Original Research Article

THE NEXUS BETWEEN AGRICULTURAL DEVELOPMENT AND EMPLOYMENT GENERATION IN NIGERIA

ABSTRACT

Despite the fact that the country is blessed with arable lands for competitive and high yielding farming, unemployment still soars, and Nigeria's inability to fully and sincerely promote agriculture has been cited as the basis for its recent alarming rate of unemployment. This study investigates the role of agricultural development in driving employment generation in Nigeria in an attempt to provide current empirical evidence for Nigeria's lingering unemployment situation. Based on the Keynesian theory of employment, interest and money, the study estimated a dynamic multivariate autoregressive distributed lag (ARDL) model using Nigeria's annual time series data for the period 1986 to 2020. The results obtained show that agricultural value addition and government expenditure on agriculture exerts a significant positive effect on employment generation both in the long and short-run while annual growth rate of the population exerts a significant positive effect on employment generation in the short-run in Nigeria. Nevertheless, human capital development and lending rate had a positive and insignificant effect on employment generation in the short-run. Furthermore, the causality results showed that a bi-directional causality existed between the selected agricultural development indices such as agricultural value addition, government expenditure on agriculture, gross fixed capital formation, annual growth rate of the population and employment generation. The study therefore recommends that the Nigerian government should embark on massive investment in agriculture as this builds an end-to-end integrated agriculture value chain which invariably boosts production and as such creates decent job which in turn, ends poverty in the long-run.

Keywords: Agriculture, Employment Generation, Value Addition, ARDL, Nigeria

1. INTRODUCTION

Employment growth is one of the major concerns of every nation particularly developing countries and agricultural sector has been viewed to play an important and supportive role in employment creation. Ajieh cited in Feyisayo, Ihuoma and Ojoko (2015) opined that the capacity of the agricultural sector in generating additional revenue, reducing unemployment as well as alleviating poverty among the citizenry are the reasons why this sector is important. That is to say, agriculture serves as the prime mover, driving the rest of the economy forward. "Sequel to this, this sector promotes the growth of investment at a faster rate than any other sector as well as wider and more efficient linkage among different sectors" (Ogwuma, cited in Simon-Oke & Awoyemi, 2010).

In the early 1960s, agriculture was the main source of employment. More than 80% of Nigeria's rural population was involved in agricultural activities. Onwuemeka and Nwogwugwu (2023) asserts that during this period, Nigeria was known for the production of cocoa, groundnut, cotton, palm oil, rubber, coal etc which were exported in large quantities and the revenue thereof was used for infrastructural and socio-economic development in all parts of the country. According to a report from World Bank 1970, the agricultural sector employed about 75% of the country's labour force in 1960. It dropped to 56% in 1977 and rose to 68% in 1980. In 1985 and 1986, it fell again to 55% and 53% respectively and remained stable at 55% in 1987 and 1988. Between 1989 and 1992, Nigeria's employment rate in agriculture grew at an average rate of 57% per year. But employment in the agricultural sector has reduced to 38% between 2017 and 2020 due to the fact that young people are not motivated enough to participate in agriculture as occupation. This is largely due to limited access to financing and inputs for farmers, serious threat of climate change on yield, limited access of agricultural outputs to the national and international markets, and security threats to agricultural investment which includes: cattle rustling, kidnapping and destruction of farmlands by herdsmen.

In addition, the decline in the proportion of the labour force employed in agriculture is also attributed to the discovery of oil in commercial quantity in 1956 at Oloibiri in present Bayelsa State which led to the neglect of the agricultural sector as well as its potential capacity of engaging a large chunk of unemployed youths. Apparently, as the focus of the Nigerian economy shifted towards oil production, this led to reduction in agricultural productivity as well as the

proportion of the population employed and a shift towards oil related industries- which despite its revenue does not provide employment for the Nigerian labour force.

It is however sad to note that, after decades of crude oil sales, unemployment rate still soars. The embarrassing level of unemployment in Nigeria has attracted the attention of successive Nigerian governments resulting in various policies and programs geared towards addressing the persistent unemployment problem. For instance, according to Nwokoye, Igbanugo, Mukaosolu and Dimnwobi (2017), there was an establishment and heavy government funding of the Graduate Internship Scheme (GIS), Youth Enterprise with Innovation in Nigeria (YOU-WIN) and the Subsidy Reinvestment and Economic Empowerment Programmes (SURE-P) introduced in 2012, as well as the N-Power programme introduced in 2016, all designed to solve youth unemployment. In addition to this, there is also the inclusion of entrepreneurship studies in tertiary education curriculum to prepare graduates for self-employment. Despite these efforts, available evidence from National Bureau of Statistics revealed that between 2015 and 2020, Nigeria's unemployment rate varied. The unemployment rate for 2015 was 10.4%. In 2016, 2017 and 2018, unemployment rate rose to 14.4%, 20.42% and 23.1% respectively. However, in 2019, it fell to 17.6% and further rose to 33.2% in 2020 as a result of the COVID-19 pandemic which lead to the closure of many companies and declines in economic activity that had left so many unemployed and living in abject poverty.

Meanwhile, in the recent time, the unemployment rate in the country is 37.7% while 22 million Nigerian children were out of school. This clearly shows that, even with Nigeria's oil wealth, Nigeria still has one of the highest rates of unemployment in the world. Underemployment 22.8% while youth unemployment is 42.5%. In the quest among scholars on alternative way of reducing unemployment and ending poverty at all levels came the option to re-consider agriculture development. Although there is handful of studies on the role of agriculture development on employment generation, there is hardly any study, at least, in Nigeria that considered the role of human capital development in the form of health and education on agricultural development. Many studies on agricultural development and employment generation used share of agriculture to GDP ratio, federal government expenditure, agriculture value added and inflation rate as a measure of agriculture development (see Ogbalubi & Wokocha, 2013; Ogbanga, 2018; Austine, James, Felix & Folorunso, 2020; Adegboyega, 2020; Ayomitunde,

Pereowei, Asosede & Eusebius (2020), 2020; Obiakor, Omoyele, Wahid & Aderemi, 2021; Asogwa & Onyegbulam, 2021). However, the present study decomposed agricultural development into annual growth rate of the population, private investment in agriculture and human capital development. This is premised on the fact that agricultural production tends to be highest in countries where the population is healthy and more educated. It is vital to note that human capital development in the form of education plays an important role in increasing production. Therefore, there is need for the farmers to be educated so as to be able to use modern implements to farm as this will increase agricultural output. Also, annual growth rate of the population contributes to agricultural development. In addition, increase in the size of the population entails surplus labour, hence, absorbing the surplus labour in agriculture will help increase food production thereby ensuring availability of supply of agricultural produce.

Besides the introduction, the latter parts of this paper are organized as follows: Section 2 discusses the literature review and theoretical framework. Section 3 explains the methods and procedure of analysis, while Section 4 presents the results and discussion of findings. Section 5 is the conclusion and recommendations.

2. LITERATURE REVIEW

2.1. Empirical literature

Various studies have been conducted to examine the relationship between agriculture and employment generation in developing nations in general and Nigeria in particular. For instance, in a study for Nigeria, Ogbalubi and Wokocha (2013) examined "the effects of agricultural development on employment generation. The authors contended that most public policies in Nigeria have been tailored towards food security, supply of agricultural raw materials needed by the manufacturing sector to provide adequate employment and income, yet, the potential of the sector is still not maximized. The summary of their viewpoint is that if the agriculture sector can be improved, it has significant potentials for the transformation of the Nigerian economy". Ayinde, Aina and Babarinde (2017) in their research on the effect of agricultural growth on unemployment and poverty reduction in Nigeria for the period of 1980-2012 used the Granger causality and Co-integration technique. The result confirmed that agricultural growth led to a decrease in unemployment which in turn led to a decrease in poverty rate in Nigeria. It was also

revealed that an inverse relationship exist between agricultural development and employment in Nigeria.

In the same vein, Megbowon, Ojo and Olasehinde (2017) empirically examined "the relationship between agro-processing sub-sector output and agricultural sector employment in South Africa during the period of 1975-2015, using secondary data sourced from South Africa Reserve Bank (SARB), South Africa Abstract of Agricultural Statistics and Quantec Website. The Toda-Yamamoto-Dolado-Lutkepohl (TYDL) causality test and ARDL bound testing approach to co-integration was used to examine the existence of a long-run equilibrium relationship and the result confirmed the existence of long-run relationship among the variables. The result also revealed a negative relationship between agro-processing output and agricultural sector employment in the long-run hence implying that agro-processing sector output was unable to promote agricultural sector employment. Furthermore, the results from Granger Causality tests indicated that causality was running from agro-processing output to agricultural sector employment".

Equally, Ogbanga (2018) applied "Error Correction model technique and Granger Causality test to examine agricultural development and employment generation in Nigeria, using annual time series data sourced from CBN statistical bulletin and Federal Office of Statistics. The result indicated that a positive and significant relationship exist between agricultural output, gross domestic product, foreign private capital, federal government expenditure and employment generation in the long-run. In addition, the results revealed a uni-directional causality from total employment to energy consumption in Nigeria". Osabohie, Mathew, Gershon, ogunbiyi and Nwosu (2019) employed the Generalized Method of Moments (GMM) econometric technique to investigate the nexus between agricultural development, employment generation and poverty reduction in West African sub-regions, using panel data from 2000 to 2016, sourced from World Development Indicator. Their results revealed that agriculture development, employment, health and education played a significant role in reducing poverty in West African sub-regions, thus showing that poor people in West African countries depend on agriculture to earn more and as well ameliorate poverty.

On the same subject, Austine et al. (2020) adopted the Error Correction Mechanism (ECM) to examine the effect of agricultural development on unemployment reduction in Nigeria during the

period of 1990-2019 using secondary data sourced from CBN statistical bulletin on various issues. The results revealed a negative effect of public expenditure on agriculture, inflation rate and exchange rate on unemployment and also a positive effect of bank lending to agriculture and share of agriculture to gross domestic product on unemployment in Nigeria. In addition, a bi-directional causality between unemployment and share of agriculture to gross domestic product was revealed. Using Johansen's Cointegration, Error Correction Method and Granger causality techniques, Adegboyega (2020) in another similar study examined the impact of agricultural financing and unemployment rate in Nigeria, using time series data collected from the Central Bank of Nigeria and World Bank database from 1981-2018. The cointegration test revealed a long-run equilibrium relationship among the variables within the periods under study. In addition, the results showed an inverse relationship between unemployment and agricultural loan, agriculture to GDP ratio and lending rate. Furthermore, a positive impact of GDP growth rate and rural population on unemployment rate in Nigeria was also revealed.

Likewise Ayomitunde et al. (2020) employed the Dynamic Ordinary Least Squares and Granger Causality techniques to investigate the role of agriculture in generating employment in Nigeria using annual time series data over the period of 1990-2017. The result revealed that the agricultural sector and inflation rate had a positive impact on employment generation in Nigeria. Also the finding showed a negative impact of agricultural expenditure on employment generation. It was further ascertained that a uni-directional causality runs from employment to agricultural expenditure and from expenditure on agriculture to inflation rate without a feedback. Furthermore, using annual time series from 1990-2017 and Autoregressive Distributed Lag technique, Demir (2021) examined the effect of employment in the agricultural and industrial sectors on economic growth in Turkey. The ARDL results revealed a long-term positive relationship between employment in agriculture and industrial sectors and GDP. Furthermore, the causality result revealed a uni-directional causality between employment in agriculture and GDP

Obiakor et al. (2021) examined whether the contribution of agriculture has generated employment in the Nigerian economy during the period of 1990-2019 using secondary data sourced from the World Bank, World Development Indicator (2020) and CBN Statistical Bulletin (2020). Using the Fully Modified Ordinary Least Square (FMOLS) technique and

pairwise Granger causality test, the result showed that agriculture had a significant impact on employment generation on one hand, while government expenditure on agriculture has not contributed to employment generation in the country on the other hand. The results further revealed that feedback relationship do not exist between agricultural value added and unemployment rate in Nigeria.

Similarly, utilizing the Generalized Method of Moment (GMM) in it analysis over the period of 2000 to 2017, Asogwa and Onyegbulam (2021) investigated the contributions of the agricultural value-added output to employment creation and regional trade integration in Sub-Saharan Africa using secondary data sourced from World Bank Development Indicator (2017). Their results revealed that increased agricultural value-added output reduces unemployment and as well increases regional integration. In addition, a long-run elasticity of 0.56% of agro allied industrialization output to regional trade was shown, thereby recommending the adoption of agricultural policies that promotes agricultural value-added output so as to improve regional integration.

Asaleye, Inegbedion, Lawal, Adeleke, Osakede and Ogunwole (2022) utilized the Error Correction modeling methodology to examine the relationship between agricultural performance and selected macroeconomics variables in Nigeria using time series data from 1981-2018. The results showed a positive and statistically significant relationship between credit to the agricultural sector, exchange rate and output in the long-run. However, in the short-run, the results showed a negative and insignificant relationship between consumer price index, interest rate, exchange rate and output. They recommended investment in the agricultural sectoras weel as strengthening the institutions for proper management of resources to ensure effective evaluation of funds disbursed for improving the agricultural sector.

It is evident from the literature review that the empirical studies undertaken to investigate the role of agricultural development on employment generation in the context of Nigeria did not include annual growth rate of the population, private investment in agriculture and human capital development as most important variables while pondering on agricultural development indices. Overall, the novelty exhibited by this study is the inclusion of the aforementioned variables which are crucial in the study of this nature. In all respect, it is clear that this study is not only pertinent but also expedient.

2.2 Theoretical Literature

There are numerous theories that have been developed to provide a theoretical foundation for the empirical analysis of the link between agriculture and economic growth and others that underpin employment growth. This ranges from the balanced growth theory, the Rostow's stages of growth theory, the Okun's Law, the Harrod-Domar model and the Keynesian theory of employment, just to mention a few. The theory predominantly used by authors for examining the link between agriculture and employment growth is the employment theory of Keynesian (1936).

The Keynesian theory of employment came into being following a reaction to the flaws of the classical economists. According to the classicists, there will always be full employment in a free enterprise capitalist economy because of the operations of Say's Law and wage-price flexibility. This classical theory came under severe attack during the Great Depression years of 1930s in the hands of John Maynard Keynes. Keynes not only criticized classical economists, but also advocated his own theory of employment in his book "The General Theory of Employment, Interest and Money" (1936). The logical underpin of Keynesian theory of employment is anchored on the concept of aggregate demand. This theory believes that when aggregate demand is increased through direct increases in government spending or policies that encourage more private investment, the performance of any economy can be optimized. This approach sees demand for labour as a derived demand. Though, Keynesian theory is traditionally a demand side economics, the theory showed that the growth of employment is demand determined and that the fundamental determinants of long term growth of output also influence the growth of employment.

Under the assumption of perfect competition in the market, short-run phenomenon and closed economy, Keynes asserts that, an increase in the aggregate effective demand would increase investment which in turn would lead to an increase in the level of employment and profit. By 'effective demand', Keynes meant the total demand for goods and services in an economy at various levels of employment (Jhingan, 2003). Therefore, effective demand signifies the money spent on the consumption of goods and services and on investment. However, Marglin (2018) opined that divers' stages of employment epitomize different stages of aggregate demand. This assertion gained support from Keynes as he inferred that levels of employment are a determinant of effective demand which through multiplier effects determines aggregate demand price and

aggregate supply price. Apparently, employment is demand determined and the rate of output growth is itself an important determinant of the rate of growth of employment which suggests the possibility of a bi-causal relationship.

In addition, Keynes was examining the possibility of unemployment in a capitalist economy against the backdrop of the Great Depression of the 1930s, hence, was regarded as cyclical or deficient demand unemployment. Keynesian holds that unemployment occurs once there is deficient demand in the economy to fuel employment. According to Mohammed (2010), the Keynesian believes that capitalists engaged workers and invest to drive output when opportunities about the economy and profits are favourable. Hence, investment and employment will increase when anticipated favourable economy and expected profit are supported by reality. In the place of Keynesian economists, equilibrium occurs when aggregate demand and aggregate supply meet, which denote the point of effective demand, which could be lesser than the full employment equilibrium. Whereas, capitalist will tend to invest and employ less when anticipated favourable economy and expected profit are not supported by reality, the unemployment arising from this is due to deficient aggregate demand, particularly investment expenditures.

Keynesian economists recommended government intervention as an imminent solution to cure unemployment problem. To affirm this, Obadan and Odusola (2010) assert that aggregate demand will stimulate employment through deficit spending by government. However, Keynes economic theory was criticized by Marxian economists, who said that Keynes ideas though good intended, cannot work in the long-run due to the contradictions in capitalism which includes: perfect competition does not exist in the real World, ignorance of the long-run problems of the dynamic economy and did not take cognizance of the effect of foreign trade on the growth of employment and income of the economy.

Conclusively, the critical role of the government towards stimulating aggregate demand in an economy is highlighted in the employment growth theory by Keynes (1936). Government can influence the level of aggregate demand by the manipulation of tax rates and public sector expenditures, so as to maintain full or nearly full employment. Undeniably, tax cuts and increased government expenditure on infrastructures, leads to an increase in agricultural output as well as business activity which generates more income, hence job creation that gives more

people money to spend, which further boost the gross domestic product (GDP). Therefore, this study adopts the Keynesian theory of employment as a working theoretical framework.

3. METHOD

This study employed the autoregressive distributed lag (ARDL) framework proposed first by Pesaran and Shin (1999), and developed by Pesaran, Smith and Shin (2001) to investigate the nexus between agricultural development and employment generation in Nigeria. The choice of the ARDL model is based on the premise that it can be employed irrespective of whether the underlying regressors are stationary at 1(0) or at 1(1), or a mixture of both. Before estimating the model, the unit root tests such as the Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests were employed to investigate the existence of unit roots in the series. The existence of a cointegrating relationship among the variables was investigated using the Bound test for cointegration after ascertaining the unit root. Thereafter, the long-run and short-run impacts of agricultural value addition and other explanatory variables on the generation of employment opportunities were then investigated. Further, diagnostic test was used to check the goodness of fit and model adequacy of our specification.

3.1. Model Specification

The model is built around the Keynesian theory of employment which believes that when aggregate demand is increased through government policy intervention, the performance of any economy can be optimized. Based on Keynes theory of employment, increased deficit spending by government will stimulate the aggregate effective demand which in turn would increase investment which invariably leads to an increase in the level of employment and profit. Following Obiakor *et al.* (2021) with slight modification to adequately address the aim of the study, the functional form of the model in this study is stated as follows:

$$EMP = f(AGRV, GEXA, HCD, GFCF, AGRPOP, LR) \quad 1$$

It is important to note that the study included human capital development, gross fixed capital formation and bank lending to agriculture which constitutes agricultural development indices but were not included in Obiakor *et al.* (2021) model. However, to take into consideration of the stochastic variable, Equation 1 is transformed as follows:

$$EMP_t = a_0 + a_1 AGRA_t + a_2 GEXA_t + a_3 HCD_t + a_4 GFCF_t + a_5 AGRPOP_t + a_6 LR_t + \varepsilon_t \qquad 2$$

Where: EMP_t = Employment rate at time t, $AGRA_t$ = Agricultural value addition at time t, $GEXA_t$ = Government expenditure on agriculture at time t, HCD_t = Human capital development at time t, $GFCF_t$ = Gross fixed capital formation at time t, Annual growth rate of the population at time t, LR_t = Lending rate at time t, a_0 = Intercept or constant coefficient, $a_1, a_2, a_3, a_4, a_5, a_6$ = The parameters to be estimated, ε_t = Error term or stochastic variable accounting for other variables affecting the dependent variable (EMP).

Apriori expectation:

The apriori expectation of the model should follow this pattern a_1, a_2, a_3, a_4, a_5 and $a_6 > 0$.

Before the estimation of the equation of employment growth, the time series properties of the data were checked through the Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) unit root tests. Thereafter, the estimation of the employment generation equation was done through the Autoregressive Distributed Lag (ARDL) Bound test to cointegration proposed first by Pesaran and Shin (1999), and developed by Pesaran, Shin and Smith (2001). The justification for the selection of this approach is based on the advantage of the ARDL for revealing the short-run dynamics apart from the estimated long-run coefficients. The computation of the ARDL statistical procedure was done with version 9 of the E-view econometric software. Restarting Equation 2 into the ARDL model, we have:

$$\Delta EMP_t = \psi_0 + \sum_{j=0}^{k} \psi_1 \Delta EMP_{t-1} + \sum_{j=0}^{k} \psi_2 \Delta AGRV_{t-1} + \sum_{j=0}^{k} \psi_3 \Delta GEXA_{t-1} + \sum_{j=0}^{k} \psi_4 \Delta HCD_{t-1}$$
$$+ \sum_{j=0}^{k} \psi_5 \Delta GFCF_{t-1} + \sum_{j=0}^{k} \psi_6 \Delta AGRPOP_{t-1} + \sum_{j=0}^{k} \psi_7 \Delta LR_{t-1} + \psi_8 EMP_{t-1} + \psi_9 AGRV_{t-1}$$
$$+ \psi_{10} GEXA_{t-1} + \psi_{11} HCD_{t-1} + \psi_{12} GFCF_{t-1} + \psi_{13} AGRPOP_{t-1} + \psi_{14} LR_{t-1} + \varepsilon_t \qquad ---------- 3$$

Where: Δ= First difference operator, $\psi_1, \psi_2, \psi_3, \psi_4, \psi_5, \psi_6, \psi_7$ = coefficients of the short-run parameters, $\psi_8, \psi_9, \psi_{10}, \psi_{11}, \psi_{12}, \psi_{13}, \psi_{14}$ = coefficients of the long-run parameters, k= lag lengths for each of the variables, t = time, t-1 =lag one (previous year), ε_t = disturbance term.

Meanwhile, in estimating Equation 3, two procedures are involved. The first step is testing for the long-run relationship and the next step is the estimation of long and short-run parameters using the OLS and Error Correction Model (ECM) respectively. The bounds test was employed to examine the existence of a long-run relationship between EMP, AGRV, GEXA, HCD, GFCF, AGRPOP and LR. We made use of the critical value bounds of the F-statistic proposed by Pesaran *et al.* (2001) to ascertain the existence or absence of co-integration among the variables. In conducting the test, we compared the F-statistic with both the upper 1(1) and lower 1(0) critical values at the 5% level. The decision concerning the existence of cointegration is guided by the following hypotheses:

$H_0 : \psi_8 = \psi_9 = \psi_{10} = \psi_{11} = \psi_{12} = \psi_{13} = 0$ (existence of cointegration).

$H_1 : \psi_8 \neq \psi_9 \neq \psi_{10} \neq \psi_{11} \neq \psi_{12} \neq \psi_{13} \neq 0$ (absence of cointegration).

As the series proved to be cointegrated, the study estimated the Error Correction Model (ECM) associated with the long-run estimates. The following is the ECM specification:

$$\Delta EMP_t = \psi_0 + \sum_{j=0}^{k} \psi_1 \Delta EMP_{t-1} + \sum_{j=0}^{k} \psi_2 \Delta AGRV_{t-1} + \sum_{j=0}^{k} \psi_3 \Delta GEXA_{t-1} + \sum_{j=0}^{k} \psi_4 \Delta HCD_{t-1}$$
$$+ \sum_{j=0}^{k} \psi_5 \Delta GFCF_{t-1} + \sum_{j=0}^{k} \psi_6 \Delta AGRPOP_{t-1} + \sum_{j=0}^{k} \psi_7 \Delta LR_{t-1} + \vartheta ECM_{t-1} + \varepsilon_t \quad (4)$$

Where $\psi_1, \psi_2, \psi_3, \psi_4, \psi_5, \psi_6, \psi_7$ are the coefficients of the short-run dynamics of the model's convergence to equilibrium while ϑ is the speed of adjustment to long-run equilibrium following a shock to the system which is anticipated to be negative and significant to verify the existence of cointegration among the variables and ECM_{t-1} is the error correction term which shows how disequilibrium in output can be adjusted in the short-run. Other variables are as defined earlier.

3.2. The Toda and Yamamoto Multivariate Causality Test

One important way of advancing policy recommendations for forecast is to establish a directional relationship between/amongst macroeconomic variables. To establish the direction of causality among the variables which is the second objective of this study, the Toda and Yamamoto's causality test approach was employed. This technique involves the application of a

Modified Wald (MWALD) test for testing the restrictions on the parameters of the VAR (k) model (where k is the lag length in the system).

Formally, according to Manap and Shirazi (2004), "the asymptotic chi-square ($\chi 2$) distribution of the Wald Statistic with k degrees of freedom in the limit is assured through the estimation of a VAR (k+dmax), dmax resulted as a result of the overfitting (augmenting) of the VAR model with an extra lag, where dmax denotes the maximal order of integration for the series in the model. This would result in the order of VAR becoming p = k+d. The application of this method requires two steps: The establishment of the true lag length (k) and the maximum order of integration (d) of the variables in the model are considered the first step. Having established the order of integration d (max) and given that the VAR (k) has been designated, a level VAR (k+d) can then be estimated. The application of the standard Wald tests to the first k VAR parameter matrix (with the exclusion of all lagged parameters) to conduct inference on Granger causality is considered the second step. It is worth noting that only the first k parameter matrices are included in the Wald test". However, the coefficients of the last d-max lagged vectors are excluded. Toda and Yamamoto (1995) asserted that these techniques guarantee that Wald test statistic has their normal asymptotic chi-square distribution under the null hypothesis through the employment of an augmented VAR such as VAR (k+d). In line with the foregoing, the multivariate framework of our study can be arithmetically stated in Equations 5, 6, 7, 8, 9, 10 and 11 as follows:

$$EMP_t = \alpha_1 + \sum_{i=1}^{k+d\max} \beta_{1i} EMP_{t-1} + \sum_{i=1}^{k+dmas} \beta_{1i} AGRV_{t-1} + \sum_{i=1}^{k+d\max} \beta_{1i} GEXA_{t-1} + \sum_{i=1}^{k+d\max} \beta_{1i} HCD_{t-1} + \sum_{i=1}^{k+d\max} \beta_{1i} GFCF_{t-1} + \sum_{i=1}^{k+d\max} \beta_{1i} AGRPOP_{t-1} + \sum_{i=1}^{k+d\max} \beta_{1i} LR_{t-1} + \varepsilon_{1t} \quad (5)$$

$$AGRV_t = \alpha_2 + \sum_{i=1}^{k+d\max} \beta_{2i} EMP_{t-1} + \sum_{i=1}^{k+dmas} \beta_{2i} AGRV_{t-1} + \sum_{i=1}^{k+d\max} \beta_{2i} GEXA_{t-1} + \sum_{i=1}^{k+d\max} \beta_{2i} HCD_{t-1} + \sum_{i=1}^{k+d\max} \beta_{2i} GFCF_{t-1} + \sum_{i=1}^{k+d\max} \beta_{2i} AGRPOP_{t-1} + \sum_{i=1}^{k+d\max} \beta_{2i} LR_{t-1} + \varepsilon_{2t} \quad (6)$$

$$GEXA_t = \alpha_3 + \sum_{i=1}^{k+d\max} \beta_{3i} EMP_{t-1} + \sum_{i=1}^{k+dmas} \beta_{3i} AGRV_{t-1} + \sum_{i=1}^{k+d\max} \beta_{3i} GEXA_{t-1} + \sum_{i=1}^{k+d\max} \beta_{3i} HCD_{t-1} + \sum_{i=1}^{k+d\max} \beta_{3i} GFCF_{t-1} + \sum_{i=1}^{k+d\max} \beta_{3i} AGRPOP_{t-1} + \sum_{i=1}^{k+d\max} \beta_{3i} LR_{t-1} + \varepsilon_{3t} \quad (7)$$

$$HCD_t = \alpha_4 + \sum_{i=1}^{k+d\max} \beta_{4i} EMP_{t-1} + \sum_{i=1}^{k+dmas} \beta_{4i} AGRV_{t-1} + \sum_{i=1}^{k+d\max} \beta_{4i} GEXA_{t-1} + \sum_{i=1}^{k+d\max} \beta_{4i} HCD_{t-1} + \sum_{i=1}^{k+d\max} \beta_{4i} GFCF_{t-1} + \sum_{i=1}^{k+d\max} \beta_{4i} AGRPOP_{t-1} + \sum_{i=1}^{k+d\max} \beta_{4i} LR_{t-1} + \varepsilon_{4t} \quad (8)$$

$$GFCF_t = \alpha_5 + \sum_{i=1}^{k+d\max} \beta_{5i} EMP_{t-1} + \sum_{i=1}^{k+dmas} \beta_{5i} AGRV_{t-1} + \sum_{i=1}^{k+d\max} \beta_{5i} GEXA_{t-1} + \sum_{i=1}^{k+d\max} \beta_{5i} HCD_{t-1} + \sum_{i=1}^{k+d\max} \beta_{5i} GFCF_{t-1} + \sum_{i=1}^{k+d\max} \beta_{5i} AGRPOP_{t-1} + \sum_{i=1}^{k+d\max} \beta_{5i} LR_{t-1} + \varepsilon_{5t} \quad (9)$$

$$AGRPOP_t = \alpha_6 + \sum_{i=1}^{k+d\max} \beta_{6i} EMP_{t-1} + \sum_{i=1}^{k+dmas} \beta_{6i} AGRV_{t-1} + \sum_{i=1}^{k+d\max} \beta_{6i} GEXA_{t-1} + \sum_{i=1}^{k+d\max} \beta_{6i} HCD_{t-1} + \sum_{i=1}^{k+d\max} \beta_{6i} GFCF_{t-1} + \sum_{i=1}^{k+d\max} \beta_{6i} AGRPOP_{t-1} + \sum_{i=1}^{k+d\max} \beta_{6i} LR_{t-1} + \varepsilon_{6t} \quad (10)$$

$$LR_t = \alpha_7 + \sum_{i=1}^{k+d\max} \beta_{7i} EMP_{t-1} + \sum_{i=1}^{k+dmas} \beta_{7i} AGRV_{t-1} + \sum_{i=1}^{k+d\max} \beta_{7i} GEXA_{t-1} + \sum_{i=1}^{k+d\max} \beta_{7i} HCD_{t-1} + \sum_{i=1}^{k+d\max} \beta_{7i} GFCF_{t-1} + \sum_{i=1}^{k+d\max} \beta_{7i} AGRPOP_{t-1} + \sum_{i=1}^{k+d\max} \beta_{7i} LR_{t-1} + \varepsilon_{7t} \quad (11)$$

3.3. Data Sources

This paper employed time series data over the period of 1986 to 2020 to estimate the model. The data needs were indentified on the basis of the objectives of the study. The data were drawn from Central Bank of Nigeria (CBN) statistical bulletin and World Development Indicators (WDI)

database (see Table 1). The variable name, proxy, source and apriori expectation are shown in Table 1.

Table 1. Variable Name, Proxies, Sources and Apriori Expectations

Variable Name	Definition and/or proxy	Source	Apriori Expectation
Employment Rate (EMP)	Refers to the percentage of the labour force that is employed. It is measured as the ratio of the employed to the working age population (%).	WDI (2020)	Dependent Variable
Agricultural Value Addition Output (AGRV)	This refers to the net output of agricultural sector after adding up all outputs and subtracting intermediate inputs. The proxy for agricultural development in this study is AGRV and is measured by agricultural value added as percentage of GDP (% of GDP).	WDI (2020)	+
Government Expenditure on Agriculture (GEXA)	This is the outflow of resources from government to agricultural sector of the economy. It is measured as the proportion of government expenditures on agriculture to total expenditure (₦′ billion).	CBN (2020)	+
Human Capital Development (HCD)	HCD refers to the process of acquiring and increasing the number of persons who have the skills, education and experience that are critical for the economic growth and development of a country. In this study, HCD is measured as proportion of government expenditures on education to total expenditure (₦′ billion).	CBN (2020)	+
Gross Fixed Capital Formation (GFCF)	Used as proxy for capital stock. GFCF refers to the net increase in physical assets (investment minus disposals) within one year (% of GDP).	WDI (2020)	+
Annual Growth Rate of the Population (AGRPOP)	This is the rate at which the population grows. It is measured by annual population growth rate (%). Population refers to the total number of people living in a country (Osabohie *et al.,* 2019).	WDI (2020)	+
Lending Rate (LR)	This is captured by prime lending rate (%), representing the employers' cost of capital.	WDI (2020)	+

Source: Researcher's Compilation (2023).

4. RESULTS AND DISCUSSION

The underlying patterns in the data was X-rayed using descriptive statistics and correlation analysis in tabular form, followed by stationarity tests so as to examine the time series characteristics of the variables that were modeled. In this case, the results of stationarity tests and co-integration formed the basic foundation of the study.

4.1. Descriptive Statistics Test Results

Table 2. Results of Estimated Descriptive Statistics of the Indicators

Statistics	EMP	AGRV	GEXA	HCD	GFCF	AGRPOP	LR
Mean	56.3149	23.9291	21.9609	154.3326	30.6645	2.5799	18.5266
Median	57.7300	23.4900	11.3000	76.5000	28.3709	2.5857	17.9500
Maximum	58.8500	36.9700	70.2700	593.4400	54.9483	2.6809	29.8000
Minimum	48.6100	18.0200	0.0200	0.2300	14.1687	2.4888	10.5000
Std. Dev.	3.2140	3.8279	23.0978	181.3855	13.0641	0.0663	3.8068
Skewness	0.3338	0.0488	0.3007	0.0546	0.3101	0.0133	0.2879
Kurtosis	3.1363	5.8728	2.2151	2.8926	1.8174	1.5928	4.5444
Jarque-Bera	10.4054	24.9584	4.0074	6.5051	2.6007	2.8888	8.0772
Probability	0.0455	0.0000	0.0348	0.0387	0.2724	0.2359	0.0176
Observations	35	35	35	35	35	35	35

Source: Researcher's Compilation (2023) using E-Views 9.

The results in Table 2 indicate that employment rate (EMP) expressed as percentage of the population employed records an annual average of 56.314% and a median value of 57.730%. The maximum value of 58.85 indicates that the highest annual employment was 58.85% and this was achieved in 1991, while the minimum value is 48.61. The standard deviation of the data is 3.124%, implying that the employment rate data dispersed moderately from its means because the standard deviation is less than its mean value. In the same vein, human capital development (HCD) has the highest mean value of 154.33 with a standard deviation of 181.39. It was also found that the variable that exhibited the highest dispersion or vagaries is human capital development as its range is the highest. The results further revealed that the means and medians of most of the variables (AGRV, GEXA, LR) are very close, indicating that the variables has high tendency to be normally distributed. Skewness is another important statistics reported in Table 2. It indicates the direction and relative magnitude of a distribution of a real-valued random variable about its mean. The range of skewness is from minus infinity ($-\infty$) to positive infinity ($+\infty$). The skewness result obtained show that agricultural value added (AGRV), government expenditure on agriculture (GEXA), human capital development (HCD), gross fixed capital formation (GFCF), annual growth rate of the population (AGRPOP) and lending rate (LR) were positively skewed, which means that the distribution is skewed to the right, while employment rate was negatively skewed, indicating that the distribution is left skewed. Meanwhile, symmetric distribution or fairly skewed (skewness between -0.5 and 0.5) and moderately skewed (skewness between -1 and -0.5 or between 0.5 and 1) distribution may not

raise a serious concern in statistical analysis. However, highly skewed distribution (skweness less than -1 or greater than 1) are said to pose serious constraint to statistical inference (Nwogwugwu, Nwokoye & Ebenebe, 2021). Kothari (2004) also notes that with pronounced skewness, standard statistical inference procedures such as a confidence interval for a mean will not only be incorrect, in the sense that the true coverage level will differ from the nominal level, but they will also result in unequal error probabilities on each side. On this note, the skewness result of this study suggests that the data do not pose s serious challenge to statistical inference.

Equally, the kurtosis statistics reveal that EMP, AGRV and LR were leptokurtic, revealing that their distributions were peaked relative to normal distribution; GEXA and HCD were mesokurtic, suggesting that the variables had normal distribution while GFCF and AGRPOP were platykurtic, implying that their distributions were flat relative to normal distribution. Finally, the Jarque-Bera Statistic accepts the null hypothesis of normal distribution for the variables at 5% significant level, manifesting in their probability values.

4.2. Correlation Matrix Test Results

Table 3. Results of Estimated Correlation Matrix of the Indicators

	EMP	AGRV	GEXA	HCD	GFCF	AGRPOP	LR
EMP	1.000000						
AGRV	0.291469	1.000000					
GEXA	-0.727238	0.159851	1.000000				
GEXED	-0.600653	0.276051	0.050945	1.000000			
GFCF	0.607652	-0.066502	-0.684200	-0.613739	1.000000		
AGRPOP	-0.280634	-0.407180	0.390915	-0.44547	-0.529710	1.000000	
LR	0.340560	0.207112	-0.383958	-0.413723	0.325040	-0.294204	1.000000

Source: Researcher's Compilation (2023) using E-Views 9.

Table 3 presents the results of correlational analysis which is a statistical method used to evaluate the strength of relationship between two quantitative variables. Correlational analysis has practical relevance in econometrics. According to Woodridge (2001), correlational analysis is an indicator of dependence between variables. He predicted that variables that are linearly dependent will have correlational coefficient that is more than 0.70. Meanwhile, this type of linear dependence is expected between dependent and independent variables but it could indicate presence of multicollinearity among explanatory variables. This simply means that correlational coefficient greater than 0.70 between two explanatory variables is a prima facie evidence of multicollinearity. The result of the estimated correlation matrix indicates that there is a linear

relationship (whether positive or negative) between the dependent variable (EMP) and the explanatory variables (AGRV, GEXA, HCD, GFCF, LR). However, there are no correlational coefficients between two explanatory variables that is greater than 0.7, revealing absence of multicollinearity among the explanatory variables.

4.3. Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) Unit Root Tests Results

Table 4. Summarized ADF and PP unit root test results

Variable	Augmented Dickey-Fuller (ADF)				Philip-Perron (PP)			
	At level	1st Difference	5% critical value	Order of Integration	At level	1st Difference	5% critical value	Order of Integration
EMP	2.7162**	-	-2.9678	1(0)	1.0022**	-	-2.9511	1(0)
AGRV	-1.7436	-6.6793**	-2.9571	1(1)	-2.6823	-7.1097**	-2.9511	1(1)
GEXA	-1.9319	-6.5144**	-2.9511	1(1)	-1.5168	-14.4394**	-2.9511	1(1)
HCD	1.5871**	-	-2.9511	1(0)	4.4443**	-	-2.9511	1(0)
GFCF	-1.5705	-4.6699**	-2.9540	1(1)	-1.9630	-4.6624**	-2.9511	1(1)
AGRPOP	-4.4035**	-	-2.9540	1(0)	-3.5956	-	-2.9511	1(0)
LR	-4.3611**	-	-2.9511	1(0)	-4.5792**	-	-2.9511	1(0)

Source: Researcher's Compilation (2023) using E-Views 9; Note: ** denotes statistical significance at 5% level of significance.

As depicted in Table 4 for the ADF and PP unit root tests, the findings showed that the variables were either 1(0) or 1(1). The variables (EMP, HCD, AGRPOP, LR) were integrated at their levels 1(0), this is because the ADF and PP statistic (in absolute terms) are greater than the Mackinnon critical values at 5% level of significance while AGRV, GEXA and GFCF were integrated at the first difference 1(1). The ADF results were validated through the PP unit root test. The findings depict that the results of the PP unit root test are a corroboration of those realized utilizing the ADF. Therefore, the unit root test results of 1(0) and 1(1) exhibited by the variables justify the usage of the ARDL technique to estimate the parameters of the model. However, the researchers proceeded first by carrying out a co-integration test to see if there exists any relationship among the variables in the long-run.

4.4. Co-integration Results from Bound Test

Table 5. Co-integration Results from Bounds Tests.

Test Statistic	Value	Lag	Significance level	Bound critical values	
				Lower Bound	Upper Bound
F-statistic	4.681876	2		I(0)	I(1)

	1%	3.15	4.43
	5%	2.45	3.61
	10%	2.12	3.23

Source: Researcher's Compilation (2023) using E-Views 9. Note: Lower and Upper Bounds critical values for the F-statistic at 5% significance level were taken from Pesaran *et al.* (2001).

Table 5 reveals the results of the bounds tests for the existence of co-integration between employment rate and the causal variables. From these results, the calculated F-statistic for the joint test of the parameters a_1, a_2, a_3 and a_4 was 4.681876. The critical value bounds were 2.45 and 3.61 at the 5% significance level. Therefore, the null hypothesis of no co-integration between EMP and the explanatory variables in the model is rejected since the calculated F-statistic (4.681876) is greater than the upper bound I(1) (3.61) of the critical value band at the 5% significance level. We conclude that there is a long-run relationship among the variables in the model. Thus, the justification for both long-run and short-run models.

4.5. Long-Run and Short-Run Relationship Results

Table 6 shows the short-run dynamics and long-run relationship using employment rate as the dependent variable. Based on the results in Table 6, the long-run results for some of the variables were in line with theoretical expectations. Agricultural value addition exerted a positive and significant relationship with employment opportunities. This means that a unit increase in agricultural value added would increase employment by 0.02%. This finding concurs with the studies of Ayinde *et al. (*2017); Ogbanga (2018); Adegboyega (2020); Obiakor *et al.* (2021) and Asogwa and Onyegbulam (2021) but contradicts Ayomitunde *et al.* (2020). Government expenditure on agriculture exerted a positive and significant relationship with employment opportunity in line with theoretical expectation. This implies that a unit increase in government expenditure on agriculture would increase employment by 0.02%. This finding suggests that government expenditure on agriculture has translated significantly to a meaningful increase in job creation. This shows that the effort of the Federal Government of Nigeria in reducing unemployment and underemployment among youth through agricultural transformation agenda is yielding the desired results. Therefore, in line with the Keynesian theory of employment, an increase in government spending would stimulate aggregate demand and thus, high aggregate demand will through multiplier effect, induce employment. This finding aligns with the

submissions of Ogbanga (2018); Adegboyega (2020); Austine *et al.* (2020) but disagrees with the submission of Obiakor *et al.* (2021).

Surprisingly, human capital development used as a proxy for expenditure on education exerted a negative and significant relationship with employment opportunities contrary to expectation. This result shows human capital development does not enhance job creation in Nigeria. The plausible reason for this may be poor funding and management of the Nigerian education sector, resulting to lack of modern learning facilities, hence making Nigerian graduates unemployable. Other factors attributed to this, may be that funds allocated to the education sector were misappropriated or embezzeled by government officials and political appointees. This result suggests that a unit increase in human capital development would reduce employment by 0.03%. However, the significance of HCD entails that investment in the education and training system which produces skilled labour has the potential to be a major contributor to job creation. This finding contravenes those of Ogbanga (2018) and Osabohie *et al.* (2019). One more terrifying long-run result which defies expectation is the relationship between gross fixed capital formation and employment generation. Gross fixed capital formation, utilized as a proxy for investment exerted a negative and significant relationship with employment generation. This implies that investment does not enhance job creation in Nigeria. The plausible reason for this may be unconducive investment climate in Nigeria caused by Boko Haram activities in the North, unknown gunmen in the East, youth restiveness in Niger Delta and lack of basic infrastructures like energy, telecommunication, water supply, road and security needed to make the business environment attractive. This result suggests that a unit reduction in gross fixed capital formation would increase employment by 0.0008%. This finding is not consistent with the submissions of Ogbanga (2018) and Obiakor *et al. (2021)* but aligns with the submission of Megbowom *et al.* (2017).

Curiously, annual growth rate of the population had a negative and insignificant relationship with employment generation contrary to expectation. This implies that a 1 percent increase in the growth rate of the population would lead to 8.86% decrease in employment opportunities. The result means that growth rate of the population used to proxy the growth rate of the labour force is not believed to improve employment in Nigeria which suggests non-utilization of labour. This finding finds an advocate in Osabohien *et al.* (2019); Adegboyega (2020) and Asogwa and

Onyegbulam (2021) but disagrees with Obiakor *et al. (2021)*. Lending rate exerted a positive and insignificant relationship with employment creation as expected. This result shows that lending rate representing the employers' cost of capital enhances job creation in Nigeria. The finding showed that a one percent increase in lending rate could increase employment by 0.02%. This is premised on the fact that interest rate is the cost of using capital, hence, based on the principle of substitutability between labour and capital in the production process, an increase in interest rate would make capital more expensive relative to labour which would eventually increase the level of employment, all things being equal. This finding differs from the submissions of Megbowom *et al.* (2017); Adegboyega (2020) and Austine *et al.* (2020).

Table 6. Estimated long-run and short-run coefficients results

Variables	Coefficient	Std. Error	t-Statistic	P-value
Long-run behaviour				
Dependent Variable: EMP				
C	35.975690	21.147805	1.701155	0.1024
AGRV	0.024811	0.115516	0.214780	0.0318**
GEXA	0.020905	0.027902	0.749239	0.0613*
HCD	-0.026809	0.004864	-5.511293	0.0000***
GFCF	-0.000803	0.055290	-0.014520	0.0885*
AGRPOP	-8.855518	7.271563	-1.217829	0.2356
LR	0.021518	0.110540	0.194662	0.8474
Short-run dynamics				
D(EMP(-1)	0.307371	0.185256	1.659165	1.1107
D(AGRV)	0.008018	0.037610	0.213195	0.0331**
D(GEXA)	0.006756	0.008687	0.777710	0.0447**
D(HCD)	0.003571	0.003063	1.166073	0.2555
D(GFCF)	-0.000259	0.017863	-0.014525	0.9885
D(AGRPOP)	2.861949	2.603036	1.099466	0.0829*
D(LR)	0.006954	0.036031	-0.193007	0.8486
ECM_{t-1}	-0.323183	0.086856	-3.720881	0.0011***

Source: Summary of result compiled by researcher (2023) using E-Views 9. Note ***, ** and * denotes significance at the 1%, 5% and10% levels, respectively.

In the short-run, change in employment rate has a positive and insignificant relationship with employment rate, implying that development in the economy enhances job creation. Change in agricultural value addition in the current year maintained its positive and significant relationship with employment rate in the short-run consistent with the long-run results. The result suggests that if agricultural value added goes up by 1 percent, employment rate will increase by 0.08%.

In addition, change in government expenditure on agriculture had a positive and significant relationship with employment rate in the short-run in line with results of the long-run growth equation. The human capital development parameter in the dynamic growth equation exerted a positive and insignificant relationship with employment rate contrary to the result of the long-run equation whereas gross fixed capital formation of the current year maintained its negative relationship with employment rate as in the long-run growth equation.

However, the short-run impact of annual growth rate of the population of the current year on employment rate was positive and significant, implying that annual growth rate of the population enhances job creation in the short-run in Nigeria. The result means that if the growth rate of the population goes up by 1 percent, employment rate will increase by 2.86%. Lending rate exerted a negative and insignificant relationship with employment rate contrary to the result of the long-run equation. It is evident from the coefficient of the error correction term that 32% of the past deviation in employment rate from equilibrium is corrected by it within one year. The negative sign and significance of the speeds of adjustments to long-run stable equilibrium based on the estimated ecm_{t-1} confirms the existence of a long-run relationship between employment rate and the independent variables.

4.6. Toda and Yamamoto Multivariate Causality Test Results

Table 7. Results of the granger causality test (TY Augmented Lags Methods)

	Sources of Causation						
Dependent Variable	**EMP** X^2	**AGRV** X^2	**GEXA** X^2	**HCD** X^2	**GFCF** X^2	**AGRPOP** X^2	**LR** X^2
EMP	-	2.41(0.09)*	0.40(0.01)**	0.93(0.62)	0.65(0.07)*	2.17(0.03)**	3.66(0.16)
AGRV	0.14(0.03)**	-	4.84(0.09)*	0.26(0.87)	1.75(0.42)	7.87(0.01)**	2.43(0.29)
GEXA	0.05(0.08)*	1.003(0.61)	-	2.05(0.36)	0.006(0.09)*	0.88(0.64)	0.14(0.92)
HCD	0.75(0.09)*	2.12(0.07)*	5.23(0.35)	-	3.79(0.14)	9.84(0.00)***	6.93(0.03)**
GFCF	0.64(0.03)**	1.27(0.53)	1.39(0.50)	0.09(0.95)	-	2.54(0.28)	1.44(0.51)
AGRPOP	0.38(0.07)*	4.72(0.09)*	0.43(0.80)	1.46(0.48)	5.67(0.05)**	-	4.08(0.12)
LR	1.92(0.38)	2.92(0.09)*	10.09(0.65)	1.29(0.52)	1.23(0.53)	1.25(0.53)	-

Source: Summary of result compiled by researcher (2023) using E-Views 9. **Note** ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. The figures outside bracket and those in bracket are the X^2-statistic with their respective p-values.

From the results of the TY estimation presented in Table 7, the asterisks (*) signs indicate that we reject the null hypothesis of Granger no-causality at both the 1%, 5% and 10% levels. The

results showed the existence of a bi-causal relationship between agricultural value addition (AGRV), government expenditure on agriculture (GEXA), human development capital (HDC), gross fixed capital formation (GFCF), annual growth rate of the population (AGRPOP) and employment in Nigeria (meaning that these variables reinforce each other). This suggest that employment generation has been associated with development of the agricultural sector as shown by the indicators (AGRV, GEXA, HCD, GFCF) used in this study. The indication is that development of the agricultural sector remains the only channel for creating job opportunities which invariably leads to the generation of income hence, poverty reduction in the country. In addition, the results revealed a bi-directional relationship between AGRV and AGRPOP on one hand and a no causal relationship between EMP and LR on the other hand.

4.7. Results of Diagnostic Tests for ARDL Model

Table 8. Diagnostic results for ARDL model

Test	Test Statistic	P-value	Null hypothesis	Decision
Jarque-Bera normality test	8.97625	0.0993	H_o: The error terms are normally distributed.	Cannot reject H_o
Heteroskedasticity Test: ARCH	0.118955	0.7302	H_o: No heteroskedasticity	Cannot reject H_o
Ramsey RESET test	0.229676	0.6365	H_o: Correctly specified	Cannot reject H_o
Breusch-Godfrey LM test	5.202991	0.0542	H_o: No serial correlation	Cannot reject H_o

Source: Summary of result compiled by researcher (2023) using E-Views 9.

The diagnostic tests results in Table 8 show that the model passed all the tests conducted. In case of the Ramsey Regression Equation Specification Error Test (RESET) model, Jarque-Bera normality test, hetroskedasticity test ARCH and Breusch-Godfrrey Serial Correlation LM Test, it is evident that the rejection of the null hypothesis at the 5% level is not possible. Under the Jarque-Bera normality test, a probability value of 0.0993 was greater than the proposed 5% level of significance. As a result, the null hypothesis of normality is accepted which suggests that the error terms are normally distributed at 5% level of significance. The result of the ARCH test showed that there was no heteroskedasticity in our model. The result shows a probability value of 0.7302 which is greater than the chosen 0.05% significance level, indicating the acceptance of the null hypothesis. Hence, there is no presence of heteroskedasticity in the model. Again, it was

observed that the probability value of 0.6365 against the Ramsey Regression Equation Specification Error Test (RESET) test was greater than the proposed 0.05% level of significance indicating the acceptance of the null hypothesis that the model was correctly specified. This suggests that there was no possibility of the model not being specified correctly which may result in the omission of certain variables and hence, has no wrong functional form. The serial correlation of the residuals was tested through the Breusch-Godfrey LM test. It was observed that the probability value of 0.0542 is equal to the chosen 0.05% level of significance. Hence, we accept H_0 and conclude that there was no serial correlation in our model.

5. CONCLUSION AND RECOMMENDATIONS

This study investigated the nexus between agricultural development and employment generation in Nigeria using data obtained from World Bank, World Development Indicator (WB, WDI) and Central Bank of Nigeria (CBN) statistical bulletin (2020) for the period of 1986 to 2020. The empirical analysis was estimated using the ARDL Bounds testing approach to cointegration. Findings of the study revealed the existence of long-run relationship between agricultural development and employment generation in Nigeria. Furthermore, the results of the long-run and short-run dynamics showed that agricultural value addition and government expenditure on agriculture exerted a positive and significant relationship with employment growth in Nigeria. This is glaring that effective investments in agriculture can guarantee food security, have the potential of generating exports, and supporting sustainable income as well as job creation for the economy. Equally glaring is the evidence of a bi-directional causality between AGRV, GEXA, HCD, GFCF, AGRPOP and employment growth which supports the Keynesian theory of employment. This emphasizes the relevance of government intervention via deficient spending as an imminent solution to cure unemployment problem. Hence, to maintain full or nearly full employment for an economy will depend on government influence on the level of aggregate demand, either through the manipulation of tax or public sector expenditures. This is to say that tax cuts and increased government expenditure on infrastructures, leads to an increase in agricultural output as well as business activity which generates more income, hence job creation.

On grounds of the above results, we recommend that government should put in place measures to boost agriculture productivity by facilitating access to inputs, such as fertilizers, to small and

commercial farmers and as well encourage the use of high yield and disease resistant seedlings. Also, concerted efforts should be made to improve access to credit by mandating the public financial institutions like the Bank of Agriculture (BoA), Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) etc. to provide an interest free loans to small scale farmers which constitute a significant percentage of the agricultural sector and as well, ensure that such credits get to the actual farmers that need them. In a similar vein, the fact that human capital development had a positive relationship with employment generation in the short-run while showing a significant relationship with employment generation in the long-run, indicates that investment in education and training of farmers on the application of new technological method of farming and high yielding method of planting will increase agricultural production as well as farmers income, hence reduce the rate of poverty and in turn, create jobs for the teaming population. Therefore, policymakers and stakeholders should encourage policies that promote the capacity building and skill acquisition, and as well make agriculture attractive in other to encourage youths to venture into this labour intensive sector.

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