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Effect of Agriculture Financing on Agriculture Productivity in Nigeria

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Abstract: *Agricultural operations in Nigeria over the past years have largely remained primitive, resulting in very low productivity due to inadequate application of modern technology. The cost of agriculture machinery like tractors, harvesters, planters and son are astronomically high and unaffordable for an average Nigeria farmer. Also, there has been daunting challenges of farmers struggling to obtain financing to modernize or expand their farms this is owing to the fact that, agriculture financing has for several years suffered major setbacks through some inhibiting factors, which includes low agricultural productivity, lack of capital and inaccessibility to credit facility, inadequate availability of input and storage facilities, lack of conductive and enabling environment weak agriculture extension and outdated sectoral infrastructure, hence, this study investigates the implication of equipment financing on increase productivity in the agricultural sector in Nigeria. The choice of research designs employed in this study is the archival and documentary research strategy, associated with the deduction approach which involve secondary data collection. The population comprises 16 years' data on total annual financial expenditure on agriculture equipment's, agriculture productivity output and export earnings from 2000 to 2015 (16 years) forms the population of the study. Secondary data on cumulative annuals expenditure on agricultural financial (AF), agricultural productivity indicator and export earnings (EE) were employed the findings from the study revealed that agricultural financing has a significant impact on technological advancement of mechanized farming and production output. The study therefore recommends that, efforts that should be made by agricultural intervention agencies and financial institutions to increase credit finance allocated to agricultural equipment's, which is a sustainable measure towards technological advancement in the sector for more productivity.*

Keywords: *Agriculture, Equipment Financing, Mechanization, Productivity, Growth.*

1. INTRODUCTION:

In Nigeria, agriculture has been conventionally considered as the mainstay of the economy in spite of the growing importance of oil exploration, making Nigeria remain essentially an agrarian economy. In the context of the Nigerian economy, agriculture is tied to the various sectors and is essentially far generating broad based growth and development. The development of agriculture is as old and closely associated with the evolution of mankind, since food is one of the essentials of life, necessitating the dominant role of agriculture in any nation's development and growth, be it a developed economy, a developing or under-developed one.

Much remains to be learned about the inter-relationship between agriculture and national economic growth. Howbeit, it is a widely recognized fact that increased productivity in agriculture is essential for national economic growth, especially in the less advanced countries. Corroborating the above statement, Adesoye, Maku and Atanda (2011) state that, agriculture serves as both the main traditional occupation and also the key to sustained growth of most developing countries in this modern economy. Economic growth has often gone hand in hand with agricultural progress. Stagnation in agriculture is the principal explanation for poor economic performance, while rising agricultural productivity has been the most important concomitant of successful industrialization (Abayomi, 1997).

Technological application in the agricultural sector (farm mechanization and processing equipment) has been seen as the pivot to agricultural revolution in many parts of the world, which has greatly contributed to increased output of food crops and other agricultural products to meet the demands of the ever increasing world population (Akande, 2009). Mechanization of agriculture has solved food scarcity problems in many countries. In the case of the United States of America, only about 3 percent of the entire population are engaged in farming, with an average American farmer producing enough food to feed thousands (Srivastava, Carrol, Roger & Dennis, 2006).

Nigeria, according to Onwualu (2009), is greatly endowed with variety of agricultural produce which can provide stimulus for the growth of processing industries. Value addition in agricultural produce provides ample opportunities for revenue generation and employment creation. Value addition is a vital component of the overall strategy towards addressing agricultural productivity, curbing post-harvest losses and ensuring food security (Adama, Obasi & Onwualu, 2006; FAO, 2012). Processing agricultural produce into various innovative products promotes market acceptability and gives the products high economic value (Onwualu, 2012) which increases productivity and contributes to economic growth. According to Kaplinsky (2000:121), a value chain is the full range of activities which

are required to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers. Thus, the Value Chain concept is no doubt revolutionizing the agriculture industry (Lyman, 2008), as focus has shifted from agricultural production to consumer demand, marketing and the coordination of product flows from producer to consumer (Olagunju, Babatunde & Salimonu, 2012).

For agricultural productivity and economic growth to be achieved, agricultural value chains are a crucial basis for understanding how inputs and services are brought together and then used to grow, transmute or manufacture a product (Webber & Labaste, 2010), understand business-to-business relationships that connect the chain, mechanisms for increasing efficiency (employment creation) and ways to enable businesses to increase productivity (achieve national food security) and add value (increase variety and quality of staple foods) (Ibrahim, 2015).

Agricultural productivity according to Dhrifi (2014) is one of the key determinants of high and sustained agricultural growth, and in fact a key determinant of its growth over the longer term. It remains a vital economic driver for developed and developing countries and plays critical and significant roles in eradicating poverty especially in low-income countries. This sector generates a substantial level of revenue while increasing real income (Christiaenson & Demery, 2007) It not only employs an estimated 70 percent of the work-force in low income countries, but it is also a major contributor to economic growth, measured by Gross Domestic Product (GDP) estimated at approximately 30 percent (The World Bank, 2007). However, there has been no much improvement in the growth rate of agricultural output (productivity) in the new millennium; the growth rate for the agricultural sector in 2000 was 4.7%, a slight improvement on the 4.5% recorded in '1999 ah 4.25% recorded in 1998 (Olaitan, 2005). The more recent growth rates are 5.9%, 5.6% and 4.0% for the years 2009, 2011 and 2012 respectively; lagging behind the national GDP growth rate of 7.0%, 7.4% and 6.6% for the respective years (CBN, 2013).

2. STATEMENT OF THE PROBLEM:

Agricultural operations in Nigeria over the past years have largely remained primitive, resulting in very low productivity due to inadequate application of modem technology. The cost of agricultural machinery like tractors, harvesters, planters and so on are astronomically high and unaffordable for an average Nigerian farmer. Also included is inadequate supply of critical inputs such as hybrid seeds, fertilizers and agro - chemicals at the appropriate time and at affordable prices have remained major constraints to increased agriculture productivity in Nigeria.

In Nigeria, there has been daunting challenges of farmers struggling to obtain financing to modernize or expand their farms, invest in productive assets or buy inputs. This is owing to the fact that, agricultural financing has for several years suffered major setbacks through some inhibiting factors, which include low agricultural productivity, lack of capital and inaccessibility to credit facilities, inadequate availability of inputs and storage facilities, lack of conducive and enabling environment, weak agricultural extension and out-dated sectoral infrastructure.

Based on the above situation, what policy and action can we take to find solution to increase in productivity, all efforts put in place over the years to achieve increased productivity output through the agricultural financing have proven abortive. It is therefore expected that at the end of all these, technological advancement in mechanized farming and increased employment will lead to sustainable agricultural productivity in Nigeria.

3. OBJECTIVE OF THE STUDY:

The broad objective of this study is to investigate the impact of Agricultural financing on productivity in the Agricultural sector in Nigeria, while specific objectives of the study are;

i. Investigate the impact of Agricultural financing on technological advancement of mechanized farming in Nigeria
ii. Examine the relationship between technological advancement of mechanized farming and increased Agricultural productivity in Nigeria.

4. LITERATURE REVIEW:

Agriculture has been defined as the production of food and livestock and the purposeful tendering of plants and animals, (Ahmed, 1993). He stated further that agriculture is the mainstay of many economies and it is fundamental to the socio-economic development of a nation because it is a major element and factor in national development. In the same view, Okolo (2004), describe agricultural sector as the most important sector of the economy which holds a lot of potentials for the future economic development of the nation as it had done in the past.

Agriculture contributes about 40% of Nigeria's GDP and provides livelihood for about 70% of the population; hence the importance of agricultural sector in the overall Nigerian economy cannot be overemphasized (CBN 2008). According to the early works of Mellor (1961) and Nicholls (1964), six different contributions of agriculture can be identified to include food, livelihood, market, industrial raw materials, foreign exchange earnings and surplus or source of savings. Prior to Nigeria's independence iii' 1960, the predominant economic activities were agricultural production and marketing of imported goods. Despite all the laudable programmes promoted by various governments, agriculture has suffered from years of poor management, inconsistent and poorly implemented government policies, and the lack

of basic infrastructure. Still the sector accounts for considerable percentage of GDP and two-thirds of employment. Nigeria is no longer a major exporter of cocoa, groundnut (peanuts), rubber, palm oil due to overdependence on petroleum as main source of revenue (Onwualu, 2009). The challenges and constraints that have made it impossible for Nigerian agriculture to be developed have been discussed severally (Onwualu, 2009; 2010). Some of the challenges include:

Lack of Appropriate Technology and Machinery for Production and Processing of Agricultural Products: The absence of appropriate processing technology and the obsolete nature of existing machinery and equipment constitute great hindrance to agro raw materials processing in the country. Most of the processing equipment are out-dated and lack the necessary spare parts for their maintenance. Consequently, the efficiency and product quality of the industries are greatly affected. This often contributes to the frequent break down and closure of such industries (Olagunju, Babatunde & Salimonu, 2012).

Difficulties in Accessing Credit Facilities for Investment in Agriculture: Investment in the sector is usually capital intensive and consequently, fund sourcing is a necessary aspect of the enterprise. However, it is extremely difficult to access credit for working capital from the financial institutions for agribusiness ventures. The high cost of funding arises from the depreciation of the local currency (Naira) against major currencies coupled with high lending rates. Presently, the lending rates fluctuate between 16 - 25% in some banks. The high lending rate encourages service business such as trading and imports rather than productive venture in the agribusiness sector (Olagunju, 2013).

Agricultural finance is the acquisition and use of capital in agriculture. It deals basically with the supply of and the demand for funds in the agricultural sector of the economy. USAID (2010) defined rural agricultural finance to include all types of finance available to farmers. It is a field of work in which people aim to improve access to efficient sustainable financial services for the agricultural industry, including farming and all related enterprises. It involves all financial services, including savings, transfers, insurance and loans, input supply, processing, wholesaling and marketing (Meyer, 2011). IFAD (2010) further adds that agricultural finance refers to all those financial services that focus on on-farm activities and agricultural businesses without necessarily targeting poor people. The crucial role of financing in agriculture cannot be overemphasized. The escalating world population is associated with greater pressure on food demand and the demand for agro-products that are input for further production, thus the need for use of more sophisticated methods capable of yielding greater output is essential (Mbufor, Ochu & Okafor, 2013). Finance in agriculture is as important for improved productivity as technical input can only be purchased and used by farmers if they have required fund at their disposal.

Agricultural finance deals with the financial aspects of the farm business. It includes both macro and micro finance aspects of an agricultural economy. Various scholars considered agricultural finance as under estimated. For instance agricultural finance is seen as the study of financing and liquidity services credit provided to farm borrowers. It is also considered as the study of those financial intermediaries who provide loan funds to agriculture and the financial markets in which these intermediaries obtain their loanable funds. Further agricultural finance is also seen as the economic study of the acquisition and use of capital in agriculture, which deals with the supply and demand for funds in the agricultural sector of the economy (Nzotta & Okereke, 2009).

Farm mechanization has been seen as the pivot to agricultural revolution in many parts of the world, and has contributed greatly to increased output of food crops and other agricultural products to meet the demands of the ever increasing world population. Through farm mechanization, many industrial raw materials are produced for the rapidly expanding world industries (Ituen, 2009). Mechanization of agriculture has solved food scarcity problems in many countries. Only about 3 percent of the American population is engaged in farming now, and one American farmer produces enough food to feed 60 people and also a family can manage up to 1200 hectares of farmland (Srivastava et al, 2006) India was once hit by severe famine due to the menace of droughts and floods and this created a precarious situation. Through concerted efforts by the Indian government, strategies were evolved in research in Universities and agricultural institutions to develop experimental plot machines and high yielding varieties of crops and associated production and protection technologies which brought about green Revolution (Ituen, 2009).

Agricultural mechanization has been described as the development, introduction and use of mechanical assistance of all forms and at any level of technological sophistication in agricultural production. Odigbo (2000) further defined agricultural mechanization as the use of a machine, any machine to accomplish a task or an operation involved in agricultural production. Such tasks or operation include reduction in human drudgery, improvement of timeliness and efficiency of various agricultural operations, bringing more land under cultivation, preserving the quality of agricultural products, providing better rural living conditions and markedly advancing the economic growth. Thus, the need for mechanization' of agriculture in Nigeria has become more acute in recent years due to, among other reasons, the urgent need to accelerate food and fibre production for the teeming urban and rural population through increasing both labour and land productivity, as well as expanding the existing cultivated area (Azogu, 2009). Also crucial is the need to create the necessary awareness of the immense potentials of agricultural mechanization technology to the economic development of the nation.

Agricultural mechanization in Nigeria can be classified into three levels of technology: Hand- Tool Technology, (HIT) Draught Animal Technology (DAT) and Engine-powered Technology (EPT) (Odigboh and Onwualu, 1994). However, for the purpose of this study, focus is on the Engine-powered technology. According to Ugwuishiwu and Onwualu (2009), the Engine-Power Technology is the highest and most modem level of agricultural mechanization. It refers to a very wide range of implements, machines and equipment powered by a similarly wide range of mobile or stationary motive sources (engines and motors), using petroleum fuels, or electricity, power sources and their associated implements are available in size, power rating, level of sophistication and technical complexity that vary tremendously.

The primary objective of agricultural mechanization was summarized by Pellizzi (1992) in Ituen (2009), as minimization of production costs, optimization of product quality, protection of the environment and minimization of farm production flexibility. Benefits of agricultural mechanization Ituen (2009) asserts include the reduction of farm drudgery, the timely provision of suitable conditions and environment forp1ant and animal growth, better control of such production functions as seed bed preparations, drainage, cultivation, fertilizer application, planting, weed and pé control, reduction of harvest losses, post-harvest quality preservation, storage, processing, distribution and marketing, which in turn contribute to enhanced food security, employment opportunities, better rural living and working conditions and thus reduced poverty.

According to Spore (2002), agricultural mechanization will bring about changes in production methods, logistics and equipment. There is the need to adopt processes and tools to the mechanics of elderly and youthful bodies alike. The ergonomics option involves technological development of production tools and equipment as well as improvement in the harvesting, handling and processing methods in order to reduce drudgery and make agricultural production processes more attractive. Odigboh (2000), further defined agricultural mechanization as the use of machine, any machine, to accomplish a task or an operation involved in agricultural production. Such tasks or operations according to Odigboh,(2000) included reduction of human drudgery, improvement of timeliness and efficiency of various agricultural operations, bringing more land under cultivation, preserving the quality of agricultural products, providing better rural living conditions and markedly advancing the economic growth.

Also, Nigerian Educational Research and Development Council (NERDC, 1991) defined Agricultural mechanization as the art and scientific application of mechanical aids for increased production and preservation of agricultural produce with increased efficiency and less drudgery. Gifford (1992) viewed agricultural mechanization as the manufacture, distribution and operation of all types of tools, implements, machines and equipment for agricultural land development, farm production and crop harvesting and primary processing. Also Mijindadi (1994) defined agricultural mechanization as the application of better and more efficient hand tools draught animals drawn implements as well as motorized equipment to reduce human efforts (drudgery), improve timeliness and the quality of various farm operations thereby increasing yields and raising the quality of products and the general efficiency of farm holdings.

Daramola, Igbokwe, Mosuro and Abdullahi, (2000) defined agricultural mechanization as the use of labour saving machinery in agricultural production. Also Iwena, (2007) defined agricultural mechanization as the application of engineering principles and technology in agricultural production, storage and processing on the farm. Agricultural mechanization in the broadest sense refers to the application of engineering, scientific and technological principles in the development and application of labour saving and productivity increasing devices such as machinery, improved breeds of animals and varieties of crops, husbandry methods and production inputs in production, storage and processing on the farm. It is applicable to land preparation, planting, husbandry, fertilizer application, weeding, crop health, irrigation and crop harvesting, storage and. processing and rearing, care and feeding and animal health as well as storage and processing of the produce in order to add value (Are, Igbokwe, Asadu, and Bawa, 2010). From these definitions, agricultural mechanization is one of the various ways of agricultural development. Therefore, any attempt to give a complete analysis of the economies of mechanization would have to include the use of hand tools, machines as well as the use of draught anim1 he corresponding implements to reduce human labour and increase the efficiency of production. Farm mechanization has been defined as the process of development and introduction of mechanized assistance of all forms and at any level of technological sophistication in agricultural production in order to reduce human drudgery, improve timeliness and efficiency of various farm operations, bring more land under cultivation, preserve the quality of produce, improve living condition and, markedly advance the economic growth of the rural sector (Faborode, 2001; Akande, 2009 and Abubakar, 2010d). Agricultural mechanization is also defined as a sector of the economy that embraces the manufacture, distribution and operation of all types of tools, implements, machines and equipment for the agricultural land development, farm crop production, crop harvesting and primary processing (FAO, 1996). This simply means that farm mechanization encompasses in its widest sense hand-tool technology, draught animal technology and mechanical-power technology.

Agricultural productivity is one of the key determinants of high and sustained agricultural growth, and in fact a key determinant of its growth over the longer term. It remains a vital economic driver for developed and developing countries and would play a critical role in eradicating poverty especially in low-income countries. This sector generates a substantial level of revenue while increasing real income (Christiaensen & Demery, 2007). It not only employs an

estimated 70 percent of the work-force in low income countries, but it is also a major contributor to Gross Domestic Product (GDP) estimated at approximately 30 percent (World Bank, 2007).

Agricultural productivity can be defined as the index of the ratio of the value of total farm output to the value of the total inputs used in the farm production. According to Ajetomobi (2008), production efficiency means the attainment of production goals without waste. Efficiency is an important factor of productivity growth specifically in developing economies where resources are meagre and opportunities for developing and adopting better technologies are limited. Farell (1957) derived the three components of efficiency recognized in the economic literature. They include: (i) Allocative efficiency, and (ii) Economic efficiency. A firm is said to be technically efficient if it produces as much output as possible from a given set of inputs or if it uses the smallest possible amount of inputs for a given level of output and input mix (Atkinson and Comwell, 1994). The allocative efficiency reflects the ability of a firm to use the inputs in optimal proportions, given their respective prices. The product of these two efficiencies is economic efficiency, which could be defined as the ability of the firm to produce a well-specified output at minimum cost.

5. EMPIRICAL REVIEW:

Isa, (2015) carried out a study to determine the Influence of Agricultural Mechanization on Crop Production in Bauchi and Yobe States. The population for the study comprised of contact farmers from the five Agricultural Development Programme Zones in Bauchi and Yobe States. Multi-stage sampling technique was used to select three hundred and sixty-eight contact farmers. Questionnaire was used as instrument to collect data from the respondents, with a four rating scale for the respondents to indicate their degree of agreement or disagreement. The biodata was analysed using the simple percentage, while the mean average was used to answer the research questions. The answers from the research questions indicated that agricultural mechanization has a significant influence on crop production. The null hypotheses were tested using Chi square statistics. The results showed that they were all rejected because their calculated significant (p) values of 0.00 were lower than the 0.05 level of significance. The findings revealed that there was increase in crop yields, size of farm, income of the farmers and improvement in their standard of living. All the five null hypotheses were rejected. It was concluded that influence of agricultural mechanization on crop production was significant. The study recommended that mechanized farm tools and equipment should be provided to the farmers by the government inform of subsidy and ensures that it is the right category of farmers' benefits. The study also recommended that there should be better funding of extension services programmes so that-the extension workers can discharge their duty effectively.

Lamidi and Akande, (2013) in their study reviewed status, challenges and prospects of Agricultural Mechanization in Osun State, Nigeria. Personal observation, oral interview, past records and questionnaire were used to collect data from various establishments visited in the nine selected Local Government Areas (LGAs) in Osun State. The data collected for the study were analyzed using simple percentage (%). During the research study, two hundred and ten (210) questionnaires were administered. Out of these questionnaires, 198 were collected back. The study revealed that, the low rate of adoption and utilization of appropriate mechanization technologies has remained one of the major factors militating against agricultural production in Nigeria. This finding is buttressed by the results of the analysis which identified 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 means as problems. There was a range of 385.5% - 394.4% for settlers than non-settlers in arable crops; 91% of non- settlers/local farmers belief that uses of farm inputs have negative side-effect on crops and soil. 68% of the farms have functional implements while 32% of the stations have non-functional implements, 52% of the respondents partially mechanized their agricultural production. 62.5% of the stations visited have maintenance, 53% of the respondents in these stations agreed diverting the money earmarked for maintenance in their budget to other things. Infrastructural problem was identified by 60 percent of the respondents. The deprivation in abundance amongst farmers in the state and in their produce is partly due to inability to mechanize agriculture to improve its efficiency, cost effectiveness, diversity and competitiveness. The study concluded that, the low rate of adoption and utilization of appropriate mechanization technologies has remained one of the major factors militating against agricultural production in Nigeria.

Francois Quesnay (1694-1774) Theory of Economic Growth

The physiocrats laid more emphasis on agriculture in the development of an economy. In their views, the source of national wealth is essentially agriculture. The agricultural sector to the physiocrats is the only genuinely productive sector of the economy and generator of surplus upon which all depends. Todaro and Smith (2003), while looking at the Lewis theory of development, assumed that underdeveloped economies consist of two sectors. These sectors consist of traditional agricultural sector and the modem industrial sector. Agricultural development was seen as necessary for successful economic transformation.

According to the export-led growth literature, exports growth is a measure of outward orientation and could also serve as a proxy for internationally competitive cost structure. Export expansion can be a catalyst for output growth both directly, as a component of aggregate output, as well as indirectly through efficient resource allocation, greater

capacity utilization, exploitation of economies of scale and stimulation of technological improvement due to foreign market competition (Fischer & Witt, 1994 in Uremadu & Onyele, 2016).

Also, higher level of investment (gross capital formation) should stimulate growth while agricultural productivity is expected to have a positive effect on aggregate economic growth. It has been observed by Subasat (2002), that countries at the early stages of development depend almost fully on agricultural growth for employment, foreign exchange, government revenue and food supply to the population. In this sense, agricultural growth is the key impetus to the growth of underdeveloped and developing countries (Uremadu & Onyele, 2016).

The Physiocracy is based on one core proposition; the agricultural sector is the only sector capable of generating a net surplus, which is paid as a rent or revenue to the landlords, while the industrial sector remains sterile because it cannot produce profits. Quesnay thought that the industrial sector would always have a rate of return of zero, the manufacturing sector would not produce surplus over cost. The reason was that competition among entrepreneurs would prevent them from generating a surplus over cost. An increase in industrial efficiency would just cheapen products and not produce a surplus for the producers. On the other hand, an increase in agricultural efficiency would increase the surplus of the economy.

Quesnay thought that agricultural costs were fixed. He identified these costs as the food that the farmers would consume themselves while producing. Since the food consumed by the farmers is constant; an increase in the nation's farms productivity would suppose an increase of the nation's surplus. That is why he thought that farmers should not be taxed in order to allow them to increase the capital/labour ratio. The capital/labour intensity of agriculture determined the size of this surplus. Landlords would have higher revenues, and would increase the demand of finished products. Because of this, artisans would be able to subsist. Consequently the surplus in agriculture would cover the cost of the raw materials of producing manufactures, the expenses incurred by the workers, and the merchant's return. His opinion was that the manufacturing sector can only exist through the wealth of those who pay for it — the landowners. Moreover, he expressed that manufacturing sector was dependent on the agriculture, since this was the origin of the raw materials used to produce manufactures.

One of the failures of the Physiocrats was that they did not realize that in their times, there were already prosperous capitalism, bankers and merchants. This is one of the main weaknesses of the theory; the absence of entrepreneur's profit. When asked about the existence of great merchants, his answer was that in a perfect competition market these great merchants would not exist. It seems that Quesnay's was simplifying his model making the assumption that entrepreneurs would have a constant returns over time, enough to keep the incentives to operate such activity, but not enough to generate profits, since an increase of capital would not mean higher income, but lower prices (Taylor, 1960).

Quesnay believed that the net surplus generated by the agricultural sector was determining the aggregate demand of the economy. To distribute the wealth to the whole nation, this surplus or circulating capital should be spent in its totality by the landowners, and nothing should held back or lost overseas. According to Quesnay theories, the economic flow was as follows. Farmers would produce the nations net surplus. Then, a small part of it would be destined for own consumption and replacement of working capital, and in exchange of money used to buy urban products. The rest would be used to pay the landowners, who after using part of it in their own consumption; would be in possession of the country's net income. After paying taxes these landlords would be contributing to the country's stock of wealth (Blaug, 1962). The agricultural sector would generate income to the tenants every year and still reserve income — circulating capital or "annual advances" — as advances for the following year. The sterile sector would receive a part, and half of it would be spent on food. The remaining will be used for the reposition of raw materials and other expenses that would allow the constant output in this sector of the economy.

6. METHODOLOGY:

The choice of research design employed in this study is the archival and documentary research strategy, associated with the deductive approach, used for descriptive research purpose (Saunders, et al., 2009); the rationale is to allow collection of quantitative. Furthermore, the research choice employed is the quantitative method, which involves secondary data collection technique. In the area of research design, the study used mathematical (econometric) models in the analysis. It is also designed to be inductive in nature, since the researcher will be drawing conclusions based on the analysis of the data collected.

The population of this study comprises 16 years data on total annual financial expenditure on agricultural equipment, agricultural productivity output and export earnings from 2000 to 2015 (16 years) forms the population of the study. Data for this period is to have a considerable degree of freedom that will be necessary to capture the net effect of the explanatory variables on the dependent variables. Secondary data on cumulative annual expenditure on agricultural financial equipment (AEF), Agricultural productivity indicator and export earnings (EE) were sourced from the CBN annual report, statement of account and statistical bulletins, World Bank report, Federal Ministry of Agriculture and the National Bureau of Statistics, in line with the time series based multiple source, secondary data method of data collection.

7. DATA ANALYSIS AND MODEL SPECIFICATION:

Data collected was analysed using time series data analysis and graphs, while postulated hypotheses were tested using student F-statistics. The decision rule for accepting or rejecting the null hypothesis for any of these tests will be based on the Probability Value (PV). If the PV is less than 5% or 0.05 (that is PV < 0.05), it implies that the regressor in question is statistically significant at 5% level; otherwise, it is not significant at that level. The model is functionally specified below is specified to analyse the six hypotheses:

TMF= f(AEF) (1)
AP = f(TMF) (2)

The study shall conduct unit root tests using Augmented Dickey-Fuller (ADF) to ascertain the stationarity of the data before carrying out the cointegration test. After establishing the existence of long-run cointegration relationship, the study investigates both the long-run effects and the short-run dynamics using the Error Correction Model (ECM) approach. Banerjee, et. al (1998) stated that a dynamic Error Correction Model (ECM) can be derived through a simple linear transformation. ECM gives the short run coefficient without losing the long run information. The lag length or order of the variables will be selected by using Akaike Information Criteria (AIC). The choice of AIC is that it gives the heaviest penalties for loss of degree of freedom and also imposes a larger penalty for additional coefficients. (Ogwumike & Ofoegbu, 2012).

The ECM model provided by Pesaran, Shin and Smith (2001) is given as:

$$\Delta Y = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 X_{t-1} + \sum_{i-1}^{i} \beta_{1i} \Delta Y_{t-i} + \sum_{i-0}^{j} \beta_{2i} \Delta X_{t-i} + \varepsilon_t$$

Therefore, linearizing equation (1 to 6), so as to obtain a steady state Error Correction Model (ECM), we have:

$$\Delta TMF = \beta_0 + \sum_{i=1}^{m} \beta_1^i \Delta TMF_{t-i} + \sum_{j=0}^{n} \beta_2^i \Delta AEF_{t-j} + \delta ECT + \varepsilon_t \qquad (7)$$

$$\Delta AP_t = \beta_0 + \sum_{i=1}^{0} \beta_3^i \Delta AP_{t-i} + \sum_{j=0}^{p} \beta_4^i \Delta TMF_{t-j} + \delta ECT + \varepsilon_t \qquad (8)$$

Where;

AEF	=	(Agricultural equipment financing)
TMF	=	Technological advancement of Mechanized Farming
AP	=	Agricultural productivity (outputs)
β_0	=	the autonomous parameter estimate (Intercept or constant)
β_1 *to* β_{12}	=	Parameter coefficients
Δ	=	First difference operator
ε_t	=	The white noise error term
ECT	=	The error correction term
δ	=	The speed of adjustment parameter

8. RESULTS AND DISCUSSIONS:

The presence of unit root in the underlying series points to the fact that there is non-stationarity in that series. If the series are non-stationary, using standard econometric techniques can point to misleading results, so standard economic theory requires the variables to be stationary. The study employs Augmented Dickey- Fuller or ADF, (p) test (Dickey and Fuller 1979; 1981) to test for unit root in the variables. An ADF test here consists of estimating the following regression:

$$\Delta Z_t = \beta_1 + \beta_{2^t} + \delta Z_{t-1} + \sum_{j=0}^{p} \alpha_i \Delta Z + \varepsilon_t \qquad (13)$$

Where Z_t is the time series under consideration, ε_t is pure white noise error, t is trend, β_1 is drift and $\delta = \rho - 1$. The number of lagged difference terms to include is often determined empirically, the idea being to include enough terms so that the error term is serially uncorrelated. If the null hypothesis that $\delta = 0$ is rejected, it means the series is stationary. Unfortunately, under the null hypothesis that $\delta = 0$ (i.e., $\rho = 1$), the t value of the estimated coefficient of does not follow the t distribution even in large samples; that is, it does not have an asymptotic normal distribution. Dickey and Fuller have shown that under the null hypothesis that $\delta = 0$, the estimated t value of the coefficient of Z_{t-1}

follows the **τ** (tau) statistic. These authors have computed the critical values of the *tau statistic* on the basis of Monte Carlo simulations. Results of the unit root tests are presented in Table 2:

Table 1: Summary of Unit Root Test Results

Variables	ADF Test Statistic	Order of Integration
TMF	-3.355482(-3.229230)***	*I(1)*
AEF	-3.296853(-3.229230)***	*I(1)*
AP	-9.332791(-4.440739)*	*I(0)*
EE	-3.288753(-3.222O92)***	*I(1)*

Source: Authors Compilation (2017) E-views 9.0 Output

From the Table 1 above, it was discovered that TMF, AEF and EE were found stationary at first difference, that is, at order I(1). This means that their ADF test statistic were found greater than their respective tabulated values. However, AP was found stationary at order I(0) as also shown in Table 1. Since the variables were found stationary at different orders (mixed orders), the ARDL approach to co-integration was applied to examine the long run relationship among the variables.

The calculated F-Statistic that the joint hypothesis that the lagged level variables of the coefficients is zero equals 5.027. This figure is greater than the upper bound of the critical values of all the conventional levels 10% (3.77) and 5% (4.35). This means that joint null hypothesis of all the lagged level variables of the coefficients being zero is rejected even at 5%. This suggests that there is co-integration between agricultural financing, productivity and economic growth and hence a long run relationship between agricultural financing, productivity and economic growth.

Test of Hypotheses

The two hypotheses formulated in this study were tested using the F-statistics. The decision rule for accepting or rejecting the null hypothesis for any of these tests will be based on the Probability Value (PV): If the PV is less than 5% or 0.05 (that is PV <0.05), it implies that the regressor in question is statistically significant at 5% level; otherwise, it is not significant at that level.

Test of Hypotheses One:

H01: Agricultural equipment financing has no significant impact on technological advancement of mechanized farming in Nigeria

Table 2: Regression Result on Agricultural equipment financing and technological advancement of mechanized farming

Dependent Variable: TMF
Method: ARDL
Date: 06/22/17 Time: 23:37
Sample (adjusted): 2002 2015
Included observations: 14 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): AEF
Fixed regressors: C
Number of models evaluated: 6
Selected Model: ARDL(1, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TMF(-1)	1.043240	0.072362	14.41699	0.0000
AEF	-0.315938	0.155356	-2.033643	0.0725
AEF(-1)	-0.006803	0.164025	-0.041474	0.9678
AEF(-2)	0.423328	0.157438	2.688859	0.0248
CointEq(-l)	-0.043240	0.072362	0.597552	0.5649
C	10.28511	46.18392	0.222699	0.8287

R-squared	0.79 1039	Mean dependent var	868.7200
Adjusted R-squared	Y6706	S.D. dependent var	178.6800
S.E. of regression	20.32841	Akaike info criterion	9.134369
Sum squared resid	37 19.197	Schwarz criterion	9.362603
Log likelihood	-58.94058	Hannan-Quinn criter.	9.113241
F-statistic	4.898396	Durbin-Watson stat	1.768337
Prob (F-statistic)	0.003132		

*Note: p-values and any subsequent tests do not account for model selection.

Source: Authors Computation, 2017 (Eview-9. 0)

By examining the overall fit and significance of the model, it could be observed that the model has better fit. This was captured by the probability F-statistic value of 0.003 is less than 0.05. ***The conclusion is that Agricultural equipment financing has a significant impact on technological advancement of mechanized farming in Nigeria***

The coefficient of determination R2 (R-square), which was used to measure the goodness of fit of the estimated model, further indicates that the model is reasonably fit in prediction. That is, about 79.10 percent change in technological advancement of mechanized farming was due to agricultural equipment financing collectively, while 20.9 percent unaccounted variations were captured by the white noise error term. It showed that agricultural equipment financing had strong significant impact on technological advancement of mechanized farming in Nigeria. Durbin Watson (DW) statistics which is also used to test for the presence of serial correlation indicates that there is no autocorrelation among the variables as captured by (DW) statistic of 1.76, and as thus the estimates are unbiased and can further be relied upon for sound policy decisions.

Hypotheses Two:

H02: There is no significant relationship between technological advancement of mechanized farming and production output

Table 3: Regression Result on technological advancement of mechanized farming and production output

Dependent Variable: AP
Method: ARDL
Date: 06/22/17 Time: 23:41
Sample (adjusted): 2002 2015
Included observations: 14 after adjustments
Maximum dependent lags: I (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): TMF
Fixed regressors: C
Number of models evalulated: 3
Selected Model: ARDL(1, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TMF(-1)	0.183065	0.101999	1.794777	0.1063
AEF	6.042150	2.950092	2.048123	0.0708
AEF(-1)	-1.069964	4.188323	-0.255463	0.8041
AEF(-2)	7.334264	2.774144	2.643794	0.0267
CointEq(-l)	-0.816935	0.101999	-8.009276	0.0000
C	-2848878	431.5919	-0.660086	0.5257

R-squared	0895297	Mean dependent var	11902.52
Adjusted R-squared	0.793207	S.D. dependent var	2690.254
S.E. of regression	221.7334	Akaike info criterion	13.91328
Sum squared resid	442491.2	Schwarz criterion	14.14152
Log likelihood	-92.39297	Hannan-Quinn criter.	13.89215
F-statistic	6.981681	Durbin-Watson stat	1.936327
Prob(F-statistic)	0.001232		

*Note: p-values and any subsequent tests do not account for model selection.

*Note: p-values and any subsequent tests do not account for model selection.
Source: Authors Computation, 2017 (Eview-9. 0)

From Table 3, it could be observed that overall regression model is significant. This was captured by the probability F-statistic value of 0.0012 is also less than 0.05. ***Thus, we may conclude that there is a significant relationship between technological advancement of mechanized farming and production output.***

The coefficient of determination R^2 **(R-square)** showed that the model has a good fit. That is, about 89.52 percent change in productivity output was due to technological advancement of mechanized farming, while 20.9 percent unaccounted variations were captured by the white noise error term. It showed that technological advancement of mechanized farming had strong significant impact on production output. Durbin Watson (DW) statistics also indicates that there is no autocorrelation among the variables as captured by (DW) statistic of 1.93, and as thus the estimates are unbiased and can further be relied upon for sound policy decisions.

9. DISCUSSION OF FINDINGS:

Findings from the study revealed that agricultural equipment financing has a significant impact on technological advancement of mechanized farming in Nigeria. This is in-line with the results of Obansa and Maduekwe, (2013) who found that there is bidirectional causality between technological advancement, economic growth and agriculture financing; and there is bidirectional causality between economic growth and agricultural growth. They suggested that agricultural investment will be more appropriately financed with foreign direct private loan, share capital, foreign direct investment and development stocks. Furthermore, Oji-Okoro (2011) findings revealed in the study that 81% of the variation in GDP through mechanized farming in Nigeria could be explained by Domestic Savings, Government Expenditure and Foreign Direct Investment. They found that in order to improve the technological advancement of mechanized farming, it is imperative for government provides more funding for agricultural universities in Nigeria to carry out researches on all areas of agricultural production this will lead to more exports and improvement in the competitiveness of Nigeria agriculture production in international markets. The Central bank of Nigeria should also come up with a stable policy for loan disbursement to farmers at a reasonable interest payback.

More so, it was found that there is a significant relationship between technological advancement of mechanized farming and production output. This is in agreement with Isa (2015) who found that agricultural mechanization has a significant influence on crop production. His findings revealed that there was increase in crop yields, size of farm, income of the farmers and improvement in their standard of living. He concluded that influence of agricultural mechanization on crop production was significant. However, Lamidi and Akande, (2013) found a contrary result. Their study revealed that the low rate of adoption and utilization of appropriate mechanization technologies has remained one of the major factors militating against agricultural production in Nigeria. Their finding is buttressed by the results of their analysis which identified 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 means as problems:

10. CONCLUSION AND RECOMMENDATIONS:

Agricultural financing effects on productivity and economic growth in Nigeria which is the broad objective of this the.sis, with special focus on agricultural equipment financing, seed improvement financing and value chain financing as proxies for the independent variable (Agricultural financing) as it affects technological advancement, increased production output and employment generation as proxies for the intervening variable (Productivity) and Productivity output, export earnings and capacity utilization as proxies for the dependent variable (Economic Growth).

The study concludes that, Agricultural equipment financing has a significant impact on technological advancement of mechanized farming in Nigeria. This is based on the findings that, about 79.10 percent change in technological advancement of mechanized farming was due to agricultural equipment financing collectively, while 20.9 percent unaccounted variations were captured by the white noise error term. It shows that agricultural equipment financing has strong significant impact on technological advancement of mechanized farming in Nigeria. Also, there is a significant relationship between technological advancement of mechanized farming and production output. That is, about 89.52 percent change in production output was due to technological advancement of mechanized farming, while 10.48 percent unaccounted variations were captured by the white noise error term. It showed that technological advancement of mechanized farming has strong significant impact on production output.

Based on the findings of the study, the following recommendations are here made;

- Since Agricultural equipment financing has been established to have a significant impact on technological advancement of mechanized farming in Nigeria, it is recommended that efforts should be made by agricultural

intervention agencies and financial institutions to increase credit finance allocated to agricultural equipment, which is a sustainable measure towards technological advancement in the sector.

- Since it has been established that, there is a significant relationship between technological advancement of mechanized farming and production output, it is recommended that specific efforts should be made by the government through supporting agencies and private sector partnership to facilitate local production of needed technology, as this will increase technical expertise and help boost mechanized farming and sustain increasing level of production output, processing and packaging of agricultural produce, due to technological input.

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