.9037	7.5025
1984	574.1308	0.8	0.001183	1.72563	7.1783	9.088
1985	1058.977	0.9	0.001257	1.72771	7.0626	11.7208
1986	1608.312	1.8	0.000978	1.78241	5.9836	8.9206
1987	4964.713	4	0.003164	1.91142	17.8617	30.3606
1988	5711.91	4.5	0.003244	1.94799	21.4457	31.1928
1989	3534.017	7.4	0.00514	2.17471	30.8602	57.9712
1990	3252.553	8	0.00806	2.18282	45.7179	109.8861
1991	3893.156	9.9	0.01099	2.28451	89.4882	121.5354
1992	2721.841	17.3	0.017778	2.24168	143.1512	205.6117
1993	4678.242	22.1	0.019289	2.2062	165.6294	218.7701
1994	7486.386	22	0.018464	2.21073	162.7888	206.0592
1995	2641.539	21.9	0.08381	2.30827	755.1277	950.6614
1996	2145.507	21.9	0.088399	2.3822	562.6266	1309.543
1997	5806.854	21.9	0.0958	2.45388	845.7166	1241.663
1998	7367.287	21.9	0.071164	2.48184	837.4187	751.8567
1999	5054.477	92.3	0.091383	2.60885	862.5157	1188.97
2000	7160.708	101.7	0.123719	2.76694	985.0224	1945.723
2001	9640.833	111.2	0.127682	3.1908	1358.18	1867.954
2002	8085.083	120.6	0.112471	3.41828	1512.695	1744.178
2003	7208.051	129.2	0.162983	3.73636	2080.235	3087.886
2004	11289	132.9	0.18817	3.98218	1987.045	4602.782
2005	22604.18	131.3	0.26811	4.22998	2800.856	7246.535
2006	34729.16	128.7	0.260859	4.51515	3108.519	7324.681
2007	42056.82	125.8	0.284742	4.82745	3911.953	8309.758
2008	54129.43	118.5	0.347316	5.21903	5593.18	10387.69
2009	41418.25	148.9	0.282553	4.6979	5480.656	8606.32
2010	34636.8	150.3	0.369432	4.81488	8163.975	12011.48
2011	30228.8	153.9	0.456132	139.0097	10995.86	15236.67
2012	35316.76	157.5	0.415584	7.24124	9766.557	15139.33
2013	42259.11	157.3	0.390729	8.24673	9439.425	15262.01
2014	34512.15	158.6	0.349938	7.56763	10538.78	12960.49
2015	27667.75	192.4	0.288614	7.21194	11076.07	8845.159
2016	24186.54	253.5	0.269626	7.14711	9480.367	8835.612
2017	29900.5	305.8	0.361988	1.98971	10804.85	13988.14
2018	41251.83	306.12	0.468774	1.85696	13445.11	19280.04

Sources: CBN Statistical Bulletin 2018, Online Portal and WDI

b) Unit Root Test Using Augmented-Dickey Fuller (ADF) Methods

Decision: If the ADF value is greater than the critical value at 5%, there is no unit root. This implies that the series is time-invariant.

Table 2: Summary of Augmented Dickey-Fuller Test Result

Variables	ADF State	5% Critical Value	Order of Integration	Assessment
NT	-6.467138	-2.948404	1(0)	Stationary
TOP	-4.710965	-2.945842	1(0)	Stationary
FDI	-3.825469	-2.945842	1(0)	Stationary
ExR	-4.210022	-2.945842	1(0)	Stationary

Source: Authors' Computation

From the results above, the variables are stationary at 1 (0) level. Therefore, the test for co-integration is not necessary, meaning that, at short-run analysis, the system will quickly adjust to the long-run equilibrium. Therefore, we proceed to the ordinary least squares (OLS) estimation.

c) Regression Results

Table 3: Dependent Variable: NT

Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOP	-53806285	20313669	2.648772	0.0122
FDI	-159.6749	14.91015	18.101955	0.0282
EXR	-100099.4	22751.33	4.399716	0.0001
C	13739398	1349025.	10.18469	0.0000
R-squared	0.924337	Mean dependent var		33725375
Adjusted R-squared	0.917661	S.D. dependent var		19578386
S.E. of regression	5617969.	Akaike info criterion		34.02014
Sum squared resid	1.07E+15	Schwarz criterion		34.19252
Log-likelihood	-642.3826	Hannan-Quinn criteria.		34.08147
F-statistic	138.4542	Durbin-Watson stat		2.393544
Prob(F-statistic)	0.000000			

Source: Eviews 9 Output

d) Interpretation of Results (Using 5% Level of Significance)

Trade Openness (TOP): The result shows that TOP has a negative relationship with net tax (NT). This indicates that a unit change in TOP will cause a change in BA by 53806285 in the opposite direction. Also, given the probability value of the estimate, the result shows that TOP is a significant determinant of NT statistically given the probability value as less than 0.05 and t-value greater than 2.

Foreign Direct Investment (FDI): The FDI has a negative relationship with NT. This means that a unit increase in FDI will cause NT to fall by 159.6749. Given the t-value greater than 2, the estimate of FDI is significant. This also holds for the probability value, less than 0.05.

Exchange Rate (ExR): This has a negative relationship with NT. This shows that a unit increase in ExR will cause NT to fall by 100099.4. Given the probability value less than 0.05, it shows that ExR is a significant determinant of NT likewise t-value greater than 2.

$R^2 = 0.924337(92\%)$*:* This shows that 92% variation in the variable NT is explained by variables in the model, while the remaining 8% is explained by other variables not included in the model.

F-Statistic: This shows that the overall model is statistically significant given the probability f-statistic at 5% level of significantly less than 0.05.

D-W-Statistics: Giving the value of D-W stat as 2.393544 greater than the R^2, there is the absence of autocorrelation. This implies the model can be used for forecasting.

e) Granger Causality Test

The existence of a relationship between the variables does not prove causality or the direction of influence. As a result, the Granger causality test is to test for the causality between NT, TOP, FDI and ExR. Since we are interested in the causality between NT and other explanatory variables in the model, other results of the causality test will not be interpreted. Therefore, the changes in any variable in the pairs can be used to predict the changes in the other.

f) Decision Rule

Reject H_0 if the probability of Granger causality < 5% level of significance, accept if otherwise. The results of the Granger causality test are presented below:

Table 4: Pair wise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
TOP does not Granger Cause NT	37	28.8324	6.E-06
NT does not Granger Cause TOP		2.27476	0.1407
FDI does not Granger Cause NT	37	18.8955	0.0001
NT does not Granger Cause FDI		2.01564	0.1648
EXR does not Granger Cause NT	37	2.65433	0.1125
NT does not Granger Cause EXR		2.71193	0.1088

Source: Eviews 9 Output

From the results above, the following conclusions are drawn. TOP Granger-causes NT but NT does not Granger-cause TOP. FDI does not Granger-cause NT and NT Granger-causes FDI. ExR Granger-causes NT and NT Granger-causes ExR.

g) Discussion of Findings

The study investigated the scope, structure and fiscal policy implications of Nigeria in the West African Trade Zone. The study models net tax as a measure of restrictive and protectionist policy instrument, as a dependent variable on foreign direct investment (FDI), the exchange rate (ExR) and trade openness (TOP). The variables are stationary at a level indicating a long-run relationship among the variables as shown by the Augment Dickey-Fuller test. The regression results show a positive relationship between NT and the variables in the model are significant at 5%. The Pair wise Granger Causality Tests reveals a two-directional causal relationship between ExR and NT, while FDI and NT, and TOP and NT have a unidirectional relationship. The overall model equally shows that the estimates are statistically significant and have a negative relationship with NT. This implies that protectionist policies on trade partners in West Africa's Trade Zone have significant effects on the external performance of the Nigerian economy either positively or negatively.

V. Summary of Findings, Conclusion and Recommendations

a) Summary of Results

1) TOP has a negative and significant effect and relationship with NT.
2) FDI has a negative and significant long-run effect and relationship with NT.
3) ExR has a negative and significant effect and relationship with NT in the long run.
4) There is no short-run interaction between variables in the model. This implies that tax being a contractionary fiscal instrument can be used to regulate the external sector of the Nigerian economy in the West African Trade Zone.

b) Conclusion and Recommendations

The study concludes that trade relationship among West African Countries fosters unity among member states. We also find that policies on trade partners in West Africa's Trade Zone have significant effects on the external performance of the Nigerian economy positively and/or negatively. It was further revealed that tax a contractionary fiscal instrument can be used to regulate the external sector of the Nigerian economy in West Africa's Trade Zone.

Accordingly, we recommend that:

i. Tax as a contractionary fiscal instrument is used to regulate the external sector of the Nigerian economy as it relates to West Africa's Trade Zone.
ii. We further suggest that all barriers against the free flow of trade among West African countries be removed forthwith.
iii. There should be bilateral trade between members of ECOWAS with no trade tariffs, customs duties, etc.
iv. Labour mobility be encouraged among the Member States of ECOWAS, etc.

References Références Referencias

1. Abomaye-Nimenibo, W. A. S (2017 a) The Empirical Determinants of Aggregate Demand And Its Effect On The Nigerian Populace, Global Journal of Management and Business Research, E. Marketing, Volume 17, Issue 3, Version 1.0; December 23, 2017.
2. Abomaye Nimenibo, W. A. S. (2017), the Concept & Practice of Taxation in Nigeria, Port Harcourt, Nimehas Publishers.
3. Blankenau, W. F. & N. B. Simpson (2004). "Public education, expenditures and growth". *Journal of Development Economics, 73, 583-605.*

4. Baxa, J. (2010): "What the Data Say about the Effects of Fiscal Policy in the Czech Republic?" In: Houda, M., Friebelova, J. (eds.): Mathematical Methods in Economics 2010. Ceske Budejovice: University of South Bohemia, 24-29.
5. Benassi, S., J. Jarreau & C. Mitaritonna. 2016. Informal trade in Benin, Togo and Nigeria: determinants and impacts on price transmission. AGRODEP project 2015X115.JAR
6. Byiers, B., J. Vanheukelom and C.K.M. Kingombe. 2015. A five lenses framework for analyzing the political economy in regional integration. (Discussion Paper 178). Maastricht: ECDPM.
7. Byiers, B., Vanheukelom, J. 2015. ATWA Phase 1 Political Economy Considerations. CILSS. 2014. Cross Border Trade Flow of Agricultural Products in West Africa.
8. Chabossou, A. F. C., (3017): "Fiscal Policy and Economic Growth in the West African Economic Monetary Union Countries" *Journal of Economics and Development Studies*. 5(3), 96-104. DOI: 10.15640/jeds.v5n3a11
9. De Roos, E., Oberst, U. & Dietz, T., (2016): "Annotated Bibliography for the Scoping study 'Improving the perspective for regional trade and investment in West-Africa: the key to food security, economic development and stability in the region'. Leiden: African Studies Centre.
10. Engel, J. & Jouanjean, M. A. (2013): "Barriers to trade in food staples in West Africa: an analytical review. London: ODI. Engel, J. and M. A. Jouanjean. 2015. Political and Economic Constraints to the ECOWAS Regional Economic Integration Process and Opportunities for Donor Engagement. EPA PEAKS. London: ODI.
11. FAO & African Development Bank. 2015. Agricultural Growth in West Africa: Market and policy drivers. Rome: FAO/AfDB Golub, S. 2015. Informal cross-border trade and smuggling in Africa. In: Handbook on trade in development, O. Morrissey, R. A. Lopez and K. Sharma. Cheltenham.
12. Haggblade, S. *et al*. (2012): "Staple Food Market Sheds in West Africa. MSU International Development Working Paper 121 February 2012. JICA. 2012. Data Collection Survey on
13. Traffic for International Port and International Corridor in Western Africa. Josser and, H. 2013. Assessment of volumes and value of regionally traded staple commodities. Presentation at Food Across Borders Conference, Accra, Ghana, January 2013.
14. Lange, P., T. D. & Rau, M. I., (2016): "Improving the perspective for regional trade and investment in West Africa: the key to food security, economic development and stability in the region. (Scoping report). The Hague: Ministry of Foreign Affairs
15. Martinez-Lopez, D. (2005), "Fiscal Policy and Growth: The case of Spanish Regions", *Economic Issues*, 10(1), 9-24.
16. Siyan P. and Adebayo F. O., (2005), an empirical investigation of stability and Money demand in Nigeria (1970-1999), *Nigerian Journal of Economics Development Matters (NJEDM),* 4(1) 87-102.

Global Journal of Management and Business Research: B
Economics and Commerce
Volume 20 Issue 10 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

Investigating the Quality Performance of Production of Some Selected Drinks using Hotelling T-square and Control Chart

By Akomolafe A. A., Olawale A. O., Jennifer. J. & Oladimeji O. A

Federal University of Technology

Abstract- Consumers make complaint about the state of home-made goods, in fact many claim that foreign goods are of high quality compared to home-made goods. We discovered that many of our indigenous industries are no more in existence and so this brought the desire to carry out this research work so as to find out whether products from our indigenous brewery industry fall within the lay-down acceptable standard that is devoid of the consumers' complaint. The significance of this study is to ascertain the quality of drinks produced by checking whether some components which make up the quality of these brands are in control and to detect error in the production process. The data for this research were collected on three major components produced [Star, Maltina And Goldberg] for four months in one of our indigenous company and the readings reported was taken twice per day and averaged.

Keywords: control charts, cumulative sum technique charts, hotellings t-square, fill height, level of carbon iv oxide [co2].

GJMBR-B Classification: JEL Code: M29

Strictly as per the compliance and regulations of:

Investigating the Quality Performance of Production of Some Selected Drinks using Hotelling T-square and Control Chart

Akomolafe A. A.[α] , Olawale A. O.[σ], Jennifer. J.[ρ] & Oladimeji O. A.[ω]

Abstract- **Consumers make complaint about the state of home-made goods, in fact many claim that foreign goods are of high quality compared to home-made goods. We discovered that many of our indigenous industries are no more in existence and so this brought the desire to carry out this research work so as to find out whether products from our indigenous brewery industry fall within the lay-down acceptable standard that is devoid of the consumers' complaint. The significance of this study is to ascertain the quality of drinks produced by checking whether some components which make up the quality of these brands are in control and to detect error in the production process. The data for this research were collected on three major components produced [Star, Maltina And Goldberg] for four months in one of our indigenous company and the readings reported was taken twice per day and averaged. Control charts, Standard Deviation charts and Cumulative Sum Technique charts (CUSUM) and Hotel lings T-square were used for the analysis, statistical software package was used to analyse the data using the necessary tools for detecting when the observed variation is significant or not. The results were presented with the use of chart and tables, it established that the three drinks product considered fall within the acceptance region based on their fill height and the level of carbon iv oxide [co2].**

Keywords: control charts, cumulative sum technique charts, hotellings t-square, fill height, level of carbon iv oxide [co2].

I. Introduction

In many manufacturing firms where there exists mass production, measurement made on each product is subject to error due to variation from one item to the other. Since there must be variations, it becomes important to study and determine when any observed variation is significant or not. This is the reason why the Federal Government of Nigeria came up with legislations to protect the buyers from buying inferior goods. Increase in consumer buying behaviou towards some selected drinks will directly affect the production of such drinks in our breweries industry. Quality control relies partly upon patronage and some other reliable factors, in beer production process, the measurement of attributes such as fill height and level of co_2 is of paramount important and that is the reason why quality control is evolving in developing systems to ensure standard products or services as well as meeting or exceeding customer's requirements. Walter Shewhart introduced the concept of statistical quality control thereby controlling quality of mass produced goods. Shewhart believed that variation always exists in manufactured products and that the variation can be studied, monitored and controlled using Statistics. Walter Shew hart explained the theories about using statistical quality control charts to improve quality and productivity in which case he developed fourte en points agenda for companies to improve quality and productivity, reduce costs and compete effectively in the world market.

Author α ρ: Department of Statistics, Federal University of Technology, Akure, Ondo state, Nigeria. e-mail: aaakomolafe@futa.edu.ng
Author σ: Department of Statistics, Federal Polytechnic, Ede, Nigeria. e-mail: oludayobola@gmail.com
Author ω: Department of Statistics, the Federal Polytechnic, Ile-Oluji, Nigeria. e-mail: olaoladimeji@fedpolel.edu.ng

II. Literature Review

Reeves and Bednar (1994) define quality as excellence, value, conformance to specifications, and meeting or exceeding customers' expectation. The term "fitness for use" defined by Juran (1974) is also included in the quality definition presented by Reeves and Bednar (1994). Thus, the customer perspective with respect to quality is the master key that should be understood while determining any term for quality or definition of quality. Deming, W.E (1986). worked on Quality and Productivity Improvement using acceptance sampling method, and he was able to obtain increase in quality and simultaneous reduction in the cost of reducing waste, re write staff attrition and litigation while increasing customer's loyalty. Farhat, B. A. and Al-Darrab, I. (1998). Total quality management is now established and widely used management process. One of its associated features is the application of statistical quality control techniques. A quality product or service is one that meets the customer's needs and provides the value that they want and expect. They are also of the opinion that quality management is a formal approach to management in which the overriding priority of the organization is to deliver a quality product or service and to work towards excellence and continuous improvement in everything it does.

Quality can be viewed from the perspectives of design and product in which case; design quality is the different grades or levels of performance, reliability,

serviceability and function that are the results of deliberate engineering and management decision. On the other hand, product quality is the conformance of the product with specifications or expectations of the user in terms of fitness for use and cost. They are also of the opinion that control charts are closely related with statistical test of hypothesis. The control chart is a test of hypothesis that the process is in a state of statistical control. Shres tha and Chalidabhongse (2006) explained over their survey on 300 employees working in 60 Thai companies to what extent job satisfaction is affected by the existing performance appraisal system used by these companies. They concluded that since the performance appraisal system is part of the company's running processes, employees would show lower performance level if the appraisal system is not satisfactorily controlled.

Cooper (2008) have emphasized on the impact of TQM practices on job satisfactions. The main aim of their research was to examine the relationship between people-related TQM practices and job satisfaction of service employees. The study triggers the question whether a TQM has an effect on employees' satisfaction. Pitterman (2000)'s findings on Telecordia technologies showed that customer satisfaction figures had gone up from 60% in 1992 to 95% at the time of implementing ISO 9001 quality system. Also, there was a 63% reduction noted in test cost efficiency since 1993 that 98% of major software released by Telcordia between 1995 and 1998 were delivered in time, even though the number of releases had tripled during the four year time.

Takala et al. (2006) have gone even further to seeking customer satisfaction by improving and ensuring that customer satisfaction survey is supposed to be well designed and validated in order to be an effective measurement tool for its intended purpose. In their research paper, the purpose was to verify the reliability of customer satisfaction survey in context to three aspects of service; quality, delivery and responsiveness. They concluded that there was a need to work on the flexibility of the customer satisfaction survey to ensure the reliability in the qualitative analysis of the supply chain. Sitko-Lutek et al. (2010) examined the customer complaint handling process with respect to the information quality, thereby suggesting possible areas of improvements in the process. Their research method involved reviewing documents, complaint handling procedures and interviews through a social network analysis (SNA) model. The software used for SNA was UCI net and the results suggested that process engineering leadership played a vital and responsive role in disseminating quality assurance information in identifying potential areas of process improvements, thereby enhance and improve the company's profit and customers satisfaction.

III. Methodology

A control chart is a graphical representation that shows whether a sample data falls within a normal range of variation. It used to know if a process is in statistical quality control or not. It is also a graphical representation of mathematical model used to monitor a process in order to detect changes in parameter of that process. It displays the quality characteristics that has been measured or computed from a sample against the sample number or time. They are simple to construct and to interpret as they employ a center line (denoted as CNL) and two major control limits; an upper control limit (denoted as UCL) and a lower control limit (denoted as LCL). The center line represents the average performance of the process when it is in a state of statistical control- that is, when only common cause variation exists. The upper and lower control limits are horizontal lines situated above and below the center line. These control limits are established so that when the process is in control, almost all plots will be between the upper and lower limits.

In practice,

- If all observed plot points are between the LCL and UCL and if no unusual pattern of points exists, we have no evidence that assignable causes exist and we assume that the process is in statistical control. In this case, only common causes of the process variation exist, and no action to remove assignable causes is taken on the process. If we were to take such action, we would be unnecessarily tempering with the process.
- If we observe one or more plot points outside the control limits, then we have evidence that the process is out of control due to one or more assignable causes. Here we must take action on the process to remove those assignable causes.

a) *Multivariate Quality Control Chart*

Multivariate methods that consider the variables jointly are required. Process-monitoring problems in which several related variables are of interest are sometimes called *multivariate quality-control (or process-monitoring) problems.* The original work in multivariate quality control was done by Hotelling (1947), who applied his procedures to bombsight data during World War II. Subsequent research dealing with control procedures for several related variables include Hicks (1955), Jackson (1956, 1959, 1985), Crosier (1988), Hawkins (1991, 1993b), Lowry et al. (1992), Lowry and Montgomery (1995), Pignatiello and Runger (1990), Tracy, Young, and Mason (1992), Montgomery and Wadsworth (1972), and Alt (1985). This subject is particularly important today, as automatic inspection procedures make it relatively easy to measure many parameters on each unit of product manufactured.

The HotellingT^2 chart is the analog of the Shewhartx chart. Multivariate control charts work well when the number of process variables is not too large—say, 10 or fewer. As the number of variables grows, however, traditional multivariate control charts lose efficiency with regard to shift detection. A multivariate approach should be used to monitor process stability with more than one important characteristic. This approach can account for correlations between characteristics and will control the overall probability of falsely signaling a special cause of variation when one is not present. The most common multivariate chart is the T^2 chart. There are many situations in which the simultaneous monitoring or control of two or more control of two or more related quality characteristics is necessary. The process is considered to be in control only if the sample means x_1 and x_2 fall within their respective control limits. Monitoring these two quality characteristics independently can be very misleading. So it is best we use the HotellingT^2 control chart.

b) The Multivariate Normal Distribution

In univariate statistical quality control, we generally use the Normal distribution to describe the behaviour of a continuous quality characteristic. The Univariate Normal probability density function is

$$f(x)=1/(\sqrt{2\pi}\sigma\,\hat{}\,2)\; e\,\hat{}\,(-1/2\;\; [\![((x-\mu)/\sigma)]\!]\;\hat{}\,2) \qquad -\infty<x<\infty \ldots \tag{1}$$

The mean of the normal distribution is μ and the variance is σ2. Note that (apart from the minus sign) the term in the exponent of the normal distribution can be written as follows:

$$(x-\mu)\,(\sigma\,\hat{}\,2)\,\hat{}\,(-1)\,(x-\mu) \tag{2}$$

This quantity measures the squared standardized distance from x to the mean, where by the term "standardized" we mean that the distance is expressed in standard deviation units. This same approach can be used in the multivariate normal distribution case. Suppose that we have p variables, given by x1, x2, . . . ,xp. Arrange these variables in a p-component vector x′ = [x1, x2, . . . ,xp]. Let μ1 = [μ, μ2, . . . , μp] be the vector of the means of the x's, and let the variances and covariances of the random variables in x be contained in a p * p covariance matrix Σ

The main diagonal elements of Σare the variances of the x's and the off-diagonal elements are the covariances. Now the squared standardized (generalized) distance from x to μis

$$(x-\mu)'\Sigma^{-1}(x-\mu) \tag{3}$$

The multivariate normal density function is obtained simply by replacing the standardized distance in equation (.2) by the multivariate generalized distance in equation (3) and changing the constant term to a more general form that makes the area under the probability density function unity regardless of the value of *p*. Therefore, the *multivariate normal* probability density function is

$$f(x)=\frac{1}{(2\pi)^{p/2}|\Sigma|^{1/2}}e^{-\frac{1}{2}(x-\mu)'\Sigma^{-1}(x-\mu)} \tag{4}$$

where $\quad -\infty < x_j < \infty, j = 1, 2, \ldots, p.$

A multivariate normal distribution for $p = 2$ variables (called a bivariate normal).

$$f(x)=\frac{1}{2\pi|\Sigma|^{1/2}}e^{-\frac{1}{2}(x-\mu)'\Sigma^{-1}(x-\mu)}\ldots \tag{5}$$

c) The Sample Mean Vector and Covariance Matrix

Suppose that we have a random sample from a multivariate normal distribution—say,

where the *I* th sample vector contains observations on each of the *p* variables $xi_1, xi_2, \ldots, xi_p$. Then the sample mean vector is

$$\bar{x}_j \quad = \frac{1}{n}\sum_{i=1}^{n} x_{ij}\ \{j = 1,2,\ldots,p\} \tag{6}$$

and the sample variance is

$$s_j^2 \quad = \frac{1}{n-1}\sum_{i=1}^{n}\left(x_{ij} - \bar{x}_j\right)^2\{j = 1,2,\ldots,p\} \quad = p\} \tag{7}$$

and the sample covariance is

$$s_{jhk} = \frac{1}{n-1}\sum_{i=1}^{n}(x_{ijk} - \bar{x}_{jk})\,(x_{ihk} - \bar{x}_{hk})\begin{cases} k = 1,2,\ldots,m \\ j \neq h \end{cases} \tag{8}$$

d) Hotelling T^2 Control Chart

It is the most familiar multivariate process-monitoring and control procedure. HotellingT^2control chart is for monitoring the mean vector of the process. It is a direct analog of the univariate Shewhart chart. There are two versions of the HotellingT^2 charts which are Sub grouped data and Individual observations.

e) Subgrouped Data

Suppose that *p* quality characteristics x_1, x_2, ...,x_p are jointly distributed according to the multivariate normal distribution (see equation 3.6.4). Let μ_1, μ_2, ...,μ_p be the mean values of the quality characteristics and let σ_{jk}'s represent the variance-covariance values of the p-characteristics. In practice, it is usually necessary to estimate Σ and μ from the preliminary samples of size n, taken when the process is assumed to be in control. Suppose that *m* such samples are available. the sample means and variances are calculated from each sample as usual; that is,

$$\bar{x}_{jk} = \frac{1}{n}\sum_{i=1}^{n} x_{ijk} \begin{cases} j = 1,2,\ldots,p \\ k = 1,2,\ldots,m \end{cases} \quad (9)$$

$$s_{jk}^2 = \frac{1}{n-1}\sum_{i=1}^{n}\left(x_{ijk} - \bar{x}_{jk}\right)^2 \begin{cases} j = 1,2,\ldots,p \\ k = 1,2,\ldots,m \end{cases} \quad (10)$$

where x_{ijk} is the *I* th observation on the *j* th quality characteristics in the *k*th sample. The covariance between quality characteristic *j* and quality characteristic *h* in the *k* th sample is

$$s_{jhk} = \frac{1}{n-1}\sum_{i=1}^{n}(x_{ijk} - \bar{x}_{jk})(x_{ihk} - \bar{x}_{hk}) \begin{cases} k = 1,2,\ldots,m \\ j \neq h \end{cases} \quad (11)$$

The statistics $\bar{x}_{jk}$, s_{jk} and s_{jhk} are then averaged over all m samples to obtain

$$\bar{\bar{x}}_j = \frac{1}{m}\sum_{k=1}^{m}\bar{x}_j \ldots\ldots\ldots\ldots (3.6.12)\ \bar{s}_j^2 = \frac{1}{m}\sum_{k=1}^{m} s_{jk}^2 \quad (12)$$

and

$$\bar{s}_{jh} = \frac{1}{m}\sum_{k=1}^{m} s_{jhk} \quad (13)$$

The $\{\bar{\bar{x}}_j\}$ are the elements of the vector $\bar{\bar{x}}$, and the *p* x *p* average of sample covariance matrices S is formed as

$$S = \begin{bmatrix} \bar{s}_1^2 & \cdots & \bar{s}_{1p} \\ \vdots & \ddots & \vdots \\ \bar{s}_{p1} & \cdots & \bar{s}_p^2 \end{bmatrix} \quad (15)$$

To use the T^2 Control Chart, we will use the test statistics;

$$T^2 = n(\bar{x} - \bar{\bar{x}})' S^{-1}(\bar{x} - \bar{\bar{x}})$$

Control chart. This is a directionally invariant control chart; that is, its ability to detect a shift in the mean vector only depends on the magnitude of the shift, and not in its direction. There are two distinct phases of control chart usage.

PHASE I is the use of the charts for establishing control; that is, testing whether the process is in control when the *m* preliminary subgroups are drawn. The control limit for T^2 control chart are given by

$$UCL = \frac{p(m-1)(n-1)}{mn-m-p+1} F_{\propto,p,mn-m-p+1} \quad and\ LCL = \quad 0 \quad (17)$$

Phase II is the use of the chart for monitoring future production, sample size of at least n= 200 is needed. The control limits are as follows:

$$UCL = \frac{p(m+1)(n-1)}{mn-m-p+1} F_{\propto,p,mn-m-p+1} \quad and\ LCL = \quad 0 \quad (18)$$

f) Individual Observation

Here, multivariate control charts with subgroup size, $n = 1$ is of interest. Suppose that m samples, each of size $n = 1$, are available and that p is the number of quality characteristics observed in each sample. Let $\bar{x}$ and S be the sample mean vector and covariance matrix, respectively, of these observations. The Hotelling T^2 statistic in equation becomes

$$T^2 = (x - \bar{x})' S^{-1} (x - \bar{x}) \quad (19)$$

The phase II control limits for this statistic are

$$UCL = \frac{p(m+1)(m-1)}{m^2 - mp} F_{\propto,p,m-p} \quad and \quad LCL = 0 \quad (20)$$

When the number of preliminary samples m is large, say m > 100, most practitioners use an approximate control limit, either

$$UCL = \frac{p(m-1)}{m-p} F_{\propto,p,m-p} \quad (21)$$

$$UCL = \chi^2_{\propto,p} \quad (22)$$

However, for m> 100, equation (21) is a reasonable approximation.
For phase i, the limits are based on a beta distribution,

$$UCL = \frac{(m-1)^2}{m} \beta_{\propto,\frac{p}{2},\frac{m-p-1}{2}} \quad and \quad LCL = 0 \quad (23)$$

Where $\beta_{\propto,p/2,(m-p-1)/2}$ is the upper α percentage point of a beta distribution with parameters p/2 and (m-p-1)/2. Approximations to the phase I limit based on the F and chi-square distributions are likely to be inaccurate. Basically, the focus will be on the Sub grouped data because it suits the type of data that was collected.

g) Control Chart for Monitoring Variability

Monitoring multivariate process are in two levels, which are to monitor the process mean vector m and to monitor process variability. Process variability is summarized by the p x p covariance matrix Σ. The main diagonal elements of this matrix are the variances of the individual process variables, and the off-diagonal elements are the covariances. We can use the approach based on the sample *generalized* variance, |S|. This statistic, which is the determinant of the sample covariance matrix, is a widely used measure of multivariate dispersion. Another method would be to use the mean and variance of |S|, that is, $E(|S|)$ and $V(|S|)$, and the property that most of the probability distribution of |S| is contained in the interval

$$E(|S|) \pm 3\sqrt{(V(|S|))}.$$

It can be shown that

$$E(|S|) = b_1|\Sigma| \quad and \quad V(|S|) = b_2|\Sigma|^2 \quad (24)$$

where

$$b_1 = \frac{1}{(n-1)^p} \prod_{i=1}^{p} (n-i) \quad (25)$$

and

$$b_2 = \frac{1}{(n-1)^{2p}} \prod_{i=1}^{p} (n-i) \left[\prod_{j=1}^{p} (n-j+2) - \prod_{j=1}^{p} (n-j) \right] \quad (26)$$

Therefore, the parameters of the control charts for |S| would be

$$UCL = |\Sigma| \left(b_1 + 3b_2^{\frac{1}{2}} \right)$$

$$CL = b_1|\Sigma|$$

$$LCL = |\Sigma|(b_1 + 3b_2^{1/2}) \quad (27)$$

The lower control limit in equation (27) is replaced with zero if the calculated value is less than zero. In practice, Σ usually will be estimated by a sample covariance matrix S, based on the analysis of preliminary samples. If this is the case, we should replace $|\Sigma|$ in equation (27) by $|S|/b_1$

In this study, two measurement quality characteristics are being analyzed using Multivariate statistical quality control.

Fill height: It measures the level of liquid in a bottle of drink. The products under study are STAR, MALTINA and GOLDBERG from Nigerian Breweries plc. The standard is always at 60cl.

Co_2 level: It measures the level of co_2 in each bottle. The target for corking a bottle of STAR is between (0.52-0.54%wt/wt), that of MALTINA is (0.59-0.61%wt/wt) and GOLDBERG is (0.62- 0.64%wt/wt) where %wt/wt means weight per weight.

Data Presentation: The data used for this analysis is shown in the appendix 'A to appendix F.

IV. Data Analysis and Results

In this chapter, the Hotelling T^2 control chart is used for the analysis of fill height and level of co_2 measurements of Star, Maltina and Goldberg using R.

Analysis on the Fill Height Measurement and co_2 Level of Star

The fill height of STAR refers to the height of the liquid content in a bottle of a STAR. And the co_2 level refers to the level of co_2 in each bottle of STAR. There can be cases of low fill, high fill and normal fill. The normal or standard fill height of STAR of the company is 60cl. And the standard co_2 level of STAR is between (0.52-0.54%wt/wt). The tables below display analysis carried out using R on various readings on fill height and co_2 level that was observed at different times.

Table 1: Star

	Means		Variance and Covariances			Control Chart Statistics	
Sample Number k	Fill Height ($\bar{x}_{1k}$)	Level of CO_2 ($\bar{x}_{2k}$)	S^2_{1k}	S^2_{2k}	S_{12k}	Hotelling T^2_k	$\|S_k\|$
1	60.0	0.518	1.5	0.00037	0.0200	3.8339370	0.00015500
2	59.6	0.530	1.3	0.00035	0.0100	0.1962245	0.00035500
3	59.8	0.520	0.7	0.00005	0.0000	2.6772350	0.00003500
4	60.0	0.530	1.0	0.00010	0.0025	0.1181133	0.00009375
5	59.8	0.546	2.2	0.00013	0.0015	7.7073474	0.00028375
6	60.0	0.526	1.0	0.00013	-0.0025	0.4357597	0.00012375
7	59.4	0.51(		0.00	-0.0005	6.453262	0.00010375
8	60.0	0.522	1.5	0.00007	0.0075	1.6743676	0.00004875
9	60.0	0.548		0.00	0.0000	10.0856(	0.00030000
10	59.4	0.528	0.3	0.00017	-0.0065	0.8187689	0.00000875
1	60.0	0.51(		0.00	-0.0025	6.914467	0.00012375
12	59.6	0.534	0.8	0.00003	-0.0030	0.6801556	0.00001500
13	60.0	0.54(		0.00	0.0000	10.0856(	0.00025500
14	59.8	0.536	2.7	0.00053	-0.0285	1.1678815	0.00061875
15	60.0	0.516		0.00	-0.0125	5.259082	0.00007375
16	59.6	0.550	0.3	0.00005	-0.0025	11.8254949	0.00000875
17	60.0	0.52(		0.00	0.0025	0.939943	0.00006875
18	59.8	0.534	1.7	0.00008	-0.0015	0.5507094	0.00013375
19	59.8	0.52(		0.00	0.0035	0.918454	0.00007875
20	60.0	0.528	1.5	0.00057	-0.0225	0.1618163	0.00034875
Averages	59.8(	0.5296		0.00	-0.0225		

Table1.0 shows the Variances and Covariances of the fill height and level of CO_2 of STAR and also the Hotelling T^2 and Variability of each of the 20 samples. The Grand mean, Variance-Covariance Matrix (s) for the control limit used in the Variability plot, and the control Limits for the Hotelling T^2 and Variability plot are represented in the table(s) below.

Grand Mean

Fill Height	59.8300
Level of CO_2	0.5296

Variance-Covariance Matrix (S) for the control limit used in the variability plot

	Fill Height	Level of CO_2
Fill Height	1.5000	-0.02250
Level of CO_2	-0.0225	0.00057

Control Limits for the Hotelling T^2 and Variability plot

Variability	0	0.00002345375	0.001096283
Hotelling T^2	0	-	14.523838130

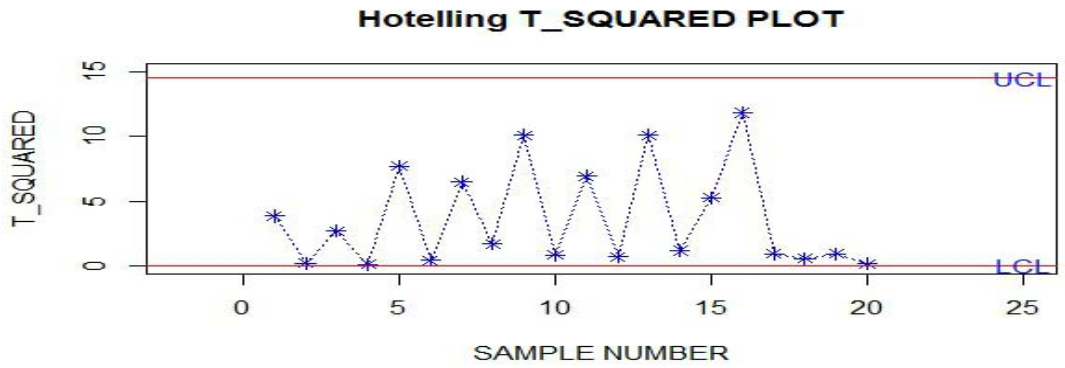


Figure 1: HotellingT-Square plot of Star

h) Interpretation of Star Chart

From the Variability plot above, most of the sample variances are on or close to the lower control limit (LCL) while they are very far from the upper control limit, which means that the variability (the variances of the observation from the mean) is in control. Thus, the Hotelling T^2 can be plotted to see if the process is actually in control. From the Hotelling T^2 plotted above also, it can be seen that all the plot point fall within the UCL and LCL, which means that it can be concluded that the fill height and level of Co_2 of STAR is under control. The R code was used for the analysis of STAR.

Analysis on the Fill Height Measurement and co_2 Level of Maltina.

The fill height of MALTINA refers to the height of the liquid content in a bottle of a MALTINA. And the co_2 level refers to the level of co_2 in each bottle of MALTINA. There can be cases of low fill, high fill and normal fill. The normal or standard fill height of MALTINA of the company is 60cl. And the standard co_2 level of MALTINA is between (0.59-0.61%wt/wt). The tables below display analysis carried out using R on various readings on fill height and co_2 level that was observed at different times.

Table 2: Maltina

Means	Variances and Covariances			Control Chart Statistics			
Sample Number k	Fill Height ($\bar{x}_{1k}$)	Level of CO_2 ($\bar{x}_{2k}$)	S^2_{1k}	S^2_{2k}	S_{12k}	Hotelling T^2_k	$\|S_k\|$
1	60.0	0.596	1.0	0.00003	0.0025	1.7606748	0.00002375
2	59.6	0.590	1.3	0.00010	0.0100	8.0208486	0.00003000
3	59.8	0.598	1.2	0.00007	0.0070	0.3296529	0.00003500
4	60.0	0.598	0.5	0.00017	0.0075	0.6161894	0.00002875
5	59.6	0.598	1.3	0.00002	-0.0010	0.4235547	0.00002500
6	60.0	0.594	0.5	0.00003	0.0025	3.5875338	0.00000875
7	59.4	0.602	1.3	0.00002	-0.0035	1.4622119	0.00001375
8	60.0	0.598	0.0	0.00007	0.0000	0.6161894	0.00000000

9	60.0	0.598	3.5	0.00007	0.0125	0.6161894	0.00008875
10	59.4	0.602	1.3	0.00002	-0.0010	1.4622119	0.00002500
11	60.0	0.608	1.5	0.00007	0.0075	5.1293660	0.00004875
12	59.6	0.608	0.3	0.00002	-0.0010	6.2803431	0.00000500
13	60.0	0.608	1.0	0.00007	0.0050	5.1293660	0.00004500
14	59.8	0.610	0.7	0.00010	-0.0050	8.5987526	0.00004500
15	60.0	0.604	1.5	0.00003	0.0025	1.2769746	0.00003875
16	59.6	0.602	1.3	0.00007	0.0010	0.7191493	0.00009000
17	60.0	0.602	0.5	0.00002	0.0000	0.3743393	0.00001000
18	59.8	0.596	0.7	0.00008	0.0065	1.3397771	0.00001375
19	59.8	0.596	1.7	0.00013	-0.0085	1.3397771	0.00014875
20	60.0	0.592	1.5	0.00007	0.0000	6.0967665	0.00010500

Table2 shows the Variances and Covariances of the fill height and level of Co_2 of MALTINA and also the Hotelling T^2 and Variability of each of the 20 samples. The Grand mean, Variance-Covariance Matrix (s) for the control limit used in the Variability plot, and the control Limits for the Hotelling T^2 and Variability plot are represented in the table(s) below.

Grand Mean

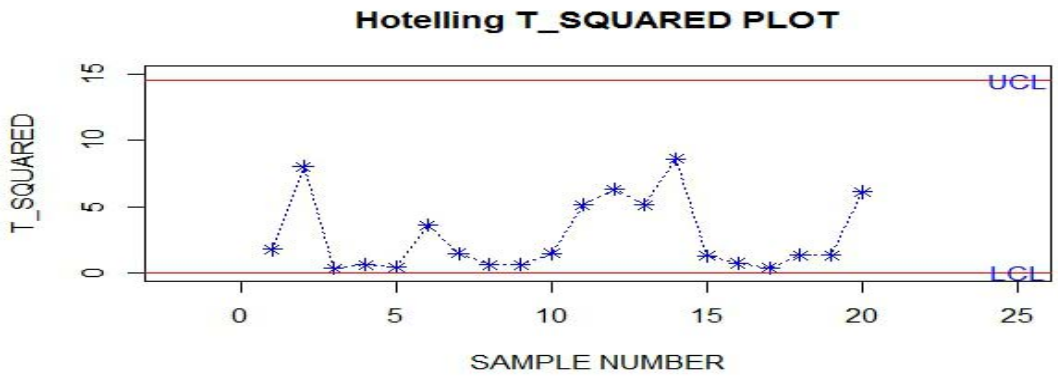
Fill Height	59.82
Level of CO_2	0.60

Variance-Covariance Matrix (S) for the control limit used in the variability plot

	Fill Height	Level of CO_2
Fill Height	1.130000	0.002225
Level of CO_2	0.002225	0.000063

Control Limits for the Hotelling T^2 and Variability plot

	LCL	CL	UCL
Hotelling T^2	0	-	14.52384
Variability	0	0.00006624	0.001096



Interpretation of Maltina Chart

Figure 2: HotellingT-Square plot of Maltina

From the Hotelling T^2 plotted above, it can be seen that all the plot point fall within the UCL and LCL, which means that the fill height and level of co_2 of MALTINA is under control.

Analysis on the Fill Height Measurement and Co_2 Level oif Goldberg

The fill height of GOLDBERG refers to the height of the liquid content in a bottle of a GOLDBERG. And the co_2 level refers to the level of co_2 in each bottle of GOLDBERG. There can be cases of low fill, high fill and normal fill. The normal or standard fill height of GOLDBERG of the company is 60cl. And the standard level of co_2GOLDBERG is between (0.62- 0.64%wt/wt). The tables below display analysis carried out using R on various readings on fill height and co_2 level that was observed at different times.

Table 3: GOLDBERG

	Means		Variances and Covariances			Control Chart Statistics	
Sample Number k	Fill Height ($\bar{x}_{1k}$)	Level of CO_2 ($\bar{x}_{2k}$)	S^2_{1k}	S^2_{2k}	S_{12k}	Hotelling T^2_k	$\|S_k\|$
1	60.0	0.642	1.0	0.00007	0.0075000	2.28910604	0.00001375
2	59.6	0.636	1.3	0.00008	0.0030000	0.28786007	0.00009500
3	59.8	0.630	0.7	0.00025	-0.0025000	1.31283293	0.00016875
4	60.0	0.634	0.5	0.00008	0.0025000	0.25264057	0.00003375
5	59.6	0.626	0.3	0.00013	-0.0045000	4.15963167	0.00001875
6	60.0	0.630	1.0	0.00010	-0.0075000	1.58110868	0.00004375
7	59.4	0.638	0.8	0.00007	0.0060000	1.37548756	0.00002000
8	60.0	0.632	0.5	0.00037	0.0010000	0.72131622	0.00008500
9	60.0	0.646	3.5	0.00008	0.0000000	5.65403962	0.00028000
10	59.4	0.634	1.3	0.00003	-0.0045000	0.88317403	0.00001875
11	60.0	0.644	1.5	0.00008	-0.0025000	3.77601443	0.00011375
12	59.6	0.632	0.3	0.00007	0.0010000	0.66321829	0.00002000
13	60.0	0.632	0.5	0.00002	0.0000000	0.72131622	0.00001000
14	59.8	0.646	2.7	0.00008	0.0015000	5.72751642	0.00021375
15	60.0	0.646	1.0	0.00008	0.0050000	5.65403962	0.00005500
16	59.6	0.628	1.3	0.00007	0.0040000	2.60304373	0.00007500
17	60.0	0.634	0.5	0.00008	0.0000000	0.25264057	0.00004000
18	59.8	0.630	0.7	0.00010	-1.1×10^{-22}	1.31283293	0.00007000
19	59.8	0.634	0.7	0.00018	0.0010000	0.06980296	0.00012500
20	60.0	0.630	0.5	0.00005	0.00250000	1.58110868	0.00001875

Table 3 shows the Variances and Covariances of the fill height and level of Co_2 of GOLDBERG and also the Hotelling T^2 and Variability of each of the 20 samples.

The Grand mean, Variance-Covariance Matrix (s) for the control limit used in theVariability plot, and the control Limits for the Hotelling T^2 and Variability plot are represented in the table(s) below.

Grand Mean

Fill Height	59.820
Level of CO_2	0.6352

Variance-Covariance Matrix (S) for the control limit used in the variability plot

	Fill Height	Level of CO_2
Fill Height	1.0300000	0.0011250
Level of CO_2	0.0011250	0.0001035

Control Limits for the Hotelling T^2 and Variability plot

	LCL	CL	UCL
Hotelling T^2	0	-	14.52384
Variability	0	0.0001053	0.000492

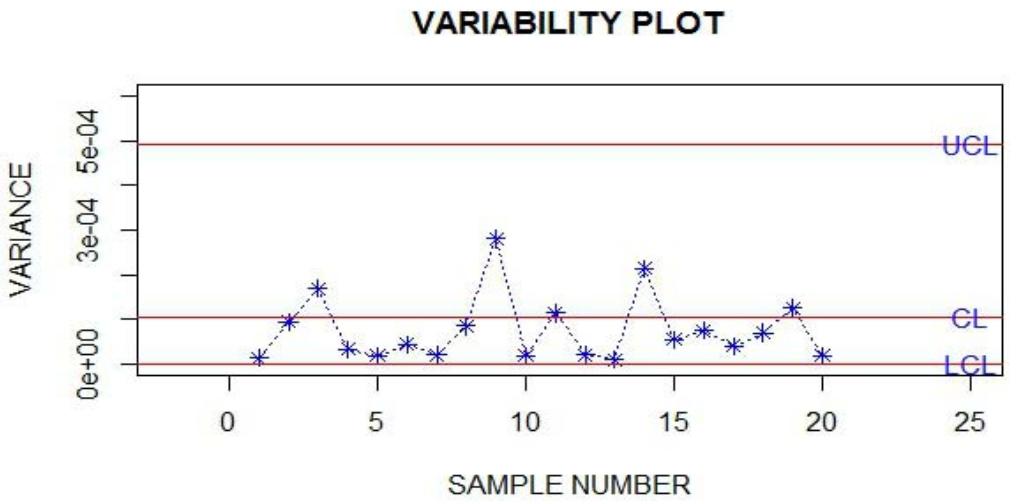


Figure 3: Variability plot of Goldberg

From the Variability plot above, most of the sample variances are on or close to the lower control limit (LCL) while they are very far from the upper control limit, which means that the variability (the variances of the observation from the mean) is in control.

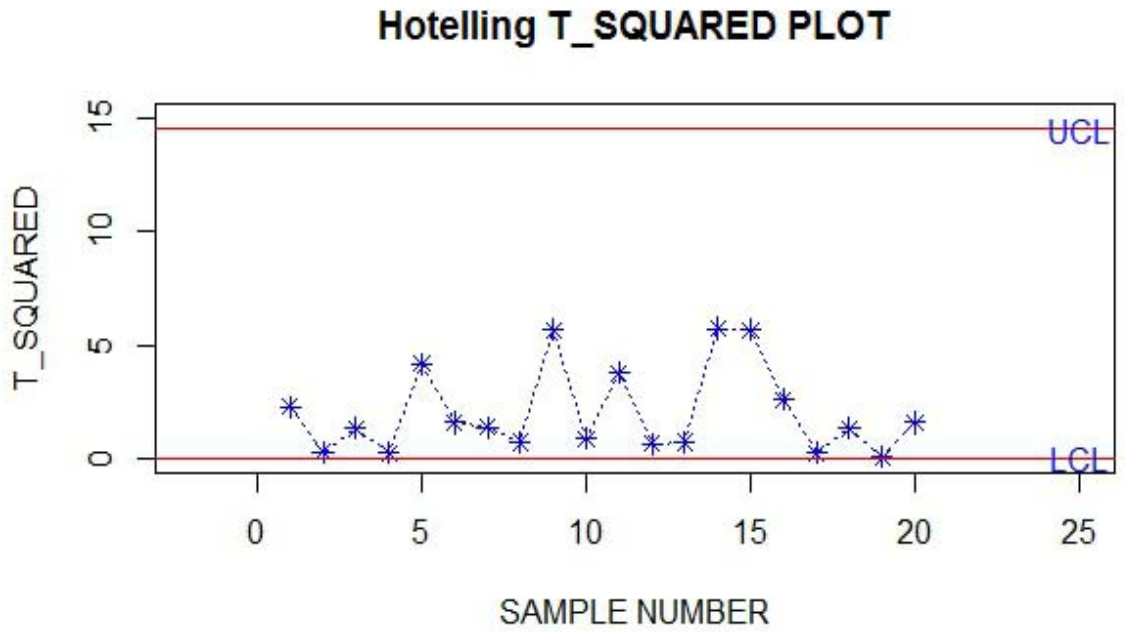


Figure 4: HotellingT-Square plot of Goldberg

From the Hotelling T2 plotted above also, it shows that all the plot point fall within the UCL and LCL, which means that the fill height and level of Co_2 of GOLDBERG is under control.

Based on the results obtained from the analysis so far for all the drinks considered, none of the characteristics examined and analyzed fall within the control which invariably means we do not have sufficient evidence to reject the null hypothesis hence we Accept the null hypothesis for both the fill height and the level of Co2.

V. Conclusion

The results obtained from the method used show that the components for the production of the beer under consideration(fill height and level of Co2) shows that the variability of the three products are in control, and this information helped in proceeding to check if the two quality characteristics are in control, also, using the Hotelling T2 control chart of Sub grouped data, the values were all within the lower and upper control limit for the three products, which helps to affirm the fact that the quality characteristics of STAR, MALTINA AND GOLDBERG are in control. This shows that the Quality Control Unit of the Company should not relent in carrying out their test on the products, all these will help the company to maintain the required standard and survive competition with other likely products from other company.

References Références Referencias

1. Acebrón, L. B. & Dopico, D. C. (2000). The importance of intrinsic and extrinsic cues to expected and experienced quality: An empirical application for beef. Food Quality and Preference, 11, 229-238.
2. Ajzen, I. & Fishbein, M. (1980). Understanding attitudes and predicting social behavior, 1st ed. Englewood Cliffs, NJ: Prentice-Hall.
3. Andersen, E. S. (1994). The evolution of credence goods: A transaction approach to product specification and quality control. MAPP working paper no 21.
4. Askegaard, S. &Brunsø, K. (1999). Food-related life styles in Singapore: Preliminary testing of a Western European research instrument in Southeast Asia. Journal of Euro marketing, 7, 65-86.
5. Baadsgaard, A., Grunert, K. G., Grunert, S. C. & Skytte, H. (1994). Undersøgelseafmulighederne for eksportafø kologiskemæl keproduktertil Nordtyskland. MAPP project paper.
6. Bech-Larsen, T. & Grunert, K. G. (1998). Integrating the theory of planned behaviour with means-end chain theory – A study of possible improvements in predictive ability. 27th EMAC Conference, Stockholm, May.
7. Chaser RB and Aquilano N J 1989. Production and Operations Management A life cycle approach 5th Edn. Irwin Series in Quantitative Analysis for Business, p. 164.
8. Carter RJ and Price PM 1995. Integrated Materials Management; Therm. and E. 2ndEdn. Handbook Series, p. 78 – 84. Dervirsiotis KN. Operations Management; International Student Edn. McGraw-Hill Inc., p. 648.
9. James C. Benneyan & David Birn 1998. Methods in Infection Control and Hospital Epidemiology. Hospital Epidemiology, 19(3): 194-214.
10. Karim Houchi et al 2015. Statistical Quality Control of High Resolution Winds of Different Radios ode Types for Chmatology Analysis. Journal of Atmospheric and Oceanic Technology, 2015, 32 (10)
11. King-Scott Peter 1971. Production Control for Supervisors; 1st Edn. Collins, London and Glasgow, p. 95.
12. Mahosh BP and Prabhuswany MS 2010. Process Variability Reduction Through Statistica Process Control for Quality Improvement. Int. J. Quality Rese., 4(3): 193-203
13. Maria Emilia Camergo, Walter Paesnitz Filho, Angela Isabel dos Santos Bulius, Jose Maurcio Carre Maciel 2008. Statistical quality control. A case study research. Mgt. Innovation and Technology, 2008, ICMIT 2008, 4th IEEE International Conference Mayer Raymond R1975.Production and Operations Management; 3rd Edn. McGraw-Hill book Company Inc., p. 347. Mittag HJ and Rinne H1993.
14. Mason, B. and Jiju, A. J. (2007). "Statistical process control."An essential ingredient for improving service and manufacturing quality. Pp. 233-238
15. Shenawy, E. and Baker, T. (2007). "Analysis of the Effect of TQM on competitive Advantage."International Journal of Quality and Reliability management. Pp. 442-471.
16. Eze, J.I.et al (2005). "Statistics and quantitative methods for construction and business managers" .The Nigerian institute of Building.
17. Ohta, H., Kimura, A. and Rahim, M. A. (2002). "An economic model for X and R chart with time-varying parameters," Quality and Reliability Engineering-International.Vol.18, no2, pp. 131-139.
18. Rahim, M. A. and Costa, A. F. B. (2000) "Joint economic design of X and R charts under Weibull shock model" International Journal of Production . Research Vol.28, no 13, pp.2871-2889.

Appendix

Table A: Showing the data of the fill height measurement of star in cl

Sample No	Time	A	B	C	D	E
1	7:00am	60	59	60	62	59
2	8:00am	59	58	60	60	61

3	9:00am	59	60	60	61	59
4	10:00am	60	61	61	59	59
5	11:00am	60	59	60	58	62
6	12 noon	61	59	60	59	61
7	1:00pm	60	59	59	58	61
8	2:00pm	62	60	59	60	59
9	3:00pm	58	62	60	59	61
10	4:00pm	60	59	59	60	59
11	5:00pm	61	59	61	60	59
12	6:00pm	60	59	59	61	59
13	7:00pm	58	60	60	61	61
14	8:00pm	57	60	61	61	60
15	9:00pm	59	61	59	60	61
16	10:00pm	60	59	60	60	59
17	11:00pm	58	60	62	59	61
18	12:00am	59	60	59	62	59
19	1:00am	59	60	59	60	61
20	2:00am	60	60	59	59	62

Note: A, B, C, D, and E are the numbers of observations for each samples respectively.

Table B: Showing the data of the level of co_2 in each bottle of star in wt/wt

Sample No	Time	A	B	C	D	E
1	7:00am	0.52	0.51	0.50	0.55	0.51
2	8:00am	0.55	0.50	0.54	0.53	0.53
3	9:00am	0.53	0.52	0.52	0.52	0.51
4	10:00am	0.54	0.54	0.52	0.52	0.53
5	11:00am	0.53	0.56	0.55	0.54	0.55
6	12noon	0.51	0.52	0.54	0.53	0.53
7	1:00pm	0.52	0.51	0.53	0.51	0.51
8	2:00pm	0.53	0.52	0.52	0.53	0.51
9	3:00pm	0.54	0.54	0.54	0.56	0.56
10	4:00pm	0.52	0.54	0.53	0.51	0.54
11	5:00pm	0.51	0.53	0.51	0.52	0.50
12	6:00pm	0.53	0.54	0.54	0.53	0.53
13	7:00pm	0.55	0.56	0.53	0.54	0.56
14	8:00pm	0.56	0.55	0.53	0.50	0.54
15	9:00pm	0.54	0.51	0.52	0.51	0.50
16	10:00pm	0.55	0.56	0.55	0.54	0.55
17	11:00pm	0.52	0.52	0.53	0.53	0.52
18	12:00am	0.54	0.54	0.52	0.53	0.54
19	1:00am	0.52	0.51	0.52	0.54	0.53
20	2:00am	0.51	0.54	0.53	0.56	0.50

Table C: Showing the Data of the fill Height Measurement of Maltina in cl

Sample No.	Time	A	B	C	D	E
1	7:00am	61	59	60	61	59
2	8:00am	59	58	60	60	61
3	9:00am	60	60	60	61	58
4	10:00am	60	60	61	60	59
5	11:00am	61	59	60	58	60
6	12 noon	60	59	60	60	61
7	1:00pm	59	60	58	61	59
8	2:00pm	60	60	60	60	60
9	3:00pm	58	61	62	58	61
10	4:00pm	58	59	60	61	59
11	5:00pm	61	60	61	58	60
12	6:00pm	60	60	59	60	59
13	7:00pm	59	61	59	61	60
14	8:00pm	59	60	60	61	59
15	9:00pm	59	62	60	59	60
16	10:00pm	59	60	58	61	60
17	11:00pm	60	59	61	60	60
18	12:00am	60	61	59	60	59
19	1:00am	62	59	60	59	59
20	2:00am	59	60	60	59	62

Table D: Showing the Data of the level of co_2 in each Bottle of Maltina in wt/wt

Sample No.	Time	A	B	C	D	E
1	7:00am	0.60	0.60	0.59	0.60	0.59
2	8:00am	0.58	0.58	0.59	0.60	0.60
3	9:00am	0.59	0.60	0.60	0.61	0.59
4	10:00am	0.59	0.61	0.61	0.60	0.58
5	11:00am	0.60	0.60	0.60	0.60	0.59
6	12noon	0.59	0.59	0.59	0.60	0.60
7	1:00pm	0.60	0.60	0.61	0.60	0.60
8	2:00pm	0.60	0.61	0.60	0.59	0.59
9	3:00p^{m}	0.59	0.61	0.60	0.59	0.60
10	4:00pm	0.60	0.60	0.60	0.60	0.61
11	5:00pm	0.62	0.61	0.61	0.60	0.60
12	6:00pm	0.61	0.61	0.61	0.60	0.61
13	7:00pm	0.61	0.62	0.60	0.61	0.60
14	8:00pm	0.62	0.60	0.60	0.61	0.62
15	9:00pm	0.60	0.61	0.60	0.61	0.60
16	10:00pm	0.61	0.59	0.60	0.61	0.60
17	11:00pm	0.60	0.60	0.60	0.60	0.61
18	12:00am	0.60	0.61	0.59	0.59	0.59
19	1:00am	0.59	0.60	0.58	0.60	0.61
20	2:00am	0.58	0.60	0.59	0.60	0.59

Table E: Showing the data of the fill height measurement of Goldberg in cl

Sample No	Time	A	B	C	D	E
1	7:00am	61	60	59	61	59
2	8:00am	59	58	60	60	61
3	9:00am	59	60	59	61	60
4	10:00am	61	60	60	59	60
5	11:00am	59	60	60	59	60
6	12 noon	61	59	60	59	61
7	1:00pm	59	60	60	58	60
8	2:00pm	60	61	59	60	60
9	3:00pm	58	61	62	58	61
10	4:00pm	58	59	60	61	59
11	5:00pm	61	60	61	58	60
12	6:00pm	60	60	59	60	59
13	7:00pm	60	59	60	61	60
14	8:00pm	57	60	61	61	60
15	9:00pm	59	61	59	60	61
16	10:00pm	59	60	58	61	60
17	11:00pm	60	59	61	60	60
18	12:00am	60	61	59	60	59
19	1:00am	59	60	59	60	61
20	2:00am	60	59	60	60	61

Table F: Showing the data of the level of co_2 in each bottle of Goldberg in wt/wt

Sample No	Time	A	B	C	D	E
1	7:00am	0.65	0.64	0.64	0.65	0.63
2	8:00am	0.63	0.63	0.64	0.65	0.63
3	9:00am	0.61	0.63	0.65	0.62	0.64
4	10:00am	0.64	0.64	0.64	0.63	0.62
5	11:00am	0.63	0.62	0.61	0.64	0.63
6	12noon	0.62	0.64	0.64	0.63	0.62
7	1:00pm	0.63	0.65	0.64	0.63	0.64
8	2:00pm	0.64	0.66	0.62	0.63	0.61
9	3:00pm	0.65	0.66	0.64	0.64	0.64
10	4:00pm	0.64	0.64	0.63	0.63	0.63
11	5:00pm	0.64	0.63	0.65	0.65	0.65
12	6:00pm	0.62	0.64	0.63	0.64	0.63
13	7:00pm	0.63	0.63	0.63	0.63	0.64
14	8:00pm	0.64	0.66	0.64	0.64	0.65
15	9:00pm	0.64	0.66	0.64	0.65	0.64
16	10:00pm	0.63	0.62	0.62	0.63	0.64
17	11:00pm	0.64	0.64	0.64	0.62	0.63
18	12:00am	0.62	0.64	0.64	0.62	0.63
19	1:00am	0.62	0.64	0.65	0.62	0.64
20	2:00am	0.62	0.63	0.63	0.63	0.64

Global Journal of Management and Business Research: B
Economics and Commerce
Volume 20 Issue 10 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

A Review on Artificial Intelligence (AI), Big Data and Block Chain: Future Impact and Business Opportunities

By Ahamed Golam Azam
University of Southern

Abstract- Mega trends are global, sustained, and macroeconomic forces of development that impacts business, economy, society, cultures and personal lives thus defines our future life. For different industries technological megatrends have different impacts. The way we have seen the technological development over last 10 years there is no doubt within 2030, technology is the sector which will have profound global impact in all kind of business entities. Financial sectors is already using the most of these technological megatrends and other sectors such as logistics, education, health care are also implementing these. The paper consists of three trend reflections where I have chosen three technological megatrends- Artificial Intelligence, Big Data and Block Chain for the analysis of their future impact on businesses and how the businesses can create greater value by the implementation of these technologies.

Keywords: technological megatrends, artificial intelligence (AI), blockchain, big data, future impact, business.

GJMBR-B Classification: JEL Code: M21

Strictly as per the compliance and regulations of:

A Review on Artificial Intelligence (AI), Big Data and Block Chain: Future Impact and Business Opportunities

Ahamed Golam Azam

Abstract- Mega trends are global, sustained, and macro-economic forces of development that impacts business, economy, society, cultures and personal lives thus defines our future life. For different industries technological megatrends have different impacts. The way we have seen the technological development over last 10 years there is no doubt within 2030, technology is the sector which will have profound global impact in all kind of business entities. Financial sectors is already using the most of these technological megatrends and other sectors such as logistics, education, health care are also implementing these. The paper consists of three trend reflections where I have chosen three technological megatrends- Artificial Intelligence, Big Data and Block chain for the analysis of their future impact on businesses and how the businesses can create greater value by the implementation of these technologies.

Keywords: technological megatrends, artificial intelligence (AI), blockchain, big data, future impact, business.

I. Introduction

The megatrends refer to transformative forces which define the future scenario of the world with impact on economies, business and personal lives to 2050 and beyond. These megatrends have a very high impact and power to change both a large city and a single individual. For any company's future strategy, development and innovation process a detailed analysis of megatrends and their inferences is a major component that should be taken into consideration at any stage. In recent years, the digital technological development and their far-reaching implications have brough us to a point where technological megatrends are really reshaping our world and our way of justification in decision making. In this paper, I have selected three technological megatrends: Artificial Intelligence (AI), Big data and Block Chain and analyzed their future prospects in the technological world.

Artificial Intelligence (AI) refers to the ability of a machine to simulate human intelligence and is done by a set of processes. According to William F. Clocksin in 2003, Artificial Intelligence is the section of computer science which focuses on machine equipping with perceptual and reasoning abilities. In another sense It is the ability of a digital computer or a robot controlled by computer to do tasks which is commonly done by intelligent beings (B.J. Copeland, 1998). As people of are looking to shorten the processing time of every tasks, at some point in future people may be replaced with machines and AI might be able to learn faster than humans, thus the impact will be like exponential growth(Peter Fisk, 2019). According Clifford G. Lau & Brian A. Haugh (2018) the application of Artificial Intelligence(AI) to autonomous systems(AS) has emerged as a megatrend that is expected have definite and wide range of influences on future human society. What makes artificial intelligence (AI) a megatrend is its recent advances in applications as self-driving cars, smart personal assistant, image-video and game playing have captured not only public imagination but also governments, industries and militaries across the globe. With AI from recent demonstrations it can be seen that AI systems will perform task like human intelligence. (Clifford G. Lau & Brian A. Haugh, 2018)

Big data refers to data which is huge in size with great diversity and with exponential growth with time that is very complex that none of the traditional data processing or management tools are able to process or store it (C.L. Philip Chen & Chun-Yang Zhang, 2014). A more detailed definition by Gartner was given in 2012: Big Data are high-volume, high-velocity or a high-variety information asset that need newer processing forms to enable inflated decision making, insight discovery and process optimization. In general sense, the data set is a big data if it performs visualization, capturing, curation, and analysis on it at the current technologies (C.L. Philip Chen, Chun-Yang Zhang, 2014). Big data is a novel term that originated from the need of large companies, such as Yahoo, Google, and Face-book, to analyze large amounts of data (Garlasu et al., 2013). There is no doubt that big data a genuine and intrinsic value and if the value is discovered properly it can have a profound impact on the decision making of the organization.

According to Waal-Montegamy, 2016 the volume of the worlds data is expected to grow by 40% per year and 50 times by 2020. According to published news in The Science Daily 90% of today's data was generated in last two years (Science Daily, 2016). Khan et al. 2014 stated the market value of big data in 2010 was $3.2 billion, and this value was expected to increase to $16.9 billion in near future. Thus, is can be

Author: MSc in Innovation and Business Development, University of Southern Denmark. e-mail: ahamedazam.dk@gmail.com

clearly predicted that big data will have an exponential growth over last 10 years which will immensely affect the company's decision making in not only operating current businesses but also to invest in new business ventures and thrive in a world of constant changes. Big data has many important application in today's world such as technology: reducing processing times from hours in seconds, health: DNA mining, discovering and monitoring health issues, Smart cities: Wise management of natural resources for sustainable economic development (Wei Fan & Albert Bifet, 2016). Big data is no longer just a marketing department slogan and is immensely becoming vital part of business IT strateigies. Data of today in its unstructured formats is very difficult to manage and maintain for companies hence the companies are making strategic data and analytics plans parallel to the business growth plan (Lalit Dhingra, 2019). According to Lalith Kumar Dhingra in 2019, Big data helps critical business decision and almost all companies especially in online business big data will be a regarded as a mainstream practice.

A block chain is a transaction ledger which is validated by a large network of computers and information stored in blocks and linked in such a way that any changed in blocks will make all future blocks invalid making it safe, secured and verified(Daniel Mullins, 2019). According to Quoc Khanh Nguyen (2019), block chain is a digitalized system of accounting records consisting of detailed transactions based on a mathematical set of rules to block any illegal interference. According to research it has been shown that, decentralized ledger and Blockchain are potentially powerful tools to minimize costs and bring major changes to the financial field in long term (Nguyen, 2019).

According to an article published in digital pulse in 2018, businesses from different industries are investing in the development of applications utilizing block chain in such extent that the technology is expected to generate US$3 trillion by 2030(Digital Pulse,2018). The block chain came to the knowledge of the public as a key technology behind bit coin but its potentiality has grown and is seen to be growing in such a way that it would become inevitable in all electronic transactions weather making payment online, brokerage activities online or even identity verification to government. In recent times, Bitcoin often regarded as the first crypto currency has enjoyed a huge success with the capital market reaching 10 billion dollars in 2016 (coindesk, 2016). The allowance of finishing payment without any bank or intermediaries, blockchain can be used in many financial services such as digital assets, remittances or online payments (Peters et al., 2015; Foroglou and Tsilidou, 2015). Furthermore, blockchain technology is becoming one of the most promising technologies for the next generation of internet interaction systems, such as smart contracts (Kosba et al., 2016), public services (Akins et al., 2013), internet of things (IoT) (Zhang and Wen, 2015) and security services (Noyes, 2016a). According to an IDC report, the financial services sector was the topmost investor in blockchain technology in 2018 ($552 million). There is no scope of doubt blockchain will play an enormous role in bringing changes in the way we do our transactions and way we do activities online. The growth of this technology till now is in such a great extent that it is clearly regarded as a major technological megatrend for next 10 years of the world.

II. Trend Reflections

a) Artificial Intelligence(AI)

In most people mind while hearing about Artificial Intelligence the first thing that comes is Robot: the reason for that is the big-budget films and novels make stories about machines like humans that wreak havocs on earth(Jake Frankenfield,2020). An easy way of defining AI is that, its is based on a principle that human intelligence can be defined in such a way that it is mimic able and excitable easily by machines. AI works by the combination a big set of data with fast, constant processing and unique algorithms which allows the automatic learning of the software from the features and pattern of the data. Artificial intelligence generally falls under two broad categories: 1. Narrow AI. 2 Artificial General Intelligence (AGI)

Narrow AI also referred to as ''Weak AI'' operates within a limited context and is a simulation of human intelligence. The machine under Narrow AI operates under far more constraints and limitations than human intelligence is focused on doing single task in perfect manner (Source: builtin, 2019). Few examples are: Google searching, image recognizing software, Siri, Alexa and other similar personal assistance, self-driven cars et.

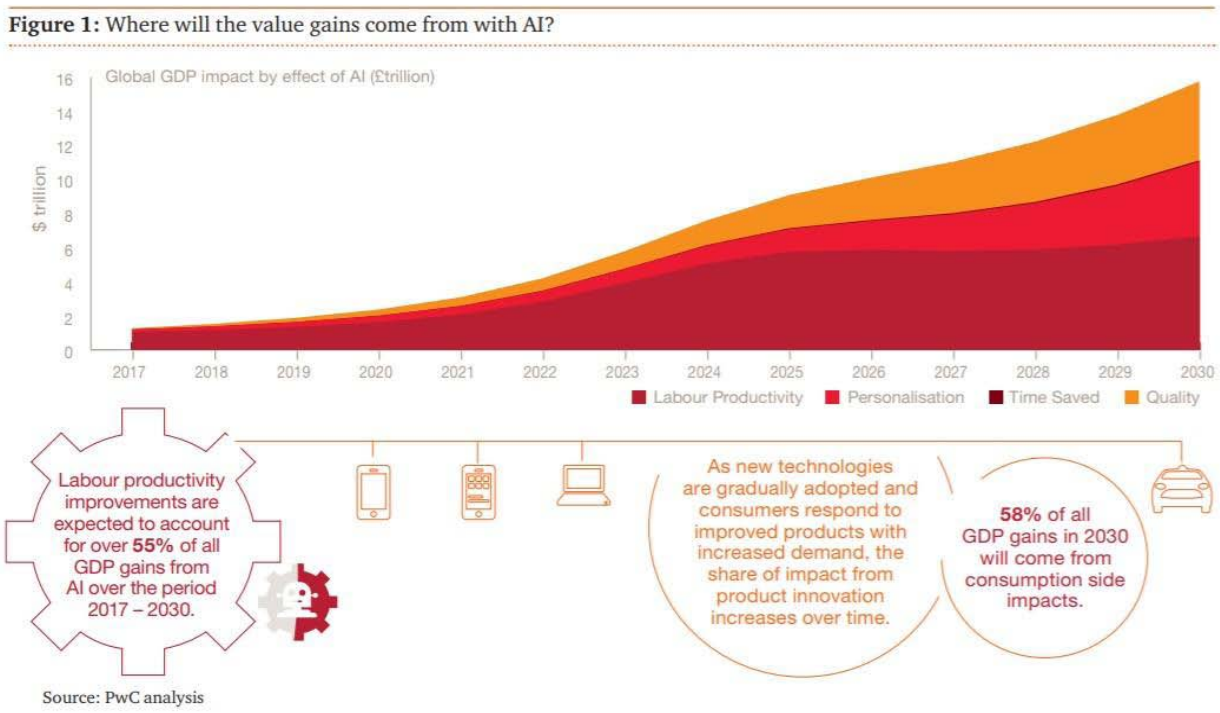
Artificial General Intelligence (AGI): AGI, sometimes referred to as "Strong AI," is the type of artificial intelligence we see in the movies and is a machine with general intelligence with much similarity to human begins. It can solve any problem through the application of certain intelligence.

III. Current Predictions About Future Impact of Artificial Intelligence (AI)

According to Clifford G. Lau & Brian A. Haugh in 2018, Artificial intelligence (AI) will enable autonomous systems (AS), with far-reaching implications in both the civilian sector and defense. Autonomous system refers to the machines that operate without the active intervention of a human operators: the technologies used in AS often include sensors, computers, and AI (G. Lau & A. Haugh, 2018). The author also stated, The

robots with AI system will perform difficult and dangerous tasks that require intelligence like humans, Automobile transport system will be revolutionize by self driven cars and traffic congestion will be reduced and big data analytics using AI techniques will make human-like decisions to improve governmental social services, health care, criminal justice, and the environment. According to an article published in Scoro (2019), it has been predicted by Ray Kurzweil that computers will have the same level of intelligence as humans by 2045, this is called singularity by some scientists (Scoro, 2019). With the big data techniques, AI will be capable to analyze huge amounts of information and come up with solutions to biggest global problems such as hunger, diseases, climate change and excessive population growth (Liisi Ruuse, 2019). As humans and machines collaborate more closely, and AI innovations come out of the research lab and into the mainstream, there is staggering possibilities of transformation (Source: pwc) According to PwC, 7 million existing jobs will be replaced by AI in the UK from 2017-2037, but 7.2 million jobs could be created.

According to the analysis of Pwc, global GDP will be up to 14% higher in 2030 as a result of the accelerating development and take-up of AI–the equivalent of an additional $15.7 trillion. The driver of this impact will be 1. Productivity gains from automation process in business (use of robots and autonomous vehicles). 2. Productivity gains from businesses from existing labour force augmented by AI. 3. Increased consumer demand due to higher availability of AI enhanced products and services (Source: pwc)



Source: pwc

Figure 1: Where will the value Gains Come from with AI?

From the above figure published by pwc, the most impact on global GDP by the effect of AI will be measured by Labour productivity by 2030 which includes the automation of routine tasks, augmenting employees capabilities and freeing them up more for stimulating and working with high value addition(Source: pwc). Personalization of products by customers will be made even more easy to make by the interventions of AI technology.

According to the analysis of Pwc Some of the most notable impact of AI in healthcare would-

- Supporting diagnosis in areas such as detecting small variations from the baseline in patients' health data or comparison with similar patients.
- Early identification of potential pandemics and incidence tracking of the disease to avert and minimize the extent of its spread
- Imaging diagnostics (radiology, pathology).

One of the first area of business in which information and communication technology (ICT) tools and techniques were applied is Accounting (Kamil Omoteso, 2012). Due to the very steady growth in technology most of the latest accounting firms have introduced Artificial Intelligence in making their Audit judgements (Omoteso, 2012).

AI techniques has produced huge waves across healthcare with an active discussion weather AI doctors

eventually be a replacement of human physicians in future. states AI will definitely be assisting physicians for better clinical decisions, may also replace human judgement in certain areas of healthcare (e.g. radiology) but will not replace human physicians (Fei Jiang et. al, 2017). According to Barnarrd Marr (2019), with better monitoring and diagnostic capabilities, artificial intelligence can dramatically influence healthcare by improving health care facilities medical organizations which as a result can reduce operating costs and save money. One estimate from McKinsey predicts big data could save medicine and pharma up to $100B annually. Potential for personalized treatment plans and drug protocols as well as giving providers better access to information across medical facilities to help inform patient care will be life-changing (Marr, 2019). Our society will have huge increase in job productivity by the introduction of autonomous transportation and AI influences in traffic congestion issues.

In the area of financial services AI will have a big impact according to the analysis of Pwc. Three areas of financial services are-

- Personalized financial planning.
- Fraud detection and anti-money laundering
- Process automation – not just back office functions, but customer facing operations as well.

According to Ai specialist of PwC in retail areas AI will have such impact which will allow retailers to use deep learning to predict customer needs and proper inventory and delivery management(Source: PwC). In transport and logistics with the usage of AI technology traffic congestion could be made under controlled and without any barrier to transport logistic services would be more efficient (Source: PwC).

Complex situations are characterized by an absence of elements or variables. Over recent year, with AI's capabilities of doing quantitative, computation and analytical tasks has surpassed human beings in doing works with complexity (Jarrahi, 2018). With the assistance of comprehensive data analytics more effective ways of human decisions equipping has been possible which opened up opportunities for dealing complexity in decision making. Thus AI in future can help to reduce complexity by identifying causal relationship among many possibilities in a acertain scenario through causal loops (Marwala, 2015). Professor Spyros Makridakis in his article in 2017 stated, with the widespread usage of AI inventions People will be capable of buying goods and obtaining services from any part in the world with the usage of Internet, and exploiting of the unlimited additional benefits.

According to Kurzweil's prediction, computers will reach human intelligence around 2029 (Kurzweil, 2005) while Singularity will come by 2045. In 2009 Barrat and Goertzel (2011) asked the participants of an Artificial General Intelligence (AGI) Conference to answer the question: "I believe that AGI (however I define it) will be effectively implemented in the following timeframe". The answers those were given by 60 participants are given below:

Time frame	Response Percent	Response Count
Before 2030	43.3	26
2030-2049	25.0	15
2050-2099	20.0	12
After 2100	10.0	6
Never	1.7	1

Source: Professor Spyros Makridakis, 2017: The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms

According to the prediction of Spyros Makridalis (2017), The technological change from the forthcoming AI revolution will open huge opportunities for growth and profitability but also new challenges and competition from new start-ups as breakthrough ideas can come from anywhere and with crowd sourcing and venture capital their development their development and financing will be easier(Makridalis,2017)

According to the critics, the fear that is present in their prediction is the fast growth of job obsolescence through AI technologies especially in service sector (Makridalis (2017). According to the New Yorker (2016), While it took three to four decade to see the impact of digital technology it might be no more than a decade until all of us observe the full effect of AI revolution. According to PBS (Thoet, 2016) the newly announced Amazon Go retail store, using AI technologies to abolish employees, "could drastically change the way people shop and eventually eliminate the need for millions of workers, according to the prediction of industry experts.

A future utopian scenario of Artificial Intelligence could be an instant transfer of certain technological skill to another human being which in today's world we only can do with training and practice within a time frame.

The AI intervened chip in human body could be another state of perfection where medical doctors can monitor their patients 24/7 and analyze their physiological condition for better treatment. The patient will no longer be visiting medical clinics but get anything they want from home. A world of complete cyber security where AI will protect all data of all the people and can track and trace any harmful activity from anywhere in the world which confirms a secured life without terrorism or cyber-attacks.

a) *Suggested measures for Business to create higher value through Artificial Intelligence*

The business in the future can increase their operational efficiency in a great extent through the usage of Artificial Intelligence (AI). Therefore, correct implementations according to requirement is an important issue. For example, in business it will be possible to process invoices by proper using of speech recognition applications to take necessary notes loudly, thus, it can provide the advantage of transcribing notes without having to work much on note taking activities Businesses should focus more on automation of every process through the applications of Artificial Intelligence which in turn can provide the opportunity to increase processing time and cost minimization. When the businesses make use of software applications powered by AI, they will be able to increase automation at the business level which enables to run the business process efficient and time is saved from investing in manual labor.

The businesses should also focus on implementing AI techniques along with big data analytics. With the availability of big data analytics decision making and AI process implementations can be more efficient for business growth in future.

IV. Big Data

Since the invention of computers, data generation has been taking place at a fast rate which ultimately has worked as a key motivator for current and future research frontiers (Ibrar Yaqoob et. al, 2014). Technological advancement in mobile devices, digital sensors, communications, computing, and storage have created the means to collect data (Bryant, Katz, & Lazowska, 2008). The novel term Big data came from the need of analyzing large amounts of data by big companies like Yahoo, Google and Facebook (Garlasu et al., 2013). The renowned IT company Industrial Development Corporation(IDC,2011) stated there has been increase of nine times in the total amount of data in the world (Gantz & Reinsel, 2011) and the figure is expected to be doubled in every tow years at a minimum (Chen, Mao & Liu, 2014). Doug Laney with Gartner described big data with three aspects: volume, velocity, and variety. The term volume refers to the size of the data, velocity refers to the speed of incoming and outgoing data, and variety indicates the sources and types of data (Philip Chen & Zhang, 2014). Veracity or variability have been added by IMB and Microsoft as the fourth V in the definition of big data. The term veracity refers to the messiness and trustworthiness of data.

The author Can Yortseven (2019) his persepective of 3 V (Volume, Velocity and Variety) of big data in an article in Deloitte as following: The volume of data simply refers to the fact that, within the big data platforms the volume of data can be bigger than the volume size of data in a traditional data management systems. The velocity of data refers to the fact that Big Data platforms are able to process both data-in-motion means streaming of data which can be retrieved from live happenings and data-at-rest (e.g. reporting layer fact-dimensions). The variety of data refers (e.g. structured data, weblogs, sensor data, video etc. (Yortseven, 2019)

V. The Current Trends and Opportunities in big Data

According to research, the growth of big data has taken place at a rapid rate and in the Waal-montgomery in 2016 it was stated that big data will grow by 50 times in 2020 (Ibrar Yaqoob et al., 2014) Owing to the rapid growth, data production in 2020 will be 44 times larger than the data production in 2009 (Khan et al., 2014a). The annual growth rate of data production was constant at roughly 40% in the early 1990s whereas in 1998, it peaked at 88% (Odom & Massey, 2003). Since then, Globally, approximately 1.2 ZB of electronic data are generated yearly (Khan et al., 2014a). The enterprise data will reach 40 ZB by 2020 according the claims of IDC (Sagiroglu & Sinanc, 2013). The Transaction between business-to-consumer (B2C) and Internet business-to-business (B2B) transaction will reach 450 billion per day by 2020 based on IDC's estimation, (Khan et al., 2014a). An illustration of the rapid increase of data in zettabytes is shown the figure 1 below.

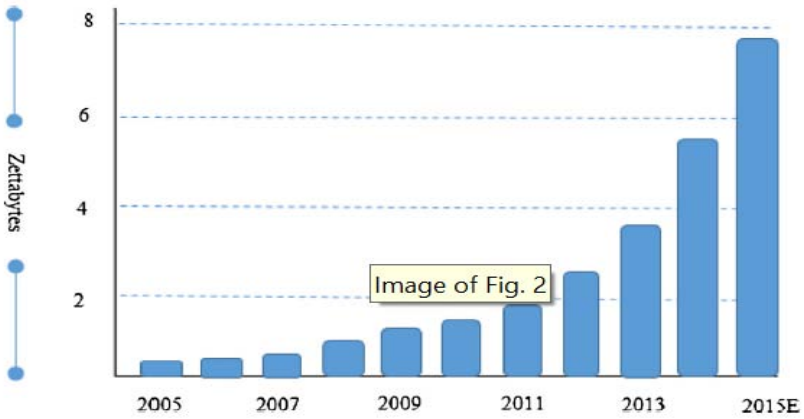


Figure 1: The rapid growth of data in Zettabytes (Yaqoob et al.,2014)

According to an article in Forbes, 2015 after the success of the company Capital one by making a statistical model based on public credit and demographic data to provide customers with "custom-tailored" products many banks have shifted focus towards Big Data analytics and Capital one had their annual net revenue increased by 17% compared with top banks in the US such as Citigroup at 11%, Bank of America at 11% and JP Morgan at 6% from 2009 to 2014. The strategic partnership between IBM and Twitter for the purpose of selling analytical information such is laso a strong example how the trend and impact of big data is rapidly growing. (Source: Forbes, 2015)

In recent time Several US government ascertain that data intensive decision making has a profound influence in the future development of the agencies such as National Institutes of Health (NIH) and the National Science Foundation (NSF). (Yaqoob et al.,2014). According to the report from McKinsey institute, there is an underlying benefit for economic transformation and a new wave of productive growth by the effective use of Big Data. An illustration in figure 2 shows the how different advantages can be obtained by harnessing big data.

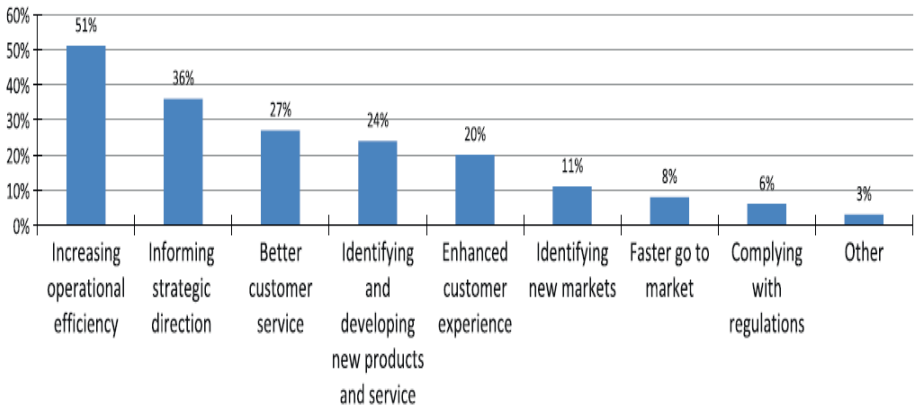


Figure 2: About 50% of 560 Enterprise think that by Harnessing of big data can help them to increase Operational efficiency (McKinsey Institute)

VI. Growth Opportunities in Business for big Data

Starting from internal insights to front-facing customer interactions there are enormous growth opportunities by big data applications in business. Three major business opportunities include: automation, in-depth insights, and data-driven decision making.

Automation: Robotic process automation can foster the improvement of internal efficiencies and operational ability by the business organization. The immediate analyzing of a huge amount of real time data can make big influence in automated decision making for the business Automated data collection and storage will also be very affordable with scalable IT infrastructure and lower cloud computing costs.

Discovery of hidden insights: The hidden opportunities in business can also be uncovered by the usage of big data and the scope to review large set of data. Complex data sets can even be used to develop new products or

enhance existing ones. Significant market data captured can prove to be invaluable.

Faster decision making: With the fast processing time of data analytics and the ability to analyze new sources of data, instant analyzing of information by business has made them able to make smart and informed organizational decisions about new business strategies.

Big data in healthcare: The real time analysis of healthcare data can result in improving medical services to the patients. Responses according to different patients to different drugs can highly pharmaceutical companies on drug development.

In fact, with the availability of large set of data pharmaceutical companies with the analysis of the data can personalize medicine for each patient and ensure faster and better recovery (Yaqoob et al., 2016). With the technologies for large set of data content optimization, classification and organization can be possible in web based medical treatment from where the patient can be highly benefited while searching for specific treatment.

Big data in logistics: Delivery optimization will be highly possible for companies as they take data from GPS trackers, telemetry systems and traffic monitoring services and can analyze them to make real time decisions (Source: itransition,2019). Inventory management is also possible in efficient manner by demand analyzing per customer segments or specific periods thus the right anticipation of demand and avoiding over or under stocking inventory management can be done proper way.

a) *Suggested measures for organization for future value outcome from Big data*

Appropriate data infrastructure: As big data consist of very large amount of data sets which is complex, the organization depending on big data analysis on their strategy formulation should have the adequate capability of holding complex data with right network, data storage and processing infrastructure. As the data will be unstructured thus the right way storing data is also important for future retrieval of data for analysis.

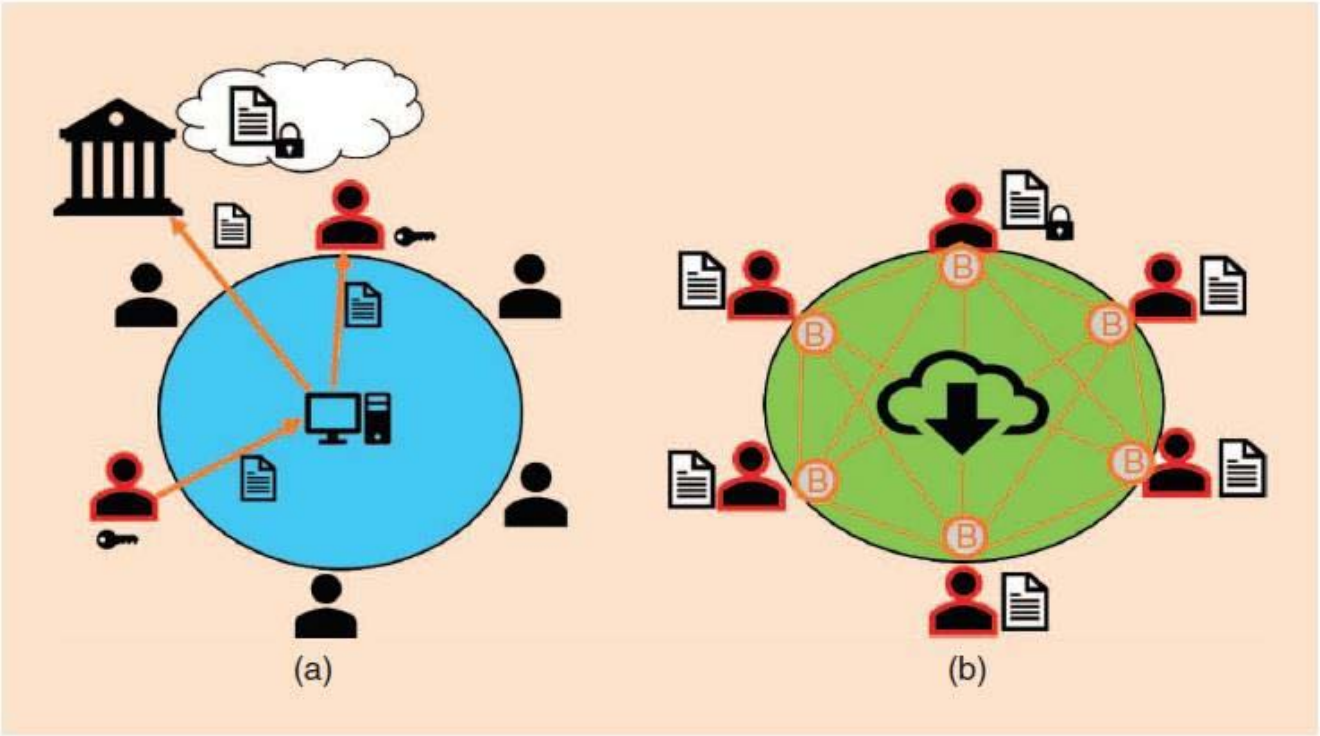
Cleanliness of data: In a database mistyped, incorrect or poorly integrated affects overall decision-making process negatively thus it can affect organization performances and decision making. Data can also contain error by human mistakes. So, organizations should be critical to their data and check data validity by searching and fixing errors.

VII. Block Chain

The digitization of information can be facilitated by Internet of Things (IoT) in some means but the reliability issues of this kind information has been and still is a key challenge (Ana Reyna et al., 2017). In this scenario the money transfer mechanism has been revolutionized by bitcoin which a crypto currency that can be transferred without financial intermediaries or foreign exchanges with the help of a digital wallet. This system is supported by a protocol that ensures that the information remains immutable over time and this protocol is known as Blockchain. (Ana Reyna et al., 2017). According to a an article in Computer world (2019), Blockchain has the ability to create secure, real time communication networks with partners around the work to support everything from supply chain to end payment to real estate deals and healthcare data sharing (Source:computerworld,2019). According to a research by ABI services blockchain has been having a solid adoption for application development and pilot testing good number of industries and likely to generate above $10.6 billion in revenue by 2023 and the revenue is expected to come from the sale of software and services.

The reason for blockchain to be regarded as one of the next technological megatrends can be justified by many prediction according to researches from big companies. According to prediction by Gartner, by the end of 2020, the banking sector will attain 1 Billion dollars of business value with the use of blockchain-powered crypto currencies and 55% of healthcare apps will be using blockchain for commercial deployment by the year 2025. Blockchain is also emerging as the perfect answer to the fight against Coronavirus by offering real-time tracking information, data immutability, and transparency across distributed decentralized ledgers (Srivastav,2020)

The three main advantages of Blockchain Technology for its widespread acclaim are Decentralization, Transparency, and Immutability. Before the invention of bitcoin and bit torrent we had a centralized entity, which refers to the interaction solely with the central entity to get required information. But in the decentralized system everyone present in the network owns the same information thus direct interaction is possible with another party without the use of third party thus bitcoin system through the protocol of blockchain make a certain person the only one in charge for sending his own money to someone.



System (Depak Puthal et al., 2018)

Figure 3: The (a) centralized system with intermediaries versus a (b) decentralized blockchain

In blockchain a person identity is hidden through a complex cryptography and presented only through public address thus a person's real identity is secured which ensures transparency in the transaction.

a) Current Trends in Blockchain

Since blockchain had made its debut in the global stage finance was the first sector to take an interest and has been continuously buzzing with innovation and breakthroughs. Not only as virtual currencies blockchain can be used as fraud-resistant cleaning and settlement systems, smart contracts and can foster the digital transactions speed. (Bernard Marr, 2020). There is an undeniable worth of blockchain for any area of industry that requires transactions recording to be kept safe and secured and the activities can be carried out in a way that is traceable.

b) Launching of Facebook's digital currency

According to forbes, 2020, Facebook plans to unleash its own cryptocurrency on the world in the earlier period of 2020, and its already generating lot excitements and concerns even though many details are still yet to know. There have been a lot of crypto currencies in the past – well over 1,000 have launched since Bitcoin arrived in 2009, with the vast majority quickly sinking without trace. But none have been launched with the backing of a such a big organization like Facebook- a factor which could mean that the implications of this particular step go far beyond anything we have seen yet (Bernard Marr, 2020).

c) Combination with Artificial Intelligence

By combining the breakthrough technologies such as combining blockchain with AI, companies can make more quick and accurate predictions, minimize the waste generated in production process, streamline supply chains, and more quickly match new products and services in new markets.

d) Predicted applications of Blockchain in Business

Blockchain may be conceptualized as a DI, however, the practical application of blockchain still rather limited and the actual impact of this technological approach is yet to be seen (Gareth R.T. White, 2017).

Financial services: The emergency of blockchain systems such as Bitcoin (Nakamoto, 2008) and (hyperledger, 2015) has brought a highly notable impact on traditional financial and business services. Peters and Panayi (2015) discussed that Blockchain has the potential to disrupt the world of banking. Besides, there are real business cases like collateralization of financial derivatives that could leverage blockchain to reduce costs and risks (Morini, 2016). Large software companies such as Microsoft Azure (Azure, 2016) and IBM have also began to offer blockchain as a service.

Product quality assurance: For many organizations product quality assurance is a vital issue and there are different mandatory and voluntary systems exist which aim for product assurance via labelling and certifications (Ahn, 2014). Blockchain techniques could be used for collating and verifying information to positively influence

the product assurance as there are often questions that arise over the trustworthiness of certification bodies (Dranove & Jin, 2010) and the cost of systems of certifications(White & Samuel, 2015)

Consumer Reviews: Online reviews of places and products have grown with very good popularity but have been criticized for their inability to distinguish between genuine and fake reporting (Scott & Orlikowski, 2014; Wang, Wezel, & Forgues, 2016). Blockchain techniques can provide some greater degree of trustworthiness of customer reviews by its multiple independent verification process.

Performance management systems: The establishment of effective performance management systems is an important part of many organizations (Church, Ginther, Levine, & Rotolo, 2015). In situations which demand the transparency of initiatives and the results are important, the implications of blockchain may support the development of such type of performance management systems (Mihaiu, 2014). As a panel member stated: ''The transparency afforded by this technique could alleviate any suspicions of inequity'' (R. T. White, 2017).

Security enhancement: The vulnerability of mobile services to malicious is also one of the important concerns in today's technological world. There are a number of anti-malware filters proposed to detect the suspected files through pattern matching schemes, which is a central server to store and update the virus patterns (Zhang et al., 2018) but still the system possesses the threat of malicious attack. Blockchain can potentially help to improve the security of distributed networks. A novel anti-malware environment named Bit AV was proposed by Charles (Noyes, 2016a), in which users can distribute the virus patterns on blockchain. In this way, Bit AV can enhance the tolerance ability for faults. It is shown in Noyes (2016a) that Bit AV can improve the scanning speed and enhance the fault reliability (Zhang et.al, 2018)

Management of Global supply chain: Supply chains system in organization may benefit through the transparent sharing of vital information (Chong, Chan, Goh, & Tiwari, 2013; Steinfield, Markus, & Wigand, 2011). For information sharing and production activities of supply chain, a development of a blockchain with verification of supply chain members could pave the way of efficient supply chain management system. Additionally, it may be used to track and record global shipments or be used in the establishment of a secured supply chain system free from cyber-attacks (R. T. White, 2017)

According to Puthal, Malik, P. Mohanty, Kougianos & Chi Yang (2018) blockchain will have a different applications according to business fields which includes financial services, small properties, IoT, health care systems and Government bodies shown in the figure 4 below.

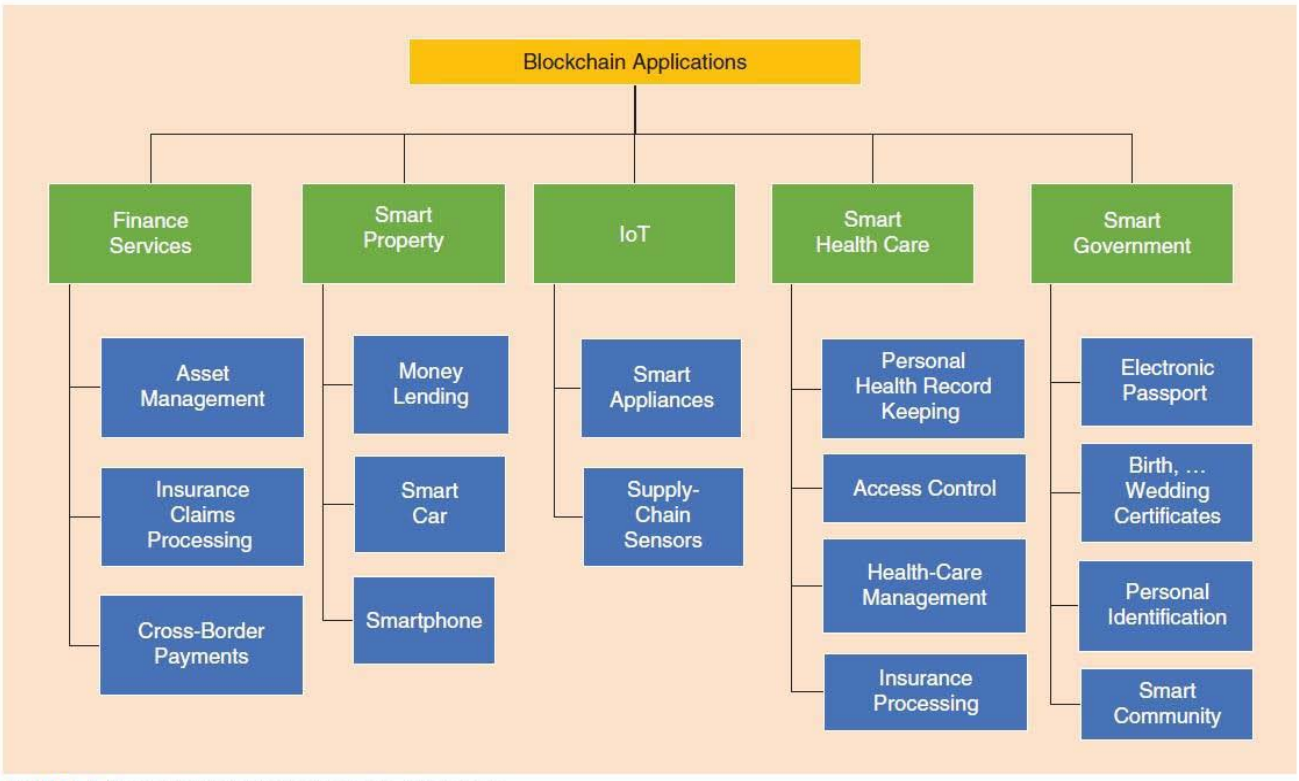


Figure 4: Potential applications of blockchain (Puthal et al., 2018: The Blockchain as a Decentralized Security Framework)

e) Suggested measures for businesses for greater value creation by Blockchain technology

The companies face a difficult task when deciding which opportunities to pursue as there are lot of use cases for blockchain. The companies can narrow their options through a structured approach thus the company should determine the availability of sufficient value for a certain case to implement blockchain technology for. It means the right choice of the case is important to predict which opportunities should be taken for organizational development through the use of block chain technology.

Every organization or business entity in future should create an active department for continuous analysis of the change on blockchain technologies. The department should collaborate with all other departments such as finance department, logistics department, marketing department and provide every department with latest data and trends according to market conditions. Thus, the companies should be able to adopt to any emerged standards.

Sing (2016) stated the device cost is decreasing and computing power is increasing day by day, therefore Blockchain presents an immense possibility in Internet of Things (IoT) and providing security. Therefore, there is no scope of doubt that with proper combination of blockchain technology and usage of IoT in businesses can open the door for immense opportunities for advancement and growth. So, the businesses should focus on the efficient applications of block chain and IoT in combination to get a sharp edge in their field.

VIII. Conclusion

From the analysis and reflection of three selected trends ins this paper namely Artificial Intelligence, Big Data and Blockchain it is evident that all these technology are in the initial stage of development and has already marked their presence and importance in businesses. From various Research about these technological megatrends what has been found is that these trends are here and they will reshape our life in a great extent in next 10 years of time. The growth rate of this trend is far higher than any other technological development in the past. Big data analytics is undoubtedly the thing for next stage for business especially after the current pandemic of corona virus that we have experienced. The organizations already are quiet dependent on data analytics to make their decision regarding new investment or investing in current sectors. We can see how fast the need for data analytics have been growing in job sectors and this will grow more in next two years. Thus, a separate department for Big data analysis can prove to be impactful and specific consultants should be hired for certain techniques implementation.

Artificial Intelligence with the combination of Internet of Things (IoT) will have a profound impact on how the business works in the future. Through AI techniques implementation the organizations will be more automated and labor productivity will be much more higher although the fact of future job availability should be taken into concern. With AI technology the health care system can be improved in huge extent and treatment process can be enhanced in great way. Patient can be monitored at any time and correct monitoring of their health conditions can improve treatment. Another most notable megatrend is Blockchain which is also in its growth stage and will probably be the most secured way of communication and will be affecting the financial sector the most. As a decentralized system is maintained in blockchain, interconnection problems will be mitigated, and communication process will be lot faster and secured. In marketing sector blockchain will have its influence as product customization based on each customer needs will be lot more possible and customer satisfaction will also be enhanced through the application of this technology.

References Références Referencias

1. Mohammad Hossein Jarrahi (2018): *Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making.*
2. Fei Jiang, Yong Jiang, Hui Zhi, Yi Dong, 4 Hao Li, Sufeng Ma, Yilong Wang, Qiang Dong, Haipeng Shen, Yongjun Wang(2017) : *Artificial intelligence in healthcare: past, present and future.*
3. Professor Spyros Makridakis (2017): *The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms*
4. Ibrar Yaqooba, Ibrahim Abaker Targio Hashema, Abdullah Gania, Salimah Mokhtara, Ejaz Ahmeda, Nor Badrul Anuara, Athanasios V. Vasilakosba *: Big data: From beginning to future.*
5. Alessandro Merendinoa, Sally Dibba, Maureen Meadowsa, Lee Quinna, David Wilsonb, Lyndon Simkina, Ana Canhoto: *Big data, big decisions: The impact of big data on board level decisionmaking*
6. Mckinsey quarterly: *Clouds, big data, and smart assets: Ten tech-enabled business trends to watch*
7. PwC: Sizing the prize what's the real value of AI for your business and how can you capitalise? retrieved from. https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report .p df accessed on 29th May, 2020
8. AI is the megatrend that will shape the future. retrieved from https://blog.abbyy.com/ai-is-the-megatrend-that-will-shape-the-future/ accessed on 29th May 2020
9. Liisi Ruuse (2019): *Artificial Intelligence: Mind-Boggling Future Predictions in 2019* retrieved from

https://www.scoro.com/blog/artificial-intelligence-predictions/Accessed on 30th May 2020
10. Bernarrd Marr & Co: *What Is The Impact Of Artificial Intelligence (AI) On Society?* retrieved from https://bernardmarr.com/default.asp?contentID=1828 Accessed on 30th may 2020
11. Peter Pham (2015): *The Impacts of big Data that you May not Have Heard of* retrieved from https://www.forbes.com/sites/peterpham/2015/08/28/the-impacts-of-big-data-that-you-may-not-have-heard-of/#899ffda6429b Accessed on 3oth May 2020.
12. Can Yurtseven (2019): The impact of Big Data, past and future retrieved from https://www.deloitteforward.nl/en/data-analytics/the-impact-of-big-data-past-and-future/ Accessed on 27th May, 2020
13. PwC: *Blockchain is here: what's your next move?* retrieved from https://www.pwc.com/gx/en/issues/blockchain/blockchain-in-business.html?WT.mc_id=CT11-PL1000-DM2-TR1-LS4-ND30-TTA5-CN_US-GX-xLoSBlockchain-DigitalPulse&eq=CT11-PL1000-DM2-CN_US-GX-xLoSBlockchain-DigitalPulse accessed on 25th may 2020
14. Blockchain Infographic: Growth, Use Cases & Facts. retrieved from https://www.dotcominfoway.com/blog/growth-and-facts-of-blockchain-technology/Accessed on 1 June 2020
15. Lalit Kumar Dhingra (2019) Big Data – Is it a new Mega Trend? retrieved from https://www.linkedin.com/pulse/big-data-new-mega-trend-lalit-kumar-dhingraaccessed on 29 thMay,2020
16. Minhaj Ahmad Khan Khaled Salah (2017): *IoT security: Review, blockchain solutions, and open challenges*
17. Ana Reyna, Cristian Martín, Jaime Chen, Enrique Soler, Manuel Díaz(2018): *On blockchain and its integration with IoT. Challenges and opportunities*
18. Sachchidanand Singh & Nirmala Sing (2016*): Blockchain: Future of Financial and Cyber Security* .
19. Deepak Puthal, Nisha Malik, Saraju P. Mohanty, Elias Kougianos, and Chi Yang(2018): *The Blockchain as a Decentralized Security Framework*
20. Gareth R. T. White (2017)*: Future applications of blockchain in business and management: A Delphi study*.

This page is intentionally left blank

Global Journal of Management and Business Research: B
Economics and Commerce
Volume 20 Issue 10 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

Leadership Impacts on Employee Motivation of the Kindergarten's Staffs in Rangpur

By Most. Ayasha Siddiqua
Begum Rokeya University

Abstract- The study focuses on building the relationship between leadership roles and employee motivation among the kindergarten staff. Purposively, 50 participants have been taken considering from 20 kindergartens. Through a questionnaire, primary data has been gathered. The motivation multifactor questionnaire style has been used because of finding a broader view of the leadership impacts. Data has been analyzing by using the SPSS-23 version. A statistical tool like factor test, percentile has been used to show the relationship between motivation and leadership. The study reveals a profound relationship between the leadership attitude and the some commit mental issues of motivation. Leadership roles like trust, initiatives, and share vision encourage creating value-driven inspiration and continuous development as positive impacts on the employee. Although it not the complete packages to satisfy the staff but mostly as per their level.

Keywords: leadership, motivation, employee commitment, kindergarten.

GJMBR-B Classification: JEL Code: M51

Strictly as per the compliance and regulations of:

Leadership Impacts on Employee Motivation of the Kindergarten's Staffs in Rangpur

Most. Ayasha Siddiqua

Abstract- The study focuses on building the relationship between leadership roles and employee motivation among the kindergarten staff. Purposively, 50 participants have been taken considering from 20 kindergartens. Through a questionnaire, primary data has been gathered. The motivation multifactor questionnaire style has been used because of finding a broader view of the leadership impacts. Data has been analyzing by using the SPSS-23 version. A statistical tool like factor test, percentile has been used to show the relationship between motivation and leadership. The study reveals a profound relationship between the leadership attitude and the some commit mental issues of motivation. Leadership roles like trust, initiatives, and share vision encourage creating value-driven inspiration and continuous development as positive impacts on the employee. Although it not the complete packages to satisfy the staff but mostly as per their level.

Keywords: leadership, motivation, employee commitment, kindergarten.

I. Introduction and Background

While this examination attracts leadership styles to progress further comprehension on the basic systems that empower leaders to act in a dictatorial or groundbreaking way and influence representative motivation, their conduct, and subsequently, their hierarchical situated ventures, every association, similar to each group requires administration (Malott, 2010). The initiative permits directors to influence worker conduct in the association (Vance, 2006). Hence, spurred representatives are one of the most significant aftereffects of compelling administration. (Ndururu, 2019), fruitful directors are additionally influential leaders since they impact workers to help achieve hierarchical objectives. Notwithstanding, accomplishing hierarchical goals isn't sufficient to keep representatives inspired, yet assisting workers to conduct their own and vocation objectives is a significant aspect of their motivation. Leadership and motivation are intelligent. Leadership ability is dependent upon, and regularly characterized as far as leaders' capacity to inspire adherents toward aggregate objectives or an aggregate strategic vision). The more propelled the supporters, the more successful the leader; the more compelling the leader, the more inspired the devotees (Chait et al., 2011).

Author: Assistant Professor, Department of Management Studies, Begum Rokeya University, Rangpur, Bangladesh.
e-mail: ayasha_siddiqua@yahoo.com

The inventiveness is a "social impact measure that is important for the achievement of cultural and hierarchical objectives; it is both prominent in its nonattendance and strange in its quality – natural but then hard to" (Bennett et al., 2009). (Burns, 1977) Leaders comprehend that they have power and that they understand the wellspring of their capacity: their position, their ability to compensate and to constrain; their aptitude; and their intrigue and appeal. They impact their devotees' conduct through correspondence, bunch elements, preparing, rewards, and order. There are numerous leadership styles, specifically: groundbreaking, situational, despotic, visionary, and magnetic leadership. While this examination is to draw from the imperious and groundbreaking leadership styles to progress further comprehension of the hidden components that

Empower leaders to act in an absolutist or groundbreaking way; and influence representative motivation, conduct, and like this, their authoritative arranged endeavors (Nadeem, 2020). The paper expects to set up the initiative style in propelling the school personnel to be focused on their work. Leadership is mind-boggling because it is concentrated in various manners that involve multiple definitions. For this situation, it very well may be characterized as the cycle of a leader conveying thoughts, picking up the acknowledgment of the vision, and rousing adherents to help and execute the ideas through others (Kressle, 2003). A leader can consistently impact others and may not be a director, though someone else can have initiative characteristics and be a chief.

There are three sorts of Managerial Leadership aptitudes, to be specific: Technical abilities, Interpersonal Skills, and Decision-Making abilities (Guillén, 2001). Specialized talents are worried about the capacity to utilize strategies and procedures to play out an undertaking; Interpersonal talents, then again, center exclusively around the capacity to comprehend, impart and function admirably with people and gatherings through creating compelling connections (Kanungo et al., 1992). Finally, dynamic aptitudes include the capability to conceptualize circumstances and select choices to tackle issues and make the most chances (Lengnick-Hall, 2009). This study has attempted to find the relationship between leadership and motivation among the kindergarten staff in Rangpur.

II. Method and Material

This study has based on the primary and, therefore, the secondary data. This study of principals' views of leadership style as an influencing factor on motivating and inspiring the teaching staff to perform better in their respective academic duties was conducted among 20 Kindergartens. From these 20 Kindergartens, 50 teaching staff were selected to participate for purposive sampling total sample size is 50. Teaching staff were selected to participate during this study because teaching may be a core duty during this enterprise. The participants were conveniently selected; however, the sample was chosen in such how that more participants came from Kindergartens that weren't performing above the provincial benchmark. the info was obtained from the faculties and every one the teaching staff were encouraged to finish the questionnaire. Identifying similar phrases, relationships between themes, distinct differences between target blocks and customary self-administered questionnaires containing structured items, were applied. Items within the questionnaire focused on leadership and motivation in assisting and supporting teaching staff. additionally, an issue was asked on how the principal manages and motivate the varsity the varsity. Closed questions helped in eliciting specific information, while open-ended questions enabled the respondents to precise their views freely and without restriction. Because the methodological paradigm applied during this research may be a survey method with the questionnaire constructed within the Likert-type approach, starting from 1 to 5, the study could also be classified as quantitative research.

Throughout the study every effort was made to take care of high ethical standards. Anonymity and confidentiality were protected within the least times with a radical explanation in the sort of a cover letter provided to all or any participants, detailing the aim of the study. theoretically researcher consider some factor like 1. Feel right about being in2. Supervision on attaining the target, 3. Leadership Capacity, 4. Rewards on attaining the target, 5. Value focuses, 6. Motivation focuses. Data analysis and interpretation were done using the interactive model of quantitative data analysis which first involved sorting or sifting through the info and sequences., it had been important that the mass of knowledge collected should then be reduced to a format suitable for analysis. The respondents' responses were then encoded consistently with the emerging themes using the SPSS V 23 program. Data were analyzed by descriptive statistics, like percentages, frequency, and, therefore, the KMO and Bartlett's Test to check for consistency of the factor data, among other things, the reliability of describing the impact and, therefore, the leadership style in these Kindergartens.

III. Leadership and Motivation

Self-motivation could be a progression of things that drive people's conduct. Motivation is normally seen as either characteristic or extraneous (Medun, 2001). Inborn motivation is accomplishing something that is intrinsically charming and fulfilling, though outside motivation depends on outer components like getting rewards or maintaining a strategic distance from discipline (McClelland, 1997). There are two parts of accommodating Leadership: first might be a pledge to the undertaking; second and similarly significant, might be a worry for individuals (Togneri et al., 2003). Compelling leaders can rouse employee's in a partnership and progressively improve profitability (Gauthier–September, 2006). Leaders need to make energy among employees so as that they're going to see importance and sense inside the different jobs they're playing (Golema, 2003). Both energy and motivation are key fixings in motivation. They will be developed by acceptable initiative style (Preece, 2009). Leadership style, which endeavors to share and grant the significance of the vision of an association with the remainder of representatives, is critical inside the technique for spurring employees (Beazleyet al., 2002). When each representative comprehends the shared objective and goals of an association as cherished in its vision explanation, it'll be very simple for leaders to make motivation in them. The compelling leadership style will affirm that employees are very much educated regarding the effect of the vision and crucial the association (Kouzes et al., 2010).They should be caused to feel a vital part of the whole cycle of making progress additionally as appreciating the gainful results of their responsibility. When this is frequently regularly accomplished, employees are getting the chance to be propelled because they have alluring incidental advantages as well as because they have a bright future close by the association (Riggio, 2008). Destitute Leadership will cover relevant data from employees (Blanchard, 2018). This may cause them to have a method of distance from the association and died down persuaded. It's general information that individuals will, in general, have the individual drive on the off chance that they know very well that they have something to exploit or be excited for either inside the short or future (Markus, 2004). At the point when such worker connection is accomplished, at that point crafted by a pacesetter goes to be smooth. Leaders who comprehend the undeniable reality that they have to shape a top to the bottom working relationship with representatives are regularly effective (Heifetz & Linsky, 2017). It's out of being close with individual specialists that it will be anything but difficult to distinguish and tackle their issues at work and in this manner rouse them. The association between Leadership and motivation that has barely been investigated inside the

past examined. The path during which the two parts of hierarchical conduct employees is critical in guaranteeing positive development during a business. The initiative could likewise be a sort of social impact which is created during a strong gathering of individuals. On the off chance that a group chief chooses to assign obligations to the subordinate staff, at that point, this may be depleted how that it will have the least involved positive effect on every employee. That is frequently now where the contrast among wonderful and wasteful initiative is watched. For instance, a changed leader will, above all else, judge the office and capability of each colleague at that point delegate task in like manner. Employees ought to be relegated obligations in regions of intrigue and ability all together that they will be inspired as they appreciate playing out their responsibilities (Behn, 2009). An initiative style which will remain in general force an errand on employee's without assessing their ability will frequently miss the point. Employees who are constrained to do duties are not really inspired, and this means dreary execution (Guglielmi et al., 2013).

Motivation could likewise be an objective situated trademark that enables a private to accomplish his goals. It pushes an individual to take a stab at achieving their dreams. A chief must have the correct initiative characteristics to impact motivation, (2012). Notwithstanding, there is no particular outline for motivation. As a pacesetter, one should keep an open viewpoint on the element. Knowing the different needs of subordinates will settle on the emotional cycle simpler. Both a representative additionally, as a supervisor must have leadership and motivational aspects. An influential leader must have a piece of extreme information on motivational elements for other people (Chemers.2014).

They're more likely than not comprehended the basic needs of representatives, friends and bosses. Leadership is utilized as to how of persuading others. Urging people to ask it engaged with arranging and significant issues goal methodology inspires them as well as shows the complexities of these key dynamic elements (Taylor, 2010). Also, it'll help everybody to ask a far superior comprehension of their part inside the association. The correspondence goes to be unambiguous and may positively pull in affirmation and gratefulness from the leader (Passarelli, 2015).

Creating good and solidarity unquestionably includes a fundamental effect on the prosperity of an organization (Turne, 2001). The metal or soul of a private comprises their ethical texture. A leader's activities and choices influence the confidence of his subordinates (Marquis& Huston, 2009) Henceforth, he ought to recall his decisions and exercises. Solidarity is the spirit of the association. The leader ought to affirm his employees appreciate playing out their obligations as a group and make themselves an area of the association's arrangements (Avolio & Bass, 2001). A pacesetter should step into the shoes of the subordinates and think about things from subordinate's point. He ought to identify with them during troublesome occasions. Relating to their issues makes them more grounded intellectually and inwardly. A significant and testing position achieved instils how of achievement among representatives. The boss must cause their representatives to feel they're playing out a meaningful work that is essential for the association's prosperity and achievement. This motivational perspective drives them to fulfil their objectives. Apart from the research gap, this study attempted to find the level of the impact of employee motivation of kindergarten staff in Rangpur.

IV. Results and Discussions

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.526
Bartlett's Test of Sphericity	Approx. Chi-Square	32.658
	df	15
	Sig.	.005

Source: Author's compilation

Figure 1 indicates that the KMO measure's value is 0.526, which is more than 0.5, and therefore, it can be accepted, and the significant level is also high because it is less than 0.005. it has been clarifying that the items of motivation nearby enormously significant for the staff matter.

Feel good about being in

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	11	22.0	22.0	22.0
	once in a while	4	8.0	8.0	30.0
	Sometimes	19	38.0	38.0	68.0
	fairly often	15	30.0	30.0	98.0
	frequently, if not always	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

Source: Author's compilation

From the table where most of the respondent's aggress that sometimes they feel right about being in the organization that carries 38%, on the other 30% believe that they feel right about being in somewhat respect of their headmaster or head of the organization. Only 2% feel frequently feel good at the boss's supervisor, 22% shown negative not at all, and finally, 8 % believe that it once forms all of the points. Concludingly it has been clear that most of them beveled and concluded to some time they feel instill pride in the organization under the supervisor.

Supervision on attaining target

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	10	20.0	20.0	20.0
	Once in a while	6	12.0	12.0	32.0
	Sometimes	20	40.0	40.0	72.0
	Fairly often	13	26.0	26.0	98.0
	Frequently, if not always	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

Source: Author's compilation

From the table where most of the respondents aggress that sometimes Supervision on attaining target in the organization that carries 40%, 26% believe that they Supervision on attaining target in somewhat in respect of their headmaster or head of the organization. Only 2% feel frequently feel good at the Supervision on attaining target, 2o% shown negative not at all, and finally, 12 % believe that it once forms all of the points. Concludingly, it has been clear that most of them revealed and concluded to sometime they Supervision on attaining target on the organization under the supervisor.

Leadership Capacity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	15	30.0	30.0	30.0
	Once in a while	10	20.0	20.0	50.0
	Sometimes	14	28.0	28.0	78.0
	Fairly often	9	18.0	18.0	96.0
	Frequently, if not always	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

Source: Author's compilation

Above table, where most of the respondent aggress that not at all 3o% agrees to Leadership Capacity of their boss. On the other 20 % believe that they feel good about Leadership Capacity on acne in a hacker space of their headmaster or head of the organization. Only 28% feel sometimes feel good at the boss's supervisor as per the leadership ability, 18 % shown fairly not at all, and finally, 4 % believe that it does not always form all of the points. Concludingly, it has been clear that most of them believe and conclude to not all they about the Leadership Capacity on the organization.

Rewards on attaining target					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	14	28.0	28.0	28.0
	Once in a while	8	16.0	16.0	44.0
	Sometimes	19	38.0	38.0	82.0
	Fairly often	9	18.0	18.0	100.0
	Total	50	100.0	100.0	

Source: Author's compilation

From the table, where most of the respondents aggress upon that they sometimes Rewards on attaining target, the percentage is 38%. Again 9% believe that they Reward on attaining targets in respect of their headmaster of the head of the organization. Only 18% feel Rewards somewhat on attaining the boss's target, 16 % shown once at all, and finally28 % believe it is not all. It has been clear that most of them beveled and concludes to a sometimes level about the Rewards on attaining target as per the leadership.

Value focuses

Value focuses					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	10	20.0	20.0	20.0
	once in a while	4	8.0	8.0	28.0
	Sometimes	24	48.0	48.0	76.0
	fairly often	12	24.0	24.0	100.0
	Total	50	100.0	100.0	

Source: Author's compilation

Above the table, most of the respondents argue that sometimes they Value focus issues in the organization that is 48%. Furthermore, r 24% believe that relatively, in the case of Value focuses on the organization's headmaster. Only 8% feel in ace a while at the bosses' supervisor per the Value focus, 20% shown negative not at all. It has been clear that most of them beveled and concluded that they feel about the supervisor's Value focuses

Motivation focuses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	7	14.0	14.0	14.0
	once in a while	10	20.0	20.0	34.0
	Sometimes	23	46.0	46.0	80.0
	fairly often	5	10.0	10.0	90.0
	frequently, if not always	5	10.0	10.0	100.0
	Total	50	100.0	100.0	

Source: Author's compilation

From the table, where most of the respondent's aggress that sometimes Motivated focuses in the organization that carries 46%. on the other 10% believe that they feel right about being in relatively respect for their headmaster Motivated focuses. Only 10% feel frequently feel good at the boss's supervisor as per the Motivated focuses, 14% shown negative not at all, and finally. Moreover, 20 % believe that it once forms all of the points; it has been clear that most of them beveled and concludes to sometime Motivated focuses on the organization under the supervisor

V. Conclusion

Leadership is one of the first levels of fears of imposing cohorts in the modern business world. Specialists have discovered that administration style affects hierarchical execution and achievement. Individual leadership styles have been proclaimed as being more skilled than others of tending to the difficulties that new chiefs face. A worker, just leader, must have leadership and inspirational qualities. A leader must have a piece of intensive information on persuasive variables for other people. The comprehensively comprehend the fundamental needs of representatives, companions and his bosses. The initiative is utilized as a method for propelling others. The leadership style that is acknowledged by the kindergarten staff will spur, rouse and impact them when choices and issue emerge. Moreover, these styles can make positive, hierarchical duty and advance employment execution. The school director or head through his initiative style can generally increment hierarchical responsibility by giving prizes. The vast majority of the cases the respondent felt at some point conduct that demonstrated that it not always but rather shows the realities generally happening to advance the great degree of initiative in kindergarten of Rangpur from the motivation and leadership role relativity.

References Références Referencias

1. Avolio, B. J., & Bass, B. M. (Eds.). (2001). *Developing potential across a full range of Leadership Tm: Cases on transactional and transformational leadership*. Psychology Press.
2. Beazley, H., Boenisch, J., & Harden, D. (2002). *Continuity management: preserving corporate knowledge and productivity when employees leave*. John Wiley & Sons.
3. Behn, R. (2009). *Leadership counts: Lessons for public managers from the Massachusetts welfare, training, and employment program*. Harvard University Press.
4. Belasen, A. T. (2012). *Developing women leaders in corporate America: Balancing competing demands, transcending traditional boundaries*. ABC-CLIO.
5. Bennett, T., Savage, M., Silva, E. B., Warde, A., Gayo-Cal, M., & Wright, D. (2009). *Culture, class, distinction*. Routledge.
6. Blanchard, K. (2018). *Leading at a higher level: Blanchard on leadership and creating high performing organizations*. FT Press.

7. Burns, J. M. (1977). Wellsprings of political leadership. *The American Political Science Review*, *71*(1), 266-275.
8. Chait, R. P., Ryan, W. P., & Taylor, B. E. (2011). *Governance as leadership: Reframing the work of nonprofit boards*. John Wiley & Sons.
9. Chemers, M. (2014). *An integrative theory of leadership*. Psychology Press.
10. Gauthier–September, A. (2006). Developing collective leadership: Partnering in multi-stakeholder contexts. *Leadership is global: Bridging sectors and communities*, 1-20.
11. Goleman, D. (2003). What makes a leader. *Organizational influence processes*, *82*, 229-241.
12. Guglielmi, D., Simbula, S., Mazzetti, G., Tabanelli, M. C., & Bonfiglioli, R. (2013). When the job is boring: The role of boredom in organizational contexts. *Work*, *45*(3), 311-322.
13. Guillén, M., & González, T. F. (2001). The ethical dimension of managerial leadership two illustrative case studies in TQM. *Journal of Business Ethics*, *34*(3-4), 175-189.
14. Heifetz, R., & Linsky, M. (2017). *Leadership on the line, with a new preface: Staying alive through the dangers of change*. Harvard Business Press.
15. Kanungo, R. N., & Misra, S. (1992). Managerial resourcefulness: A reconceptualization of management skills. *Human Relations*, *45*(12), 1311-1332.
16. Kouzes, J. M., & Posner, B. Z. (2010). *The truth about leadership: The no-fads, heart-of-the-matter facts you need to know*. John Wiley & Sons.
17. Kressler, H. (2003). *Motivate and reward*. Basingstoke: Palgrave Macmillan.
18. Lengnick-Hall, C. A., & Beck, T. E. (2009). *Resilience capacity and strategic agility: Prerequisites for thriving in a dynamic environment* (pp. 39-69). San Antonio, TX: UTSA, College of Business.
19. Malott, C. (2010). *Policy and research in education: A critical pedagogy for educational leadership* (Vol. 4). Peter Lang.
20. Markus, M. L. (2004). Technochange management: using IT to drive organizational change. *Journal of Information technology*, *19*(1), 4-20.
21. Marquis, B. L., & Huston, C. J. (2009). *Leadership roles and management functions in nursing: Theory and application*. Lippincott Williams & Wilkins.
22. McClelland, D. C. (1987). *Human motivation*. CUP Archive.
23. Medun, B. D. (2001). *The factors that may influence a faculty members' decision to adopt electronic technologies in instruction* (Doctoral dissertation, Virginia Tech).
24. Nadeem, S., & Siddiqui, D. A. (2020). How HR Practices influence Managers and Organisational Ambidexterity in Pakistani Firms: The Mediatory role of Self-Efficacy and Motivation in a Multilevel Integrated Framework. *Available at SSRN 3683340*.
25. Ndururu, T. N. (2019). *Impact of Charismatic Leadership Style on Employees' Performance within Cooperative Bank of Kenya Limited* (Doctoral dissertation, United States International University-Africa).
26. Passarelli, A. M. (2015). Vision-based coaching: optimizing resources for leader development. *Frontiers in Psychology*, *6*, 412.
27. Preece, J., & Shneiderman, B. (2009). The reader-to-leader framework: Motivating technology-mediated social participation. *AIS transactions on human-computer interaction*, *1*(1), 13-32.
28. Riggio, R. E., Chaleff, I., & Lipman-Blumen, J. (Eds.). (2008). *the art of followership: How great followers create great leaders and organizations* (Vol. 146). John Wiley & Sons.
29. Taylor, P. J. (2010). *Unruly complexity: Ecology, interpretation, engagement*. University of Chicago Press.
30. Togneri, W., & Anderson, S. E. (2003). Beyond Islands of Excellence: What Districts Can Do To Improve Instruction and Achievement in All Schools. A Project of the Learning First Alliance [and] A Leadership Brief.
31. Turner, B. S., & Rojek, C. (2001). *Society and culture: Scarcity and solidarity*. Sage.
32. Vance, R. J. (2006). Employee engagement and commitment. *SHRM foundation*, 1-53.

Global Journal of Management and Business Research: B
Economics and Commerce
Volume 20 Issue 10 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

The Profitability of Fish Production by Co- Operative Society Members in Rivers State, Nigeria

By George, Sotonye M. D.
Nnamdi Azikiwe University

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.

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

GJMBR-B Classification: JEL Code: M21

Strictly as per the compliance and regulations of:

The Profitability of Fish Production by Co-Operative Society Members in Rivers State, Nigeria

George, Sotonye M. D.

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.

Author: B.Sc. Accountancy, and PGD Business Management (RSU); M.Sc. Cooperative Economics and Management, and PhD, Co-Operative Economics and Management in View (UNIZIK). Department of Cooperative Economics and Management, Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, Enugu State.
e-mail: wasanim2006@yahoo.com

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).

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

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.

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

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

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

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.

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

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.

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

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

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-

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

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.

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

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.

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.

		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

		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

	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

					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

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

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;

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

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

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

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.

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

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.

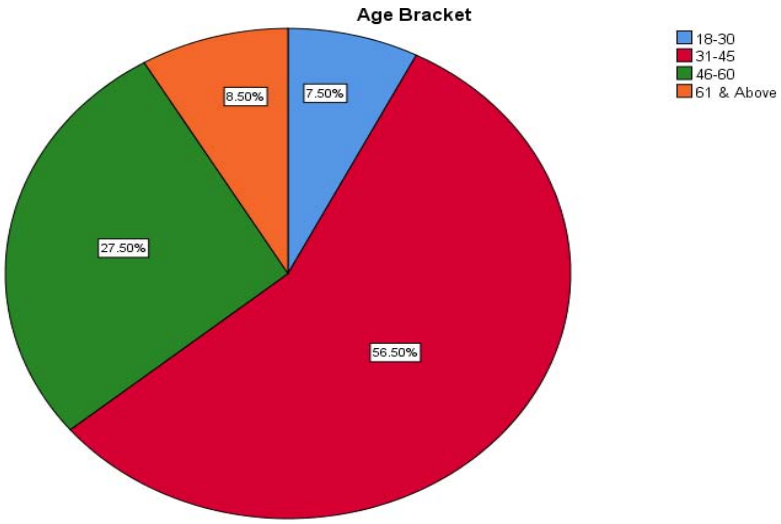
a) Data Presentation and Analysis

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

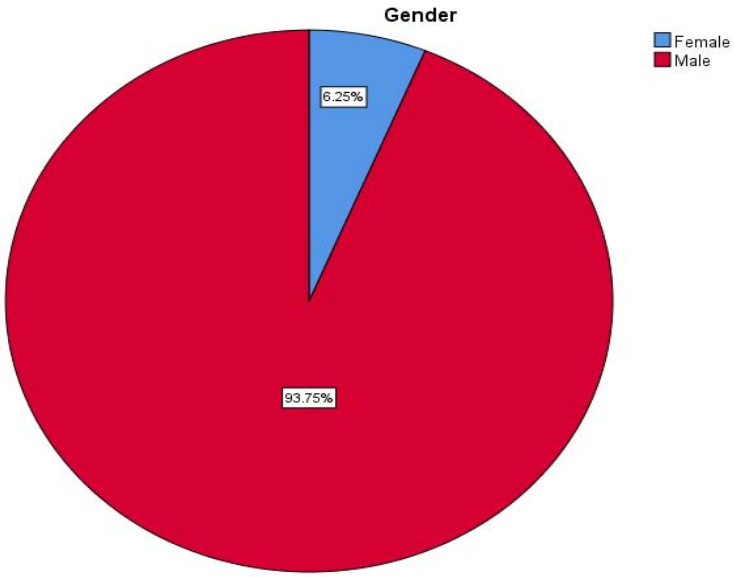
cooperative fish farmers in Rivers State. In this subsection, we present, with the aid of charts, the distribution of respondents by age group, gender, marital status, educational attainment, years in fishing, years in cooperative and income group.



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

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

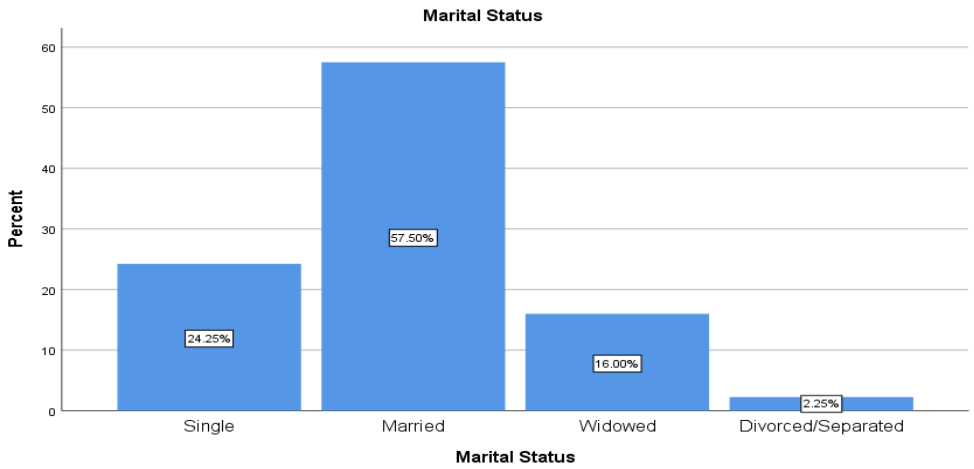
Fig. 4.1 shows the distribution of the respondents by age bracket. Majority of the respondents, that is, 226 (56.5%) of the cooperative fish farmers are between the ages of 31 - 45 years old, while about 110 (27.5%) of them are between 46 - 60 years old. Few cooperative fish famers, that is, 34 (8.5%) 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 (%)

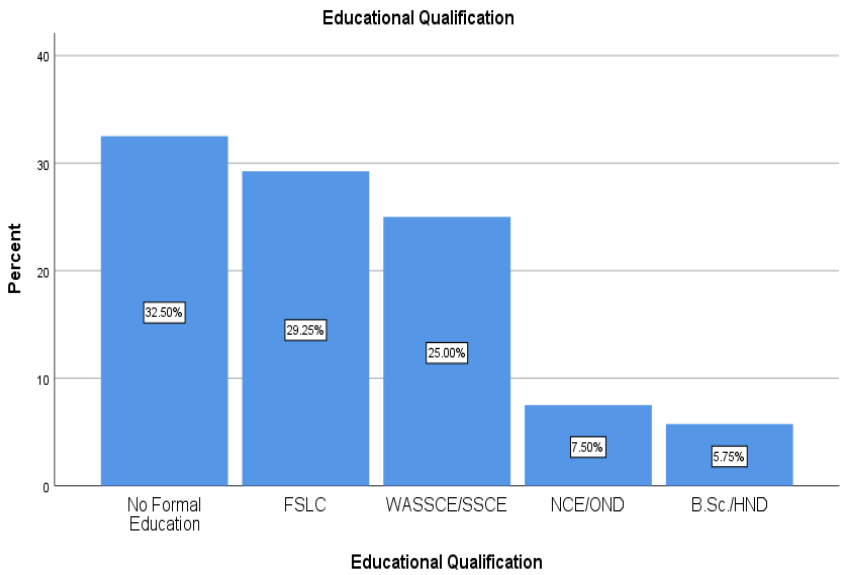
Fig. 4.2 shows the distribution of respondents by gender. Expectedly, majority of cooperative fish farmers, that is, 375 (93.75) are male, while very few of them, 25 (6.25%) are female. Therefore, fish farming in Rivers state is predominantly the male activity sector.



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

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

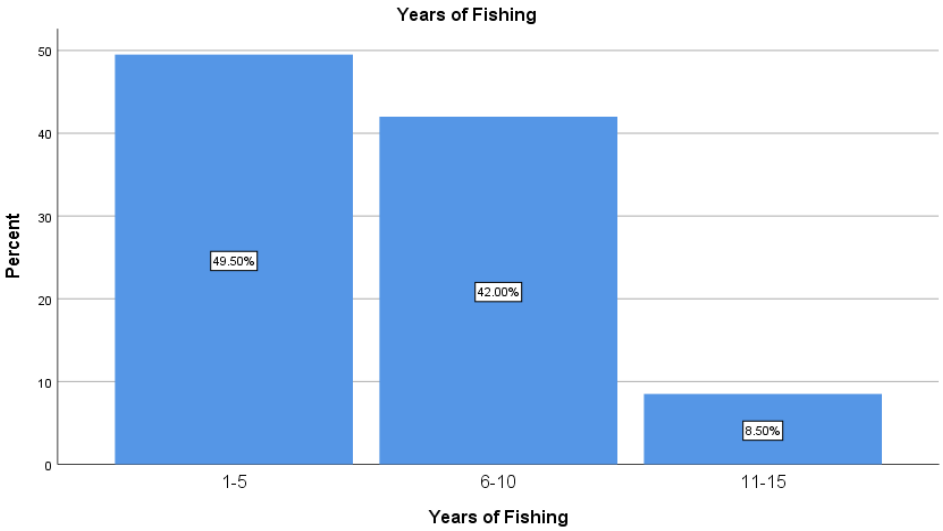
Figure 4.3 provides information on the marital status of the respondents. Among the cooperative fish farmers, 97 (24.25%) are single, 230 (57.5%) are married, 64 (16%) are widowed, while 9 respondents, representing 2.25% are either divorced or separated persons. It was observed that majority of the respondents 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 (%)

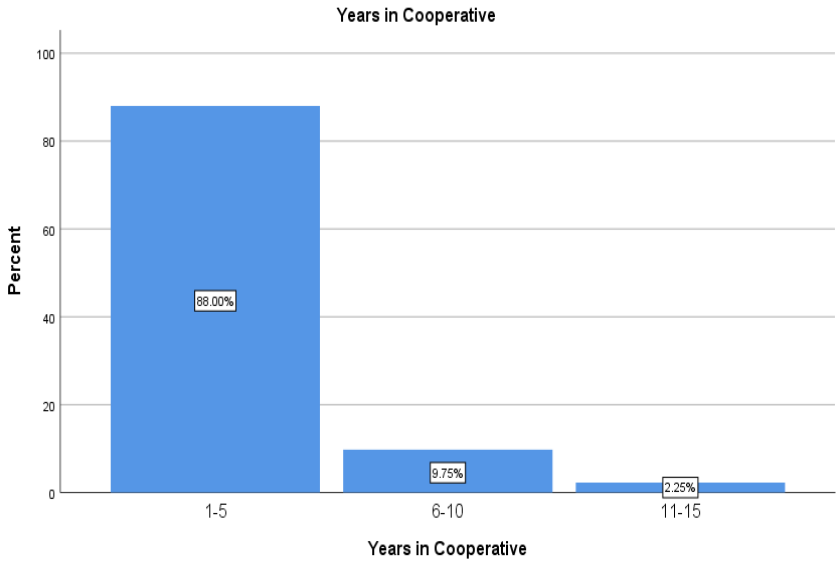
Fig. 4.4 shows the classification of the respondents according to the level of their educational qualifications. The survey revealed that among the cooperative fish farmers, 130 (representing 32.5%) had no formal education, 117 (representing 29.25%) had basic primary education, 100 (25%) had completed 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.



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

Figure 4.5: Distribution of Respondents by Years in Fishing

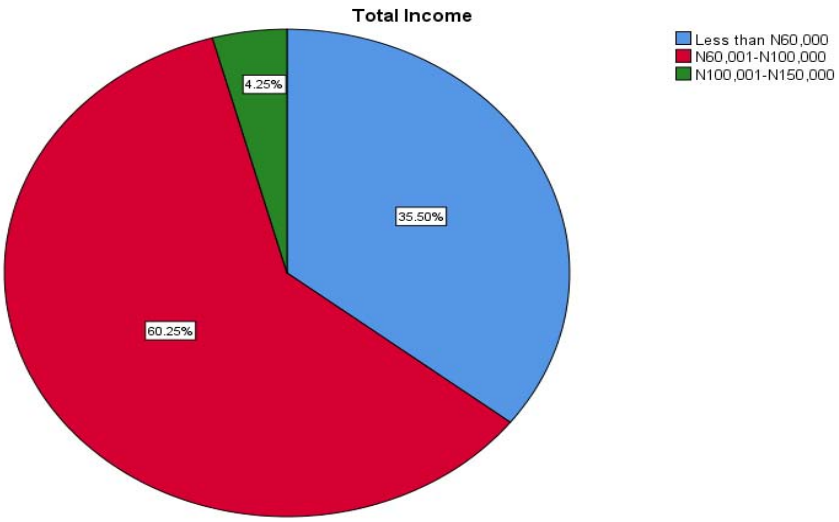
Fig. 4.5 shows the distribution of respondents based on years in fishing business. It was gathered that 198, representing 49.5% of the cooperative fish farmers have spent from 1 – 5 years in the business, while 168 (42%) cooperative fish farmers have been in the business from 6 – 10 years. The figure 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

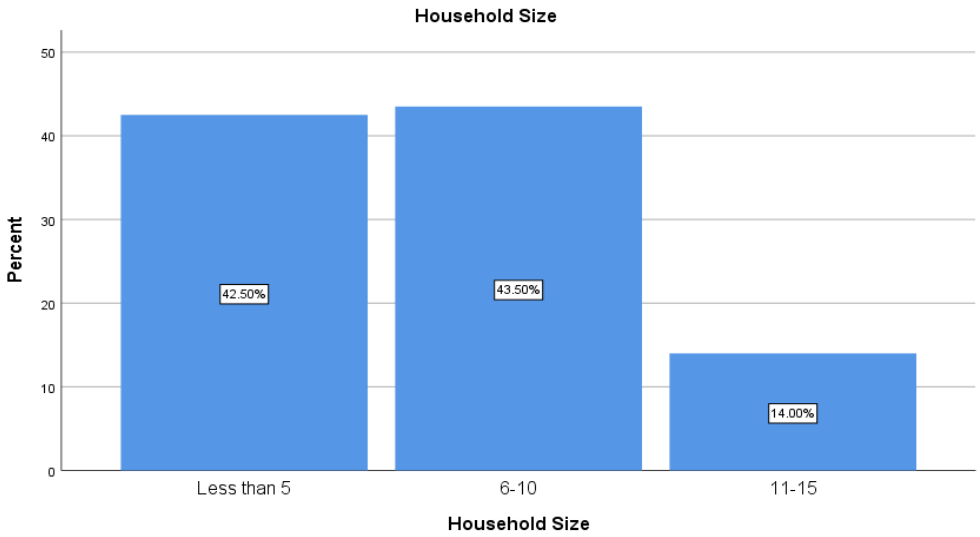
Fig. 4.6 shows the distribution of the respondents by years in cooperative. As shown in the figure, majority of the fish farmers, 352 (88%) have spent 1 – 5 years in cooperative, while 39 fish farmers, representing 9.75% have spent 6 – 10 years in cooperative. It was also found that very few fish farmers,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



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

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

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

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.

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).

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

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.

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

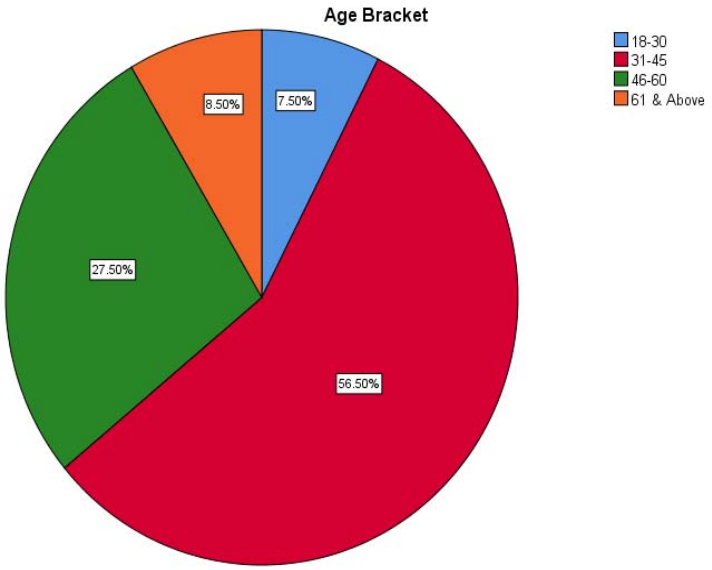
This section is dedicated to the presentation, analysis and discussion of findings based on data collected from the field study, using descriptive and inferential statistical methods. The data were analysed, and presented on the basis of the objectives earlier formulated for the study. This chapter is 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*

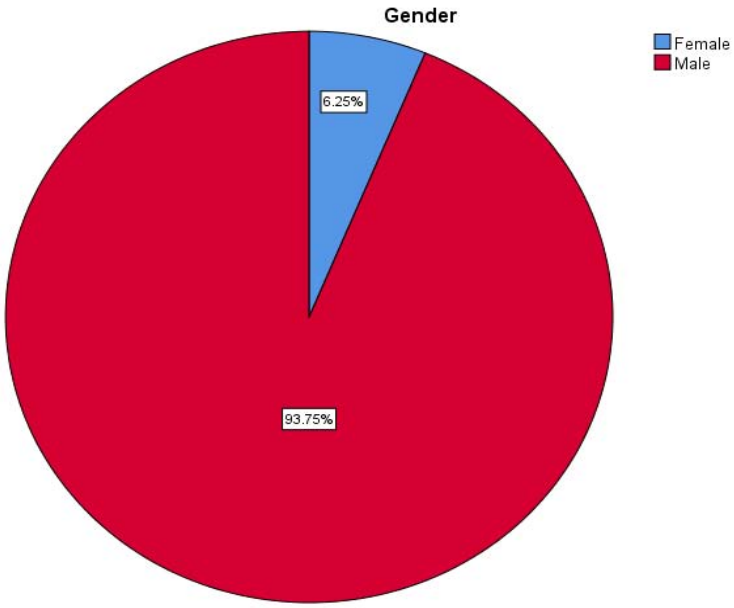
It is part of the objectives of this study to examine the socioeconomic characteristics of cooperative fish farmers in Rivers state. In this subsection, we present, with the aid of charts, the distribution of respondents by age group, gender, marital status, educational attainment, years in fishing,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



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

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

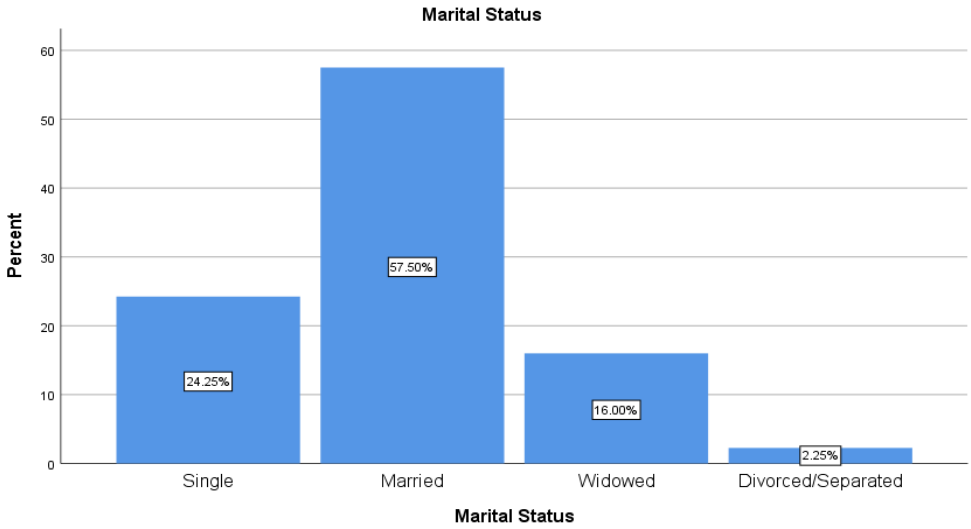
Fig. 4.1 shows the distribution of the respondents by age bracket. Majority of the respondents, that is, 226 (56.5%) of the cooperative fish farmers are between the ages of 31 - 45 years old, while about 110 (27.5%) of them are between 46 - 60 years old. Few cooperative fish famers, that is, 34 (8.5%) 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 (%)

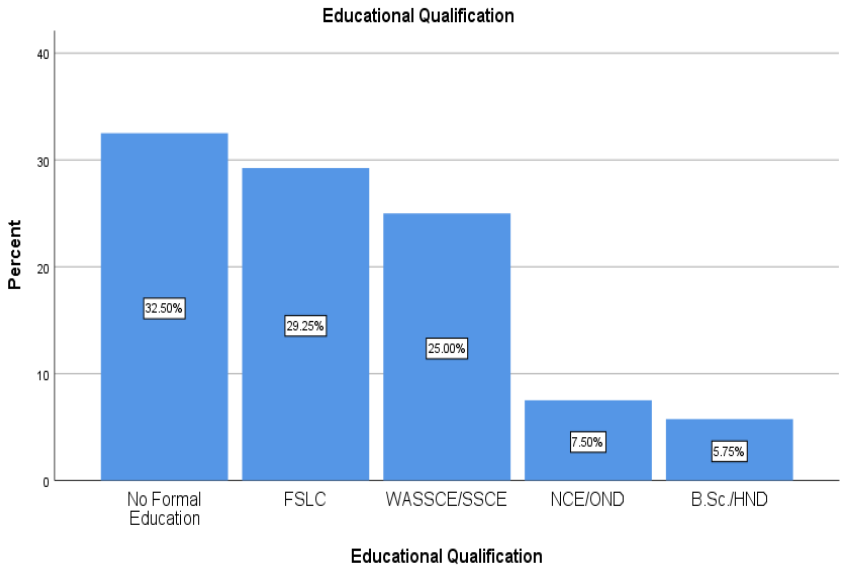
Fig. 4.2 shows the distribution of respondents by gender. Expectedly, majority of cooperative fish farmers, that is, 375 (93.75) are male, while very few of them, 25 (6.25%) are female. Therefore, fish farming in Rivers state is predominantly the male activity sector.



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

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

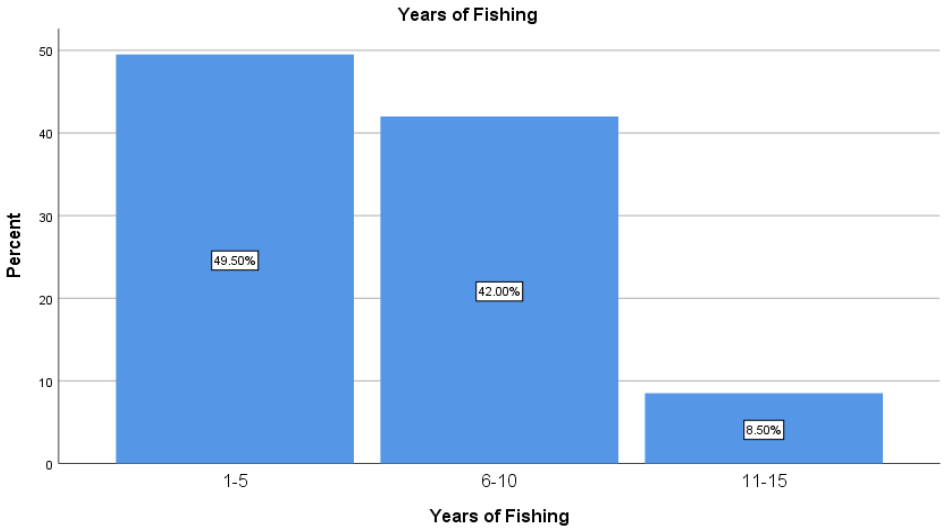
Figure 4.3 provides information on the marital status of the respondents. Among the cooperative fish farmers, 97 (24.25%) are single, 230 (57.5%) are married, 64 (16%) are widowed, while 9 respondents, representing 2.25% are either divorced or separated persons. It was observed that majority of the respondents 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 (%)

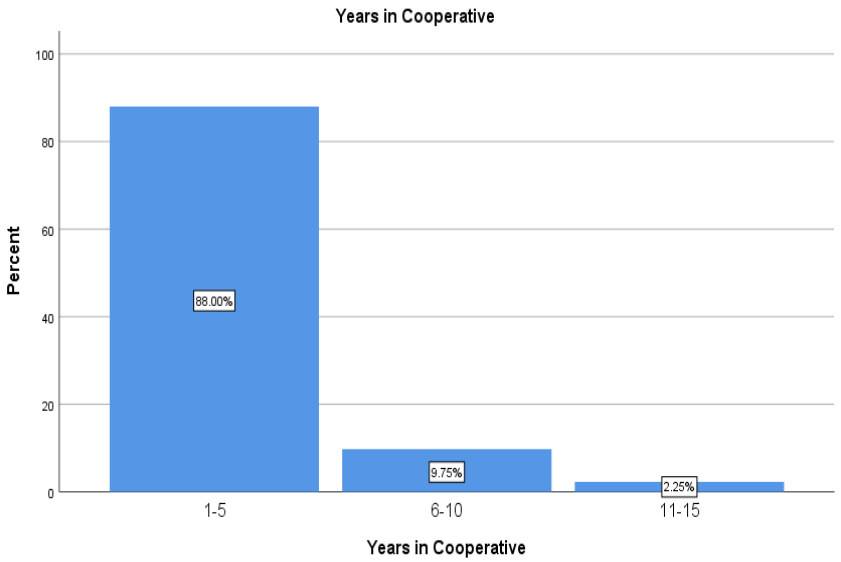
Fig. 4.4 shows the classification of the respondents according to the level of their educational qualifications. The survey revealed that among the cooperative fish farmers, 130 (representing 32.5%) had no formal education, 117 (representing 29.25%) had basic primary education, 100 (25%) had completed 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.



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

Figure 4.5: Distribution of Respondents by Years in Fishing

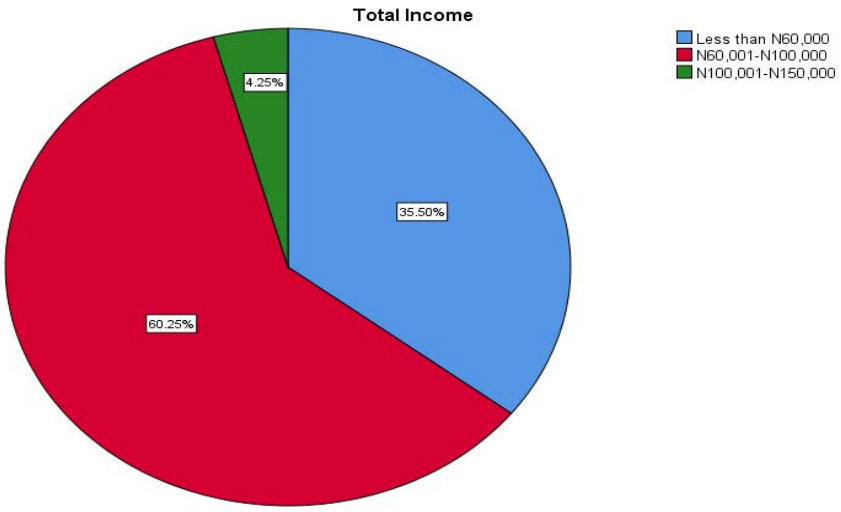
Fig. 4.5 shows the distribution of respondents based on years in fishing business. It was gathered that 198, representing 49.5% of the cooperative fish farmers have spent from 1 – 5 years in the business, while 168 (42%) cooperative fish farmers have been in the business from 6 – 10 years. The figure 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

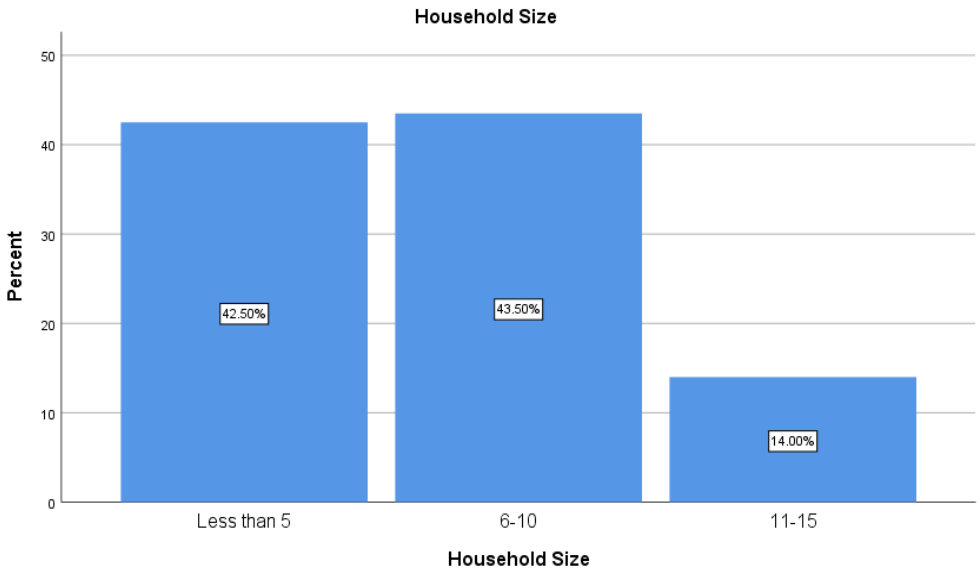
Fig. 4.6 shows the distribution of the respondents by years in cooperative. As shown in the figure, majority of the fish farmers, 352 (88%) have spent 1 – 5 years in cooperative, while 39 fish farmers, representing 9.75% have spent 6 – 10 years in cooperative. It was also found that very few fish farmers,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



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

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						

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

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.

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).

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.

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.

References Références Referencias

1. Adeogun, O. A., Alimi, T. & Adeyemo, R. (2012). Status, cost, and profitability of aquaculture enterprises in Nigeria: Implications for food security. *International Journal of Agricultural Sciences*, 2 (1), 059 – 066.
2. Adewumi M, Ayinde, O., Adenuga A. & Zacchaeus S. (2012). The profitability analysis of artisanal fishing in the Asa river of Kwara state, Nigeria *International Journal of Development and Sustainability*. 1(3), 932-938.
3. Adewuyi, S. A., Phillip, B. B., Ayinde, I. A. &Akerele, D. (2010). Analysis of profitability of fish farming in Ogun State Nigeria. J. Hum. Ecol., 31: 179-184. http://www.krepublishers.com/02-Journals/JHE/JHE-31-0-000-10-Web/JHE-31-3-000-10-AbstPDF/JHE-31-3-179-10-1963-Adewuyi-S-A/JHE-31-3-179-10-1963-Adewuyi-S-A-Tt.pdf.
4. Agu-Aguiyi, F. N., Onyia, C. C., Umebali, E. E. & George, S. M. D. G. (2018).Performance of fishery cooperative societies in Rivers State Nigeria. *International Journal of Community and Cooperative Studies*, 6 (1), 50 – 74.
5. Aheto, D., Asare, N. K., Quaynor, B., Tenkorang, E. Y., Asare, C. & Okyere, I. (2012). Profitability of small-scale fisheries in Elmina, Ghana. *Sustainability*, 4(1), *2785-2794*.
6. Ajao, A. O. (2006): Economic of fish farming in Oyo state, Nigeria. An Unpublished Ph.D. Dissertation, submitted to the Department of Agricultural Economics, *Obafemi Awolowo University*, Ile-Ife, Nigeria.
7. Amire, A (2008). The challenges of piracy in the marine sector of capture fisheries in Nigeria. Lead Paper Delivered at the 2008 *Annual Conference of Fisheries Society of Nigeria*, October 25th, 2008 in Kaduna.
8. Anene, A., Ezeh, C. I. & Oputa, C. O. (2010). Resources use and efficiency of artisanal fishing in

Oguta, Imo State, Nigeria. J. Dev. Agric. Econ., 2:094-099. http://www.academicjournals.org/jdae/PDF/Pdf2010/Mar/Ane ne%20et%20al.pdf.
9. Awoyemi, T. &Ajiboye, A. (2011). Analysis of profitability of fish farming among women in Osun State, Nigeria. *Journal of Economics and Sustainable Development*, 2(4).
10. Busari, A. O. (2018). Economic Analysis of Homestead Fish Farming in Olorunda Local Government Area, Osun State, Nigeria. *Nigerian Journal of Fisheries and Aquaculture*, 6(2), 19 – 26.
11. Central Bank of Nigeria (CBN). (2005). Annual report and statement of accounts. *Central Bank of Nigeria Publication*, Abuja.
12. Costello, C., Ovando, D., Hilborn, R., Gaines, S., Deschenes, O., & Lester, S. (2012). Status and solutions for the world's Unassessed fisheries. *Science*, 3(38), 517–520.
13. Dambatta, M. A., Sogbesan, O. A., Tafida, A. A., Haruna, M. A. & Fagge, A. U. (2016). Profitability and constraints of three major fisheries enterprises in Kano State, Nigeria. *Global Journal of Science Frontier Research: Interdisciplinary, 16(1), 7-12*.
14. Elhendy, A. M. & Alzoom, A. A. (2001). Economics of fish farming in Saudi Arabia: Analysis of Costs of Tilapia production. *Aquaculture and Economics Management 5(3-4)*:229 – 238.
15. El-Naggar, G., Nasr-Alla, A. & Kareem, R. O. (2008). Economic analysis of fish farming in Behera Governorate of Egypt. In: Elghobashy, H., Fitzsimmons, K., Diab, A.S., eds. Proceedings of 8th *International Symposium on Tilapia in Aquaculture*, Cairo, Egypt, 12–14 Oct 2008. Vol. 1. "From the pharaohs to the future".
16. Ezeh C. I, Anene A. & Anya I. P. (2008). Socio-economic and profitability of pond catfish production in Abia State, Nigeria. *J. Food and Fibre Prod*., 9 (1) 127-136.
17. FAO (2013). A technical guide to support the implementation of the voluntary guidelines on the responsible governance of tenure of land, fisheries, and forests in the context of national food security. Preliminary Version: Food and Agriculture Organization of the United Nations, Rome.
18. FAO. (2014). *the state of world fisheries and aquaculture*. Food and Agriculture Organization of the United Nations, Rome.
19. FAO (2005). FAO/World fish center workshop on interdisciplinary approaches to the assessment of small-scale fisheries. 20-22 September 2005. FAO Fisheries Report No.787. Rome: FAO.
20. FAO (2003). *Review of the state of world agriculture*. FAO Fisheries Circular No 886 Revision 2 FAO Rome 95 pp.
21. FAO (1999). *Future challenges in world fisheries and aquaculture*. 23rd Session of the Committee.
22. FAO, (1989). *Fisheries: Country profile of Nigeria*. FIDCP/NIR Rev., 4: 9.
23. Food and Agriculture Organization, (FAO) (2005). *Increasing the contribution of small-scale fisheries to poverty alleviation and food security*. 1st Edn., Food and Agriculture Organization, Rome, ISBN-10: 9251054185, pp: 79.
24. Food and Agriculture Organization, (FAO). (2011). Fishery and aquaculture country profiles Nigeria. *Fisheries and Aquaculture Department.* http://www.fao.org/fishery/countrysector/FI-CP_NG/3/en
25. George, S. M. D. (2020), Profitability of Fish Production Among Members of Cooperative Societies In Rivers State, Nigeria, an unpublished PhD Dissertation submitted to the Department of Cooperative Economics and Management, Faculty of Management Sciences, and the Postgraduate School, Nnamdi Azikiwe University, Awka
26. Gien, L. T. (2000). Land and sea connection: the east coast fishery closure, unemployment, and health. *Canadian Journal of Public Health*, 91, 121–124
27. Gill, D., Mcconney, P. & Mahon, R. (2007). Socio-economic profile of fisheries in the Grenadine Islands. *CERMES Technical Report No 11, 1-61*.
28. Iheke, O. R. & Nwagbara, C. (2014). Profitability and viability of catfish enterprises in the Abia state of Nigeria. Journal of Agriculture and Social Research, 14(1), 31-36.
29. Inoni, O.E., (2007). Allocative efficiency in pond fish production in Delta State, Nigeria: A production function approach. Agric. *Tropica Subtropica,* 40: 127-134. http://www.agriculturaits.czu.cz/pdf_files/vol_40_4_pdf/1Inon ix.pdf
30. Inter Academy Council (IAC), (2004). *Realizing the promise and potential of African agriculture,* p: 82. Royal Netherlands Academy of Arts and Sciences, Amsterdam, the Netherlands.
31. Iruo, F. A., Onyeneke, R. U., Eze, C. C., Uwadoka, C. & Igberi, C. O. (2018). Economics of smallholder fish farming to poverty alleviation in the Niger Delta region of Nigeria. *Turk. J. Fish. &Aquat. Sci.*, 19(4), 313-329.
32. Islam, N. S., Murshed, M., Moniruzzaman, M. & Abdul B. N. (2002). Rice cum fish farming in selected areas of Nymensingh District. *Journal of Biological Sciences* 2(10):715-718.
33. Issa, F. O., Abdulazeez, M. O., Kezi, D. M., Dare, J. S. & Umar, R. (2014). Profitability analysis of small-scale catfish farming in Kaduna State, Nigeria. *Journal of Agricultural Extension and Rural Development*, 6(8), 267-273.
34. Kimathi, A. N., Ibuathu C. N. &Guyo H. S. (2013). Factors affection profitability of fish farming under economic stimulus programme in Tigania East

District, Meru County, Kenya. *IOSR J. Bus. Manag.,* 25-36.
35. Kudi, T. M., Bako, P. F., & Atala, T. K. (2008). Economics of fish production in Kaduna State Nigeria. *ARPN Journal of Agricultural and Biological Science 3(5 & 6)*:17-21
36. Lassen, H. (1998). The future fisheries, Constraints, possibilities, and sustainability: Ecological impact from fisheries, the political environment and how this may affect the future of capture fisheries. *J. Northw. Atl. Fish. Sci.*, 23, 27–39.
37. McClurg, T. (2014). Conceptual framework for the identification and assessment of potential fisheries investments. *Toroa Strategies:* Consultancy report prepared for the *World Bank*.
38. National Population Commission (N.P.C) (2006). *National population census 2006 provisional results*. Abuja: Nigeria. Retrieved from: https://www.population.gov.ng
39. Nieves, P. M., Pelea, N. R., Bradecina, R. G., Pereyra, M. A., Morooka, Y., Shinbo, T. & Rivero, M. C. P. (2009). Socio-economic conditions, the status of fisheries and agriculture and the adaptive capacities of households and communities in San Miguel Island, Albay, the Philippines in the Kuroshio sphere of influence. *Kuroshio Science, 3(1), 23-32*.
40. Okpeke, M. Y. &Akarue, B. O. (2015). Analysis of the profitability of fish farming in the Warri South local government area of Delta State, Nigeria. *IOSR Journal of Agriculture and Veterinary Science*, 8 (12), 45-51.
41. Olagunju. F. I. Adesiyan, I. O. & Ezekiel, A. A. (2007). Economic viability of catfish production in Oyo State, Nigeria. *Journal of Human Ecology* 21(2), 121 – 124.
42. Olaoye, O. J., Ashley-Dejo, S. S., Fakoya, E. O., Ikeweinwe, N. B., Alegbeleye, W. O., Ashaolu, F. O. &Adelaja, O. A. (2013). Assessment of socio-economic analysis of fish farming in Oyo State, Nigeria. *Global Journal of Science Frontier Research Agriculture and Veterinary*, 13 (9).
43. Olomola, A. (1991). Capture fisheries and aquaculture in Nigeria: A comparative economic analysis. *Issues in African Rural Social Science Series*.
44. Omobepade, B. P., Adebayo, O. T., Amos, T. T. & Adedokun4, B. C. (2015). Profitability analysis of aquaculture in Ekiti State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 11(1), 114-119.
45. Pauly, D., Alder, J., Bakun, A., Heileman, S., Kock, K., Mace, P. & Worm, B. (2005). *Chapter 18: Marine fisheries systems*. In Ecosystems and Human Well-being: Current States and Trends, Volume 1. The Millennium Ecosystem Assessment Series. Island Press.
46. Raufu, M. O., Adepoju, A. A., Salau, A. S. & Adebiyi, O. A. (2009). Determinants of yield performance in small scale fish farming in Alimosho local government area of Lagos state. *International Journal of Agricultural Economics & Rural Development*, 2 (1).
47. Rivers State Ministry of Agriculture and the State's Department of Cooperative Societies (2018). Retrieved 5th Aug. 2019 from https://www.rsmoa.gov.ng
48. Samson, Y. A., (1997). *Introduction to agriculture and fisheries management in Nigeria*. Goal Education Publishing, Abeokuta, Nigeria, pp: 10-24.
49. Teh, L. C. L. & Sumaila, U. R. (2013), Contribution of marine fisheries to worldwide employment. *Fish and Fisheries*, 14, 77–88.
50. Tokrisna, R.; Panayotou, T. & Adulavidhaya, K. (1985). *Production technology and economic efficiency of the Thai Coastal fishery*. In Theodore Panayotou (ed). Small-scale Fisheries in Asia: Socio-Economic Analysis and Policy. IDRC. 229e. International Development Research Center, Ottawa, Canada.
51. Tunde, A. B., Kuton M. P., Oladipo, A. A. & Olasunkanmi, L. H. (2015). Economic analyze of costs and return of fish farming in Saki East local government area of Oyo State, Nigeria. *Journal of Aquaculture Research & Development*, 6 (2).
52. World Bank. (2012). *Hidden harvest: The global contribution of capture fisheries*. Washington, DC. World Bank. Washington DC.
53. Yesuf, S. A., Ashiru, A. N., &Adewuyi, S. A. (2002). Economics of fish farming in Ibadan Metropolis. *Tropical Journal of Animal Science.* 5(2), 81-88.
54. Yisa, E. S., Adebayo, C. O., Mohammed, U. S. & Anaweta, P. U. (2015). Profitability analysis of catfish farming in Suleja local government area of Niger State, Nigeria. *Journal of Agriculture and Food Sciences*, 13 (1).

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

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

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

126	4	1	4	2	3	2	3	3
127	3	1	2	1	3	2	2	3
128	4	0	1	2	1	1	4	3
129	2	0	3	2	1	5	4	3
130	1	0	2	1	2	4	2	1
131	3	1	4	2	3	4	3	2
132	4	1	2	1	1	4	3	2
133	2	1	3	1	2	2	4	1
134	1	0	4	2	1	1	3	2
135	1	1	1	2	3	3	3	3
136	4	0	2	1	2	5	3	1
137	1	0	4	2	1	2	3	1
138	1	0	3	2	3	4	2	3
139	4	1	3	2	2	1	1	2
140	4	1	1	2	2	5	1	1
141	3	0	3	1	1	4	3	2
142	3	0	3	2	3	5	4	1
143	4	1	1	1	2	4	3	2
144	2	1	3	1	2	4	4	2
145	3	0	3	1	1	3	4	2
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
158	2	1	1	2	3	3	4	3
159	1	0	4	2	2	5	4	2
160	2	0	4	2	3	3	2	3
161	3	1	3	2	2	5	1	1
162	4	1	4	1	2	2	1	1
163	2	1	2	2	3	1	4	3
164	3	1	3	1	3	2	2	3
165	4	1	3	1	3	1	2	3
166	4	1	3	1	2	2	2	3
167	2	1	4	2	3	4	1	1
168	4	1	1	2	1	2	2	1

169	2	1	2	1	3	3	2	1
170	3	1	4	1	3	5	1	2
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
178	2	0	1	2	3	3	3	2
179	3	1	2	1	3	3	2	1
180	3	1	3	2	1	4	1	3
181	3	1	1	2	1	2	3	1
182	4	0	3	2	2	3	3	3
183	2	1	3	2	2	5	4	2
184	1	0	1	2	1	1	4	3
185	1	1	2	1	3	4	2	1
186	2	0	2	2	2	1	4	2
187	2	1	4	1	3	5	3	1
188	3	1	1	2	2	3	1	1
189	3	0	2	1	1	1	1	3
190	3	1	1	1	1	1	4	3
191	3	1	2	1	3	3	3	1
192	1	0	1	1	1	3	2	1
193	1	1	2	1	3	4	1	2
194	1	1	1	2	3	5	2	2
195	4	1	3	2	1	4	1	3
196	3	1	2	2	2	2	4	3
197	3	1	4	1	1	1	1	3
198	1	0	3	2	2	4	4	2
199	1	0	4	1	1	2	4	3
200	4	0	1	1	1	5	3	2
201	2	1	2	1	2	4	2	1
202	1	0	1	2	2	1	1	3
203	3	0	1	1	3	4	1	2
204	3	1	3	1	1	5	1	2
205	1	0	2	1	3	5	3	2
206	3	0	2	1	3	2	4	2
207	2	0	1	2	3	1	4	3
208	2	0	4	1	3	5	4	3
209	4	1	2	2	1	5	3	3
210	4	1	2	1	3	1	1	2
211	4	0	1	2	2	4	4	3

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
218	2	0	3	2	2	1	1	1
219	3	1	3	1	2	1	3	1
220	1	0	2	1	1	4	2	2
221	3	0	1	1	2	1	2	1
222	3	0	3	1	1	2	2	2
223	2	1	4	2	3	4	3	2
224	4	1	4	1	2	3	2	2
225	1	0	2	3	3	3	4	2
226	2	1	2	3	3	4	2	2
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
249	3	1	4	3	1	2	2	2
250	4	0	2	1	4	3	4	1
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

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

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
305	4	0	4	2	2	5	3	3
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
314	1	0	4	2	4	5	1	1
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
320	4	1	2	3	3	1	4	2
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
328	3	0	1	1	5	2	1	2
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

341	3	1	2	2	2	4	2	3
342	3	1	4	2	3	3	4	3
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
347	1	0	1	1	4	3	3	1
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
358	2	0	1	1	4	1	3	3
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
362	1	0	1	2	1	1	3	1
363	2	1	4	3	4	4	2	3
364	2	1	3	1	5	1	2	3
365	3	0	3	3	1	2	2	2
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
378	2	0	4	1	1	1	1	2
379	2	0	1	2	3	2	2	3
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

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

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

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

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
139	135000	1290000	678000	83000	595000	695000
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

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
158	662000	1723000	392000	131000	261000	1462000
159	503000	563000	37000	20000	17000	546000
160	661000	1071000	397000	47000	350000	721000
161	297000	1897000	530000	110000	420000	1477000
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

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

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
263	942000	1172000	319000	76000	243000	929000
264	730000	555000	510000	75000	435000	120000
265	669000	801000	521000	86000	435000	366000
266	434000	897000	639000	102000	537000	360000
267	338000	1287000	675000	87000	588000	699000
268	337000	473000	61200	52000	9200	463800
269	148000	1536000	43700	43000	700	1535300
270	977000	858000	448000	47000	401000	457000
271	867000	543000	398000	100000	298000	245000
272	272000	1261000	396000	108000	288000	973000
273	425000	1739000	419000	129000	290000	1449000
274	233000	1636000	68800	51000	17800	1618200
275	304000	1070000	665000	110000	555000	515000
276	604000	1678000	486000	96000	390000	1288000
277	790000	1276000	315000	54000	261000	1015000
278	265000	1895000	389000	115000	274000	1621000
279	977000	517000	390000	125000	265000	252000
280	261000	461000	574000	125000	449000	12000
281	398000	1428000	483000	54000	429000	999000
282	504000	699000	590000	115000	475000	224000
283	428000	1088000	631000	131000	500000	588000
284	608000	1428000	449000	77000	372000	1056000
285	177000	1155000	389000	53000	336000	819000

286	226000	810000	627000	78000	549000	261000
287	593000	1498000	642000	119000	523000	975000
288	782000	1888000	66800	31000	35800	1852200
289	785000	1048000	490000	134000	356000	692000
290	527000	882000	647000	124000	523000	359000
291	189000	1538000	545000	150000	395000	1143000
292	730000	689000	674000	101000	573000	116000
293	597000	1738000	516000	145000	371000	1367000
294	125000	449000	407000	66000	341000	108000
295	205000	1754000	688000	139000	549000	1205000
296	931000	1548000	571000	118000	453000	1095000
297	200000	1434000	67500	54000	13500	1420500
298	983000	1276000	57600	12000	45600	1230400
299	769000	1963000	52400	22000	30400	1932600
300	991000	1626000	591000	145000	446000	1180000
301	148000	1804000	659000	101000	558000	1246000
302	486000	540000	559000	75000	484000	56000
303	664000	559000	65300	33000	32300	526700
304	162000	1070000	670000	87000	583000	487000
305	723000	836000	672000	74000	598000	238000
306	110000	652000	65300	26000	39300	612700
307	822000	1396000	678000	85000	593000	803000
308	363000	776000	438000	46000	392000	384000
309	158000	1981000	619000	133000	486000	1495000
310	739000	808000	48500	30000	18500	789500
311	852000	849000	562000	92000	470000	379000
312	984000	603000	67700	37000	30700	572300
313	661000	1076000	316000	45000	271000	805000
314	134000	655000	678000	107000	571000	84000
315	178000	1856000	606000	135000	471000	1385000
316	866000	1179000	337000	120000	217000	962000
317	220000	1103000	472000	132000	340000	763000
318	637000	1811000	367000	72000	295000	1516000
319	993000	442000	54100	20000	34100	407900
320	923000	1204000	565000	70000	495000	709000
321	275000	1406000	540000	86000	454000	952000
322	599000	1520000	447000	49000	398000	1122000
323	142000	841000	54400	10000	44400	796600
324	309000	815000	601000	69000	532000	283000
325	150000	1160000	419000	103000	316000	844000
326	129000	1039000	442000	109000	333000	706000
327	738000	1255000	50600	26000	24600	1230400
328	288000	807000	659000	96000	563000	244000
329	714000	1738000	62700	16000	46700	1691300

330	416000	712000	567000	99000	468000	244000
331	838000	1900000	500000	55000	445000	1455000
332	930000	1423000	34700	22000	12700	1410300
333	657000	1986000	534000	137000	397000	1589000
334	472000	1702000	646000	129000	517000	1185000
335	485000	1143000	390000	83000	307000	836000
336	131000	1049000	503000	62000	441000	608000
337	851000	1016000	377000	58000	319000	697000
338	464000	1643000	55200	37000	18200	1624800
339	360000	848000	510000	118000	392000	456000
340	761000	1617000	66700	57000	9700	1607300
341	745000	948000	506000	57000	449000	499000
342	429000	739000	656000	135000	521000	218000
343	377000	1929000	606000	70000	536000	1393000
344	280000	685000	52500	22000	30500	654500
345	673000	919000	68700	61000	7700	911300
346	770000	1296000	325000	34000	291000	1005000
347	946000	638000	38000	30000	8000	630000
348	105000	819000	554000	135000	419000	400000
349	905000	778000	38600	15000	23600	754400
350	545000	664000	442000	49000	393000	271000
351	667000	1442000	573000	104000	469000	973000
352	850000	1768000	65300	59000	6300	1761700
353	547000	1799000	61000	10000	51000	1748000
354	332000	997000	471000	61000	410000	587000
355	164000	407000	50900	34000	16900	390100
356	277000	464000	308000	48000	260000	204000
357	531000	708000	528000	83000	445000	263000
358	327000	817000	49500	18000	31500	785500
359	946000	1753000	302000	48000	254000	1499000
360	116000	1034000	352000	79000	273000	761000
361	764000	944000	535000	94000	441000	503000
362	681000	1667000	60500	46000	14500	1652500
363	386000	1195000	528000	143000	385000	810000
364	188000	803000	573000	120000	453000	350000
365	704000	893000	338000	133000	205000	688000
366	636000	670000	632000	146000	486000	184000
367	456000	1039000	667000	76000	591000	448000
368	853000	1005000	330000	59000	271000	734000
369	907000	488000	488000	144000	344000	144000
370	950000	521000	486000	67000	419000	102000
371	279000	949000	391000	46000	345000	604000
372	470000	1672000	512000	60000	452000	1220000
373	626000	604000	546000	62000	484000	120000

374	812000	597000	303000	59000	244000	353000
375	473000	609000	510000	140000	370000	239000
376	495000	757000	60400	14000	46400	710600
377	584000	1155000	43800	19000	24800	1130200
378	359000	1752000	570900	65000	505900	1246100
379	104000	953000	38800	37000	1800	951200
380	407000	1100000	63500	36000	27500	1072500
381	472000	1669000	380500	129000	251500	1417500
382	837000	1345000	320100	83000	237100	1107900
383	386000	516000	64300	45000	19300	496700
384	603000	1655000	45400	14000	31400	1623600
385	837000	1606000	426000	135000	291000	1315000
386	227000	986000	480500	70000	410500	575500
387	627000	1410000	420800	78000	342800	1067200
388	347000	1500000	314000	46000	268000	1232000
389	636000	1785000	350700	38000	312700	1472300
390	837000	1773000	310700	41000	269700	1503300
391	232000	840000	64700	62000	2700	837300
392	185000	1157000	340600	67000	273600	883400
393	804000	1350000	580600	85000	495600	854400
394	429000	1343000	54800	20000	34800	1308200
395	493000	1289000	370400	104000	266400	1022600
396	120000	712000	302000	89000	213000	499000
397	582000	1425000	660600	129000	531600	893400
398	105000	1528000	580300	62000	518300	1009700
399	915000	1278000	360000	106000	254000	1024000
400	257000	1721000	350800	130000	220800	1500200

Appendix Three

Results of Answers to Interiew Questionnaires

S/n.	FI	SC	SP	SF	PC	PS	OP
1	5	5	4	3	5	2	5
2	4	5	3	2	5	4	5
3	5	5	2	1	5	3	5
4	4	5	3	3	5	4	5
5	4	5	5	2	5	4	5
6	1	5	3	2	5	5	5
7	1	5	3	2	5	5	5
8	3	5	5	5	5	2	5
9	4	5	2	2	5	3	5
10	4	5	2	4	5	4	5
11	5	5	2	5	2	5	3
12	1	4	4	1	3	3	5

13	2	5	3	4	5	3	3
14	1	5	5	5	3	4	5
15	3	4	2	3	5	2	5
16	4	5	3	5	3	2	4
17	1	3	2	1	5	4	5
18	5	3	3	1	3	2	3
19	4	4	4	5	3	4	4
20	2	5	3	4	4	2	3
21	4	5	3	5	3	3	5
22	3	4	2	5	3	5	5
23	3	5	4	5	5	3	3
24	1	3	5	3	5	3	4
25	2	3	4	4	4	3	5
26	4	3	3	1	3	3	4
27	3	5	3	3	4	4	3
28	1	4	2	5	3	4	4
29	1	3	2	1	4	2	3
30	1	5	3	1	3	3	4
31	3	4	3	2	3	2	4
32	5	4	5	5	4	4	3
33	5	5	5	3	5	2	4
34	5	4	5	4	3	4	5
35	3	4	5	1	2	2	3
36	3	4	5	5	3	3	5
37	5	3	2	4	5	5	5
38	4	4	4	2	3	4	4
39	1	3	3	2	4	4	4
40	5	5	4	3	2	5	4
41	2	5	4	5	3	5	4
42	4	4	2	5	4	3	5
43	1	3	2	1	4	4	5
44	2	4	3	5	3	5	5
45	5	3	3	2	2	5	5
46	2	5	5	2	5	5	4
47	3	4	5	2	5	3	5
48	5	4	4	4	2	4	3
49	4	5	4	5	2	3	4
50	2	3	3	3	4	5	5
51	4	5	5	2	2	2	4
52	4	4	2	1	5	4	3
53	1	4	3	4	3	3	5
54	5	3	4	3	2	4	3
55	3	5	3	2	4	4	4
56	4	3	4	2	3	2	4

57	1	4	3	5	3	3	4
58	5	5	5	2	2	5	5
59	2	5	4	2	2	4	5
60	5	3	3	1	3	5	5
61	2	5	4	2	2	5	4
62	2	5	5	5	5	4	4
63	3	3	3	3	3	2	4
64	1	3	5	1	4	5	3
65	3	4	2	5	4	2	3
66	1	5	4	5	2	4	4
67	2	5	2	4	2	3	3
68	1	5	2	5	4	5	3
69	2	5	2	1	5	5	5
70	5	5	2	2	2	2	5
71	5	3	3	4	3	3	3
72	5	4	2	5	3	2	5
73	2	4	4	4	2	5	3
74	5	4	5	4	4	2	5
75	1	4	5	3	3	2	5
76	4	5	5	1	5	3	4
77	2	3	3	4	5	3	5
78	5	4	4	4	5	3	5
79	4	4	3	4	5	2	3
80	2	5	3	5	5	3	5
81	5	3	2	2	3	4	3
82	3	3	5	5	2	5	3
83	5	4	5	2	5	4	3
84	1	5	5	4	5	5	4
85	3	3	4	3	5	4	4
86	1	3	5	1	4	3	3
87	3	4	2	3	4	4	4
88	4	5	3	5	5	2	4
89	1	4	4	1	5	4	3
90	5	3	3	1	4	5	3
91	1	4	3	2	3	3	3
92	2	5	2	2	5	5	4
93	4	5	2	4	5	5	4
94	1	3	4	1	5	2	5
95	2	3	4	4	2	4	4
96	1	3	3	4	4	3	5
97	1	3	3	3	3	2	5
98	2	5	3	2	2	3	3
99	4	4	5	3	5	5	3
100	2	5	3	4	3	3	5

101	2	4	4	5	2	3	3
102	1	5	2	5	5	4	3
103	2	5	4	1	5	2	4
104	2	4	2	5	2	2	4
105	3	3	3	3	4	4	4
106	2	3	3	4	5	5	4
107	4	3	5	3	2	4	3
108	2	5	3	5	3	4	4
109	2	4	4	5	2	4	3
110	4	5	4	5	3	2	3
111	4	4	5	3	4	3	3
112	3	5	3	3	4	4	3
113	4	4	3	1	5	5	3
114	1	5	5	4	3	5	5
115	5	3	3	4	2	2	3
116	5	3	5	3	4	4	5
117	2	5	2	5	4	5	5
118	3	5	5	3	3	3	4
119	3	5	4	2	3	5	3
120	3	5	3	3	2	3	5
121	5	3	4	3	4	3	4
122	5	3	4	1	4	3	4
123	5	5	2	3	4	2	3
124	1	3	2	3	4	2	5
125	5	5	3	2	3	5	5
126	4	4	3	4	5	3	5
127	3	5	5	2	4	5	4
128	5	5	3	5	2	4	4
129	3	3	5	4	4	5	4
130	1	4	4	1	4	3	3
131	2	3	3	3	4	2	5
132	2	3	4	5	5	3	5
133	1	3	2	2	3	4	4
134	4	5	3	3	2	3	4
135	4	3	4	4	4	3	4
136	1	5	5	5	3	5	4
137	2	4	2	4	4	2	5
138	1	3	5	5	3	2	4
139	4	4	5	1	4	3	5
140	3	5	2	4	2	3	5
141	2	5	3	1	5	3	5
142	3	3	2	1	2	3	4
143	2	5	4	2	5	5	5
144	5	3	5	5	2	3	3

145	1	4	2	1	4	5	5
146	1	5	3	1	3	3	3
147	4	5	3	5	2	4	4
148	4	5	3	3	2	3	3
149	3	4	4	3	4	4	5
150	2	4	5	1	4	5	3
151	2	5	3	4	5	3	5
152	4	4	3	4	3	4	4
153	1	4	3	2	3	2	4
154	1	5	5	4	4	5	3
155	1	5	5	1	4	2	4
156	3	5	5	5	5	5	3
157	4	4	3	4	3	5	3
158	5	5	4	1	2	3	3
159	3	5	2	2	5	3	4
160	1	5	3	1	3	5	3
161	2	3	3	3	5	2	3
162	1	5	4	3	4	4	4
163	2	5	5	3	5	5	3
164	5	3	2	2	4	2	3
165	3	5	5	5	4	4	5
166	1	3	3	2	5	3	4
167	2	5	2	5	5	5	3
168	5	3	4	2	3	3	3
169	3	5	4	3	4	4	4
170	4	5	5	5	5	3	5
171	4	3	2	3	4	4	4
172	3	3	4	2	2	3	5
173	5	4	2	2	5	5	4
174	5	4	3	5	3	3	4
175	2	5	2	4	3	3	4
176	4	3	3	5	4	2	5
177	5	5	2	4	3	5	5
178	2	5	2	3	5	5	3
179	5	5	4	1	4	2	4
180	3	4	4	1	4	3	3
181	5	5	3	5	2	2	5
182	5	3	4	3	3	5	3
183	5	4	4	3	5	2	3
184	1	5	2	1	3	3	4
185	5	4	3	3	3	4	5
186	1	5	2	4	5	4	5
187	3	3	5	2	4	3	3
188	2	5	5	1	3	2	5

189	2	3	5	4	3	3	3
190	3	4	5	1	5	3	3
191	5	5	4	1	2	4	5
192	3	3	3	3	4	2	4
193	1	4	4	3	3	5	3
194	4	3	2	4	3	4	5
195	2	3	2	4	4	5	5
196	2	3	5	3	2	2	3
197	4	3	4	5	5	4	3
198	2	3	3	3	4	3	4
199	3	5	2	4	2	3	4
200	3	4	3	2	3	5	5
201	1	4	3	5	2	5	5
202	1	4	3	1	2	2	4
203	5	3	3	3	4	3	3
204	4	4	5	5	3	4	3
205	3	3	2	4	3	3	5
206	2	5	3	1	3	3	4
207	1	5	5	4	3	3	3
208	1	5	3	1	4	5	3
209	3	5	3	1	4	3	5
210	3	4	4	3	2	5	3
211	2	3	5	1	4	3	5
212	5	5	5	3	4	2	4
213	5	3	3	1	2	4	5
214	5	3	5	2	2	4	5
215	3	3	5	1	4	2	5
216	1	4	5	1	3	5	3
217	3	4	3	3	3	3	5
218	2	4	3	1	5	4	4
219	3	4	4	2	5	2	5
220	4	5	4	2	5	3	5
221	4	4	2	1	4	4	4
222	1	5	5	5	5	3	4
223	4	5	5	5	3	3	5
224	2	4	5	3	4	4	3
225	5	4	2	4	5	3	4
226	1	3	5	4	5	3	4
227	2	5	2	5	4	5	5
228	4	5	5	2	4	5	3
229	3	4	3	2	2	5	3
230	4	3	3	1	4	2	3
231	2	3	3	3	3	5	3
232	2	3	4	4	5	4	4

233	2	4	5	4	3	5	5
234	1	5	3	2	2	4	3
235	3	4	4	2	3	2	5
236	3	4	5	1	3	5	5
237	4	4	4	2	2	5	3
238	2	4	2	3	3	4	3
239	4	5	4	3	2	3	3
240	4	3	3	4	4	2	4
241	2	5	4	4	2	2	3
242	1	4	4	3	3	3	5
243	2	5	5	5	5	5	3
244	2	4	2	2	2	5	3
245	3	3	3	1	3	2	5
246	3	3	2	2	2	4	3
247	1	4	4	4	4	3	5
248	2	5	2	3	2	5	4
249	3	3	2	2	4	4	4
250	1	4	2	5	3	2	3
251	5	5	3	2	3	5	5
252	5	4	3	4	4	5	5
253	4	4	2	3	5	4	5
254	2	4	4	3	5	2	5
255	5	4	5	5	5	5	3
256	3	3	5	2	4	2	5
257	5	4	3	4	2	3	4
258	1	4	5	1	5	3	3
259	1	4	5	2	5	2	3
260	2	4	2	4	3	4	3
261	5	4	3	5	4	4	3
262	3	5	4	3	4	5	4
263	4	5	5	3	5	2	3
264	3	3	2	2	4	3	5
265	5	3	5	5	5	2	4
266	1	5	2	3	5	4	4
267	5	3	3	3	4	5	4
268	3	5	2	5	5	3	5
269	1	3	3	1	5	3	5
270	2	5	2	4	4	2	5
271	2	3	4	1	3	2	4
272	4	4	4	5	4	3	3
273	5	3	2	4	3	4	3
274	5	3	3	4	5	2	3
275	4	3	3	1	5	3	4
276	4	4	4	1	4	2	5

277	3	3	2	1	2	4	4
278	2	5	3	5	5	2	5
279	2	3	2	4	3	4	5
280	3	5	4	3	5	3	3
281	4	3	4	4	2	4	3
282	4	3	3	4	5	2	5
283	3	3	2	2	4	3	4
284	4	3	3	1	3	5	3
285	3	5	3	4	3	2	3
286	1	3	2	2	3	3	4
287	5	5	4	2	4	5	3
288	3	5	2	5	2	5	5
289	2	3	2	1	4	2	3
290	5	5	3	3	5	5	3
291	5	5	2	2	2	3	4
292	5	5	2	5	2	2	4
293	5	4	2	5	3	2	4
294	5	4	2	2	2	3	5
295	3	5	3	3	2	3	4
296	2	3	2	3	2	5	3
297	1	4	5	4	5	2	3
298	3	4	5	3	3	5	3
299	4	3	3	2	5	5	4
300	2	4	5	3	4	5	4
301	3	4	2	1	3	2	5
302	1	4	2	4	2	5	4
303	2	3	4	1	2	5	3
304	2	5	2	1	5	5	3
305	1	5	2	4	2	4	3
306	3	4	4	5	2	2	3
307	1	4	2	4	5	2	3
308	5	5	3	4	5	5	4
309	1	4	4	5	2	3	3
310	5	3	5	3	4	2	4
311	3	5	4	5	5	5	4
312	5	4	5	5	4	5	5
313	2	4	3	2	2	2	4
314	2	5	3	4	2	2	3
315	1	5	3	1	4	5	5
316	5	3	5	1	5	5	3
317	2	3	4	1	3	3	3
318	4	3	2	4	2	3	5
319	3	3	2	5	2	5	5
320	3	4	2	3	4	4	5

321	5	3	2	4	5	4	5
322	3	4	2	2	4	4	3
323	4	3	3	2	5	2	5
324	4	3	4	5	5	5	3
325	4	4	4	2	4	5	5
326	1	5	5	4	3	3	3
327	1	3	5	3	4	2	3
328	1	5	2	3	4	4	4
329	1	3	3	3	3	5	4
330	2	3	3	5	2	3	4
331	4	5	2	1	5	2	4
332	1	3	5	3	4	3	5
333	2	3	3	3	3	4	3
334	5	4	4	1	4	4	3
335	4	5	4	5	3	4	3
336	3	5	2	4	3	2	5
337	4	5	2	2	3	5	3
338	5	5	2	1	5	4	4
339	5	3	5	1	5	2	5
340	1	4	2	5	2	2	4
341	4	4	4	2	3	4	4
342	2	3	5	2	5	5	4
343	1	3	3	1	5	5	5
344	4	5	4	4	2	4	5
345	4	5	5	2	3	3	5
346	3	3	4	2	5	5	4
347	1	3	5	5	3	5	5
348	5	4	4	5	4	3	4
349	4	5	3	4	3	2	3
350	4	4	2	2	3	4	3
351	5	3	3	4	2	2	3
352	4	5	5	1	2	2	4
353	2	4	4	3	2	2	4
354	1	5	2	4	4	3	4
355	1	4	5	1	4	2	5
356	1	3	2	3	2	2	3
357	1	4	4	2	4	2	3
358	3	3	5	3	2	2	5
359	2	5	2	2	3	5	5
360	3	4	3	5	2	4	3
361	4	5	3	2	5	2	5
362	5	5	3	5	4	3	3
363	1	4	2	5	2	5	3
364	4	3	5	3	3	3	4

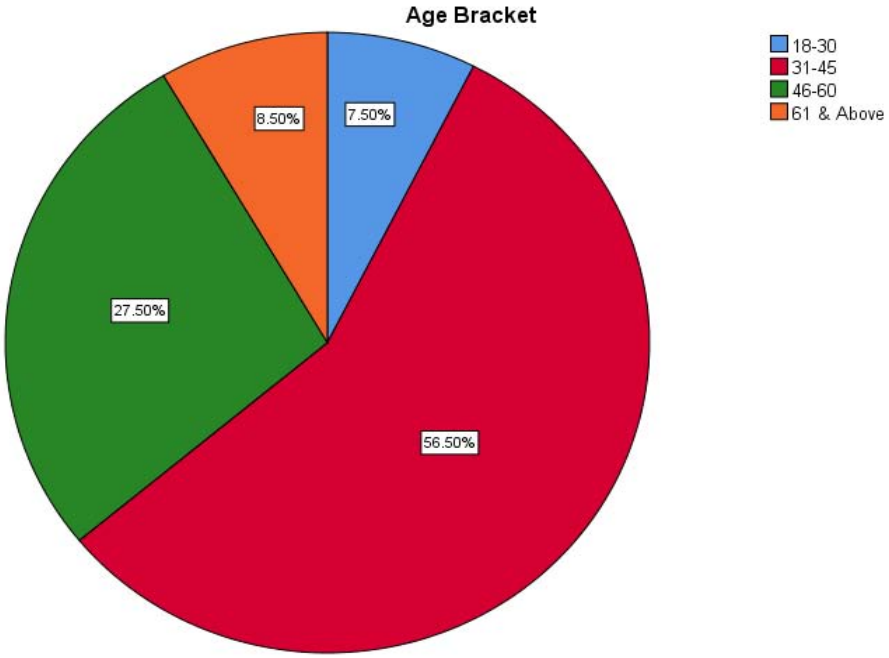
365	3	5	3	5	3	2	4
366	1	4	5	3	2	5	4
367	2	5	2	4	4	4	3
368	5	5	2	4	3	3	4
369	5	4	3	1	2	3	5
370	2	5	5	3	5	3	4
371	5	3	4	4	3	5	5
372	4	5	5	3	4	2	3
373	4	3	2	5	4	4	4
374	3	3	3	2	5	3	4
375	4	5	2	1	5	5	5
376	2	5	5	3	3	4	3
377	3	5	5	2	2	3	5
378	3	4	2	3	3	2	3
379	3	3	2	1	4	3	5
380	2	4	3	2	5	5	3
381	3	4	3	5	4	5	3
382	2	3	4	3	4	3	4
383	5	3	3	5	2	3	4
384	2	4	2	3	3	2	3
385	2	3	5	1	4	3	4
386	5	4	2	3	5	5	3
387	5	4	3	1	2	2	5
388	2	3	2	1	3	2	5
389	5	3	5	2	5	4	3
390	2	5	5	3	2	5	4
391	4	3	2	5	4	3	4
392	2	5	3	1	3	2	5
393	3	3	4	4	5	4	5
394	1	5	3	2	5	3	5
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

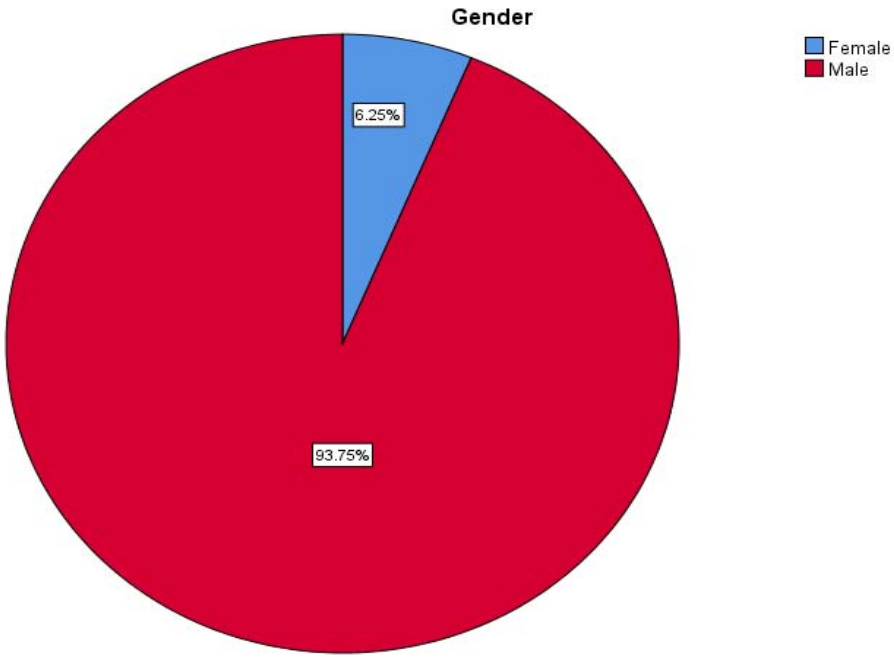
Results of Findings in Statistical Tables and Graphs

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

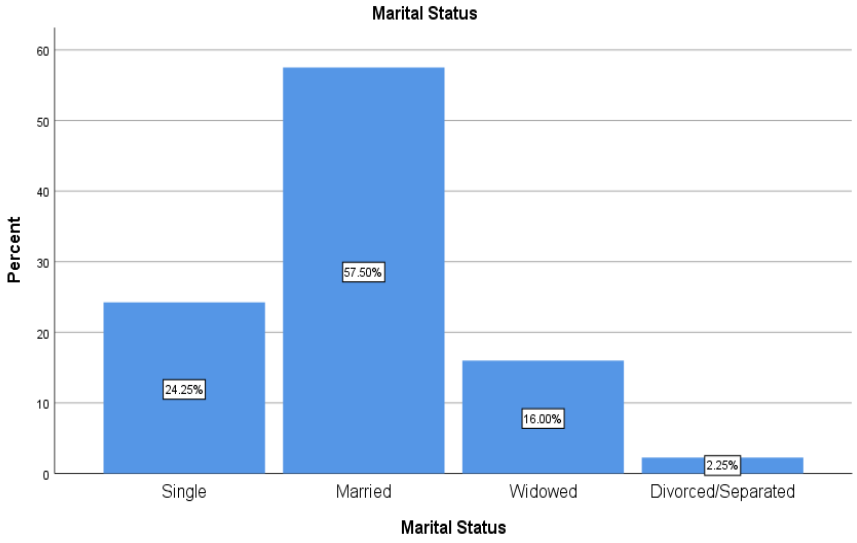
	61 & Above	34	8.5	8.5	100.0
	Total	400	100.0	100.0	



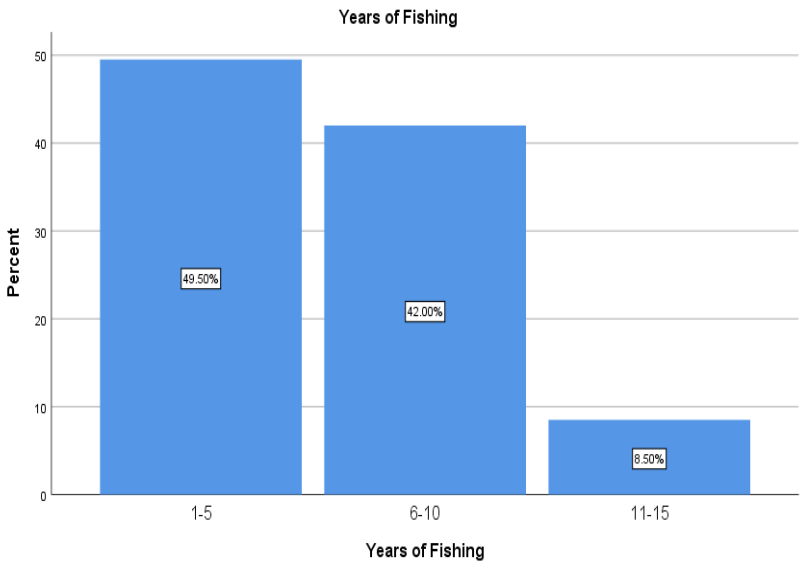
Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	25	6.3	6.3	6.3
	Male	375	93.8	93.8	100.0
	Total	400	100.0	100.0	



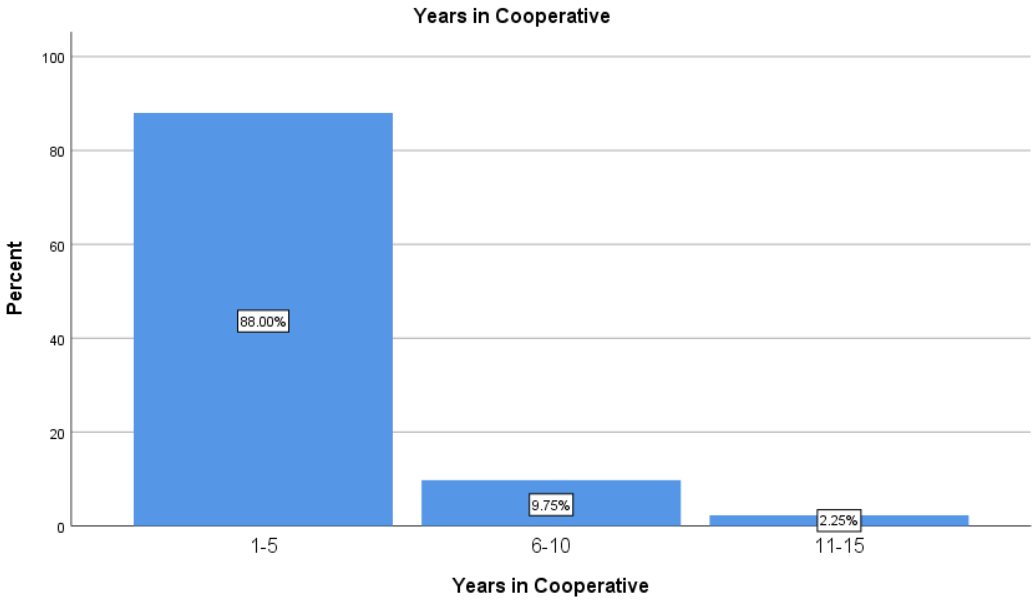
Marital Status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	97	24.3	24.3	24.3
	Married	230	57.5	57.5	81.8
	Widowed	64	16.0	16.0	97.8
	Divorced/Separated	9	2.3	2.3	100.0
	Total	400	100.0	100.0	



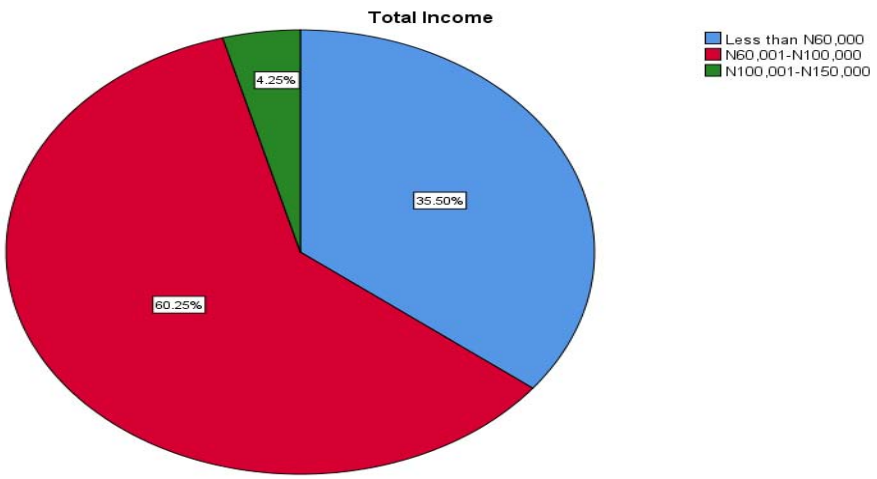
Years of Fishing					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5	198	49.5	49.5	49.5
	6-10	168	42.0	42.0	91.5
	11-15	34	8.5	8.5	100.0
	Total	400	100.0	100.0	



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	



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		

		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					

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					

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					

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 [ ]

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_____

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)					

Global Journals Guidelines Handbook 2020

www.GlobalJournals.org

Memberships

Fellows/Associates of Management and Business Research Council

FMBRC/AMBRC Memberships

Introduction

FMBRC/AMBRC is the most prestigious membership of Global Journals accredited by Open Association of Research Society, U.S.A (OARS). The credentials of Fellow and Associate designations signify that the researcher has gained the knowledge of the fundamental and high-level concepts, and is a subject matter expert, proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice. The credentials are designated only to the researchers, scientists, and professionals that have been selected by a rigorous process by our Editorial Board and Management Board.

Associates of FMBRC/AMBRC are scientists and researchers from around the world are working on projects/researches that have huge potentials. Members support Global Journals' mission to advance technology for humanity and the profession.

FMBRC

Fellow of Management and Business Research Council

FELLOW OF MANAGEMENT AND BUSINESS RESEARCH COUNCIL is the most prestigious membership of Global Journals. It is an award and membership granted to individuals that the Open Association of Research Society judges to have made a 'substantial contribution to the improvement of computer science, technology, and electronics engineering.

The primary objective is to recognize the leaders in research and scientific fields of the current era with a global perspective and to create a channel between them and other researchers for better exposure and knowledge sharing. Members are most eminent scientists, engineers, and technologists from all across the world. Fellows are elected for life through a peer review process on the basis of excellence in the respective domain. There is no limit on the number of new nominations made in any year. Each year, the Open Association of Research Society elect up to 12 new Fellow Members.

Benefit

To the institution

Get letter of appreciation

Global Journals sends a letter of appreciation of author to the Dean or CEO of the University or Company of which author is a part, signed by editor in chief or chief author.

Exclusive Network

Get access to a closed network

A FMBRC member gets access to a closed network of Tier 1 researchers and scientists with direct communication channel through our website. Fellows can reach out to other members or researchers directly. They should also be open to reaching out by other.

Career | Credibility | Exclusive | Reputation

Certificate

Certificate, LoR and Laser-Momento

Fellows receive a printed copy of a certificate signed by our Chief Author that may be used for academic purposes and a personal recommendation letter to the dean of member's university.

Career | Credibility | Exclusive | Reputation

Designation

Get honored title of membership

Fellows can use the honored title of membership. The “FMBRC” is an honored title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., FMBRC or William Walldroff, M.S., FMBRC.

Career | Credibility | Exclusive | Reputation

Recognition on the Platform

Better visibility and citation

All the Fellow members of FMBRC get a badge of "Leading Member of Global Journals" on the Research Community that distinguishes them from others. Additionally, the profile is also partially maintained by our team for better visibility and citation. All fellows get a dedicated page on the website with their biography.

Career | Credibility | Reputation

Future Work

Get discounts on the future publications

Fellows receive discounts on future publications with Global Journals up to 60%. Through our recommendation programs, members also receive discounts on publications made with OARS affiliated organizations.

Career | Financial

GJ Account

Unlimited forward of Emails

Fellows get secure and fast GJ work emails with unlimited forward of emails that they may use them as their primary email. For example,
john [AT] globaljournals [DOT] org.

Career | Credibility | Reputation

Premium Tools

Access to all the premium tools

To take future researches to the zenith, fellows receive access to all the premium tools that Global Journals have to offer along with the partnership with some of the best marketing leading tools out there.

Financial

Conferences & Events

Organize seminar/conference

Fellows are authorized to organize symposium/seminar/conference on behalf of Global Journal Incorporation (USA). They can also participate in the same organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent. Additionally, they get free research conferences (and others) alerts.

Career | Credibility | Financial

Early Invitations

Early invitations to all the symposiums, seminars, conferences

All fellows receive the early invitations to all the symposiums, seminars, conferences and webinars hosted by Global Journals in their subject.

Exclusive

Publishing Articles & Books

Earn 60% of sales proceeds

Fellows can publish articles (limited) without any fees. Also, they can earn up to 70% of sales proceeds from the sale of reference/review books/literature/publishing of research paper. The FMBRC member can decide its price and we can help in making the right decision.

Exclusive | Financial

Reviewers

Get a remuneration of 15% of author fees

Fellow members are eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get a remuneration of 15% of author fees, taken from the author of a respective paper.

Financial

Access to Editorial Board

Become a member of the Editorial Board

Fellows may join as a member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. Additionally, Fellows get a chance to nominate other members for Editorial Board.

Career | Credibility | Exclusive | Reputation

And Much More

Get access to scientific museums and observatories across the globe

All members get access to 5 selected scientific museums and observatories across the globe. All researches published with Global Journals will be kept under deep archival facilities across regions for future protections and disaster recovery. They get 10 GB free secure cloud access for storing research files.

ASSOCIATE OF MANAGEMENT AND BUSINESS RESEARCH COUNCIL

ASSOCIATE OF MANAGEMENT AND BUSINESS RESEARCH COUNCIL is the membership of Global Journals awarded to individuals that the Open Association of Research Society judges to have made a 'substantial contribution to the improvement of computer science, technology, and electronics engineering.

The primary objective is to recognize the leaders in research and scientific fields of the current era with a global perspective and to create a channel between them and other researchers for better exposure and knowledge sharing. Members are most eminent scientists, engineers, and technologists from all across the world. Associate membership can later be promoted to Fellow Membership. Associates are elected for life through a peer review process on the basis of excellence in the respective domain. There is no limit on the number of new nominations made in any year. Each year, the Open Association of Research Society elect up to 12 new Associate Members.

To the institution

Get letter of appreciation

Global Journals sends a letter of appreciation of author to the Dean or CEO of the University or Company of which author is a part, signed by editor in chief or chief author.

Exclusive Network

Get access to a closed network

A AMBRC member gets access to a closed network of Tier 2 researchers and scientists with direct communication channel through our website. Associates can reach out to other members or researchers directly. They should also be open to reaching out by other.

Career | Credibility | Exclusive | Reputation

Certificate

Certificate, LoR and Laser-Momento

Associates receive a printed copy of a certificate signed by our Chief Author that may be used for academic purposes and a personal recommendation letter to the dean of member's university.

Career | Credibility | Exclusive | Reputation

Designation

Get honored title of membership

Associates can use the honored title of membership. The “AMBRC” is an honored title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., AMBRC or William Walldroff, M.S., AMBRC.

Career | Credibility | Exclusive | Reputation

Recognition on the Platform

Better visibility and citation

All the Associate members of ASFRC get a badge of "Leading Member of Global Journals" on the Research Community that distinguishes them from others. Additionally, the profile is also partially maintained by our team for better visibility and citation. All associates get a dedicated page on the website with their biography.

Career | Credibility | Reputation

Future Work

Get discounts on the future publications

Associates receive discounts on the future publications with Global Journals up to 60%. Through our recommendation programs, members also receive discounts on publications made with OARS affiliated organizations.

Career | Financial

GJ Account

Unlimited forward of Emails

Associates get secure and fast GJ work emails with 5GB forward of emails that they may use them as their primary email. For example, john [AT] globaljournals [DOT] org..

Career | Credibility | Reputation

Premium Tools

Access to all the premium tools

To take future researches to the zenith, fellows receive access to almost all the premium tools that Global Journals have to offer along with the partnership with some of the best marketing leading tools out there.

Financial

Conferences & Events

Organize seminar/conference

Associates are authorized to organize symposium/seminar/conference on behalf of Global Journal Incorporation (USA). They can also participate in the same organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent. Additionally, they get free research conferences (and others) alerts.

Career | Credibility | Financial

Early Invitations

Early invitations to all the symposiums, seminars, conferences

All associates receive the early invitations to all the symposiums, seminars, conferences and webinars hosted by Global Journals in their subjec.

Exclusive

Publishing Articles & Books

Earn 60% of sales proceeds

Associates can publish articles (limited) without any fees. Also, they can earn up to 30-40% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.

Exclusive | Financial

Reviewers

Get a remuneration of 15% of author fees

Fellow members are eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get a remuneration of 15% of author fees, taken from the author of a respective paper.

Financial

And Much More

Get access to scientific museums and observatories across the globe

All members get access to 2 selected scientific museums and observatories across the globe. All researches published with Global Journals will be kept under deep archival facilities across regions for future protections and disaster recovery. They get 5 GB free secure cloud access for storing research files.

Associate	Fellow	Research Group	Basic
$4800 **lifetime designation**	$6800 **lifetime designation**	$12500.00 **organizational**	APC **per article**
Certificate, LoR and Momento **2** discounted publishing/year **Gradation** of Research **10** research contacts/day **1 GB** Cloud Storage **GJ** Community Access	**Certificate,** LoR and Momento **Unlimited** discounted publishing/year **Gradation** of Research **Unlimited** research contacts/day **5 GB** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**Certificates,** LoRs and Momentos **Unlimited** free publishing/year **Gradation** of Research **Unlimited** research contacts/day **Unlimited** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**GJ** Community Access

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

Policy on Plagiarism

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures

- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

Authorship Policies

Global Journals follows the definition of authorship set up by the Open Association of Research Society, USA. According to its guidelines, authorship criteria must be based on:

1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

Copyright

During submission of the manuscript, the author is confirming an exclusive license agreement with Global Journals which gives Global Journals the authority to reproduce, reuse, and republish authors' research. We also believe in flexible copyright terms where copyright may remain with authors/employers/institutions as well. Contact your editor after acceptance to choose your copyright policy. You may follow this form for copyright transfers.

Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Management Research Paper

Techniques for writing a good quality management and business research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of management and business then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.
Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.

- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

Index

A

Adduces · 55
Agitation · 30
Amidst · 3
Anomalous · 20

D

Disenchantment · 33
Dissertation · 2, 56
Dwellers · 15, 16, 24

E

Entrenched · 53

F

Farfetched · 50
Fathomed · 55

G

Garnered · 50, 55

H

Hindrances · 16

I

Imputation · 10

L

Lucrative · 10
Lukewarm · 30

M

Maginalisation · 28
Malfeasance · 54

O

Oblivious · 53
Orchestrating · 54

P

Patronage · 55
Pedagogical · 38

R

Renaissance · 43
Restiveness · 43

T

Truancy · 31, 40

W

Whither · 59

save our planet

Global Journal of Management and Business Research

Visit us on the Web at www.GlobalJournals.org | www.JournalofBusiness.Org
or email us at helpdesk@globaljournals.org

ISSN 9755853