

CONSTRAINTS TO AGRICULTURAL DEVELOPMENT IN NIGERIA

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ABSTRACT: *The role of agriculture in accelerating economic growth and development process of any nation cannot be overemphasized. However, in Nigeria, the sector has suffered severe neglect, due in part, from the windfall from the discovery of oil in the 1970s and other structural rigidities. The study investigated the constraints to agricultural development in Nigeria using time series data spanning the period 1970 – 2010 and contemporary econometric methods of unit root test, co-integration and error-correction mechanism. Empirical findings reveal that rainfall, exchange rate and food export (lag one) are the most significant positive determinants of agricultural output in Nigeria. However, food imports, diversion of funds meant for agricultural purposes and low technology diffusion in agriculture are among the factors identified as constraints to agricultural development in Nigeria. The study recommends among others, maintenance of stable and favourable exchange rate regime, and the pursuance of programmes that will bolster partnerships between research institutions and other stake holders in agriculture as a route to facilitating agricultural development and hence, economic development in Nigeria.*

KEYWORDS: Agricultural Constraints, Agricultural Development, Food Export, Economic Development

INTRODUCTION

Nigeria is one of the largest countries in Africa, with a total geographical area of 923,768 square kilometres and an estimated population of about 167 million (NBS, 2014). It lies wholly within the tropics along the Gulf of Guinea on the Western Coast of Africa. Nigeria has a highly diversified agro ecological condition which makes possible the production of a wide range of agricultural products. Over the past two decades, agricultural yields have remained the same or worse still declined. Nigeria's agriculture to a large extent still possesses the characteristics of a peasant economy that was prominent in the pre-independence period (Adewumi & Omotesho, 2002).

More than 70 per cent of the farming population in Nigeria consists of smallholder farmers, each of whom owns or cultivates less than 5 hectares of farmland (NARP, 1994). Less than 50% of the country's cultivable agricultural land is under cultivation. Even then, smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields, cultivate most of this land. The smallholder farmers are constrained by many problems including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, inadequate research and extension services, etc.

Although there has been a recent rise in agricultural productivity, such improvement is derived more from expanded planting areas for staple crops than from yield increases. Howbeit, agriculture constitutes one of the most important sectors of the economy. The sector is

primarily important, given its employment generation potential and its contribution to gross domestic product (GDP) and export revenue earnings (Ogen, 2002; Essien, 2005). A vibrant agricultural sector is capable of ensuring the supply of raw materials for the industrial sector as well as providing gainful employment for the teeming population (Ukeje, 2007).

The emergence of the petroleum sector in the early 1970's resulted in significant structural changes in the Nigeria economy which negatively affected the agricultural sector. In response to the oil boom, public expenditures grew, fostering many other economic activities, including infrastructural development, creation of new institutions and expansion of existing ones, and importation of all kinds of consumer goods (Essien, 2005; Ukeje, 2007). Earnings from petroleum resources favoured these developments, but tradable agricultural commodities did not experience similar growth. The share of the oil sector in the total value of exports, which was under 60 per cent in 1970, rose to over 90 per cent after 1973. The non-oil exports declined from about 30 per cent in 1970 to less than 10 per cent by 1980 (Ojo, 1992). Agricultural productivity estimates for Nigeria showed a decline in productivity growth from the 1960s to the 1980s. Nigeria has witnessed strong economic growth in the past few years, averaging 8.8 per cent real annual GDP growth from 2000 to 2007. However, the agricultural sector has lagged behind GDP growth at 3.7 per cent in 2007.

In spite of the various agricultural programmes and policies initiated by different administrations for the development of Agriculture in Nigeria, there has not been any phenomenal growth in agricultural output since the 1970s. Agriculture's contribution to the non-oil gross domestic product (GDP) was stable at about 40 per cent in recent years (FDA/FMARI, 2005). The index of agricultural output declined from 75.5 in 1970 to 35.2 in 1979. Although the index increased steadily from 35.2 in 1979 to 40.10 in 2005, the growth rate shows complete absence of sustainability. For instance, the growth rate was negative throughout the 1970s; declined from 6.34 to 3.04 between 1982 and 1986, and then fluctuated to 8.33 in 2003 and -3.24 in 2005. The rate was worsened in 2010 (4.2) due to the high price of oil. The question agitating the minds of scholars is why agricultural output is low amidst the huge expenditure via the different programmes implemented in Nigeria.

Consequently, there has been a dramatic increase in the incidence and severity of poverty in Nigeria, arising in part from the dwindling performance of the agricultural sector where a preponderant majority of the poor are employed. Furthermore, poverty in Nigeria has been assuming wider dimensions including household, income poverty, food poverty/insecurity, poor access to public services and infrastructure, unsanitary environment, illiteracy and ignorance, insecurity of life and property, and poor governance. Arising from this backdrop, this paper is poised to investigate the nexus between food export and import on agricultural sector performance. Also, the study is apt to assess the relationship between agricultural credit financing and the sector's productivity, while attempting to unravel the major determinants of agricultural output in Nigeria. The rest part of the study consists of literature review, methodology and empirical model, empirical results, findings, conclusions and policy recommendations.

LITERATURE REVIEW**Overview of Agricultural sector performance (1988 – 2010)**

The agricultural sector has been relatively stagnant at 3% growth performance in 2003, but moved from 4.1% growth rate in 1998 to 5.64% by end of 2010 (vide Table 1). This was as a result of a renewed attention of the government within the period through various reform programmes that also encouraged increasing private sector entrepreneurial activities (but not necessarily due to the effectiveness of policy implementation in the long run). Agricultural entrepreneurs were positioned to take advantage of the policy targets. In growth terms, the sector was only second to telecommunications services, the fastest growing sector since 2004.

The agricultural share of National Gross Domestic Product (GDP) has been hovering around 40 – 41% annually since 2003 (Table 2). The largest subsector contribution to national output is from the crops subsector which annually ranged between 36% (2003, 2004 and 2005) and 37% (2006 and 2007) in an increasing manner. The livestock subsector share of GDP is almost constant at 2.6% while the fishing sector at 1.37% contributions. The agricultural sector is the highest contributor to non-oil GDP growth rate. After an initial fall from 6.64% in 2003 to 6.50% in 2004, the growth rate appreciated per annum from 2005 (7.06%) but still fell to 5.64% in 2010 (Vide Table 2). The documented growth figures are expected to positively affect livelihoods, especially in terms of food prices and employment. The contrary, however, is the case.

As earlier shown above, the agricultural sector is characterized by a dominant crop subsector (Vide Table 3) with its long varietal chain, and a growing livestock and fishery subsectors. These subsectors are in dire need of appropriate interventions to attain market competitiveness in order to contribute to overall national economic growth objectives and poverty alleviation. The forestry subsector may have remained vibrant, but not for reduced commitment to forest resource development. The crops subsector could be divided into major and minor crops depending on whether they are cash or key staple food crops and minor, if otherwise, they are non-cash or purely food crops. However, effectiveness of some major food crops in Nigeria shows absence of sustainability (Igwe, 2008).

TABLE 1: Sectoral Growth Rates

INDICATOR	2003	2004	2005	2006	2007	2008	2009	2010
Real GDP Growth (%)	9.6	6.6	6.5	6.0	6.2	5.98	6.96	7.87
Oil sector	23.9	3.3	0.5	-4.15	-5.9	-	0.45	4.98
						6.19		
Non-oil sector	5.2	7.8	8.6	9.8	9.6	8.95	8.32	8.43
Sectoral Growth (%) Agriculture	6.6	6.5	7.1	7.4	7.4	6.27	5.88	5.64
Industry/Manufacturing Services	0.4	8.8	8.0	9.2	9.8	8.89	7.85	7.64

Source: CBN Annual Report and Statement of Accounts, 2010

Recent public sector (Federal Government) budgetary provision for agriculture has increased as the overall budget increases. With respect to overall budgetary provisions, it could be seen that agriculture share of annual national budgets remained very low, merely increasing from 1.3% in 2003 to a recent 7.0% in 2007 (Table 4 below). It is also observed that capital budget for agriculture remained low, though increasing. This however shows that the sector's budget is heavily on the recurrent side.

The development of agricultural infrastructure has been poor, in spite of annual budgetary provisions for such activities. Some efforts tailored to the development of irrigation facilities in different parts of the country have been progressive. The agriculture sector share of overall capital budget over this period which also increased annually from ₦8.5 billion in 2003 to ₦136.3 billion by 2007 (Table 4) indicate clearly that the Federal Government is the greater single spender on agricultural development.

The functional federal Government capital Expenditure on economic sector basis shows that the capital budget for overall economic sector increased from ₦98.1 billion in 2003 to ₦367.9 billion in 2007 (Table 5). The allocation of funds relative to other key economic sectors shows an increase by 78% (₦17.3 billion in 2005 to ₦30.8 billion in 2006), but rate of increase went down 25.97% between 2006 and 2007 budget. However, agriculture budget has remained paltry relative to the sectoral budgets of the Federal Government; 3.09%, 4.2% and 4.04% of sector budget portfolio for 2005, 2006 and 2007 respectively. These figures which are lower than provisions for the federal capital territory, fall far short of the Maputo Agreement for 10% of national budgetary provision for agriculture.

State's overall budget for agriculture increased from ₦18.1 billion (2003) to ₦30.8 billion (2007). A similar trend is seen in capital budget for agriculture. The weak presence of the states in agricultural development is indicated in the overall national dependence on oil revenue, and their inability to optimize the huge revenue options provided by the agricultural sector. The uncoordinated manner of the spending by the tiers of government leads to slow growth experience.

TABLE 2: Percentage share of gross domestic product at 1990 Constant Prices

Activities	Share in total %							
	2003	2004	2005	2006	2007	2008	2009	2010
Agriculture	41.01	40.98	41.19	41.72	42.20	42.18	41.70	40.84
Crop	36.51	36.48	36.69	37.20	37.65	37.54	37.54	38.12
Livestock	2.60	2.60	2.61	2.63	2.65	2.64	3.61	2.84
Forestry	0.54	0.54	0.53	0.53	0.53	0.64	0.58	0.60
Fishing	1.37	1.37	1.36	1.37	1.37	1.38	1.40	1.39
Total GDP	100.0	100.0	100.0	100.0	100.0	100.00	100.00	100.00
Non-oil (GDP)	73.47	74.28	75.74	78.15	80.65	80.73	84.11	85.20
Total GDP growth rate	9.57	6.58	6.51	6.03	6.22	6.25	6.69	7.52
Oil GDP growth rate	23.90	3.30	0.50	-4.51	-5.92	-6.19	0.45	4.98
Non-oil GDP growth rate	5.17	7.76	8.59	9.41	9.61	8.95	8.32	8.43
<i>Agriculture</i>	6.64	6.50	7.06	7.40	7.43	6.27	5.88	5.64
<i>Industry</i>	21.26	4.15	1.71	-2.51	-3.48	4.1	4.0	4.21
<i>Services</i>	0.41	8.83	7.96	9.18	9.76	9.78	9.80	9.85
<i>Finance & insurance</i>	-9.56	2.73	2.85	4.98	5.00	4.82	4.01	3.95
<i>Manufacturing</i>	8.8	9.2	9.8	9.39	9.57	8.89	7.75	7.64
<i>Mining & quarrying</i>	5.66	10.00	9.61	9.39	9.16	9.18	9.11	9.20
<i>Communication</i>	5.44	10.85	9.53	10.28	10.51	9.14	10.12	10.25
Average	35.87	27.77	28.38	32.45	32.80	33.81	35.11	32.33

Source: National Bureau of Statistics & CBN Annual Report (2010)

TABLE 3: Index of agricultural production by type of activity (1990 = 100) in million MT

Subsector	2003	2004	2005	2006	2007	2008	2009	2010
Crops	159.8	169.9	181.5	195.3	208.4	211.6	209.2	215.4
(a) Staples	175.9	186.9	199.5	215.0	229.5	231.6	230.6	233.6
(b) Other Crops	76.5	82.2	88.6	93.3	98.9	97.6	98.7	98.9
Livestock	225.5	238.0	250.0	265.0	279.7	282.7	281.8	293.7
Fishing	160.5	172.1	182.1	190.7	201.7	201.8	203.4	211.5
Forestry	123.1	125.7	132.6	134.8	138.4	138.2	138.3	137.6
Aggregate	165.4	175.5	186.9	200.1	212.8	213.6	213.9	215.4

Source: CBN Annual Report & Statement of Accounts, 2010 and National Bureau of Statistics, 2010 Review

TABLE 4: Agriculture share of Federal Government budget (2003-2010) in ₦ billions

Source	2003	2004	2005	2006	2007	2008	2009	2010
Total national budget	1,223.2	1,462.0	1,840.7	1,942.6	2,348.6	3,240.8	3,452.9	4,194.2
Total agricultural budget	16.0	50.0	76.6	107.4	164.3	65400.0	22432.2	62232.1
Agric. budget as % of total national budget	1.31	3.42	4.16	5.53	7.0	2.0	6.49	5.4
Capital budget (agriculture)	8.5	38.7	60.3	89.5	136.3	138.4	141.3	140.2
% of total capital budget	3.52	11.2	11.61	16.20	17.95	18.10	18.65	19.66

Source: Computed from CBN Annual Report and Statement of Accounts, 2010

TABLE 5: Summary of Agriculture's Annual Budgetary Allocations, 1990-2010

Year	Total budget		Allocation to agric.		% of Total
	₦'b	US &'b	₦'b	US &'b	
1990	39.76	4.94	1.96	0.24	4.95
1991	38.66	4.80	0.67	0.08	1.74
1992	52.03	6.47	0.92	0.11	1.78
1993	112.10	13.94	2.83	0.35	2.53
1994	110.20	13.71	3.71	0.46	3.37
1995	153.49	19.09	6.92	0.86	4.51
1996	337.21	41.95	5.71	0.71	1.69
1997	428.21	53.27	8.66	1.07	2.02
1998	487.11	60.60	9.04	1.12	1.86
1999	947.69	117.90	12.15	1.15	1.28
2000	701.05	87.21	13.60	1.67	1.94
2001	1,018.02	126.67	64.94	8.07	6.38
2002	1,018.15	126.67	44.80	5.57	4.40
2003	1,223.2	134.64	16.0	1.89	1.31
2004	1,462.0	152.11	50.0	6.12	3.42
2005	1,840.7	174.16	76.7	7.71	4.17
2006	1,942.6	181.04	107.4	9.98	5.53
2007	2,348.6	186.44	164.3	12.96	7.01
2008	1423.5	185.76	141.2	13.01	6.90
2009	1494.9	188.34	166.9	13.30	7.05
2010	4079.3	189.86	315.8	13.45	7.35

Source: CBN Statistical Bulletin and Annual Reports, Various Issues. Dollar conversion is in 1990 constant factor

Agricultural Policies in Nigeria

The need for active government intervention in the Agricultural sector through reform programs was informed by the dearth and neglect of Agriculture in Nigeria, due majorly to the rising fortunes in crude oil in the early 70's. Until then, Nigeria had a very robust agricultural sector with self-sufficiency in food production and minimal imports of processed food for the elites; farmers produced enough food crops to feed the population and foreign exchange receipts from exported crops was used to finance government expenditure in education, health, construction and finance, etc. The northern region (including the middle belt) was largely exporting cotton, hides and groundnuts; the South West region specialized in cocoa, while the South East region (including the present South-South region) was a major exporter of rubber and palm produce. Government focused on research, extension services, marketing and pricing of export crops.

The period 1970-85 witnessed more direct government intervention in agriculture in the face of the noticeable decline in agriculture performance. A variety of policies were introduced. Macroeconomic policies became expansionary, including direct government involvement in agricultural production; incentives were introduced, including low tariffs on agricultural inputs. The period witnessed the establishment of many new agricultural institutions and programmes. Notable were the marketing board system which was reformed in 1973 and 1967/77 due to mounting criticisms against the inefficiencies and abuses that characterized the operations of the boards (Olomola & Akande, 1990). Nigerian Agricultural and Co-operative Bank (NACB) later followed in 1973 and the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1978, which were established to provide agricultural finance. During this period, world Bank-assisted ADPs were introduced in a number of states.

The programmes were designed to provide an integrated approach to agricultural and rural development. River Basin Development Authorities were also established to provide all-year-round water through irrigation to farmers. More research institutes were established during this period. In anticipation of the increased agricultural output arising from these projects and Operation Feed the Nation (OFN), there was a reorganization of marketing boards, which gave rise to the grain boards.

However, the Structural Adjustment Programme (SAP) policy of 1986 began the era of liberalization of Nigeria Agricultural exports, including the scrapping of commodity boards and deregulation of the entire economy. During the period 1986-99, which combines SAP and post-SAP era, market-oriented and not so market-oriented agricultural development policies and programmes were introduced. River Basin Authorities were restructured from 21 to 11; the DFERRI was established, as well as the National Agricultural Insurance Corporation and Peoples' Bank. Farm input supply policy was actively pursued during this period. Trade liberalization was an important aspect of SAP. Abolition of import and export licensing and exchange control measures took place. With these reforms, export earners became entitled to 100 per cent of their foreign exchange earnings provided these were kept in a domiciliary account. Thus, agricultural producers had an incentive to boost their exports.

The Nigerian Export-Import Bank (NEXIM) grew out of the Export Incentive and Miscellaneous Decree of 1986 and Nigerian Export Credit Guarantee and Insurance Corporation in 1988 and commenced operations in 1991. The focus was to provide refinancing and discounting facilities to commercial and merchant banks to encourage them to provide credit and risk-bearing facilities in support of exports. Perhaps the most visible and pervasive

policy under SAP is the naira exchange rate devaluation. The rate, which was 0.639 naira to the US dollar in 1981 and 0.9996 naira in 1985, averaged 3.32 naira in 1986. By 1992, it had fallen to 19.66 naira and to 91.83 naira in 1999.

The current democratic era that begun in 1999 gave rise to yet new Agricultural policy reforms to wit, National Economic Empowerment and Development Strategy (NEEDS), National Agricultural Policy (NAP) and Rural Sector Strategy (RSS), 2004. The overall strategic objective of the NEEDS and NAP is to diversify the productive base from oil and to promote market-oriented and private sector-driven economic development with strong local participation. Specifically, it sought to achieve a minimum annual growth rate target of 6% for the agricultural sector in the first instance and attain a minimum agricultural exports of \$3 billion per annum from the Cassava initiative alone, and drastically reduce food imports to 5% from the present 14.5%. It also targeted increasing cultivable arable land by 10% per annum and foster implementation of private sector participation through incentives schemes to achieve agricultural production sustainability. The strategies to achieving the NEEDS Agriculture objectives include such programs as the presidential initiatives on chosen competitive commodities and taking advantage of concession arrangements in bilateral and multilateral agreements (WTO, EU-ACP, US-AGAO, and ECOWAS). Others include strengthening agricultural research, training and extension institutions and frameworks. It also sought a sustainable development of a private sector-led input supply and distribution system; an integrated agriculture led rural development and the growth of agricultural credit access window for farmers, while NAP aims at laying a solid foundation for sustainable growth in agricultural productivity.

General and persistent Constraints of the sector

Several structural bottlenecks beset Nigeria's agricultural growth and competitiveness. First is the problem of policy incapacity, instability and implementation inefficiency (Innocent, 2008). In most cases it results from incomplete policy thought-through or ineffective implementation of policy prescribed programmes to result-end. This therefore questions skills and appropriate use of required manpower in both policy formulation and implementation processes. For instance, the failure of the \$3 billion per annum cassava export earning was announced but not followed with the necessary structural back-up to ensure the processing of cassava into confectionary flour (which however when reduced to 5% still failed). In their study on the impact of FADAMA II project implementation in Imo State, Nigeria, Echeme and Nwachukwu (2010) concluded that, several issues associated with project implementation include, poor project funding, low level of local government support, poor community support and low capacity building, while Olomola (2006) associated agricultural policy failure in Nigeria to lack of competitiveness.

There is also the malaise of non-competitive input-end subsidy administration system. The existing input subsidy administration has been known to be defective, discouraging the development of agricultural service delivery competitiveness. The system of input-end subsidy administration has been tainted with official and institutional corruption and impedes the growth of efficient private sector led input service. The process of using some private sector fronts appointed by government to procure fertilizer on its behalf, led to distortions in the procurement process such as over-invoicing, late deliveries and middlemen cartel development in the distribution system. Consequently, the administration of the subsidy policy was considered tainted and non-transparent in implementation and consequently ineffective. Subsidized inputs have been diverted to the open market and sold at higher input prices, thereby

depriving farmers the subsidy benefit which the unintended beneficiaries (middlemen and their sponsors in the public sector) usurp.

Poor agricultural technology and service delivery environment hampers agricultural productivity in Nigeria. Technology diffusion in farming is low. Whereas Igwe (2008) establishes the positive link of technology diffusion in the cultivation of rice and yam in Nigeria, the low use of appropriate farming technology and poor agricultural service delivery environment combined with lack of incentives for private sector led input chain development severely hampers the development of competitive farming and agribusiness. This also severely impedes the growth of local input and equipment manufacturing as well as efficient and cost-effective procurement and distribution system. The immediate outcome is that the sector is a low input and output technology enterprise and thus, reducing agriculture to become labour-driven, farmers having poor skills and lacking processing and value-added content, leading annually to heavy post-harvest losses.

The absence of basic infrastructure for agricultural, industrial and social services in the economy is a big disincentive to downstream agribusiness processes and a heavy drawback against agricultural development. The effect has been heavy also on upstream agriculture (irrigation facilities, transport and market information infrastructure) and value chain development. Enabling infrastructures, especially rural roads and irrigation systems are not likely to be in place in the humid and sub-humid tropics of Africa in the next 20-30 years (Dunstan, 1994). Absence of long term finance window for agriculture is also a huge drawback to agricultural productivity in Nigeria. Over several years, there has practically been a dearth of sustainable funding windows through which investors could borrow capital for agricultural and agribusiness entrepreneurship engagement. Earle (2011) argue that limited financing and inadequate new investments hinder agricultural development. There is however smallholder funding windows through the development finance institutions such as the CBN (ACGS), NACRDB, and international Development Assistance (IDA's) pro-poor target programmes that sustained small and subsistence farmers in Nigeria. Although, access process to these finance sources has been difficult to small farmers, in terms of availability, timing amount and the lack of security for more formal (private/bank) credit. Thus, farm finance remains a persistent constraint. Ojo and Akanji (1996) opined that, beginning from 1970-85, agricultural credit came mostly from informal sources and at prohibitive interest rates; government spent less than 10 per cent of its total capital expenditures on agriculture.

The market for agricultural input and output has been weak, undeveloped and atomistic. Access to foreign markets is affected by commodity productivity and price competitiveness. Also, non-remunerative prices for agricultural commodities, worsened by cycles of surplus and low farm production, cause unsteady farm income, poverty and food insecurity among Nigerian farmers, creating an unstable environment of cyclical low and high food prices. Tied to the above is the lack of reliable and sustainable market information system to aid output in order to ensure competitive prices for producers and agribusiness operators. Thus, improvement in marketing has been widely recognized as one of the most effective ways to increasing agricultural productivity (Yisa, 2009).

Agricultural activity is particularly risk-prone, given that, farmers can manage only some part of the production process while natural conditions beyond the farmer's control also have a significant impact. Both crop and livestock production can be strongly affected by weather; yields vary from year to year, and extreme weather conditions such as frost, droughts, floods and storms can heavily damage agricultural output. Though technological progress has allowed

agricultural producers to improve the degree to which they can manage the influence of natural factors, the experience in Nigeria is yet to show significant improvement. However, among the various measures of financial risk applied to agricultural risk, the Spectral Risk Measure (SRM) proposed by Acerbi (2004) stands distinctive, in that, it specifically incorporates a user's degree of risk aversion.

Other constraints to agricultural sector development in Nigeria have been the practice of tenure ownership. Lloyd (1962) noted that land tenure had seriously handicapped the commercial development of agriculture in Western Nigeria. Only a few years later, Adegboye (1967) argued in a much more radical vein that any society seeking land reform must make a choice between economic efficiency and retention of traditional ties and institutions. He identified land tenure, farm tenancy and the provision of agricultural credit as obstacles to increasing productivity per acre and per farmer. The literature on the shortcomings of customary forms of tenure is fairly large (see, Adeniyi 1972; Fabiyi, 1974; Famoriyo, 1979; Ojaodola, 1970; Olatunbosun, 1975; Osuntagun, 1976; Wells, 1974; Williams, 1978). However, a recent study by Francis (2005) considered the impact of the Decree on patterns of landholding and use in a community in the cocoa belt of Southwest Nigeria and revealed that the political conditions which govern the ownership and control of land indicates that the system of tenure as it existed prior to the Decree functioned as an equitable, stable and flexible means of regulating access to land.

METHODOLOGY AND EMPIRICAL MODEL

The study uses both descriptive and econometric approaches of unit root, co-integration, error correction mechanism, as well as Jacque Bera normality test to empirically re-assess the constraints to agricultural development in Nigeria. This is to enable the researcher investigate the cause and effect relationship between agricultural output and the explanatory variables adopted in the study. The theoretical base of the model is the endogenous growth theory which associates growth to endogenous factors, other than external forces (Romer, 1994). The endogenous growth theory can be expressed in a simple Harrod-Domar growth model thus;

$$Y=AK \quad (1)$$

In this formulation, **A** represents any factor that affects technology, and **K** captures both physical and human capital. The model has been modified to include some important variables that affect agricultural output in Nigeria, to wit; Agricultural Output measured in million naira (AGTR), Credit to Agricultural sector measured in million naira (CASTR), Food Export measured in millions (FEXTR), Food Import measured in millions (FIXTR), Rainfall measured in volume (RNFTR), Exchange Rate measured in percentage (TERTR), Government Expenditure measured in million naira (GEXPENTR). Therefore, the model is specified thus;

$$AGTR = a_0 + a_1CASTR + a_2FEXTR + a_3FIXTR + a_4RNFTR + a_5 TERTR + a_6GEXPENTR + U_t \quad (2)$$

However, to have the variables normally distributed, the model is again specified in a log-linear form as shown below;

$$\text{LogAGTR} = a_0 + a_1\text{LogCASTR} + a_2\text{LogFEXTR} + a_3\text{LogFIXTR} + a_4\text{LogRNFTR} + a_5\text{LogTERTR} + a_6\text{Log GEXPENTR} + U_t \quad (3)$$

The a priori expectation of the variables is summarized below as follows;

$$a_1, a_2 > 0; a_3 < 0, a_4, a_5 \text{ and } a_6 < 0.$$

Empirical Results

The preliminary analysis of time series variables is the test for unit root in the series. A series is said to be stationary if the mean and auto covariance of the series do not depend on time. The test for co-integration among the data-set follows the unit root test; the test is carried out to determine the existence or otherwise of a long-run equilibrium relationship among explanatory variables employed. However, if a co-integrating relationship is found to exist, then the error correction equation is estimated. The pre-testing procedure and the estimated results obtained are presented and analysed for each econometric technique adopted in the study as presented below;

Unit Root

The Augmented Dickey-Fuller (ADF) test for unit root was used in the study and the result is as presented below in trend and intercept as well as intercept only. In the unit root test, the null hypothesis of the presence of a unit root (non-stationary) was tested against the alternate hypothesis of the absence of unit root (stationary) with trend and intercept as well as intercept alone. The result shows that the series were all integrated of order one - 1(1) using the Augmented Dickey Fuller (ADF) test. These variables are stationary because their calculated values using ADF are greater than their critical values at five percent level of significance considering the intercept as well as trend and intercept results presented in table 6 below.

Table 6: Augmented Dickey Fuller test

Variables	Intercept		Trend and intercept		Decision
	Levels	1 st Difference	Levels	1 st difference	
Agtr	1.563468	-6.716871	0.666868	-6.649571	I(1)
Castr	0.398561	-5.985755	-0.765018	-6.362619	I(1)
Fextr	1.120533	-10.51494	1.837203	-9.088084	I(1)
Rnfr	0.481020	-4.196987	1.990816	-4.166255	I(1)
Tertr	-0.838557	-6.098801	0.731855	-5.358289	I(1)
Fixtr	0.569045	-5.833102	-1.541729	-6.102035	I(1)

Critical Values: 5% = -2.935001

Critical Values: 5% = -3.523623

Source: Author's computation

Co-integration test

Co-integration test for the study follows Engle-Granger (1987) two step procedure. According to Engle and Granger (1987) assumption, "any two or more integrated time series that are co-integrated have an error correction representation, and two or more time series that are error correcting are co-integrated". Granger (1986) also demonstrated that the dynamic relation among co-integrated variables can be represented by an ECM; the approach was to test for co-integration among the variables using their residual. However, the stationarity test on the estimated U_t (Residual) shows that the Residual is stationary at levels, meaning that long-run relationship exist among the variables employed in the study.

Table 7: Engle-Granger two step procedure

Intercept	Trend and Intercept				
	Levels	1 st Difference	Levels	1 st Difference	Decision
Residual	-3.034549		-3.864604		I(0)
	5% Critical value: -2.935001		5% Critical value: -3.523623		

Source: Author's computation

Error correction result

The over parameterized result estimate is shown in Table 8. At this level, it is difficult to interpret the result in any meaningful way; its main function is to allow for the identification of the main dynamic patterns in the model. However, the parsimonious result estimate is more interpretable and suitable for policy formulation, as presented in Table 9, after excluding the insignificant variables. The result reveals that all the variables are consistent with a *priori* expectations except Credit to Agricultural sector: $D\log(\text{CASTR}(-1))$ and Food Export: $\log(\text{FEXTR}(-1))$. Rainfall: $\log(\text{RNFTR})$, Exchange Rate: $\log(\text{TERTR})$ and Food Export: $\log(\text{FEXTR}(-1))$ are statistically significant at five percent; $\log(\text{FEXTR})$ is statistically significant at 10 per cent, whereas, $D\log(\text{CASTR}(-1))$ and Food Imports: $D\log(\text{FIXTR})$ are not statistically significant at both five and 10 per cent significant levels. However, a one percent increase in $\log(\text{RNFTR})$, $\log(\text{FEXTR})$ and $\log(\text{TERTR})$ will stimulate a 0.145115, 0.055408 and 0.117556 per cent increase in Agricultural Output: $D\log(\text{AGTR})$ respectively. Also, a one percent change in $\log(\text{FEXTR}(-1))$ will lead to a -0.071504 change in $D\log(\text{AGTR})$ after a one year period.

The adjusted R-squared shows that 67.57 per cent of the total variation in agricultural output of Nigeria is explained by factors considered in the model leaving the remaining 32.43 per cent for other factors not captured in the study. The F-statistic reveals that the overall model estimate is statistically significant at 5 per cent level of significance since its calculated value of 21.8786 is greater than its tabulated value of 2.45. Hence, the estimated result can be relied upon for predicting the future behaviour of Nigeria's agricultural output. The Durbin-Watson statistic of 1.5639 falls under the inconclusive region, meaning that the existence or otherwise of auto-correlation in the estimated result cannot be ascertained. In an attempt to remedy the situation and be more sure of the existence of auto-correlation or not, Breusch Godfrey Serial Correlation LM test was carried out and the result came out very strong. The outcome depicts that there is no autocorrelation in the result estimate. This is because the F-statistic (2.6194) is greater than the prob. F(30) value of 0.0894.

The Jargue Bera test was also conducted to determine the normality of the distribution of the residual term in the model. Where the distribution is not normal, the basic assumptions of OLS estimation are assumed to have been violated. However, the result reveals that the estimates are normally distributed. The speed of adjustment in eliminating deviations from the long-run equilibrium is 19.62 per cent. This means that the speed of adjustment in correcting the short-run deviations in Nigeria's agricultural output from the short state due to deficiency to secure stationarity is slow.

Table 8: Results of the over parameterized model for agricultural output equation
Dependent variables: DLOG(AGTR)

Dependent variables	Coefficient	Std. Error	t-statistic	Prob
DLog(CASTR(-1))	-0.027641	0.118259	-0.233732	0.8169
Log(FEXTR)	0.062067	0.037467	1.656590	0.1088
Log(FEXTR(-1))	-0.085663	0.039523	-2.167437	0.0389
DLog(FIXTR)	0.008235	0.142997	0.057586	0.9545
Log (RNFTR)	-0.197590	0.139662	-1.414775	0.1682
Log(RNFTR(-1))	0.121923	0.148652	0.820188	0.4190
DLog(TERTR)	0.011371	0.016271	0.698825	0.4904
DLog(TERTR(-1))	-0.001467	0.018937	-0.077466	0.9388
Log(GEXPENTR)	-0.002130	0.017389	-0.122495	0.9034
ECM(-1)	-0.222182	0.017389	-2.879552	0.0076
C	0.799401	1.072779	0.745168	0.4624
R- Squared	-0.336325			
Adjusted R-square	- 0.299299			
F-Statistic	- 1.418935			
Durbin Watson	- 1.388953			

Source: Author's computation

Table 9: Results of the parsimonious model for agricultural output equation
Dependent variable: DLOG(GTR)

Dependent variables	Coefficient	Std. Error	t-statistic	Prob
DLOG (CASTR(-1))	-0.019355	0.100746	-0.192119***	0.8489
LOG(FEXTR)	0.055408	0.032066	1.727955**	0.0936
LOG(FEXTR(-1))	-0.071504	0.029003	-2.465400*	0.0192
DLOG(FIXTR)	0.036321	0.120789	0.300697***	0.7656
LOG(RNFTR)	0.145115	0.015831	9.166508*	0.0000
DLOG(TERTR)	0.117556	0.013582	8.655279*	0.0000
ECM(-1)	-0.196204	0.063007	-3.114012*	0.0039
C	1.302283	0.798086	1.631756	0.1125
R-Squared	- 0.723682			
Adjusted R-squared	- 0.675738			
F-Statistic	- 21.87863			
Durbin – Watson	- 1.563902			

* - Significant at 5% level
 ** - significant at 10% level
 *** - Not significant at both 5% and 10%

Source: Author's Computation

Table 10: Breusch-Godfrey serial correlation LM test:

F-statistic	2.619402	Prob. F(2,30)	0.0894
Obs*R-squared	5.946630	Prob. Chi-Square(2)	0.0511

Source: Author's computation.

IMPLICATION OF FINDINGS

Arising from the empirical results, any policy that stimulates an increase in credit to agricultural sector at lag one year will not lead to significant positive shifts in Nigeria's agricultural output. Also, food export at lag one year will lead to a reduction of 0.07 per cent in agricultural output. This contradicts the outcome of a study by Enoma (2010) whose empirical results confirm credit to the agricultural sector to be considerably vital in stimulating agricultural output if adequately utilized. Findings from this study also contradict the findings of Earle (2011) who maintained that an increase in credit to the agricultural sector as well as a rise in food export stimulates an increase in agricultural output.

The reason for this contradictory outcome may be due to the diversion of funds meant for agricultural purposes to other areas of interest such as education, marriages, commodity trade, etc. Apart from the negative effect on the agricultural sector, DLOG (CASTR(-1)) was also not significant in influencing agricultural output whereas food export at lag one- LOG(FEXTR(-1)) was significant. Rainfall has proven to be the highest determinant of agricultural output in Nigeria followed by exchange rate. This therefore means that any policy geared toward enhancing agricultural output in Nigeria must take into consideration, these factors, due to the important role they play in agricultural output growth. This outcome corroborates the findings of Dunstan (1994) who opined that exchange rate, rainfall and other relevant infrastructures like rural roads, and irrigation systems should be put in place in order to harness the rich potentials of Agriculture in the region, although, he forecasted that these infrastructures may not be in place in the humid and sub-humid tropics of Africa in the next 20-30 years.

The positive effects of food export and the insignificance of food import from our findings also supports the findings by Ukeje (2007). He maintained that the major problems militating against agriculture and food security in Nigeria were inadequate farm input supply; low rate of technology adoption, post-harvest loses etc. which resulted to high rate of food importation. This high rate of food imports may be due to the lack of interest in the agricultural sector by the youths. This is worrisome since the youths constitute a greater percentage of the Nigerian population. Hence, if urgent steps are not taken to reverse the trend, the negative influence of a youthful population may overwhelm its positive gains. The absence of auto-correlation in the model and the significance of the F-statistics depicts that the model can be relied upon in forecasting policies that will transform the agricultural sector of Nigeria in particular as well as ensure food security in general.

CONCLUSION AND POLICY RECOMMENDATIONS

Agriculture plays a significant role in the economic growth and development process of any economy, although, most developing economies, like Nigeria are yet to fully harness the potentials of a well-structured agricultural sector for the actualization of higher economic

growth trajectories. However, the study investigated the constraints to agricultural development in Nigeria and uncovered some binding constraints to the sector, some of these constraints include; diversion of funds meant for investment in agriculture to other areas of interest, increasing food imports and lack of requisite technologies for the facilitation of agribusinesses, etc. Explanatory variables such as food export, rainfall and exchange rate are significant positive determinants of agricultural output in Nigeria as revealed in the empirical results. Judging from the findings, however, the study proffers the following recommendations;

- I. Government must as a matter of necessity adopt strategies to re-direct adequate loans to genuine farmers through micro-finance banks and commercial banks. Apart from this, government should also strengthen research and development institutions as a means of seeking for new knowledge. One method of achieving that is increasing research grants as well as staff training and re-training to adequately equip upcoming and experienced researchers in the agricultural sector.
- II. Government should initiate programmes and policies that will ensure adequate partnerships between research institutions and our higher institutions of learning to breach the widening gap between theory and practice. Such research institutions are manifold. Examples include, International Institute of Tropical Agriculture (IITA), International Food Policy Research Institute (IFPRI), National Root Crops Research Institute, and Arable Crops Research Institutes etc. This will assist in effective implementation of new knowledge as well as expose the younger generation on the lofty potentials in agricultural sector.
- III. Government through its agencies should seek to maintain a stable and favourable exchange rate since the variable has been found to possess a significant positive effect on agricultural output.
- IV. The Federal Ministry of Agriculture as a representation of government must work in partnership with other organized farmers' groups, non-governmental organizations (local and foreign) with special focus in agriculture to sensitize the public on the negative implication of high food import. This can be achieved by organizing seminars and workshops but not necessarily on increasing tariffs on food import to avoid retaliation from trading partners.
- V. The development of agro-allied industries that will ensure processing, preservation and packaging of agricultural products for consumption and export must be given serious attention by agricultural stake holders. This will encourage local producers to engage fully in agriculture, create jobs, and earn significant foreign exchange for the country.
- VI. By and large, Government should device a means of conserving wasted water from rainfall. This water can be conserved and used for irrigation, artificial ponds and canals that will ensure all year round irrigation system especially in the Northern part of the country which has been noted for high incidences of drought.

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