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GROWTH ASSESSMENT OF INDUSTRIAL FISH SUPPLY IN NIGERIA: 1980-2014

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Abstract

The study focused on growth assessment of industrial fish supply in Nigeria 1980-2014. Secondary data on industrial fish supply covering 1980-2014 were obtained from National Bureau of Statistic (NBS), Federal Department of Fishery (FDF) and Nigeria Institute of Oceanography and Marine Research (NIOMR). The various analytical tools used were Augmented Dickey Fuller Test to check for the stationarity of the data; exponential growth model and graphical trend analysis were used to examine the growth of industrial fish supply, simulation method was used to estimate industrial fish supply growth projection from 2015-2030. The result from the growth model shows that, the growth of industrial fish supply was stagnated, as the P value of 0.569 was not statistically significant, The simulation estimate shows decline result of the industrial fish supply growth projection from 2015-2030. Conclusions were reached, that the supply growth of industrial fish was stagnated overtime covered in the work, while the future industrial fish supply growth projection from 2015-2030 declined. Based on these findings, it was recommended that policies that will encourage private and public sectors engagement in the industrial fishery sector be formed. Also, policies that will enforce procedures to guide against obnoxious fishing methods and operations as well as creating marine security be formed.

Keywords: Growth, Assessment, Industrial, Fishery, Sector, Supply.

Introduction

Industrial fisheries is a sub-sector of the fishery sector in Nigeria that has contributed immensely to agricultural growth, which further boost a country's economic growth by stimulating employment opportunities, generating revenue to both private and public sectors, as well as sources of raw materials for some related agro allied industries (Bromley, 1991). It boosts international relations in the export of special species of fish supply from the sector.Industrial fishing involves the use of modern sophisticated technologically designed boat with trawl net attached for the purpose of fishing in the

continental shelf of 200 nautical miles (NM) and above in the exclusive economic zone (EEZ) of a country's jurisdiction(Choi *et al.*, 2004).

A close observation of the marine fishing economy in the Nigeria river line region shows that the littoral environment of the area has set certain ecological peculiarities which have shaped the people's socio-economic history. It was also noted that among other factors, illiteracy, adherence to rudimentary fishing technology and problem of storage hindered productivity.

The marine sub-sector is the most active in Nigerian fisheries and it poses the greatest challenges to sustaining fish supplies as noted by Ajayi *et al.* (1984).

According to FAO(2011), industrial fisheries supply the world with about 148 million tonnes of fish in 2010 (with a total value of US$217.5 billion), of which about 128 million tonnes were utilized as food for people, and data for 2011 indicate increased production of 154 million tonnes, of which 131 million tonnes were destined as food. With sustained growth in fish production and improved distribution channels, world fish food supply has grown dramatically in the last five decades, with an average growth rate of 3.2% per year in the period 1961-2009, outpacing the increase of 1.7% per year in the world's population. Weeratung, *et al.* (2012) confirmed that World per capita food fish supply increased from an average of 9.9kg (live weight equivalent) in the 1960s to 18.4kg in 2009, and estimates for 2010 point to a further increase in fish consumption to 18.6kg of the 126 million tonnes available for human consumption in 2009, fish consumption was lowest in Africa (9.1 million tonnes, with 9.1kg per capita), while Asia accounted for two-thirds of total consumption, with 85.4 million tonnes (20.7kg per capita), of which 42.8 million tonnes was consumed outside China (15.4 kg per capita).

Nandeesha *et al.* (2013) reported that, the State of the World Fisheries and Fish in 2011 for Oceania, North America, Europe, and Latin America and the Caribbean were 24.6 kg, 24.1 kg, 22.0 kg and 9.9 kg, per capita respectively. Although annual per capita consumption of fishery products has grown steadily in developing regions (from 5.2 kg in 1961 to 17.0 kg in 2009) and in Low-Income Food-Deficit Countries (LIFDCs, from 4.9 kg in 1961 to 10.1 kg in 2009), it is still considerably lower than in more developed regions, although the gap is narrowing.

Both the industrial and artisanal fleets exploiting the marine resources have significant effects on the Nigerian economy, the former in the value of its fishery output and the later in terms of food security and socio-economic benefits.

Issues of multiple effects of climate change on natural fish production and multiplication as a result of raising sea level, flooding, wave current effects, increase in sea temperature. Other environmental issues are water erosion as a result of mass deforestation of our ecosystem, this constrain the availability of fishes for catch even at the industrial level.

other studies has been done on fresh fish marketing in Andoni and Port-Harcourt Local Government Areas of Rivers State, (Okuduwor, 2010), responsiveness of Nigeria fisheries to price and policy factors, 1971-2010 (Onuche*et al.,* 2015) but this study with broad objective growth assessment of industrial fishery sector supply in Nigeria from 1980-2014 is a researchable gap that is necessary to be filled. The specific objectives are to:

i. examine the growth of industrial fish supply in Nigeria from 1980-2014
ii. estimate growth projection for industrial fish supply in Nigeria from 2015-2030.

Methodology

The study on growth assessment of the industrial fish supply from 1980 to 2014 was carried out in Nigeria as the study area within the exclusive economic zone of 200 nautical miles and above in our Atlantic ocean.

It has a coastline of 853 km which borders the Atlantic Ocean in the Gulf of Guinea in the south. The states along the coast are:AkwaIbom, Bayelsa, Cross River, Delta, Lagos, Ogun, Ondo and Rivers. These waters include the continental shelf along more than 800 kilometres of coastline. Apart from these interruptions and some offshore oil prospecting installations, the shelf is considerably trawlable.

Secondary data were used for the study, a time series data for industrial fish supply were obtained from Nigeria institute of oceanography and marine research (NIOMR), Federal Department of Fisheries(FDF) andNational Bureau of Statistics (NBS), covered 1980 to 2014.

A time series graphical trend analysis and exponential growth model was used to investigate the growth assessment of industrial fish supply from 1980 - 2014 (objective 1).

Objective 2: on the growth projection for industrial fisheries supply from 2015-2030 was estimated using simulation method.

Model specification

The model of the ADF test with the constant term and trend is as follows:

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$$\Delta Y_t = \alpha_1 + \alpha_2 t + \beta Y_{t-1} + \sum_{i-1}^{n} \theta_i \Delta Y_{t-1} + \varepsilon_t \quad \ldots\ldots (1)$$

Growth trend model

$$Q_S = Y_0(1+r)^t \ldots\ldots (2)$$

Y_0= fish growth value base in year t.

r = Rate of growth of Q_s

t = time in chronological years.

Taking the natural log of equation (1) to make it linear thus

$$In\ Q_s = ln\ Y_0 + tln\ (1+r) \ldots\ldots (3)$$

Substituting ln Y with B, and ln(1+r) with B_2, equation (2) is rewritten as

$$Qs = \beta_1 + \beta_2 t \ldots\ldots (4)$$

$$QS = \beta_1 + \beta_2 t + N_t \ldots\ldots (5)$$

If β_2 is positive and statistically significant, there is acceleration in the growth of industrial fish supplied, if β_2 is negative and statistically significant, there is deceleration in growth, if $\beta_2$is not statistically significant there is stagnation in the growth process.

Results and Discussion

Trend analysis of industrial fish supply in Nigeria from 1980-2014

The result of the graphic trend analysis is shown in figure 1. The result revealed the trend of the industrial fish supply in Nigeria over the period under consideration. From the graphic display, it is evident that from 1980 to 1985there was steady low supply of about 25 million tones, thereafter, there was an increase in supply to about 75 million tones in the next four years and a slight drop in a year before the highest increase in supply by 1990, to about 140 million tones. This steady rise in supply and subsequent peak rise in supply of industrial fishes could be attributed to a combination of better environmental factors, such as less sea pollution, non sea piracy and harassment of fishing trawlers, proper monitoring control and surveillance mechanism in our exclusive economic zone, and governmental

factors such as stable and focus government policies and programmes. This might have affected positively the interest rate, exchange rate, taxes, and encouraged foreign direct investment in the sector, which could have boosted the supply output of fishes from the sector.

From 1991, the drop or decrease in the supply output of industrial fishes could not retain or regain its balance, as the slight undulated movement sprang via year 2000.There after, a further decrease to about 18 million tones from 2003 to 2014.This could be associated with the new political system, programmes and policies as well as the environmental factors such as high level of sea pollution via rampant oil spillage and bunkery activities and high level of militants harassment to the trawler operators in our coastal region.

The exponential growth model was also used for the assessment of industrial fish supply in Nigeria as showed on table 2. The result of growth model on table 2, shows that ,the P value of 0.5695 was not statistically significant, this demonstrated stagnation in the supply growth of industrial fishes in Nigeria. From both the graphic trend and growth model employed in the assessment of industrial fish supply in Nigeria, it was concluded that the growth was not progressive and encouraging over the period covered in this study. The stagnation of Nigeria fish stocks cannot be attributed to fishing alone. Habitat destruction, pollution, climate change and invasive species also have an impact on fish populations. Also, a changing environment affects stock abundance, and some stocks experience collapse from environmental causes alone. The fish resources of the world's vast oceans were thought to be essentially inexhaustible, even by the most prominent biologists (Smith, 2000). As the fishing industry expanded and technology made larger catches possible and more areas of the ocean exploitable, the received wisdom that fisheries were inexhaustible soon became discredited.

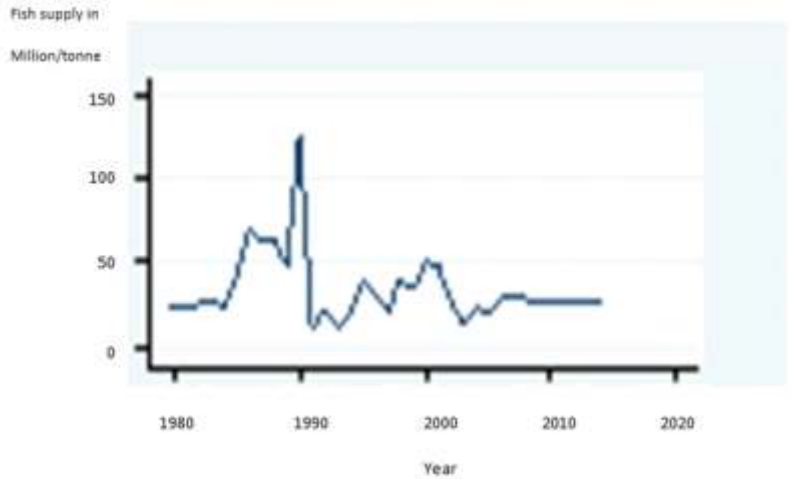

Figure 1, Trend Showing the Industrial Fish Supply in Nigeria 1980-2014

Table2: Estimates of the Growth Model

Industrial fishery supply	Co-efficient	Standard error	t. statistics	p value
T	.0000504	.0347971	0.00	0.999
t^2	-.0002453	.0009276	-0.26	0.795
Constant	3.522565	.2716751	12.97	0.000
Number of observations =	35			
F-statistics =	0.57			0.5695
R-squared =	0.0346			

Source: Data Analysis (2017).

Growth projection of industrial fish supply in Nigeria from 2015-2030

Simulation method was employed from the mean of the supply growth over the years, and the supply quantity for the sector was projected as shown on table 2,

The information displayed on table 2, shows a steady decline in supply growth projection for Nigeria industrial fishery sector from 2015 -2030, as also reflected on the trend.

Inspite of the FAO target to achieve hunger free by 2030, the contribution of industrial fish supply is still on the decline, the implication is largely dependence on imported fish and fish products in the country, this is a threat to food security and income generation as well as economic leakage in the nation at large.

For offshore to be sustainable, production systems must focus on the interactions between the culture techniques and the environment. It is pertinent to note that the growth and the expansion of offshore as an industry occurred during a period of growing concern of its environmental implications. Opportunities exist for the government to improve farm productivity through the promotion of appropriate responsible production, extension technologies and policy that is environmentally friendly(Quinn 1999)..

According to the fishery statistic of Nigeria (FSN 2007) fourth edition yearly report, enumerated several factors that contributed to the decline in the supply of industrial fish in Nigeria to include viz:-

I. High cost of fishing Vessels and its maintenance.

ii. Low level of government and private sector participation in the marine fishery business.

iii. Lack of effective institutional support linkage.

iv. Lack of access to affordable credit and insurance scheme to cover the interested entrepreneur.

v. Poor management and non-effective utilization of most of the nations numerous water bodies.

vi. Shortage of competent and experienced technical man power.

vii. No systematic monitoring, control and surveillance mechanism.

viii. Illegal exploitation of the marine fisheries resources particularly by foreign Vessels.

ix. High level of sea piracy and incessant harassment of fishing trawlers by militants in the marine waters.

Clark (1990), argued that most government programmes impacts did not get to the terminal target hence the economic constraint in the industrial fishery sector appear to be continuous.

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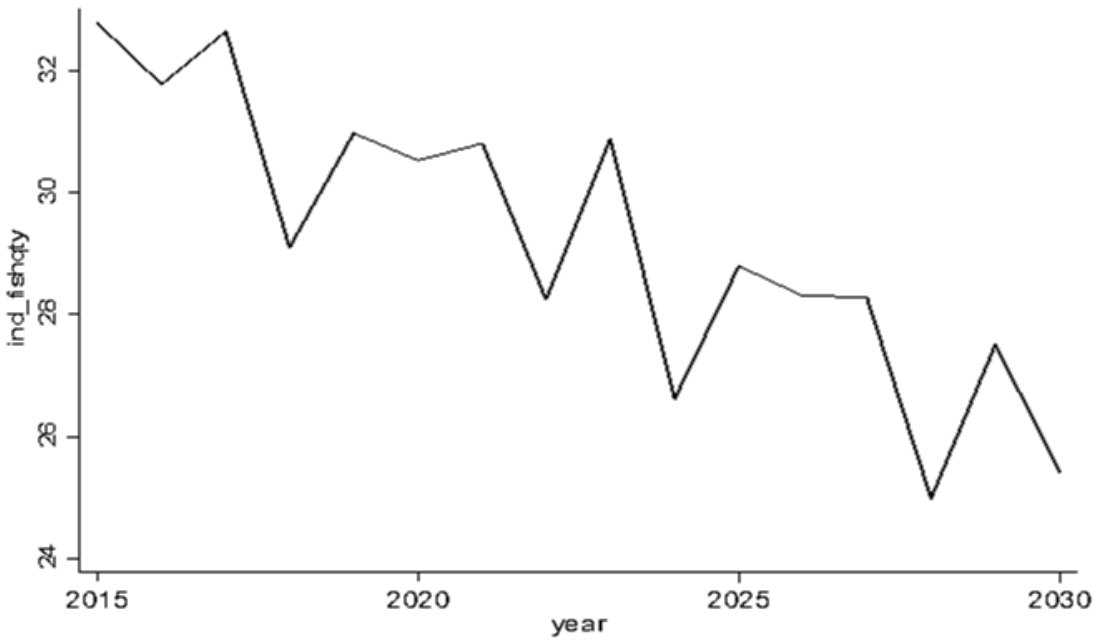
Table 3: Industrial Fish Supply Growth Projection in Nigeria from 2015-2030

t	year	industrial fish supply quantity (million tones)
1	2015	32.56853
2	2016	33.78215
3	2017	32.51835
4	2018	32.55915
5	2019	31.42238
6	2020	32.11506
7	2021	29.64444
8	2022	30.48419
9	2023	28.9372
10	2024	27.06301
11	2025	28.82384
12	2026	26.8071
13	2027	29.83273
14	2028	26.93511
15	2029	26.17632
16	2030	25.32905

Source: Data Analysis (2017).



Source: Data Analysis (2017)

Figure 2. Industrial Fish Supply Growth Projection Trend in Nigeria from 2015-2030

Conclusion and Recommendations

Conclusion was reached, that the supply of industrial fish was stagnated overtime covered from 1980-2014 and the industrial fish supply future growth projection declines from 2015-2030. Based on these findings, it was recommended that policies that would encourage private and public sectors engagement in the industrial fishery sector be formulated. Also, policies that will enforce procedures to guide against obnoxious fishing method and operation as well as creating marine security be formed.

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Appendix I: Fish output, Price, interest rate, Exchange rate and Inflation rate in Nigeria from 1980nto 2014

S/NO	Year	Fish Out Put (in million tons)	Price (1000 tones in Dollar $)	Interest Rate	Exchange Rate	Inflation Rate
1	1980	25,679.2	25	8.10	0.712	10.66
2	1981	25,914.9	25	9.80	0.762	
3	1982	25,988	26	8.30		
4	1983	24,793.6	28	9.98	0.7241	11.50
5	1984	26,443.9	24	10.24	0.7649	13.00
6	1985	29,116	44	9.43	0.8938	11.75
7	1986	30,409.7	70	9.96	2.0206	12.00
8	1987	50,670	63	13.96	4.0179	19.20
9	1988	56,314	64	16.62	7.3916	17.60
10	1999	53,226	69	20.44	8.0378	24.60
11	1990	125,211	126	25.30	9.9095	27.70
12	1991	23,568	10	20.04	17.2984	20.80
13	1992	36,662	24	24.76	22.0511	31.20
14	1993	34,885	12	31.65	21.8861	36.09
15	1994	34,693	20	20.48	21.8861	21.00
16	1995	33,479	39	20.23	21.8861	20.79
17	1996	27,244	33	19.84	218860	20.86
18	1997	27,703	21	17.80	92.34	23.32
19	1998	29,954.8	40	18.18	101.70	21.34
20	1999	31,139.4	34	20.29	111.23	27.19
21	2000	23,308.3	52	21.27	120.58	21.55
22	2001	28,378	49	23.44	137.76	21.35
23	2002	30,091	28	24.77	133.14	30.19
24	2003	33,882	13	20.71	137.70	22.88
25	2004	30,421	25	19.18	129.93	20.32
26	2005	32,595	20	17.95	128.37	19.49
27	2006	33,778	29	16.90	117.72	18.70
28	2007	26,193	29	16.94	146.59	18.36
29	2008	27,621	29	15.48	150.33	18.70
30	2009	27,894	28	18.36	152.08	22.62
31	2010	24,228	27	17.59	161.31	22.51
32	2011	24,269	28	16.02	156.96	22.42
33	2012	24,742	28	16.79	196.13	23.79
34	2013	23,946	28	16.72	282.2	24.94
35	2014	23,877	28	16.55		25.50