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Industrial Policy on Fish Farming and Sustainable Economic Growth in Nigeria (1990-2016)

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Abstract: This study explored the relationship between Industrial Policy on Fish Farming and Economic Growth in Nigeria (1990-2016). Specifically, it determined the type of relationship between Nigeria Federal Government subsidies on fish farming and real gross domestic product. Ordinary least square technique of regression was used for analysis of time series data generated from Federal Government statistical Bulletin and Bureau of Statistics. The study applied econometric model for estimating hypothesized relationship through causality and co-integration procedures. Findings revealed that there is a significant positive relationship between subsidies on fish farming and real gross domestic product. It is concluded that robust industrial policy on fish farming will enhance sustainable economic growth in Nigeria. Therefore, it is advocated that industrial policy on fish farming should consider in detail the long run nexus between fish farming subsector and other sectors of the Nigeria Economy.
Keywords: Industrial Policy, Fish Farming, Sustainability, Economic Growth, Nigeria

INTRODUCTION

The government industrial policy is aimed at improving the entrepreneurial climate. It is also regarded as government efforts to alter industrial structure to promote productivity based growth involving all forms of state interventions that affect and influence industrial activities [1].

Over the years a number of policies have been formulated by the Nigeria government with a view to developing small/medium scale industries. These policies include funding, setting-up industrial areas and estates, providing local finance through its agencies such as Central Bank of Nigeria (CBN) [2]. Federal Ministry of Industries, Nigerian Industrial Development Bank (NIDB) and Nigerian Bank for Commerce and Industrial (NBCI) and Fish Farming which involves the rearing of fish for the purpose of consumption of sale [3, 4].

Fish farming is a profitable venture and has the potential to help expand the resource base for food production and reduce the pressure on conventional sources of fish which are harvested faster than they can be regenerated. Fish is acclaimed to be the principal source of animal protein for over a billion people globally and provide many important nutritional health benefits. For Nigeria where the economy is largely agrarian, fish farming can generate significant employment, enhance socio-economic status of the farmers as well as generate foreign exchange, reduce poverty, develop entrepreneurship, for which will optimize the use of the unexploited resources and self-sufficiency [4, 5].

Nigeria has shown interests in fish farming through setting up various national programmes and projects such as the Aquacultural and Inland Fishery Project (AIFP); National Accelerated Fish Production projection (NAFPP); fishing terminal Projects (FTP); Fisheries Infrastructures Provision/Improvement (FIP) and the Presidental initiative on Aquacultural (PIA). Part of the plan of government is to distribute fingerlings to small scale fish farmers free while large scale farmers will be subsidized up to 50% of cost (FMAWR, 2008). This in addition to sensitizing Nigerians to various method of fish farming. However, this agricultural subsector appears elusive. Demand for fish in Nigeria stands at about 1.5 million metric tonnes per annum which domestic production is just 511,700 metric tonnes. The nation spends about N150 billion (USS 1 billion) annually to bridge the gap between supply and demand (FAO, 2006) consequently, policy measures have been put in place to stimulate local fish farming. Till date, the result from the colossal investment and policy appears not yielding the desired results. Most of the fish farming in Nigeria is carried out by small scale operators in small fresh water ponds. Nigeria's population and her national fish demand have increased, while annual aquaculture production hovers around countable metric tonnes. These combined with ever-decreasing catch (due to overexploitation) from the

capture fisheries have not been able to meet the ever increasing protein demand of the country. Thus the challenge to increase protein consumption in Nigeria appears to be more urgent than ever.

To operationalize the variable, however, the study is based on two major constructs namely: industrial policy climate and fish farming performance. This implies that fish farming performance is a function of industrial policy influences. Thus fish farming performance is measured by real gross domestic product of fishing subsector in agricultural activity sector. Further, industrial policy influences can be operationalized into indicators given as government subsidies in fish farming.

In view of this, the primary objective of the study is to explore the relationship between industrial policy on fish farming and sustainable economic growth in Nigeria. Specifically, the study seeks to: Determine the type of relationship between fish farming subsidies and real gross domestic product in Nigeria. Consequently, the directional hypothesis is that, there is significant relationship between fish farming subsidies and real gross domestic product in Nigeria.

CONCEPTUAL AND THEORETICAL ISSUES

Concept of Industrial Policy

Industrial policy involves all forms of state intervention that affect and influence industrial activities [1]. Thus policy is viewed as consciously acknowledged rules of conduct that guide administrative decisions Shama & Sadana, 2009 in [6]. There are four dimensions of Public Policy (Uchendu, 2000): At the philosophical level, it describes "a doctrine that justifies the actions of a community, organization, political agencies or the state in their respective efforts to set the framework for solutions to common problems. At pragmatic level, it is viewed as "an end-product consisting of either documents or conclusions drawn by responsible authorities who clearly express their views on problems demanding action and how they plan to deal with them with available resources". At the strategic level, it describes "the fundamental process through which an organization provides stability and orderly change while planning to capture desired goals". And at the level of framework for action, the term policy stands for "both the process and the end result, that is "a guide to action".

Industrial policy, therefore, is government policy to influence industries expansion via subsidies, tax breaks, and other aids to favour industries. The purpose aside from political favour, may be to foster competitive advantage where there are beneficial externalities.

Fish Farming

It is the principal form of aquaculture while other methods may fall under mariculture. Fish farming involves raising fish commercially in tank or enclosures, usually for food. Fish farming is the fastest growing animal based food production sector, particularly in the developing countries Green facts, 2004 in [7]. Fish farming is the farming of aquatic organisms in controlled environment (FAO, 2007) introduced to Nigeria in the early 1950s. Fisheries occupy a unique position in the agricultural sector of the Nigeria economy. In terms of Gross Domestic Product (GDP), the fishery subsector has recorded the fastest growth rate to GDP. The contribution of the fishery sub-sector to GDP is N428,229.01 million [2].

Fish contributes significantly to the Nigerian economy when viewed from the perspective of supply of high dietary protein, income generation, creation of employment especially at the grassroots and the enhanced inflow of foreign exchange earnings through shrimp export.

Sustainability

Sustainability could be defined as an ability or capacity of something to be maintained or sustain itself (http://www.dp:nsw.gov.au/forests/management. it is about taking what we need to live now, without jeopardising the potential for people in the future to meet their needs. Sustainability means development that meets the needs of the present without compromising the needs of the future generations to meet their own need (World Commission on Environment and Developments (WCED). At the heart of the concept is the belief that social, economic and environment objectives should be complementary and interdependent in the development process. Thus indicating three principal dimensions; economic growth, social equity and protection of the environment. Underlying the economic dimensions is the principle that society's well being would have to be maximized and poverty eradicated through the optional and efficient use of natural resources. The social aspect refers to the relationship between nature and human beings, uplifting the welfare of people, improving access to basic health and education services, fulfill food security needs and respect for human rights. The environmental dimension, on the other hand is concerned with the conservation and enhancement of the physical and biological resources base and ecosystems Vorley, [8] in (South Africa, Department of Agriculture Discussion Document, 8th Draft, 2002).

Economic Growth

Economic growth is an increase in real Gross Domestic Product (RGDP) per capita occurring over some time period [9], economic growth is the increase in the inflation-adjusted market value of the goods and services produced in the economy overtime. It is conventionally measured as the percentage rate of increase in real gross domestic product or real GDP.

Economic growth has traditionally been attributed to the accumulation of human and physical capital and increased productivity arising from technological innovation.

Theoretical Framework

The study is anchored on Export Promotion Industrialization (EPI) strategy. The export oriented industrial policy was meant to achieve a broad objective of accelerating the pace of industrial development in Nigeria, embedded in the new export promotion policy/incentives in the new industrial policy of Nigeria of 1989 and debt conversion (equity swap) policy. The urgent need to generate more foreign exchange particularly from non oil sources to meet the country's rising import bills, mounting external debt obligations, rising fiscal responsibilities of the government, and to attend to socio-economic responsibilities resulted in the introduction of Structural Adjustment Programme (SAP) in Nigeria in July, 1986, and eventually a shift in Nigeria's industrial policy thrust from Import substitution Industrialization Strategy (ISI) approach to Export Promotion Industrialization (EPI). EPI, otherwise described as outward oriented industrialization, involves domestic production of goods for export. It is government's deliberate efforts to expand the volume of a country's exports through export incentives and other means in order to generate more foreign exchange and improve the current account of balance of payment [1].

Empirical Review

Prior studies on Industrial Policy on fish farming and sustainable economic growth in Nigeria among scholars presented varied perspectives and findings.

Ramesh [10] investigated aquaculture: Evidence from China and Nigeria, using exploratory design. The findings from the study indicated that the state of Nigeria's aquaculture industry has been driven by Dependency Theory. But the Chinese aquaculture industry has been driven by modernization theory. China started a series of reforms in 1978. These reforms incentivized farmers to fish farm and facilitated development of institutions such as a legal and regulatory framework as well as centres of technological innovations.

In a related development [11] studied socio-economic and policy issues determining sustainable fish farming in Nigeria, the researchers adopted the multistage sampling technique to arrive at the sample. Descriptive statistics, budgetary analysis and multiple regression methods were used to analyze the data. The study reveals that fish farming is a recent phenomenon attracting younger and well educated farmers. Earthen ponds were mostly used, making the system susceptible to pollution from upstream sections of stream channels and poaching.

Ekpo [1] assessed Nigeria Industrial policies and industrial sector performance. Using analytical exploration method found that the industrial policies so far implemented in Nigeria were identified as ISI, EPI and foreign private investment led industrialization strategy (FPII). The common features of these policies had been foreign inputs (capital, technology and skilled labour) reliance. Further findings indicate that Nigeria has been pursuing dependent industrialization; poorly conceived, industrial policies which were casually implemented. However, he proposed a "Home Grow Industrial Policy".

METHODS

This study utilized correlation quantitative research model since it is a systematic empirical investigation of quantitative properties and phenomena and their relationships [12]. Fish farming performance was proxied by Real Gross Domestic Product in the fishing subsector of the Agricultural Activity Sector, while Industrial Policy influences were operationalized by Government subsidies in fish farming.

Data for the study were obtained from Federal Government Statistical Bulletin and Bureau of Statistics (1990-2016). The data are shown below:

Table 1: Real Gross Domestic Product at 1990 Constant Basic Prices and Government Subsidies (Expenditure) on Fish Farming Activity Sector: Agriculture (Fishing).

S/N	Year	RGDP ₦1,m	Subsidies ₦, m
1.	1990	4,478.93	64.50
2.	1991	4,474.56	52.17
3.	1992	4,027.11	113.99
4.	1993	3,020.34	450.95
5.	1994	2,824.01	295.82
6.	1995	3,106.42	377.60
7.	1996	3,752.56	398.14
8.	1997	4,176.51	514.72
9.	1998	4,765.50	722.92
10.	1999	5,442.05	14,829.04

11.	2000	5,659.73	1,583.94
12.	2001	6,112.50	1,766.13
13.	2002	6,499.36	2,498.38
14.	2003	6,763.13	*1,949.49
15.	2004	7,202.74	*20,713.34
16.	2005	7,636.00	*8,387.07
17.	2006	8,135.79	*10,349.97
18.	2007	8,670.87	*13,150.13
19.	2008	9,240.54	16,349.75
20.	2009	9,810.35	5,608.80
21.	2010	10,395.40	7,054.48
22.	2011	11,014.16	10,292.47
23.	2012	11,661.14	8,325.00
24.	2013	*11,023.57	*8,557.32
25.	2014	*11,232.96	*9,058.26
26.	2015	*11,305.89	*8,646.86
27.	2016	*11,187.47	*8,754.15

* → Provisional

Source: Central Bank of Nigeria Statistical Bulletin (2012) Vol.23 Abuja: Central bank of Nigeria Statistics Dependent Nigerian Bureau of Statistics (2012)

Ordinary Least Square Technique of regression was employed to analyze the time series data since it items provides linear unbiased estimates [13]. Econometric model was applied for estimating hypothesized relationship through causality and co-integration procedures. The total government expenditure on fish-farming for various years was obtained by dividing the total expenditure for Agriculture in each year because there were four subsector (crop production, livestock, forestry and fishing) in the agriculture activity sector.

Model Specification

$$y_{i,t} = a + b\,x_{i,t} + e_t \quad \text{(i)}$$

Where:

y = Real Gross Domestic Product (RGDP)

a = Intercept or Constant

b = Slope Coefficient of the Independent Variable (x)

x = Subsidies (SUBS)

e_t = Error Terms

i,t = Time indicator

$$RGDP_t = a_i + b_i\,SUBS_t + e_t \quad \text{(ii)}$$

The regression result, the diagnostic, unit root and co-integration tests are presented below:

Table 2: Regression Result of RGDP and SUBS

Dependent Variable: RGDP				
Method: Least Squares				
Date: 04/04/16 Time: 12:52				
Sample: 1990- 2016				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6360.998	587.2282	10.83224	0.0000
SUBS	0.092734	0.032675	2.838071	0.0089
R-squared	0.243677	Mean dependent var		7171.096
Adjusted R-squared	0.213424	S.D. dependent var		3006.681
S.E. of regression	2666.599	Akaike info criterion		18.68618
Sum squared resid	1.78E+08	Schwarz criterion		18.78217
Log likelihood	-250.2635	Hannan-Quinn criter.		18.71472
F-statistic	8.054649	Durbin-Watson stat		0.503933
Prob(F-statistic)	0.008878			

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 3: Diagnostic Test Result

Ramsey RESET Test			
Equation: UNTITLED			
Specification: RGDP C SUBS			
Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	3.389197	24	0.0024
F-statistic	11.48665	(1, 24)	0.0024
Likelihood ratio	10.55978	1	0.0012

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 4: Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	39.44482	Prob. F(2,23)	0.0000
Obs*R-squared	20.90517	Prob. Chi-Square(2)	0.0000

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 5: Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH			
F-statistic	49.90401	Prob. F(1,24)	0.0000
Obs*R-squared	17.55662	Prob. Chi-Square(1)	0.0000

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 6: Unit Root Test at Level Form, Constant Applying Augmented Dickey-Filler Statistics

Variables	t-Statistics	Critical Value at 1% df	Critical Value at 5% df	Critical Value at 10% df	Prob.	Remarks
RGDP	0.352162	-3.711457	-2.981038	-2.629906	0.9766	Not Stationary. So proved to another level
SUBS	-4.471518	-3.711457	-2.981038	-2.629906	0.0016	Stationary and significance

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 7: Unit Root Test at First Difference, Constant Applying Augmented Dickey-fuller Statistics

Variables	t-Statistics	Critical Value at 1% df	Critical Value at 5% df	Critical Value at 10% df	Prob.	Remarks
RGDP	-2.646754	-3.724070	-2.986225	-2.632604	0.0974	Stationary
SUBS	-4.882744	-3.831511	-3-029970	-2.655194	0.091	Stationary

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 8: Co Integration Result

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.453376	16.55188	15.49471	0.0345
At most 1	0.056426	1.452008	3.841466	0.2282
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 9: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.453376	15.09987	14.26460	0.0368
At most 1	0.056426	1.452008	3.841466	0.2282
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

Table 10: Pairwise Granger Causality Tests

Pairwise Granger Causality Tests			
Date: 04/07/16 Time: 11:07			
Sample: 1990 2016			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
SUBS does not Granger Cause RGDP	26	4.27926	0.0500
RGDP does not Granger Cause SUBS		6.58343	0.0173

Source: Computed from CBN Statistical Bulletin (2012) Data on RDGP and SUBS, Using Eview 8.0

DATA ANALYSIS AND ESTIMATION OF RESULTS

Table 2 indicates that RGDP has positive relationship (6360.998) with SUBS and it is significant at 0.0000 probability value with t-statistics of 10.83224. Similarly, SUBS has positive relationship (0.092734) with RGDP and it is significant at 0.001 probability value with t-statistics of 2.838071. Although F-Statistic is significant at 0.001, considering the global utility of any econometric model, Adjusted R-squared 0.213424 (21%) and Durbin-Watson statistic, 0.503933 have not met the global fit. These results show the presence of autocorrelation and required diagnostic test.

Table 3 shows the diagnostic test result. Applying Ramcey Reset Test, the specification of RGDP constant SUBS indicates that t-statistic (3.389197) and F-statistic (11.48665) are significant at 0.0024. This confirms that the null hypothesis which state that the model is well fitted is not rejected.

Table 4 shows the serial correlation LM Test and the hypothesis is that there is no serial correlation in the residuals up to the specified order. From the result F-statistic with Breusch-Godfrey Serial Correlation in the residuals up to the specified order. From the result, F-statistic with Breusch-Godfrey Serial Correlation LM Test, indicates high significance value of 0.0000 for both F-statistic (3.944482) and obs* R-squared (20.90517). This result rejects the null hypothesis and it is concluded that there is serial correlation in the residuals up to the specified order and the model is well fitted.

Table 5 shows the heteroskedasticity test: ARCH which tests for residual at 5 percent level of significance. The result of the test indicates that F-statistic (49.90401) and obs*R-squared (17,55662) are significant at 0.0000. the Autoregressive conditional heteroskedasticity Arch test is carried out to determine the presence of heteroskeddasticity in the model. The null hypothesis states that there is no autoregressive conditional heteroskadasticity up to order 1 in the model. Given this result, the null hypothesis is rejected and it is concluded that there is autoregressive conditional heteroskedasticity up to order 1 in the model.

Table 6 presents the result of Unit Root Test (Stationality Test) at level form, constant, applying Augmented Dickey-Fuller Statistics. RGDP has probability value of 0.9766 which is not significant and not stationary. Therefore, we proceed to another level. However, SUBS is significant at 0.0016 and stationary.

Table 7 presents the result of Unit Root Test at first Difference, constant, Applying Augumented Dickey-Fuller Statistics. The Unit Root Test states that the values of the dependent and independent variables may not be stationary at a particular point in time due to the manner, the data were gathered. Since 10 percent is accepted as level of significance in Unit Root Test, at first difference constant, RGDP (t-statistics of -2.646745) and SUBS (t-statistics of -4882744) are significant at 0.0974 and stationary. This result allows co-integration test.

Table 8 shows the Co-integration Result of the Unrestricted Cointegration Rank Test (Trace). The null hypothesis states that there is no long run positive relationship between RGDP and SUBS for order 1 and 2. Both variables indicate probability value of 0.0345 and 0.2282 with two stars (**). The hypothesized no of CE(s) has one star (*) which stipulates that the null hypothesis be rejected. It is concluded that there is a long run positive relationship between RGDP and SUBS.

Table 9 presents Unrestricted co-integration Rank Test (Maximum Eigenvalve) which also shows that RGDP and SUBS have probability value of 0.0368 and 0.2282 with two stars (**). The hypothesized of CE(s) has one star (*) indicating that the null hypothesis be rejected and the alternate be accepted. Therefore, there is a long run positive relationship between RGDP and SUBS.

Table 10 shows the result of Pairwise Granger Causality Tests. The null hypothesis states that SUBS does not Granger cause RGDP and RGDP does not Granger cause SUBS. From the result, SUBS is associated with F-statistic (4.27926) and significant at P-value of 0.0500. Similarly, RGDP has F-statistic value of 6.58343 and significant at P-value of 0.0173. Since the P-value is significant, the null hypothesis is rejected and it is concluded that SUBS Granger cause RGDP and vice versa.

IMPLICATIONS OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

The finding which shows significant positive relationship between RGDP and SUBS connotes some implications. It suggests that provision of government subsidies has potency on the real gross domestic products in the Nigerian economy. It could also serve as incentive for sustainability of fish farming in Nigeria. This result corroborates the findings of Shimang [4], Ajayi [11] and Kambakhsh [5] which indicated that fish farming can generate significant employment, enhance socio-economic status of farmers, generate foreign exchange, reduce poverty, develop entrepreneurship, optimize the use of the unexploited resources and self-sufficiency.

The result from Pairwise Granger Causality Test shows that both RGDP and SUBS Granger cause each other. This implies that any intervention on RGDP directly influences SUBS, and vice versa. Perhaps, any governmental policy on fish farming can affect agricultural sector and other sectors of the Nigerian Economy. This finding confirms the result of Ekpo [1] study which showed that Nigeria has been pursuing dependent industrialization, poorly conceived industrial policies and casual policy implementation.

Following from the model specification data analyses result estimates and findings, it is concluded that robust industrial policy on fish farming enhances sustainable economic growth in Nigeria. Therefore, there is a significant positive relationship between subsidies on fresh farming real gross domestic product. Consequently, it is recommended that industrial policy on fish farming should consider in detail the long run nexus between fish farming subsector and other sectors of the Nigerian Economy.

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