Sustained Development of Nigeria: An Assessment of the Impact of Investment Drive in the Agricultural Sector of the Economy.

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Abstract
Development essentially connotes the capacity and willingness of Man to overcome the harshness of nature in his favour. After independence in 1960, Agriculture was the mainstay of the Nigerian economy. Agriculture contributed over 90% of GDP and was the sole export earner. The discovery of oil in 1956, followed by the Oil boom of the 1970s, relegated the Agricultural Sector in its importance as the mainstay of the Nigerian economy. The over-dependence on Oil revenue and the resultant mismanagement of the Nigerian economy led to a host of problems. First, the growth rate in national income (nominal GDP) in the last few years had declined from 9.1% in 2011 to 4.4% in 2013. The non-oil sectors contributed only 25% of total revenue in 2012 and the economy is import-dependent with imports reaching N15.79 trillion in 2013 in nominal terms. Unemployment rate is high, reaching 27.4% in 2012 with the inflation rate as high reaching an all time high of 76.7% in 1994. The problem of the Nigerian economy is exacerbated by exchange rate problem resulting in sliding (depreciating) value of the naira due to the introduction of the Structural Adjustment Programme (SAP) in 1986. The present state of the economy is dismal with poverty, unemployment, inflation, insecurity and corruption being rife in the country. Some scholars and popular opinion have argued that the past neglect of the Agricultural sector was inimical to growth and development and that investment in Agriculture is the panacea to the Nigerian problem. This study is an attempt to test the above hypothesis. A 50% increase in investment intervention in 2026 in all the Agricultural sub-sectors was proposed and tested using total differential modeling approach and Markov Chains analysis and the result revealed and indicated that even though Agriculture cannot return to being the mainstay of the Nigerian economy, it will boost the growth and development of the Nigerian economy considerably and regain some of its lost glory and potentials, especially if developed and managed along modernized lines.

Key words: *Welfare Indicators, Inflation, inflation rate, Unemployment rate, economy, total differential modeling approach, Markov Chains, Growth and Development.*

INTRODUCTION

Agricultural development is one of the most powerful tools to end extreme poverty, boost shared prosperity, and feed a projected 10 billion people by 2050 (Wikipedia). Agriculture plays the role of providing employment, income, food, raw materials, and foreign exchange earnings for people (Investopedia). Agriculture remains the largest sector in Nigeria contributing an average of 24% to the nation's GDP over some past years (2013 – 2019). In addition, the sector employs more than 36% of the country's labour force, a feat which ranks the sector as the largest employer of labour in the country. It is however a misnomer to take agricultural development as a short-term initiative. Rather, it is a long-term obligation.

After independence in 1960, Agriculture was the mainstay of the Nigeria economy as it contributed over 90% of GDP and was the sole export earner. However, the discovery of oil in 1956 in Nigeria, followed by the Oil boom of the 1970s relegated the Agricultural Sector in its importance as the mainstay of the Nigerian economy. The over- dependence on Oil revenue and the resultant mismanagement of the Nigerian economy led to a host of problems. The growth rate in national income (nominal GDP) in the last few years had declined from 9.1% in 2011 to 4.4% in 2013. The non-oil sectors contributed only 25% of total revenue in 2012 and the economy is import dependent with imports reaching N15.79 trillion in 2013 in nominal terms. Unemployment rate is high, reaching 27.4% in 2012 with the inflation rate as high reaching an all time high of 76.7% in 1994. The problem of the Nigerian economy is exacerbated by exchange rate problem resulting in sliding (depreciating) value of the naira due to the introduction of the Structural Adjustment Programme (SAP) in 1986 (Aruofor, 2017). Agriculture contributed 19.63% to nominal GDP in the first quarter of 2023. The present state of the economy is dismal with poverty, unemployment, inflation, insecurity and corruption being rife in the country (Aruofor and Ogbeide, 2025). Scholars have argued that the past neglect of the Agricultural sector was inimical to growth and development and that investment in Agriculture is the panacea to the Nigerian problem. This study is an attempt to test the above hypothesis. A 50% increase in investment intervention in 2026 in all the Agricultural sub-sectors has been proposed and tested using Markov Chains analysis.

OBJECTIVES OF THE STUDY

The objectives of the paper among others, include:

1. To use a comprehensive model of the Nigerian economy to analyze the impact of investment in the Agricultural Sector on the Nigerian economy as a whole, using the total differential systems modeling and analysis approach (ecostatometrics).
2. To analyze the impact, implications and consequences of increasing investment by 50% in the Agricultural Sector on the Nigerian economy as a whole, *a'la* the total differential systems modeling and analysis approach (ecostatometrics) and Markov Chains Analysis.
3. To predict the outlook of the Nigeria economy to year 2035 with a quantum leap in investment in the Agricultural Sector by 2026.
4. In particular, to determine the effects on incomes and consumption, sectoral outputs, aggregate demand and supply, investment, inflation, employment, standard of living, poverty, purchasing power, among others with a view to determine if Agriculture can return to being the mainstay of the Nigeria economy; and
5. Conclude and make some recommendations.

The article is therefore divided into five parts. Part I is the introduction and states the objectives

of the study. Part II is the literature review while Part III is the methodology. In Part IV, the results of the analyses are presented and discussed and Part V concludes the study and makes some recommendations.

LITERATURE REVIEW

To Dudley Seers (Researchgate, 2020), Development is viewed in terms of knowledge of nature from where technology springs forth and the storage of values. He endorses the reduction of deprivation in all ramifications, in societies. He posed three crucial questions to determine the developmental level of any polity, namely,

a. What is the food situation, that is, poverty level?
b. What is the unemployment rate? and
c. What is the inequality rate?

Most critical of the three questions is the food situation. No wonder therefore that the concept of food security is both of local and international recognition. When a country, for instance, Nigeria cannot feed its population, how can it possibly dream of export earnings from that sector?

While economic development is not equal to Development, it is however a critical part of it, reflecting the productive base of the country upon which the political superstructure is built.

Agriculture first began around 12,000 years ago and was considered a revolution in farming culture. Before its introduction, most food supplies were derived from hunting and gathering, which required a nomadic lifestyle to follow herds and natural wildlife. The Federal Ministry of Agriculture and Rural Development (FMARD), was established in 1966 with a clear vision to ensure food security and promote agricultural sustainability in Nigeria. The Ministry had the responsibility of optimizing agriculture and integrating rural development for the transformation of the Nigerian economy, with a view to attaining food security and positioning Nigeria as a net food exporter for socio-economic development. Agriculture was broadly divided into four sub-sectors in Nigeria; comprising crop production, fishing, livestock and forestry. Crop production remained the largest segment and it accounts for about 87.6% of the sector's total output.

Recently, The Federal Ministry of Agriculture and Rural Development (FMARD) has metamorphosed into The Federal Ministry of Agriculture and Food Security (FMAFS). The new agricultural policy in Nigeria, include: The achievement of self-sufficiency in basic food supply and the attainment of food security; Increased production of agricultural raw materials for industries; Increased production and processing of export crops, using improved production and processing technologies and generating gainful employment for Nigerian citizens.

The Federal Department of Forestry on the other hand now belongs to the Federal Ministry of Environment. Historically, forestry development in Nigeria began with reservation of forest lands to manage, maintain forest reserves and provide a supply of timber. This was followed by exploitation of forest resources to meet both export and burgeoning local demand as well as to earn much needed foreign exchange. The forests play important roles in the amelioration of weather pattern and climate, provision of clean air, protection of biological diversity, protection of soil and food crops and carbon sequestration. The greatest contribution of Forests is through its protective environmental functions such as the maintenance and restoration of soil fertility and soil improvement, erosion control and maintenance of biodiversity. Indeed, Sustainable Development Goal 15 aims to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss”.

The importance of forest to Nigeria economy cannot be overemphasized as the forest sector contributes about 2.5% to the Gross Domestic Product and provides employment for over 5 million people through the supply of timber and non-timber products. Before now the Forestry sub-sector had been a very reliable and dependable foreign exchange earner for Nigeria through Timber exports. Indeed, the forests have benefitted the Nigerian economy in areas relating to employment, exports, foreign exchange earnings and creation of industries. Modern forestry generally embraces a broad range of concerns, in what is known as multiple-use management, including: the provision of timber, fuel wood, wildlife habitat, natural water quality management, recreation, landscape and community protection, employment, aesthetically appealing landscapes, biodiversity among others. However, Forestry in Nigeria is on the concurrent list with the Forest Estate of Nigeria under State Government's control.

Indeed, Agriculture as an indigenous occupation in Nigeria has gone through various phases of development. This development spans three phases from pre-colonial, post-colonial and development till date. Accordingly, agriculture contributes to the economic development of a nation through channels which include:

(i) Provision of food and therefore the reduction of imports.
(ii) Agricultural exports and the provision of foreign exchange for development.
(iii) Increased food production which helps to keep down the rate of inflation.
(iv) Provision of raw materials for industrial development.
(v) Creation of employment opportunities to a large percentage of population.

The practice of Agriculture in Nigeria has been bedeviled by a host of problems which has been summarized to include:

(i) Poor Agricultural Infrastructure.
(ii) Climate Change.
(iii) Pests and Diseases.
(iv) Inefficient Agricultural Practices.
(v) Inadequate Access to Credit and Finance.
(vi) Deforestation.

The practice of Agriculture in Nigeria has mainly been confined to subsistence farming with little prospects of agricultural mechanization, which is stalled by shortage of capital, land tenure, small farm holding and fragmented land, poor infrastructural facilities, poor attitudes toward adoption of new innovation and non-availability of storage facilities (Internet).

Also, Poor transportation system has been identified in the literature as a constraint to agricultural practice in Nigeria. Indeed, presences of bad roads or total lack of it makes distribution of product to markets very difficult and this leads to wastage. Among the problems identified are access to banking services in rural communities, lack of acceptable collateral/ security, perceived high agricultural risk, lack of access to credit information, high cost of credit administration, access to market, infrastructural challenges and subsistence nature of farming as well as insecurity to life and property.

In an attempt to alleviate poverty, the interface between Agricultural Crop Sub-sector and the Forestry Sub-sector is widening mainly due to subsistence farming and shifting cultivation leading to deforestation. The solutions to the problems caused by deforestation are reforestation and

afforestation programs which will help restore ecosystem services, promote biodiversity, and sequester carbon. Reforestation involves planting trees in deforested or degraded areas, while afforestation establishes new forests in previously not forested regions (Aruofor, 2000 and 2009).

Government in Nigeria draw up policies and programmes, make regulations for those concerned with agricultural development, grant loans or credit facilities and subsidy, finance research, establish farm settlements and supply vaccine and quarantine services. It will appear that the above role of Government is inadequate to say the least and Government will need to do more if the future prospects of Agriculture in Nigeria is to improve. Indeed, the future of farming lies at the intersection of technology, innovation and sustainability. Precision agriculture, vertical farming, genetic engineering, sustainable practices, robotics and block chain are more than just buzzwords-they are transformative forces reshaping the agricultural landscape.

METHODOLOGY:

The approach used in this study is divided into two sections. The first is termed the total differential modeling approach (see Aruofor, 2001, 2004, 2007, 2013, 2017 and 2020) also Aruofor and Ogbeide, (2017 and 2022) and Aruofor and Okungbowa, (2018). The total differential modeling approach (ecostatometrics) is the reward of a personal commitment in research that dates back to 1976 by the author. The research results has been published in Aruofor (2020). It assumes that in the real world situation, every economic variable or subsystem depends on and is depended upon by other variables or subsystems.

A schematic representation of the above theory is presented in Fig. 1.

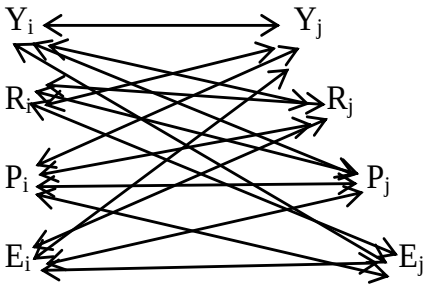

Fig: 1: The True Socio – Economic Causal Chain

Y = Production variables;
R = Primary Factors;
P = Policy instruments;
E = Environmental variables.

This theory was first mooted by Walras as early as 1874 even though it was not developed beyond the conceptual stage. The true practical empirical systems total differential modeling approach (Ecostatometrics), was achieved by Aruofor (2017) when Professor Rex Oforitse Aruofor delivered his inaugural lecture, titled "Economic Systems Engineering, Poverty, Unemployment

and Under-Development: A Quest for Solution and Imperatives for Developing the Nigerian Economy" at Benson Idahosa University, Benin City, Nigeria on March 6. 2017. Since then it has crystallized into academic publications (see Aruofor, 2017, 2019 and 2020), Aruofor and Okungbowa, (2018) and also Aruofor and Ogbeide, (2017, 2022a, 2022b, 2023a, 2023a, 2024a, 2024b, 2024c, 2024d, 2024e, 2024f and 2025). The total differential modeling approach relies on statistically significant multiple simple linear regression coefficients as opposed to multiple linear regression parameters. It is a blend between the traditional Input Output Analysis and Econometrics and assumes the structure of programming models. The theory behind it is that an economy is not truly dynamic but only dynamically static. It is the change that occurs in an economy in the current year(t) that determines where the economy (the endogenous variables) will be at the end of the current year (t) and not in the next year(t+1). This model is a departure from the normal econometric approach, where the structure of the economy is determined by combinations of economic theories. The true structure of an economy is so complex that economic theory will be self defeating (see Duesenberry et al , 1965 and Gordon, 1968). ***Indeed, Adeyoju (1975) had rightly noted that " the unstable nature of population and its growth, national income and its distribution, investment capacity, employment opportunities, balance of payments and raw material base often lead to conflicting theories of economic development".*** We therefore do not need other elaborate theories to explain the working of an economy.

If we can estimate all the independent relationships among the variables of the economy taken two at a time, (depending on whether they are statistically significant) and classify the significant coefficients into a matrix, ***B***, according to whether they are endogenous or exogenous, then we would have in matrix notation,

$$Y = BY + CX + A + U$$
$$\therefore [I - B]Y = CX + A + U$$
$$Y = [I - B]^{-1}CX + [I - B]^{-1}A + [I - B]^{-1}U$$
$$\frac{dY}{dX} = [I - B]^{-1}C$$
$$\therefore dY = [I - B]^{-1}CdX$$
$$\textbf{i.e}\ \Delta Y = [I - B]^{-1}C\Delta X$$
$$\therefore Y_t = [I - B]^{-1}CX_t - [I - B]^{-1}CX_{t-1} + Y_{t-1}$$

Where, *Y*=endogenous and *X*=exogenous variables. The fact that the relationships are not estimated by multiple linear regressions means that the issue of simultaneous equation bias is by-passed and all the estimation difficulties, including multi-collinearity associated with econometric multiple linear regression, which renders it inconsistent and therefore non-operational, are also by-passed. Moreover, no complicated econometric and economic theories are needed to proceed. It is then possible to view the whole economy at a glance and the structure of the economy is determined automatically.

Thus, given a simple linear regression between two variables, X *and* Y, we proceed as follows and state the equation as below:

$$Y = a + bX + u$$

Where Y = the dependent variable

X = the independent variable
$a \& b$ = parameters
u = error term.

The estimate of the parameters $a \& b$, is achieved by the application of least squares to the data on the variables, with a view to minimize the sum of squared deviations around the regression line (Koutsoyiannis, 1977 and Aruofor, 2001 and 2020).

The parameters can be estimated by solving the following normal equations:

$$a\sum 1 + b\sum X = \sum Y \qquad (1)$$

$$a\sum X + b\sum X^2 = \sum XY \qquad (2)$$

This was the basic procedure adopted and the coefficients were estimated by means of a computer software, ESM-Lab 4.4, that tested for statistical significance at the 5% level of significance using the asymptotic t-ratios. For this study, the data were assembled from the Central Bank Statistical Bulletin (CBN, 2017, 2018, 2019 and 2021) and Aruofor, (2017) and Aruofor and Ogbeide (2019, 2024). The time series ranged from 1981 to 2021. The list of variables consists of ninety variables, comprising eighty six (86) endogenous variables followed by four (4) exogenous variables (see fig 2).

Fig. 2: LEGEND OF NIGERIAN ECONOMY - AGRICULTURE INVESTMENT ON WELFARE

S/no.	ACRONYMS	ACTIVITY	UNIT
1	NGDP(t)	GDP at Current Basic Prices	N million
2	AGGDD	Aggregate Demand	N million
3	AGGSS	Aggregate Supply	N million
4	INVST(t)	Investment	N million
5	INDUST(t)	2. Industry	N million
6	MANUFC(t	(c) Manufacturing	N million
7	OILREFIN	OIL Refining	N million
8	ELECTSS(t)	3. Electricity,Gas,Steam & Air conditioner	N million
9	WATER(t)	4. Water supply, sewage, waste Mang.	N million
10	CONSTN(t)	5. Construction	N million
11	SERVCS(t)	C. SERVICES	N million
12	TRADE(t)	1. Trade	N million
13	EDUCATN(	11. Education	N million
14	HLT&SOC	12. Human Health & Social Services	N million
15	DISPINC(t)	Disposable Income	N million
16	REALINC(t)	Real Income	N million
17	REALGDP(t	Real GDP	N million
18	GROWTRT	Growth rate	%
19	GROWTH(t	Growth	N million
20	CONS(t)	Consumption	N million
21	CAPITAL(t)	Capital accumulation	N million
22	FDI(t)	Foreign Direct Investment	N million
23	CPI(t)	Consumer Price Index	
24	INFLTD(t)	Inflation Dummy = 1 when CPI increases, otherwise = 0	
25	INFLATN(t)	Inflation = INFTD X CPI	
26	INFLTRT(t)	Inflation Rate	%
27	UNEMPL(t	Unemployment Rate	%
28	LABCOMP	Labor Force Compensation	N million
29	EMPLMNT	Employment	Million
30	PRDTIVTY	Productivity	
31	LPROVITY	Labor Productivity	
32	AVWAGE	Average Wage Rate	Naira
33	DDEMENT	Demand for Employment	
34	EMDDPR	Employment Demand Pressure	
35	POOR(t)	Poor	Million
36	EXTPOOR(t	Extremely (Absolute) Poor	Million
37	POVRT(t)	Poverty Rate	%
38	SLAVERY	Slavery	Naira
39	SAVINGS(t	Savings	N million
40	BOT(t)	Balance of trade	N million
41	BOP(t)	Balance of payments	N million
42	EXTRES(t)	External reserve	N million
43	DBTBDN(t)	Debt burden or Bondage	
44	OILREV(t)	Oil revenue	N million
45	NOILREV(t	Non-oil revenue	N million
46	CORPTD(t)	Corruption Dummy = 1 when DDMOPR increases, otherwise = 0	
47	CORRPTN(	Corruption= CORPTD X DDMOPR.	

Fig. 2: LEGEND OF NIGERIAN ECONOMY - AGRICULTURE INVESTMENT ON WELFARE CONT'D

S/no.	ACRONYMS	ACTIVITY	UNIT
48	DDMONY(t	Demand for money	N million
49	DDMOPR(t	Demand for money pressure	
50	DEMOCY(t	Dummy Variable 1.0 for New Democracy and 0 elsewhere.	
51	CORDEM(t	Equals DEMOCY x CORRPTN	
52	PWLFARE	Personal Welfare (Per capita income)	Naira
53	STDOLIVN	Standard of Living	
54	PUPWER	Purchasing Power	
55	FODSRITY	Food Security	
56	HLTCARE	Health Care	
57	DDHCARE	Demand for Health Care	
58	HCRDDPR	Health Care Demand Pressure	
59	HRESDEV	Human Resource Development	
60	DDEDUC	Demand for Education	
61	EDUDDPR	Education Demand Pressure	
62	WEALTH	National Wealth	
63	PWEALTH	Personal Wealth	
64	IMPDPEN	Import Dependence	
65	DDIMP	Demand for Imports	
66	PENCIMP	Penchant for Imports	
67	TIME(t)	Time	
68	EXCHRTRP	Exchange rate (Relative poverty)	N million
69	POP(t)	Population	Million
70	IMPORT(t)	Imports	N million
71	XPOTOIL(t	Oil export	N million
72	XPTNOIL(t	Non-oil export	N million
73	DODBT(t)	Domestic debts	N million
74	EXTDBT	External debts	$ million
75	GEXPDN(t)	Government expenditure	N million
76	PRIMELR(t	Primary lending rate	%
77	INTSAV(t)	Interest rate	%
78	MONYSS(t	Money supply	N million
79	TAX(t)	Tax	N million
80	ACGSC	Agricultural Credit Guarantee Scheme	N million
81	DFUELP(t)	Domestic fuel price	N/Litre
82	CROPS	Agriculture Crops	N million
83	LIVESTOK	Livestock	N million
84	FORESTY	Forestry	N million
85	FISHRY	Fishery	N million
86	AGRICSEC	Agricultural Sector	N million
	EXOGENOUS VARIABLES		
87	INVCROPS	Investment in Agriculture Crops	N million
88	INVLSTOI	Investment in Livestock	N million
89	INVFOR	Investment in Forestry	N million
90	INVFISHY	Investment in Fishery	N million

THE CONSTRUCTION OF THE COMPOSIT MODEL OF NIGERIAN ECONOMY.

The Nigeria model consists of the primary sectors comprising of the agricultural sector, the manufacturing sector, industry, construction, transport, services, education and health; and other real sectors including national income, consumption and investment, population, labor and employment, foreign sector, economic indicators and policy instruments. Together, they comprise the endogenous variables of the model, while the exogenous variable consist of investment in Agricultural subsectors.

THE POPULATION MODEL AND DERIVATION OF VARIABLES

Extant models of the Nigerian economy lacked data on total active work force, employment, etc. These are major defects and according to Stolper, (1966), the development planner cannot afford to assume his facts; he must find them as best as he can. We therefore proceeded as follows:
The population of Nigeria is growing at approximately 3% per year. Given this fact, we back cast the population at 3% discount rate to 1901 and projected it to 2021 assuming that the population has been adjusted for deaths.

1) Going by international standard, children are those people of ages Sixteen (16) years and below and was derived as:
   Children = Pop_t - Pop_{t-16}
2) Population of people eighty years and below was derived as:
   Pop_t– Pop_{t-80}
3) Estimated potential active work force (EPAWF) = Pop_t – Pop_{t-80} – Children.
4) Population of old people equals the residual.
5) Unemployed work force = EPAWF x Unemployment rate.
6) Employed work force (EMPWF) = EPAWF - Unemployed work force.
7) Employment = $\Delta EMPWF$
8) Average wage rate = $Labor \quad Force \quad Compensation/EMPWF$
9) National Productivity = NGDP/Labor force compensation
10) Estimated potential active work force (EPAWF) = Pop_t – Pop_{t-80} – Children.
11) opulation of old people equals the residual.
12) Unemployed work force = EPAWF x Unemployment rate.
13) Employed work force (EMPWF) = EPAWF - Unemployed work force.
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18) Estimated potential active work force (EPAWF) = Pop_t – Pop_{t-80} – Children.
19) Population of old people equals the residual.
20) Unemployed work force = EPAWF x Unemployment rate.
21) Employed work force (EMPWF) = EPAWF - Unemployed work force.
22) Employment = $\Delta EMPWF$

23) Average wage rate = $Labor\ \ Force\ \ Compensation/EMPWF$

24) National Productivity = NGDP/Labor force compensation

25) Labor Productivity = NGDP/ EMPWF
26) Demand for Employment = $\Delta EMPWF_{-1}$
27) Demand Pressure for Employment = $(\Delta EMPWF_{-1})$/Unemployed Work Force
28) Demand for Health care = $\Delta HGDP_{-1}$
29) Demand Pressure for Health care = $\Delta HGDP_{-1}/Pop$
30) Demand for Education = $\Delta EdGDP_{-1}$
31) Demand Pressure for Education = $\Delta EdGDP_{-1}/Pop$
32) Demand for Imports = $\Delta IMPOTS_{-1}$
18) Penchant for Imports = $\Delta IMPOTS_{-1}/Pop$
19) Import Dependence = $IMPOTS/NGDP$
20) Slavery = EXTDEBT/Pop

Some other variables were derived from existing data as follows:

- $AGGDD = (\Delta GDP)_{-1}$
- $AGGSS = \Delta GDP$
- $AGGDDPR = (\Delta GDP)_{-1}/POP$
- $GROWT\ \ RATE = ((\Delta GDP)/GDP_t)*100)$
- $DINCOM = GDP - TAX$
- $COLIVN = (CONS_{t-1}((1+(INFRT_t/100)))$
- $POOR = POP/((RGDP/EXCHRT)*\$720)$
- $ABPOOR = POP/((RGDP/EXCHRT)*\$360)$
- $RICH = POP - (POOR + ABPOOR)$
- $RPOVRT = (1-((RGDP/EXCHRT)/RGDP)*100)$
- $DDMONY = (\Delta MONYSS)_{-1}$
- $DDMOPR = ((\Delta MONYSS)_{-1}/POP)$
- $IMPDD = (\Delta IMPORT)_{-1}$
- $IMPDDPR = ((\Delta IMPORT)_{-1}/POP)$
- $XPOTDD = (\Delta XPORT)_{-1}$
- $DBTBDN = (EXDBT/(GDP/EXCHRT))$
- $INVEDU = (INVSTNENT/NGDP)*EDUGDP$
- $INVIND = (INVSTNENT/NGDP)*INDGD$
- *SECTORAL INVESTMENTS =INVESTMENT RATIO *SECTORAL GDP.*

However the 2001 and 2006 census of the Nigerian economy by the National Bureau of Statistics was used to adapt the population of male and female, as well as urban and rural populations in Nigeria according to their shares.

MARKOV CHAINS ANALYSIS

The second section is Markov Chains analysis. An economy and indeed the world consists of variables interacting in a dynamic fashion. These variables include people (i.e. children, the work force, employed and unemployed, old people), businesses, vocations, sectors, governments etc interacting and changing in space and time. Even the policies they implement and the policy instrument they use also change in time and space and the ability to manage these changes tend to depend on our ability not only to understand them but to be able to analyze and interpret them.

Markov Chains Analysis provides us with such a tool for analyzing and understanding these changes and ecostatometrics alias total differential modeling approach provides the enabling mechanisms for capturing the changes. Markov Chains Analyses can be approached in terms of flows which is the original concept but also can be approached in terms of change or a combination of both which is a new concept. However, the concept is versatile and depends on how we define our variables in the Markov Chains, especially in the estimation and interpretation of the transition matrix, which is vital to the procedure.

In the above connection, our variables can be defined as the probability of being in one state in period ($t+1$), when another state changes in period (t); or just the probability that a variable will change in period ($t+1$) when another variable changes in period (t) or both. Given the above definitions, it is worthy of note that Markov Chains analysis deals only with probabilities which do not admit of negative values; but an economy interacts in both negative and positive numbers. This impasse can be overcome by reducing the system to conform (see Aruofor, 2003 and 2020). This was the methodology applied in this study. For the Markov Chains, a 50% increase on sectoral investment over that of 2025 was assumed across board so that the policy intervention for 2026 was N19.85 trillion investment in Crops sub-sector, N1.24 trillion investment in Livestock sub-sector, N166 billion investment in Forestry sub-sector and N1.123 trillion investment in Fishery sub-sector. A computer programme has been developed by the author, Professor Aruofor, Rex Oforitse and Mr. Omoruyi, Kingsley Igbinoba of Microcraft Nigeria Ltd and incorporated into ESM Lab and can be assessed on the Internet as esmlab.ng.com and ran as administrator.

RESULTS AND DISCUSSION

THE IMPACT OF AGRICULTURAL CROPS SUB-SECTOR INVESTMENT ON THE NIGERIA ECONOMY.

The Agricultural Crops sub-sector is the largest in Nigeria Agriculture. The impact of investment in the sub-sector is positive on nominal income causing it to increase by N0.559327 million. In addition, Investment, Manufacturing, Oil refining and Construction will also increase by N1.889679 million, N0.00538 million, N0.016804 million and N0.008886 million respectively. Disposable income will also increase by N0.285521 million. The investment in the crop sub-sector will increase the growth rate by 2.85e-06% which will result in a growth of N1.17e+07 million. Capital will increase by N0.032867 million, with foreign direct investment increasing by N0.005181 million.

Table 1a: SHORT TERM IMPACT MULTIPLIERS.

S/no		INVCROP(t	INVLSTOK(	INVFOR(t)	INVFISHY(t)
1	NGDP(t)	0.559327	-22.1665	-166.189	46.65479
2	AGGDD	-0.26457	-12.7895	-96.1126	35.58257
3	AGGSS	-0.16284	13.80565	103.7487	-2.16458
4	INVST(t)	1.889679	34.86448	264.9267	25.83712
5	INDUST(t)	-0.13535	-4.67963	-35.8694	-13.4635
6	MANUFC(t	0.005382	1.739542	13.34591	-0.2487
7	OILREFIN	0.016804	0.188013	1.436563	0.18196
8	ELECTSS(t)	-0.00341	-0.05974	-0.44601	-0.08307
9	WATER(t)	-0.00113	-0.03741	-0.28447	-0.016
10	CONSTN(t)	0.008886	0.212907	1.91646	4.769093
11	SERVCS(t)	-0.24871	11.88298	88.60833	-31.0985
12	TRADE(t)	-0.03403	5.321166	39.82394	-10.1925
13	EDUCATN(	-0.01642	-0.64781	-4.93801	-1.08777
14	HLT&SOC	-0.00073	0.104817	0.802325	-0.0317
15	DISPINC(t)	0.285521	35.50992	264.8727	-77.8856
16	REALINC(t)	-0.00857	-0.18064	-1.37217	0.127847
17	REALGDP(t	-0.11423	11.34256	86.32807	9.074451
18	GROWTRT(	2.85E-06	5.41E-05	0.000412	5.93E-06
19	GROWTH(t	1.17E-07	9.52E-07	7.16E-06	-6.3E-06
20	CONS(t)	-0.85954	-21.9935	-168.881	-9.28969
21	CAPITAL(t)	0.032867	3.145452	24.98355	22.12855
22	FDI(t)	0.005181	0.358262	2.795271	2.206205
23	CPI(t)	1.08E-07	6.69E-05	0.0005	-8E-05
24	INFLTD(t)	4.54E-09	3.27E-07	2.52E-06	1.06E-06
25	INFLATN(t)	9.06E-07	8.37E-05	0.000627	-0.00017
26	INFLTRT(t)	4.61E-06	8.89E-05	0.000677	3.54E-05
27	UNEMPL(t)	9.29E-07	1.78E-05	0.000134	-1.3E-05
28	LABCOMP	-0.8001	-13.0365	-98.966	8.161566
29	EMPLMNT	-5.4E-07	-6.3E-07	-6.3E-06	-4E-05
30	PRDTIVTY	-2.9E-07	-1.7E-05	-0.00013	-8.3E-05
31	LPROVITY	0.022008	0.897955	6.735364	-1.56365
32	AVWAGE	-0.00502	-0.04471	-0.34785	-0.15563
33	DDEMENT	6.3E-08	4.58E-07	3.67E-06	-2.1E-06
34	EMDDPR	-3.8E-08	-1.2E-06	-9.2E-06	-2.8E-06
35	POOR(t)	4.52E-06	9.36E-05	0.000711	6.87E-06
36	EXTPOOR(t	-5.5E-07	-3.2E-05	-0.00024	7.61E-05
37	POVRT(t)	7.08E-08	2.03E-06	1.55E-05	2.96E-06
38	SLAVERY	-0.00247	-0.0591	-0.4537	-0.14059
39	SAVINGS(t)	0.071965	-0.27201	-2.11712	-5.42896
40	BOT(t)	0.123933	1.82716	13.63696	-5.82893
41	BOP(t)	-0.03969	2.303746	17.86645	9.510135
42	EXTRES(t)	0.000433	0.014515	0.10816	-0.02882
43	DBTBDN(t)	5.38E-09	-6E-09	8.34E-09	8.91E-07
44	OILREV(t)	-0.04188	0.279547	1.95305	-2.33983
45	NOILREV(t)	0.013951	0.008095	0.053036	0.197698
46	CORPTD(t)	-4.9E-09	-5.3E-07	-4.1E-06	-2.5E-06
47	CORRPTN(t	-2.9E-05	0.007025	0.050234	0.004993

Table 1b: SHORT TERM IMPACT MULTIPLIERS.

S/no		INVCROP(t	INVLSTOK(	INVFOR(t)	INVFISHY(t
48	DDMONY(t	-0.1698	0.459989	3.170776	1.181059
49	DDMOPR(t	0.000853	0.020199	0.153071	0.047195
50	DEMOCY(t)	4.7E-09	-3.1E-07	-2.3E-06	2.91E-07
51	CORDEM(t	-3.1E-05	0.00711	0.050864	0.005224
52	PWLFARE	0.009812	0.491012	3.680107	-0.71565
53	STDOLIVN	-0.0067	0.111296	0.820165	-0.36426
54	PUPWER	5.28E-05	0.000498	0.003782	0.000952
55	FODSRITY	-0.00037	0.031264	0.23361	-0.08547
56	HLTCARE	-8.2E-06	-0.00016	-0.00119	0.000183
57	DDHCARE	-0.00226	-0.08069	-0.61001	-0.06751
58	HCRDDPR	-3.6E-06	-0.0002	-0.00152	-0.00052
59	HRESDEV	-7.4E-05	-0.0021	-0.01603	-0.00651
60	DDEDUC	-0.00992	-0.13563	-1.02826	-0.08202
61	EDUDDPR	-4.3E-05	7.15E-05	0.000583	0.001056
62	WEALTH	-4.4E-10	1.69E-08	1.2E-07	-1.5E-07
63	PWEALTH	0.000635	0.01412	0.107032	0.034703
64	IMPDPEN	-9.4E-09	-2.8E-07	-2.2E-06	-2.7E-07
65	DDIMP	0.364593	7.038368	52.98466	-4.00419
66	PENCIMP	0.001134	0.014066	0.104049	-0.0507
67	TIME(t)	-2.6E-07	1.28E-06	9.37E-06	-6.7E-06
68	EXCHRTRP	-1.9E-06	-1.5E-05	-0.00011	6.25E-05
69	POP(t)	-1.1E-06	-1.9E-06	-1.6E-05	-1.7E-05
70	IMPORT(t)	-0.00122	1.347756	10.55708	2.520839
71	XPOTOIL(t)	0.023563	-0.53797	-3.75389	8.71266
72	XPTNOIL(t)	0.025344	0.393908	2.965481	0.940011
73	DODBT(t)	-0.07596	-3.22227	-24.5644	-5.56229
74	EXTDBT	-0.13312	-0.74724	-5.53846	-1.07067
75	GEXPDN(t)	0.014809	2.129127	15.78502	-7.58039
76	PRIMELR(t)	-2.6E-08	4.81E-06	3.72E-05	1.81E-05
77	INTSAV(t)	1.8E-07	3.14E-06	2.4E-05	-1.4E-05
78	MONYSS(t)	-0.01283	-1.19631	-7.65816	30.17431
79	TAX(t)	-0.03177	-5.97732	-44.539	12.92673
80	ACGSC	-0.06733	1.452169	10.64154	4.90039
81	DFUELP(t)	1.8E-06	0.000102	0.000767	-0.0002
82	CROPS	-0.00773	-4.35331	-32.8764	10.84987
83	LIVESTOK	0.018034	-0.41937	-3.13587	1.09889
84	FORESTY	0.002552	-0.06086	-0.45544	0.141121
85	FISHRY	-0.01782	-0.37304	-2.8438	0.170118
86	AGRICSEC	-0.00784	-4.83902	-36.5507	12.4042

However, inflation rate and unemployment rate will increase by 4.61e-06% and 9.29e-07% respectively though the reason for this is not clear. In addition, non-oil revenue will increase by N0.013951 million and corruption will reduce (see table 1a and 1b for details). Per capita income will increase by N0.009812 million, while purchasing power will increase by N5.28e-05 per caput. Savings i.e. personal wealth, will increase by N0.000615 million/caput. Oil export and non-oil exports will increase by N0.23563 million and N0.025344million respectively but import dependence will still be high.

THE IMPACT OF LIVESTOCK SUB-SECTOR INVESTMENT ON THE NIGERIAN ECONOMY.

The impact will be positive on aggregate supply and investment causing them to increase by N13.80565 million and N34.86448 million respectively. Manufacturing, Oil refining, Construction, Services and Trade will also be impacted upon, causing them to increase by N1.739542 million, N0.188013 million, N0.212907 million, N11.88298 million and N5.0321166 million respectively.

Disposable income and real output will also increase by N35.50992 million and N11.34256 million respectively. The economy will also grow by N9.52e-07 million with growth rate increasing by 5.41e-05%. Capital and Foreign direct investment will increase by N3.145452 million and N0.358262 million respectively. Regrettably, the Poor will increase by 9.36e-05 million and inflation and unemployment will also rise as can be inferred from tables 1a and 1b. However, balance of payments will improve and non-oil revenue will increase by N0.008095 million. Personal welfare, standard of living and purchasing power will experience positive increases but import dependence will still be high.

THE IMPACT OF FORESTRY SUB-SECTOR INVESTMENT ON THE NIGERIAN ECONOMY.

Investment in the Forestry sub-sector will have a very profound impact on Aggregate supply, Investment, Manufacturing, Construction, Services and Trade causing them to increase by N103.7487 million, N264.9267 million, N13.34591 million, N1.436563 million, N1.91646 million, N88.60833 million and N39.82398 million respectively. This must be the result of the profound forward and backward linkages Forestry has with the rest of the Nigeria economy.

Disposable income will increase by N264.8727 million while real output will increase by N86.32807 million. The economy will record a growth of N7.16e-06 million with growth rate increasing by 0.000412%. The other details are as contained in Tables 1a and 1b.

THE IMPACT OF FISHERY SUB-SECTOR INVESTMENT ON THE NIGERIAN ECONOMY.

Investment in Fishery has a profound impact nominal income and aggregate demand to the tune of N46.65479 million and N35.58257 million respectively. It will also promote Investment to the tune of N25.83712 million. Unlike the rest, investment in Fishery will cause real income to increase by N0.127847 million. Real output will also increase by N9.074451 million.

The growth rate will increase by 5.93e-06% with Capital and Foreign direct investment increasing by N22.12855 million and N2.206205 million respectively. However, the Poor and Absolute Poor as well as the poverty rate will increase as can be inferred from Tables 1a and 1b. In any case, investment in Fishery will promote the balance of payments by N9.510135 million and increase non-oil revenue by N0.197698 million. Unlike the rest, investment in Fishery has the largest impact on the Agricultural Sector causing it to increase by N12.4042 million. It will also improve the purchasing power of Nigerians as well as promote oil and non-oil exports.

ANALYSIS OF THE TRANSITION MATRIX OF THE NIGERIA ECONOMY.
THE DYNAMIC IMPACT OF AGRICULTURAL SECTOR INVESTMENT.

Table 2 shows the dynamic impact of Agricultural sector investment on the rest of the economy. It is easy to trace the links to the other variables of the Nigeria economy.

Table 2: PARTIAL TRANSITION MATRIX

	NGDP(t)	AGGDD	AGGSS	INVST(t)	INDUST(t)	MANUFC(t	OILREFIN	ELECTSS(t)	WATER(t)	CONSTN(t)
ACGSC	0.003186	0.000163	0	0.001512	0.000303	0	0	1.68E-05	4.65E-06	0.000102
DFUELP(t)	0.002769	0	0	0.000738	0.000534	8.43E-05	3.88E-06	1.34E-05	3.29E-06	7.97E-05
CROPS	0.002796	0	0	0.000759	0.000525	7.74E-05	3.21E-06	1.29E-05	3.4E-06	7.98E-05
LIVESTOK	0.003378	0	0	0.000724	0.00063	0.000104	5.5E-06	1.51E-05	3.8E-06	9.12E-05
FORESTY	0.003409	0	0	0.000736	0.000641	0.000109	5.59E-06	1.53E-05	3.86E-06	9.33E-05
FISHRY	0.00206	0	0	0.000734	0.000377	0	0	9.73E-06	2.73E-06	6.04E-05
AGRICSEC	0.002793	0	0	0.000757	0.000523	7.69E-05	3.21E-06	1.29E-05	3.39E-06	7.95E-05
INVCROP	0.001468	0	0.000291	0.000734	0.000224	0	0	5.93E-06	2.08E-06	3.76E-05
INVLSTOK	0.001449	0	0.000386	0.000726	0	0	0	0	2.07E-06	0
INVFOR	0.001445	0	0.000385	0.000727	0	0	0	0	2.07E-06	0
INVFISHY	0.001497	0	0	0.000747	0.000242	0	0	6.47E-06	2.1E-06	4.02E-05

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	SERVCS(t)	TRADE(t)	EDUCATN(	HLT&SOC	DISPINC(t)	REALINC(t)	REALGDP(t	GROWTRT(	GROWTH(t	CONS(t)
ACGSC	0.003675	0.001209	4.7E-05	0	0.005705	2.9E-05	0.000558	1.8E-09	5.5E-11	0.002678
DFUELP(t)	0.002642	0.000873	4.29E-05	1.03E-05	0.004221	2.12E-05	0	0	1.27E-10	0.001874
CROPS	0.002706	0.000897	4.3E-05	1.03E-05	0.004315	2.12E-05	0	0	1.29E-10	0.001979
LIVESTOK	0.003153	0.001048	5.33E-05	1.37E-05	0.005069	2.47E-05	0	0	1.57E-10	0.002279
FORESTY	0.003155	0.001048	5.39E-05	1.39E-05	0.005072	2.47E-05	0	0	1.6E-10	0.002301
FISHRY	0.002166	0.000717	3E-05	6.19E-06	0.003419	1.69E-05	0	0	8.92E-11	0.001551
AGRICSEC	0.002705	0.000897	4.29E-05	1.03E-05	0.004315	2.12E-05	0	0	1.28E-10	0.001975
INVCROP	0.001857	0.000617	1.83E-05	0	0.002906	1.39E-05	0	0	5.97E-11	0.001223
INVLSTOK	0.001892	0.00063	1.78E-05	0	0.002959	1.39E-05	0	0	5.7E-11	0.001248
INVFOR	0.001884	0.000628	1.78E-05	0	0.002947	1.38E-05	0	0	5.71E-11	0.001246
INVFISHY	0.001849	0.000613	1.88E-05	0	0.002895	1.42E-05	0	0	6.22E-11	0.001208

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	CAPITAL(t)	FDI(t)	CPI(t)	INFLTD(t)	INFLATN(t)	INFLTRT(t)	UNEMPL(t)	LABCOMP	EMPLMNT	PRDTIVTY
ACGSC	0.000423	0	1.21E-08	5.14E-11	1.25E-08	3.77E-09	1.01E-09	0.00162	6.99E-10	0
DFUELP(t)	0.000272	2.64E-05	8.87E-09	2.96E-11	8.96E-09	0	8.09E-10	0.001157	0	0
CROPS	0.000301	2.93E-05	9.33E-09	2.98E-11	9.34E-09	0	7.94E-10	0.001163	0	0
LIVESTOK	0.000318	3.77E-05	1.07E-08	3.27E-11	1.07E-08	0	9.07E-10	0.001345	0	0
FORESTY	0.000328	3.84E-05	1.08E-08	3.23E-11	1.08E-08	0	9.15E-10	0.001348	0	0
FISHRY	0.000247	1.82E-05	7.41E-09	2.66E-11	7.47E-09	0	6.44E-10	0.000936	0	0
AGRICSEC	0.0003	2.92E-05	9.32E-09	2.99E-11	9.33E-09	0	7.94E-10	0.001163	0	0
INVCROP	0.000188	0	6.44E-09	2.67E-11	6.51E-09	0	5.5E-10	0.000768	0	0
INVLSTOK	0.00019	0	6.6E-09	2.75E-11	6.66E-09	0	5.34E-10	0.000768	0	0
INVFOR	0.000191	0	6.58E-09	2.74E-11	6.64E-09	0	5.33E-10	0.000765	0	0
INVFISHY	0.000185	0	6.36E-09	2.65E-11	6.44E-09	0	5.71E-10	0.00078	0	0

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	LPROVITY	AVWAGE	DDEMENT	EMDDPR	POOR(t)	EXTPOOR(t	POVRT(t)	SLAVERY	SAVINGS(t	BOT(t)
ACGSC	9.19E-05	1.8E-05	2.8E-10	6.23E-11	0	2.34E-10	1.45E-10	3.13E-06	0	0.000466
DFUELP(t)	6.61E-05	1.36E-05	2.97E-10	0	0	0	8.71E-11	0	0.000106	0.000343
CROPS	6.71E-05	1.35E-05	1.95E-10	0	0	0	9.02E-11	0	9.02E-05	0.000341
LIVESTOK	7.79E-05	1.59E-05	2.2E-10	0	0	0	1.01E-10	0	0.000127	0.000379
FORESTY	7.79E-05	1.59E-05	2.19E-10	0	0	0	9.98E-11	0	0.00013	0.000381
FISHRY	5.42E-05	1.07E-05	1.7E-10	0	0	0	7.82E-11	0	4.67E-05	0.000287
AGRICSEC	6.71E-05	1.35E-05	1.95E-10	0	0	0	9.03E-11	0	9E-05	0.00034
INVCROP	4.75E-05	8.69E-06	0	0	0	0	7.73E-11	0	0	0.000253
INVLSTOK	4.82E-05	8.61E-06	0	0	0	0	7.98E-11	0	0	0.000249
INVFOR	4.8E-05	8.58E-06	0	0	0	0	7.95E-11	0	0	0.000249
INVFISHY	4.77E-05	8.89E-06	1.24E-10	0	0	0	7.65E-11	0	0	0.000261

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	BOP(t)	EXTRES(t)	DBTBDN(t)	OILREV(t)	NOILREV(t)	CORPTD(t)	CORRPTN(t	DDMONY(t	DDMOPR(t	DEMOCY(t)
ACGSC	0.000482	2.73E-06	1.49E-11	7.38E-05	0.000131	5.92E-11	1.99E-06	0.000729	1.35E-06	4.37E-11
DFUELP(t)	0.00027	2.12E-06	0	0	0.000102	0	0	0.00048	9.43E-07	0
CROPS	0.000296	2.18E-06	0	0	0.000102	0	0	0.000508	1.02E-06	0
LIVESTOK	0.000318	2.55E-06	0	0	0.000119	0	0	0.00058	1.23E-06	0
FORESTY	0.000316	2.57E-06	0	0	0.000121	0	0	0.00058	1.25E-06	0
FISHRY	0.000268	1.71E-06	0	0	7.83E-05	0	0	0.000419	7.4E-07	0
AGRICSEC	0.000296	2.18E-06	0	0	0.000102	0	0	0.000508	1.02E-06	0
INVCROP	0.000283	1.46E-06	0	0	5.75E-05	0	0	0.000381	5.67E-07	0
INVLSTOK	0.000299	1.47E-06	0	0	5.56E-05	0	0	0.000397	5.98E-07	0
INVFOR	0.000298	1.47E-06	0	0	5.55E-05	0	0	0.000396	5.97E-07	0
INVFISHY	0.000273	1.46E-06	0	0	5.97E-05	0	0	0.00037	5.37E-07	0

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	CORDEM(t	PWLFARE	STDOLIVN	PUPWER	FODSRITY	HLTCARE	DDHCARE	HCRDDPR	HRESDEV	DDEDUC
ACGSC	1.99E-06	3.99E-05	0	6.28E-08	7.73E-06	1.63E-07	4.37E-06	2.29E-08	0	3.6E-06
DFUELP(t)	0	2.87E-05	0	0	5.63E-06	1.26E-07	2.79E-06	1.49E-08	1.89E-07	0
CROPS	0	2.92E-05	0	0	5.75E-06	1.27E-07	2.6E-06	1.36E-08	1.83E-07	0
LIVESTOK	0	3.42E-05	0	0	6.7E-06	1.52E-07	2.75E-06	1.48E-08	2.45E-07	0
FORESTY	0	3.42E-05	0	0	6.72E-06	1.53E-07	2.81E-06	1.51E-08	2.48E-07	0
FISHRY	0	2.33E-05	0	0	4.57E-06	9.63E-08	2.22E-06	1.14E-08	1.12E-07	0
AGRICSEC	0	2.92E-05	0	0	5.75E-06	1.27E-07	2.59E-06	1.36E-08	1.83E-07	0
INVCROP	0	2.03E-05	0	0	3.91E-06	7.62E-08	1.65E-06	8.21E-09	0	0
INVLSTOK	0	2.06E-05	0	0	3.95E-06	7.64E-08	1.47E-06	7.16E-09	0	0
INVFOR	0	2.05E-05	0	0	3.94E-06	7.61E-08	1.48E-06	7.18E-09	0	0
INVFISHY	0	2.03E-05	0	0	3.92E-06	7.69E-08	1.84E-06	9.29E-09	0	0

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	EDUDDPR	WEALTH	PWEALTH	IMPDPEN	DDIMP	PENCIMP	TIME(t)	EXCHRTRP	POP(t)	IMPORT(t)
ACGSC	2.77E-08	2.77E-12	6.86E-07	2.03E-11	0.000275	1.44E-06	1.77E-09	1.06E-08	6.3E-09	0.000102
DFUELP(t)	0	0	0	1.15E-11	0	0	1.24E-09	8.01E-09	4.47E-09	0.000218
CROPS	0	0	0	1.14E-11	0	0	1.27E-09	8.41E-09	4.66E-09	0.000186
LIVESTOK	0	0	0	1.19E-11	0	0	1.46E-09	9.77E-09	5.34E-09	0.000253
FORESTY	0	0	0	1.19E-11	0	0	1.47E-09	9.87E-09	5.37E-09	0.000258
FISHRY	0	0	0	1.05E-11	0	0	1.01E-09	6.56E-09	3.74E-09	0.000107
AGRICSEC	0	0	0	1.14E-11	0	0	1.27E-09	8.4E-09	4.65E-09	0.000186
INVCROP	0	0	0	9.98E-12	0	0	8.6E-10	5.44E-09	3.21E-09	0
INVLSTOK	0	0	0	9.92E-12	0	0	8.65E-10	5.57E-09	3.27E-09	0
INVFOR	0	0	0	9.9E-12	0	0	8.63E-10	5.56E-09	3.26E-09	0
INVFISHY	0	0	0	1.02E-11	0	0	8.64E-10	5.36E-09	3.19E-09	0

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	XPOTOIL(t)	XPTNOIL(t)	DODBT(t)	EXTDBT	GEXPDN(t)	PRIMELR(t	INTSAV(t)	MONYSS(t)	TAX(t)	ACGSC
ACGSC	0.000777	5.26E-05	0.000224	0.000151	0.000362	1.09E-09	6.61E-10	0	0	0.971211
DFUELP(t)	0.000513	0	0.000207	0	0.000264	6.04E-10	3.35E-10	0.00025	0	0
CROPS	0.000532	0	0.000208	0	0.000269	6.29E-10	3.53E-10	0.000249	0	0
LIVESTOK	0.000579	0	0.000256	0	0.000311	6.8E-10	3.5E-10	0.000342	0	0
FORESTY	0.000586	0	0.000259	0	0.000312	6.75E-10	3.39E-10	0.00035	0	0
FISHRY	0.000448	0	0.000148	0	0.000217	5.64E-10	3.65E-10	0.000132	3.54E-05	0
AGRICSEC	0.000531	0	0.000208	0	0.000269	6.3E-10	3.55E-10	0.000248	0	0
INVCROP	0.000386	0	9.35E-05	0	0.000188	5.71E-10	4.18E-10	0	5.14E-05	0
INVLSTOK	0.000387	0	9.12E-05	0	0.00019	5.9E-10	4.39E-10	0	5.49E-05	0
INVFOR	0.000386	0	9.1E-05	0	0.00019	5.87E-10	4.36E-10	0	5.47E-05	0
INVFISHY	0.00039	0	9.59E-05	0	0.000189	5.64E-10	4.08E-10	0	4.98E-05	0

Table 2: PARTIAL TRANSITION MATRIX CONT'D

	DFUELP(t)	CROPS	LIVESTOK	FORESTY	FISHRY	AGRICSEC	INVCROP	INVLSTOK	INVFOR	INVFISHY
ACGSC	1.27E-08	0.001281	7.83E-05	1.02E-05	7.87E-05	0.00145	0.000579	3.73E-05	4.94E-06	3.33E-05
DFUELP(t)	0.979508	0.000858	5.9E-05	7.82E-06	4.5E-05	0.00097	0.000276	1.73E-05	2.29E-06	1.63E-05
CROPS	8.9E-09	0.979955	6.01E-05	7.96E-06	4.57E-05	0.000989	0.00028	1.76E-05	2.33E-06	1.64E-05
LIVESTOK	1.02E-08	0.000978	0.975865	9.35E-06	4.75E-05	0.001105	0.000262	1.62E-05	2.15E-06	1.55E-05
FORESTY	1.02E-08	0.000985	7.12E-05	0.975652	4.78E-05	0.001114	0.000265	1.65E-05	2.18E-06	1.56E-05
FISHRY	7.33E-09	0.000725	4.64E-05	6.14E-06	0.983455	0.000819	0.000279	1.76E-05	2.33E-06	1.64E-05
AGRICSEC	8.9E-09	0.000874	6E-05	7.95E-06	4.57E-05	0.980088	0.000279	1.76E-05	2.32E-06	1.64E-05
INVCROP	6.58E-09	0.000631	3.66E-05	4.81E-06	4.02E-05	0.000713	0.986405	1.8E-05	2.38E-06	1.74E-05
INVLSTOK	6.7E-09	0.000629	3.66E-05	4.8E-06	4.01E-05	0.00071	0.000286	0.986183	2.34E-06	1.73E-05
INVFOR	6.67E-09	0.000628	3.65E-05	4.79E-06	4E-05	0.000709	0.000286	1.77E-05	0.986205	1.73E-05
INVFISHY	6.57E-09	0.000641	3.69E-05	4.87E-06	4.09E-05	0.000724	0.000296	1.84E-05	2.43E-06	0.986363

A TEST OF AGRICULTURAL SECTOR INVESTMENT DRIVE ON THE NIGERIAN ECONOMY: DYNAMIC IMPACT AND OUTLOOK TO YEAR 2035.

A 50% increase of investment intervention in 2026 in all the Agricultural sub-sectors was proposed and tested using Markov Chains analysis. The results are as presented in Figs 3 to 6 below.

Fig 3: AGRICULTURAL SECTOR INVESTMENT IMPACT ON SOME REAL SECTORS

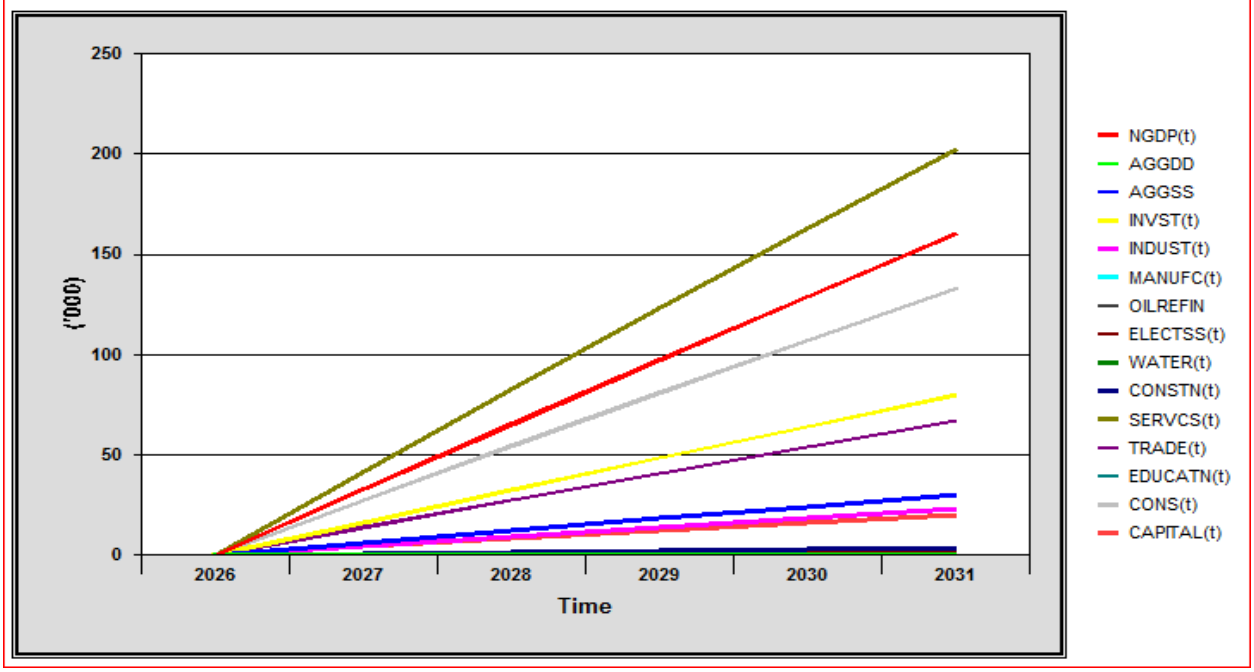


Fig. 3 shows that indeed, the Nigerian economy will fan out as a result of a quantum leap investment in the Agricultural sector. Nominal income will increase from N32.9 billion in2027 to N280.4 billion by 2035; Aggregate demand also will increase from N75.764 million in 2028 to N2.5 billion by 2035; Aggregate supply on the other hand will increase from N6.33 billion in 2027 to N51 billion by 2035. Investment in Agriculture will further boost investment in the economy from N16.4 billion in 2027 to N139 billion by 2035. Industry and Manufacturing are not left out and will grow from N4.7 billion in 2027 and N23.9 million in 2028 respectively to N41 billion and N604 million respectively by 2035.

In addition, Oil refining will increase from N1.7 million in 2028 to N43 million by 2035; Electricity supply will increase from N125 million in 2027 to N1076.7 million by 2035; Water resources will also increase from N46.54 million in 2027 to N395 million by 2035. On the other hand, Construction will increase from N790.93 million in 2027 to N6.8 billion by2035, with Services also increasing from N41.6 billion in 2027 to N353.3 billion by 2035. Trade will also increase from N13.8 billion in 2027 to N117.4 billion by 2035 and Education from N410 million in 2027 to N3.5 billion by 2035. In addition Capital and Consumption will grow from N4.2 billion and N27.4 billion respectively in 2027 to N35.25 billion and N232 billion by 2035 respectively. These are all complementary.

Fig 4: AGRICULTURAL SECTOR INVESTMENT IMPACT ON INFLATION AND UNEMPLOYMENT

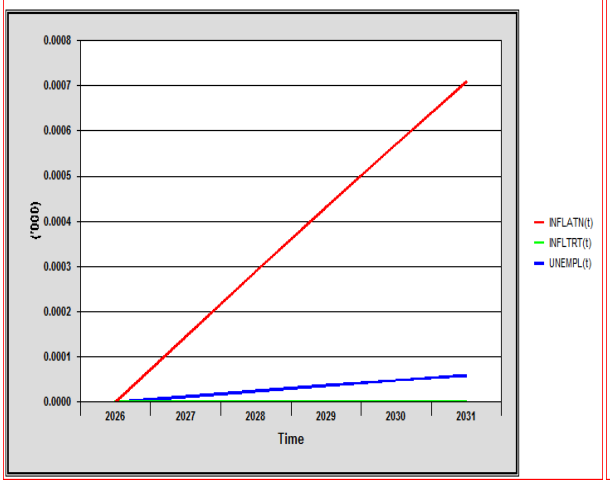


Fig 5: AGRICULTURAL SECTOR INVESTMENT IMPACT ON WELFARE INDICATORS

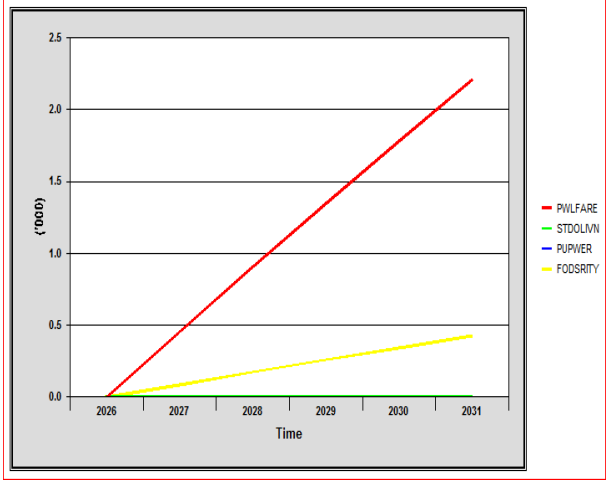
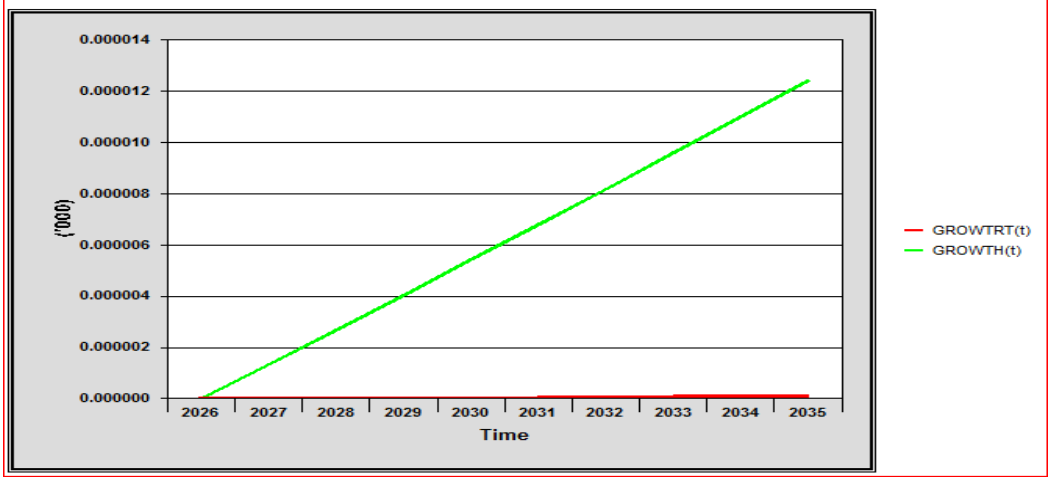


Fig 6: AGRICULTURAL SECTOR INVESTMENT IMPACT ON GROWTH AND GROWTH RATE



In figs 4 to 6, it is possible to evaluate the impact of Agricultural investment on welfare indicators under the present state of the Nigeria economy. Fig. 4 indicates that inflation, inflation rate and unemployment will continue to be a source of concern despite investment in the Agricultural sector. Indeed, inflation will grow from 0.146 units in 2027 to 1.24 units by 2035; inflation rate from 6.42e-06% in 2028 to 0.000257% by 2035, while unemployment rate will increase from 0.0123% in 2027 to 0.106% by 2035. Accordingly, the impact on welfare will not be profound under extant nature of agriculture. Personal welfare i.e. per capita income, will increase from N455/caput in 2027 to N3,865/caput by 2035. Food security on the other hand will increase from N87.53/caput in 2027 to N743.52/caput by 2035. The impact on standard of living and purchasing power will be negligible but the impact on growth will be profound as growth will increase from N0.00134 million in 2027 to N0.0124 million by 2035.

CONCLUSION

Generally, the pattern of the impact of investment in the different aspects of the Agricultural sub-sector on the Nigerian economy, by and large is almost the same. While land based investment

promote aggregate supply, investment in fishery promote aggregate demand. They all promote investment and foreign direct investment and are capable of revamping the Nigerian economy. However, they do not propagate the sector except investment in fishery which propagates the sector by N12.4 million.

It is evident that Agriculture cannot return to being the mainstay of the Nigeria economy due to the myriad of challenges and problems facing the sector but mostly due to the habits and attitude of Nigerians. However having said this, it has been demonstrated in this study that Agriculture still has a lot of potentials for promoting growth and development in Nigeria. A quantum leap investment drive in Agriculture and deliberate modernization of operations in Nigeria will not only boost investment in the economy and therefore promote growth and development but will go a long way to repositioning Agriculture and restore some of her lost glory. The Agricultural sector of Nigeria is bedeviled by a host of problems ranging from Poor Agricultural Infrastructure, Climate Change, Pests and Diseases, Inefficient and archaic Agricultural Practices, Inadequate Access to Credit and Finance, Deforestation and recently Insecurity to Farmer's and Rural population's lives and property due to insurgence and banditry. The way forward will be to redress these challenges.

A modern approach to Agricultural production which will go a long way to repositioning the Agricultural sector of Nigeria, should start with the Land use policy to address the fragmental nature of extant agriculture thus creating room for Large scale intensive mechanized farming and reactivation of River basin Authority.

RECOMMENDATIONS

The following recommendations are expedient :

1) More factories and industries including food processing should be established in the rural areas of Nigeria if the problem of unemployment is to be solved.
2) More banks should be established in rural areas of Nigeria and Agricultural credits should be made more available and accessible.
3) Agricultural infrastructure, including the development and rehabilitation of rural roads should be embarked upon by Nigerian government.
4) Nigeria, should address the Land use policy to solve the fragmental nature of extant agriculture thus creating room for Large scale and intensive mechanized farming.
5) Cattle ranching as opposed to free range nomadic livestock herding should be adopted.
6) Precision agriculture, vertical farming, genetic engineering, sustainable practices, robotics and block chain which are transformative forces reshaping the agricultural landscape should be pursued and adopted in Nigeria.
7) The practice of aquaculture should be promoted and expanded in Nigeria.
8) Afforestation and reforestation of degraded lands, coupled with agro-forestry, wildlife ranching should also be pursued with vigor.
9) Above all, Nigerians should shun corruption and indiscipline in all ramification and Government must be seen to provide security to life and property in Nigeria particularly in the rural areas of the country.

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