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INNOVATION AND ECONOMIC STRUCTURAL CHANGES IN NIGERIA: A PATHWAY TOWARDS ATTAINING ECONOMIC GROWTH

[1]Victor Ushahemba Ijirshar, [2]Joseph Tarza Sopko, [3]Hilary Eshidenang Ushie & [4]Kelvins Terhemba ADZER
[1,2]Benue State University, Makurdi
[3]University of Calabar Microfinance Bank
[4]College of Education, Katsina-Ala

ABSTRACT
The study examines the relationship between innovation and economic structural changes as a pathway towards attaining economic growth in Nigeria. The study covers 1986 to 2018. The study is based on the Auerbach-Kotlikoff (AK) model, product variety theory, and the Schumpeterian theory of growth. Vector Error Correction (VEC) Granger Causality test was used to examine the causal relationship between innovation and economic structural changes and the Vector Error Correction test was used to examine the influence of innovation and economic structural changes on economic growth in Nigeria. The study found a unidirectional relationship running from domestic investment to innovation in Nigeria and no causal relationship between innovation and economic structural changes in Nigeria. Innovation and economic structural changes also do not granger cause economic growth in Nigeria. The study further reveals that innovation, value addition in agriculture, value addition in manufacturing, value addition in industry, and value addition in the service sector have a strong influence on economic growth in Nigeria in the long-run. The study recommends that Nigerian government should channel government spending towards productive investments and improve research and development that could advance the level of technology and accelerate the economic structural changes in the country, create enabling business environment through development of infrastructural facilities for domestic investors to strive, establish investment incentives such as soft loans and implement trade policies that could favour the growth of the domestic infant industries and invest hugely in value addition activities in all the sectors that could change the economic structure of the Nigerian economy thereby creating a room for growth.
Keywords: Economic Growth, Innovation, Economic structural changes, and Value addition

INTRODUCTION
The process of innovation is often considered as one of the most promising approaches to the analysis of the actors and their interactions in the field of

science and technology. It generally reflects the contemporary perception of the innovation-related processes as the result of co-development of institutions, industries, firms, policies, and infrastructures. These processes are known for their complex dynamic behavior that can be exhibited as path-dependent and highly inertial concerning intentional regulatory efforts, but vulnerable to the specific types of exogenous and endogenous shocks (Vitaliy & Leonid, 2015). Innovation is widely accepted as one of the key-framing determinants of economic structural changes and economic growth (Arthur, 1994). Franco and Fabio (2004) state that economies undergo major processes of structural change that are occasioned by innovative activities. These changes have important implications on economic growth and other macroeconomic variables like employment dynamics and trade patterns. Thus, the country's differential economic growth is largely expected to be related to processes of economic structural changes which are in turn due to sectorial differences in innovation activities.

From the foregoing, the advantages offered by innovation present the premises for economic growth and overall economic structural changes in an economy. Thus, innovation occasioned by Research and Development (R&D) are prerequisites for ensuring competitiveness, progress, and economic development (OECD, 2007). Furthermore, a sustained training level of workforce and increase in the level of R&D generates positive effects, first, on the growth of private and public sectors and second, on the improvement of standards of living of the population. Therefore, economic structural changes of the entire economy are almost not possible without an effective technology transfer and a well-defined country's innovation system. These factors led to the spectacular improvement in competitiveness and the economic success of many industrialized economies.

Over time, Nigeria has increased her expenditure on research and development and as a result, innovations have been witnessed in telecommunication, manufacturing, banking, stock exchange market, transportation, and other aspects of the economy. But despite the improved attention given to innovation processes, the value addition in manufacturing, industry, agriculture and service sector as percent of GDP declines and at best continue to dwindle, which invokes empirical concern. This points towards an empirical investigation of the phenomena. Also, Nigeria is characterized by low per-capita income, high unemployment rates, and low

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and falling growth rates of GDP; problems which innovation is theoretically supposed to solve. It is against this backdrop that this study examined the relationship between innovation and economic structural changes in Nigeria and how these act as a pathway towards attaining economic growth covering from 1986 to 2018. The study intends to ascertain the nature of the causal relationship between innovation and economic structural changes by sectors in Nigeria and to examine the impact of innovation and economic structural changes on economic growth in Nigeria. The rest of this paper is organised as follows: section two presents a literature review while section three presents Methodology. Section four covers empirical results and discusses while section five offers conclusion and policy recommendations.

LITERATURE REVIEW

The study reviews the concept of innovation and economic structural changes, the appropriate theories, and previous empirical studies.

Conceptual Clarification

Innovation: According to the European Central Bank (2017), innovation is the development and application of ideas and technologies that improve goods and services or make their production more efficient. More recently, information technology transformed the way companies produce and sell their goods and services while opening up new markets and business models. Innovation has been broadly defined as an idea, practice, or object that is perceived as new by the entrepreneur (Rogers, 1995). Because of the emphasis on adoption versus development of innovations, a firm's development like diversification and integration are included in this definition. Because adoptions of innovations result in an upward shift of the production frontier, which is measured as technical change. Moreover, a firm's growth enables the entrepreneur to change the size of the firm and improve scale efficiency. Innovation can be measured by the global innovation index which includes two sub-indices: the innovation input sub-index and the innovation output sub-index. The first sub-index is based on five pillars: institution, human capital and research, infrastructure, market sophistication, and business sophistication. The second sub-index is based on two pillars: knowledge and technology outputs and creative outputs (World Bank, 2020). Innovation is considered as one of the key drivers of an economy (Andergassen et al. 2009; Mansfield 1972; Nadiri 1993; Romer 1986; Santacreu 2015; Solow 1956). It affects the economy in multiple channels, such as economic growth, global competitiveness, financial systems, quality of life, infrastructure development, employment, trade openness, and hence, spurs or accelerates economic growth (Bae & Yoo, 2015).

Economic Structural Change: Economic structural change can be seen as a shift in the basic ways a market or economy functions or operates. It is a dramatic shift in the way market functions or an industry, usually brought on by major economic developments (Ganti, 2019). It is a dramatic shift in the way a country, industry, or market operates usually brought on by innovation or major economic developments. This can be seen as a value addition in sectors of an economy. A structural change in a country is viewed in terms of a shift from primary and secondary to tertiary production. Hence, technical progress is crucial in the process of structural change. According to Ganti, (2019), a major driver of structural change is innovation. It is also seen as the change in the relative weights of individual sectors during the development process. This structural change can be measured in terms of industry value-added, manufacturing value-added, services value-added and agriculture value-added. Sectorial structural change, therefore, refers to shifts in the sectorial economic structure as a result of different levels of strong growth in the individual sectors of an economy.

Theoretical Review

This study is based on the endogenous growth models (Auerbach-Kotlikoff (AK) model, product variety theory, and the Schumpeterian theory of growth). The endogenous growth theory holds that economic growth is primarily the result of endogenous and not external forces. The models of endogenous growth are primarily concerned with establishing how technological progress or innovation can bring about increasing output. The AK model developed by Arrow (1962) articulates the possibility of productivity depending on output per worker. The theory explains that technological progress can occur, though unintended, by "learning by doing" (Chukwuemeka, 2015). In the AK neoclassical growth model, the increased output is induced by savings and capital accumulation, whereas in the AK model, economic growth is induced by savings, capital accumulation, and efficiency where efficiency is defined as the increase in the productivity of factor inputs by "learning by doing" (Chukwuemeka, 2015).

The inability of the AK model or paradigm to produce a convincing model of long-run growth and convergence motivated another wave of endogenous

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growth theory, consisting of innovation-based growth models (Howitt, 2015). It has branches, viz: the product-variety model developed by Romer (1990). According to Romer (1990), innovation causes productivity growth by creating new, but not necessarily improved, varieties of products (Howitt, 2015). While the other branch of the innovation-based theory was developed by Aghion and Howitt (1992) that grew out of modern industrial organization theory and is commonly referred to as Schumpeterian growth theory, because of its focus on quality-improving innovations that render old products obsolete, and hence involves the force that Schumpeter called creative destruction (Chukwuemeka, 2015).

The product variety model states that output or growth is a consequence of the expansion of a specialized intermediate variety of products. The theory does this by insisting that growth is driven by innovations that lead to the introduction of new varieties. The theory also argues that the interaction of the roles of different sectors mitigates the problem of diminishing reruns in modeling long-run economic growth. Romer (1990) modeled the product variety theory taking note of imperfect markets and including Research and Development (R&D) sector that generates designs for new inputs through horizontal innovations. Grossman and Helpman (1991) present the product variety framework with an expansion of consumer products that enter the utility function. Grossman and Helpman (1991) later used the product variety model to analyze the effect of market integration on economic growth. The Schumpeterian Growth theory states that growth or economic structural changes in an economy is generated by a sequence of quality improvement or vertical innovations. To Schumpeter (1942), it is called Schumpeterian since it embodies the forces referred to as "creative destruction" (Chukwuemeka, 2015). This means that innovation that drives growth or changes in structure creates new technology and at the same time destroys older technology by making them redundant or obsolete. This theory is similar to the product variety model as they all emphasize innovations and research spillovers as drivers of growth.

Thus, endogenous growth models as a whole depend largely on the assumptions of the neoclassical theory which has proven inadequate especially for developing economies and the theory is far from reality by assuming the symmetry of sectors in an economy. However, the study has carried out a disaggregated analysis of the innovation in different sectors of the economy.

Empirical Review

Rana, Maradana, Saurav, Kunal, Manju, and Debaleena (2017) examines the long-run relationship between innovation and per capita economic growth in the 19 European countries over the period 1989–2014. The study used six different indicators of innovation: patents-residents, patents-nonresidents, research and development expenditure, researchers in research and development activities, high-technology exports, and scientific and technical journal articles to examine this long-run relationship with per capita economic growth. Using the cointegration technique, the study finds evidence of a long-run relationship between innovation and per capita economic growth in most of the cases, typically concerning the use of a particular innovation indicator. Using the Granger causality test, the study finds the presence of both unidirectional and bidirectional causality between innovation and per capita economic growth but varies from country to country, depending upon the types of innovation indicators that were used. Most importantly, the study finds that all these innovation indicators are considerably linked with per capita economic growth. Similarly, Andreea, Olivera, and Florina (2015) analyze if the long term economic growth is influenced by the innovation potential of an economy. The analysis was performed by using multiple regression models estimated for the following CEE countries, namely Poland, Czech Republic, and Hungary. To quantify the innovation, the study used various variables, such as the number of patents, number of trademarks, R&D expenditures. The results provide evidence of a positive relationship between economic growth and innovation. This implies that innovation plays an important role in achieving growth.

In determining the determinants of R&D expenditures and patents and the link between innovation and economic growth, Westmore, (2013) used a panel model, based on a sample of 19 OECD countries covering 1980 to 2008. The study finds that tax incentives and public support for research and development and patent rights encourage innovation activities in the private sector. Moreover, the results have not identified a direct effect of these policies on aggregate productivity growth. Also, the policies that support competition are important for the transmission of knowledge from both sources, both domestic and external. Petrariu, Bumbac, and Ciobanu (2013) also examine the connection between economic growth and innovation by using a panel model. The study reveals that the level of development of an economy, reflected in the allocation of resources for research and development is the main support for innovation. The results pointed out that Central and Eastern European economies recorded fast economic growth, but it was not based on the innovation process. Petrariu, Bumbac, and Ciobanu (2013) sees innovation as a catch-up process as compared to the growth rate. But Norris, Kersting and Verdier (2010) analyzed the innovation process for the manufacturing industry from both developed and emerging countries covering 2005 to 2007. The study found that innovation has a major impact on the financial performance of the companies and that the positive effect of innovation on companies' performance is mediated through capital markets. The study further states that the positive effect of innovation on productivity is significantly higher in countries with developed capital markets and that financial development may influence economic growth through the facility provided by technological innovations that will boost productivity.

Using micro-level data for nineteen US manufacturing industries over the period 1975 to 2000, Minniti and Venturini (2013) investigate the relationship between innovation and growth. The results obtained showed that the impact of tax incentives for research and development activity is lengthy and that the subsidies awarded to for research activities increase the research and development efforts and the economic growth rate, but only for the short term. While in the long-run, research and development policy does not have a significant effect, in the best case it is noted that subsidies for research and development activities have a temporary effect on growth. In a closely related study, Ulku, (2004) investigates the relationship between economic growth, research and development expenditures, innovation for 20 OECD countries and 10 countries that are not OECD members, by applying the model that was proposed by (Romer, 1986), by using a panel model, built on GMM methodology. The study was conducted for the period 1981 to 1997 and tested the following assumptions: the research and development expenditures increase the level of innovations and the latter lead to permanent growth of GDP/capita. The results obtained provide evidence that innovations have a positive impact on GDP/capita, both for developed and emerging economies. Another conclusion was that only developed OECD countries can increase the level of innovation based on research and development expenditures, and furthermore OECD countries are interdependent, since some countries ensure their innovation by using the know-how of other OECD countries. Furthermore, the study revealed that innovation is endogenous in an economy and support economic growth, but the assumption of the existence of constant yields of innovation is not sustained, indicating that innovation leads to an increase in the output for a short period, and cannot explain perpetual economic growth. Pessoa (2007) also investigates the relationship between innovation and economic growth in the case of Sweden and Ireland. The findings suggest that there is not a strong link between research and development expenditures and economic growth, and the innovation policy must take into consideration the complexity of the economic growth process, by including other indicators, in addition to research and development expenditures. These studies have assessed the influence of innovation on growth but have not accounted for the effect of economic structural changes in different sectors of the economy as the innovative ideas often manifest in economic structural changes that accelerate economic growth. This study fills the gap in the literature by assessing the relationship between innovation and economic structural changes in Nigeria as they serve as a pathway towards attaining growth. This approach remains novel as researchers have rarely attended to the issue empirically.

METHODOLOGY

Method of Data Analysis

This study used the VEC Granger causality test to examine the relationship between innovation and economic structural changes and vector error correction test was employed to examine the impact of innovation and economic structural changes in Nigeria. Also, the Johansen con-integration was employed to trace whether there is a long-run relationship among the variables and the time-series properties of the variables were examined using Augmented Dickey-Fuller (ADF) unit root test and Ng and Perron unit root test.

Theoretical Model and Model Specification

The theoretical framework which underpins the methodology is based on the endogenous models (Auerbach-Kotlikoff (AK) model, product variety theory, and the Schumpeterian theory of growth) which shows that innovation promotes growth in an economy. To Arrow (1962), economic growth is induced by savings and capital accumulation while the AK model argues that

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economic growth is induced by savings, capital accumulation, and efficiency. This can be specified as:

$$gdp = f(sav, div, eff) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (1)$$

Where

gdp is gross domestic product, sav is gross national savings, div is capital investment, and eff is efficiency. However, long-run growth is also determined by innovation (inn) often referred to as innovation-based growth models (Howitt, 2015). Equation (1) can be restated as:

$$gdp = f(sav, div, eff, inn) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (2)$$

The value addition in different sectors can also be summed to growth. Thus, incorporating the value additions of the different sectors of the economy. The model can be stated as:

$$gdp = f(sav, div, eff, inn, vaa, vam, vai, vas) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (3)$$

Where:

vaa is value addition in the agricultural sector, vam is value addition in the manufacturing sector, value addition in the industry sector, and vas is value addition in the services sector. It is equally important to note that economic structural changes in an economy are equivalent to value addition as defined in this study. Value addition is the difference between national income (Y_t) and intermediation production (X_t). This can be specified as:

$$sc_i = Y - X = va_i \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (4)$$

Where sc_i is the economic structural changes in different sectors and va_i is the value addition in different sectors of an economy. Value addition for i sector (va_i) is often influenced by innovations (inn).

$$va_i = f(inn) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (5)$$

However, the growth as argued theoretically is influenced by government spending (gsp), foreign investment (fdi), and domestic investment (div). Excluding efficiency eff due to difficulty in measurement while incorporating government spending (gsp), foreign investment (fdi) and domestic investment (div), the model can be expressed as:

$$gdp = f(inn, vaa, vam, vai, vas, gsp, fdi, div) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (6)$$

Specifying the above model stochastically stated as:

$$gdp = \beta_0 + \beta_1 inn + \beta_2 vaa + \beta_3 vam + \beta_4 vai + \beta_5 vas + \beta_6 gsp + \beta_7 fdi + \beta_8 div + u_t \quad - \quad (7)$$

This study employs Vector Autoregression (VAR) models since each variable in the system does not only depend on its lags, but also the lags of other variables. Therefore, VAR is the most appropriate framework to deal with the independency that exists among the variables used in this study. It is the best approach that can also handle the inter-linkages that exist between economic structural changes and innovation. The stationary, k-dimensional, VAR(p) process as:

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + Cx_t + \varepsilon_t \qquad - \qquad (8)$$

Where

$y_t = (y_{1t,} y_{2t,\ldots,} y_{kt})'$ is a $k \times 1$ vector of endogenous variables,

$x_t = (x_{1t,} x_{2t,\ldots,} x_{kt})'$ is a $k \times 1$ vector of exogenous variables,

$A_1, \ldots, A_p$ are $k \times k$ matrices of lag coefficients to be estimated,

C is a $k \times d$ matrix of exogenous variable coefficients to be estimated,

$\varepsilon_t = (\varepsilon_{1t,} \varepsilon_{2t}, \ldots, \varepsilon_{kt})'$ is a $k \times 1$ while noise innovation process, with

$E(\varepsilon_t) = 0, E(\varepsilon_t \varepsilon_t') = \sum_t$, and $E(\varepsilon_t \varepsilon_s') = 0$ for $t \neq s$.

The last statement implies that the vector of innovations are contemporaneously correlated with full rank matrix $\sum_t$, but are uncorrelated with their leads and lags of the innovations and (assuming the usual x_t orthogonality) uncorrelated with all of the right-hand side variables. Since only lagged values of the endogenous variables appear on the right-hand side of the VAR equations and the innovations are assumed to be uncorrelated with lagged innovations and the exogenous regressors, standard orthogonality conditions hold and OLS yields consistent estimates. Furthermore, even though the innovations ε_t may be contemporaneously correlated, all of the equations in the system have identical ε_t regressors so that OLS is both equivalents to GLS and efficient.

Given that there is cointegration among the variables, Vector Error Correction (VEC) Models are applied and the models from equation (7) are re-stated as:

$$\Delta gdp_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta gdp_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta inn_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta vaa_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta vam_{t-i} + \sum_{i=1}^{p} \beta_{5i} \Delta vai_{t-i}$$
$$+ \sum_{i=1}^{p} \beta_{6i} \Delta vas_{t-i} + \sum_{i=1}^{p} \beta_{7i} \Delta gsp_{t-i} + \sum_{i=1}^{p} \beta_{8i} \Delta fdi_{t-i} + \sum_{i=1}^{p} \beta_{9i} \Delta div_{t-i} + \Omega_1 ECM_{t-1} + \mu_{1t} \qquad (9)$$

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$$\Delta inn_t = \varpi_0 + \sum_{i=1}^{p}\varpi_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\varpi_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\varpi_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\varpi_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\varpi_{5i}\Delta vai_{t-i}$$
$$+\sum_{i=1}^{p}\varpi_{6i} vas_{t-i} + \sum_{i=1}^{p}\varpi_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\varpi_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\varpi_{9i}\Delta div_{t-i} + \Omega_2 ECM_{t-1} + \mu_{2t}$$
(10)

$$\Delta vaa_t = \theta_0 + \sum_{i=1}^{p}\theta_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\theta_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\theta_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\theta_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\theta_{5i}\Delta vai_{t-i}$$
$$+\sum_{i=1}^{p}\theta_{6i}\Delta vas_{t-i} + \sum_{i=1}^{p}\theta_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\theta_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\theta_{9i}\Delta div_{t-i} + \Omega_3 ECM_{t-1} + \mu_{3t} \quad (11)$$

$$\Delta vam_t = \vartheta_0 + \sum_{i=1}^{p}\vartheta_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\vartheta_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\vartheta_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\vartheta_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\vartheta_{5i}\Delta vai_{t-i}$$
$$+\sum_{i=1}^{p}\vartheta_{6i}\Delta vas_{t-i} + \sum_{i=1}^{p}\vartheta_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\vartheta_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\vartheta_{9i}\Delta div_{t-i} + \Omega_4 \Delta ECM_{t-1} + \mu_{4t} \quad (12)$$

$$\Delta vai_t = \varsigma_0 + \sum_{i=1}^{p}\varsigma_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\varsigma_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\varsigma_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\varsigma_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\varsigma_{5i}\Delta vai_{t-i}$$
$$+\sum_{i=1}^{p}\varsigma_{6i}\Delta vas_{t-i} + \sum_{i=1}^{p}\varsigma_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\varsigma_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\varsigma_{9i}\Delta div_{t-i} + \Omega_5 ECM_{t-1} + \mu_{5t} \quad (13)$$

$$\Delta vas_t = \psi_0 + \sum_{i=1}^{p}\psi_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\psi_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\psi_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\psi_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\psi_{5i}\Delta vai_{t-i}$$
$$+\sum_{i=1}^{p}\psi_{6i}\Delta vas_{t-i} + \sum_{i=1}^{p}\psi_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\psi_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\psi_{9i}\Delta div_{t-i} + \Omega_6 ECM_{t-1} + \mu_{6t}$$
(14)

$$\Delta gsp_t = \xi_0 + \sum_{i=1}^{p}\xi_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\xi_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\xi_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\xi_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\xi_{5i}\Delta vai_{t-i}$$
$$+\sum_{i=1}^{p}\xi_{6i}\Delta vas_{t-i} + \sum_{i=1}^{p}\xi_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\xi_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\xi_{9i}\Delta div_{t-i} + \Omega_7 ECM_{t-1} + \mu_{7t} \quad (15)$$

$$\Delta fdi_t = \pi_0 + \sum_{i=1}^{p}\pi_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\pi_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\pi_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\pi_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\pi_{5i}\Delta vai_{t-i}$$
$$+\sum_{i=1}^{p}\pi_{6i}\Delta vas_{t-i} + \sum_{i=1}^{p}\pi_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\pi_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\pi_{9i}\Delta div_{t-i} + \Omega_8 ECM_{t-1} + \mu_{8t}$$
(16)

$$\Delta div_t = \phi_0 + \sum_{i=1}^{p}\phi_{1i}\Delta gdp_{t-i} + \sum_{i=1}^{p}\phi_{2i}\Delta inn_{t-i} + \sum_{i=1}^{p}\phi_{3i}\Delta vaa_{t-i} + \sum_{i=1}^{p}\phi_{4i}\Delta vam_{t-i} + \sum_{i=1}^{p}\phi_{5i}\Delta vai_{t-i} + \sum_{i=1}^{p}\phi_{6i}\Delta vas_{t-i} + \sum_{i=1}^{p}\phi_{7i}\Delta gsp_{t-i} + \sum_{i=1}^{p}\phi_{8i}\Delta fdi_{t-i} + \sum_{i=1}^{p}\phi_{9i}\Delta div_{t-i} + \Omega_9 ECM_{t-1} + \mu_{9t} \quad (17)$$

EMPIRICAL RESULTS AND DISCUSSION

Results of Descriptive Statistics

The summary results of the descriptive statistics of the variables captured in the model are presented in Table 1.

Table 1: Descriptive Statistics of Variables

	GDP	INN	VAA	VAM	VAI	VAS	GSP	FDI	DIV
Mean	4.45	25.95	23.98	13.57	28.99	46.06	3.95	1.75	31.41
Median	4.63	26.18	23.49	12.06	28.28	44.68	2.12	1.54	29.39
Maximum	15.33	28.20	36.97	21.02	37.71	59.79	9.45	5.79	54.95
Minimum	-2.04	21.90	18.02	6.55	18.17	35.36	0.91	0.35	14.90
Std. Dev.	3.92	1.61	3.93	5.03	5.40	6.16	3.00	1.24	13.05
Skewness	0.45	-0.75	1.43	0.16	-0.01	0.34	0.61	1.70	0.24
Kurtosis	3.31	3.02	5.55	1.39	2.01	2.47	1.84	5.75	1.75
Jarque-Bera	1.24	3.09	20.11	3.72	1.34	1.03	3.91	26.35	2.45
Probability	0.54	0.21	0.000	0.16	0.51	0.60	0.14	0.000	0.29
Observations	33	33	33	33	33	33	33	33	33

Source: Extractions from E-View 11 output

An examination of the 33 observations in Table 1 reveals that between 1986 and 2018, economic growth rate, innovation, value addition in agricultural sector as percent of GDP, value addition in manufacturing as percent of GDP, value addition in industry as percent of GDP, value addition in service sector as percent of GDP, government spending as percent of GDP, foreign direct investment as percent of GDP and domestic investment as percent of GDP averaged about 4.45%, 25.95, 23.98%, 13.57%, 28.99%, 46.06%, 3.95%, 1.75% and 31.41% respectively. The study can deduce that out of the economic structural changes value addition in service sector as percent of GDP averaged the highest implying that the sector has highest contribution to GDP in Nigeria during the study period. The maximum value for economic growth rate, innovation, value addition in agricultural sector as percent of GDP, value addition in manufacturing as percent of GDP, value addition in industry as percent of GDP, value addition in service sector as percent of GDP, government spending as percent of GDP,

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foreign direct investment as percent of GDP and domestic investment as percent of GDP recorded 15.33%, 28.2%, 36.97%, 21.02%, 37.71%, 59.79%, 9.45%, 5.79% and 54.95% in with their corresponding minimum values of -2.04%, 21.9%, 18.02%, 6.55%, 18.17%, 35.36%, 0.91%, 0.35% and 14.9% respectively. This also shows that value addition in service sector remains the highest as percent of GDP relative to economic structural changes in other sectors.

The test for normality of all the variables revealed low Jarque-Bera value with their respective low probability values. The data also indicated positively skewed distribution for economic growth rate, value addition in the agricultural sector, value addition in manufacturing, value addition in the service sector, government spending, foreign direct investment, and domestic investment while innovation and value addition in industry are negatively skewed. These indicate that the distributions for economic growth rate, value addition in the agricultural sector, value addition in manufacturing, value addition in the service sector, government spending, foreign direct investment, and domestic investment are skewed to the right implying that the data are tilted towards large values whereas, the data distribution for innovation and value addition in industries are tilted towards small values. The results of kurtosis which explains the peakedness and flatness of a normal curve also indicated values of less than 3 (that is less than excess Kurtosis) for value addition in manufacturing, value addition in industry, value addition in the service sector, government spending and domestic investment implying that the data for the variables have the platykurtic shape (that is, $K<3$). This means that the data distributions for the variables are widely spread from the mean values. The distribution for economic growth rate, innovation, value addition in agriculture, and foreign direct investment revealed a kurtosis of more than 3 implies that the distribution for the variable has a leptokurtic shape. This means that the data distribution for the variables is clustered around their mean values.

Correlation Test Analysis

The results of the correlation test among the variables were conducted to detect the problem of high multicollinearity that may lead to a single equation matrix. This is because highly correlated variables result in impossibility in obtaining reliable estimates. The results are presented in Table 2.

Table 2: Correlation Test Result

	GDP	INN	VAA	VAM	VAI	VAS	GSP	FDI	DIV
GDP	1.00	0.52	0.46	-0.37	-0.21	-0.11	0.21	-0.15	-0.22
INN	0.52	1.00	0.45	-0.23	-0.02	-0.26	0.26	0.26	-0.13
VAA	0.46	0.45	1.00	-0.05	-0.16	-0.50	-0.20	0.17	-0.07
VAM	-0.37	-0.23	-0.05	1.00	0.83	-0.70	-0.86	0.08	0.82
VAI	-0.21	-0.02	-0.16	0.83	1.00	-0.78	-0.67	0.08	0.82
VAS	-0.11	-0.26	-0.50	-0.70	-0.78	1.00	0.73	-0.18	-0.68
GSP	0.21	0.26	-0.20	-0.86	-0.67	0.73	1.00	0.00	-0.80
FDI	-0.15	0.26	0.17	0.08	0.08	-0.18	0.00	1.00	0.17
DIV	-0.22	-0.13	-0.07	0.92	0.82	-0.68	-0.80	0.17	1.00

Source: Extractions from E-views 11 output

The result in Table 2 indicates that the correlation coefficients among the variables are not high that could result in a multicollinearity problem among the variables incorporated for the study. This is because there is a moderate correlation between the variables of the model except for between domestic investment and value addition in manufacturing, between government spending and value addition in manufacturing, and between value addition in industry and value addition in manufacturing. It explains the interlinkages and not capable of causing multicollinearity problems. This implies that there is no incidence of correlation that could lead to a single equation matrix (the problem of high multi collinearity).

VAR Lag Order Selection Criteria

The results of VAR lag selection criteria or optimal performance of the model are presented in Table 3.

Table 3: VAR Lag Selection Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-557.7253	NA	61220.25	36.56293	36.97924	36.69863
1	-413.8260	194.9604*	1311.599	29.18039*	36.66809*	33.86200
2	-281.2961	102.6038	233.0587*	32.50490	37.09045	31.75888*

Source: Extractions from E-views 11 output

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indicates lag order selected by the criterion. LR: sequentially modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion.

The results presented in Table 3 show that lag one (1) has the least AIC and SC relative to the other lags. This implies that the best lag for optimal performance of the model according to the Akaike information criterion and Schwarz information criterion is lag one (1).

RESULTS OF UNIT ROOT TEST

The test result of the Augmented Dickey-fuller statistic for the time series variables used in the estimation are presented in Table 4

Table 4: Result of Unit Root Test (ADF)

Variables	At level	First Difference	1%Critical Level	5%Critical Level	10%Critical Level	Order of Integration
GDP	-2.099316	-10.00043	-3.661661	-2.960411	-2.619160	I(1)
Prob	0.2463	0.0000*				
INN	-1.458435	-6.552013	-3.661661	-2.960411	-2.619160	I(1)
Prob	0.5413	0.0000*				
VAA	-2.603842	-6.561816	-3.670170	-2.963972	-2.621007	I(1)
Prob	0.1027	0.0000*				
VAM	-1.291092	-6.750314	-3.661661	-2.960411	-2.619160	I(1)
Prob	0.6215	0.0000*				
VAI	-1.670487	-6.928828	-3.670170	-2.963972	-2.621007	I(1)
Prob	0.4361	0.0000*				
VAS	-1.116121	-4.268455	-3.661661	-2.960411	-2.619160	I(1)
Prob	0.6972	0.0022*				
GSP	-1.117194	-5.201088	-3.661661	-2.960411	-2.619160	I(1)
Prob	0.6967	0.0002*				
FDI	-1.072568	-7.278108	-3.661661	-2.960411	-2.619160	I(1)
Prob	0.7035	0.0000*				
DIV	-1.645216	-6.334026	-3.670170	-2.963972	-2.621007	I(1)
Prob	0.4486	0.0000*				

Source: Extractions from E-views 11 Output

Note: These critical values are computed from Mackinnon (1996) and if the probability value of a particular variable is less than the 5% critical value, the researchers reject the null hypothesis of the variable having a unit root. The asterisk (*) denotes rejection of the unit root hypothesis at 5% critical levels.

From the results of ADF unit root in Table 4, all the variables (GDP, INN, VAA, VAM, VAI, VAS, GSP, FDI, DIV) are not stationary at level but are integrated at the first difference at 5% level of significance, that is I(1). This is because the probability values of the variables are less than 0.05 critical values at the first difference. This implies that the variables have mean-reverting ability hence the need for a co-integration test which in this case, the Johansen co-integration is appropriate given that all the variables are integrated of the same order and at the first difference, that is I(1). The study also validated the unit root test results and estimated the Ng and Perron unit root test and the results are presented in Table 5.

Table 5: Results of Ng and Perron Unit Root Test

Variables	MZa	MZt	MSB	MPT	Decision at 5%
	-8.1	**-1.98**	**0.233**	**3.17**	
GDP	-5.68458	-1.68244	0.29596	4.32011	Not Stationary
D(GDP)	-12.2021	-2.47003	0.20243	2.00785	I(1)
INN	-4.7808	-1.3532	0.28305	5.51379	Not Stationary
D(INN)	-14.9737	-2.72822	0.1822	1.66621	I(1)
VAA	-6.48415	-1.79904	0.27745	3.78359	Not Stationary
D(VAA)	-40.8768	-4.52012	0.11058	0.60145	I(1)
VAM	-0.33452	-0.24031	0.71839	29.732	Not Stationary
D(VAM)	-14.9692	-2.66197	0.17783	1.91062	I(1)
VAI	-4.47566	-1.44725	0.32336	5.55819	Not Stationary
D(VAI)	-67.5953	-5.78919	0.08564	0.41619	I(1)
VAS	-2.78561	-1.11994	0.40205	8.59554	Not Stationary
D(VAS)	-13.553	-2.56286	0.1891	1.96058	I(1)
GSP	-2.02037	-0.94574	0.4681	11.5147	Not Stationary
D(GSP)	-15.4435	-2.73619	0.17717	1.74453	I(1)
FDI	-5.91992	-1.52796	0.26566	3.94881	Not Stationary
D(FDI)	-14.3814	-2.67237	0.18582	1.73831	I(1)
DIV	-0.08131	-0.0607	0.74647	33.4762	Not Stationary
D(DIV)	-31.6365	-3.86266	0.1221	1.11545	I(1)

Source: Culled from E-views 11 output

The Ng and Perron unit root results in Table 5 also reveals that all the series are not stationary at level but become stationary at first difference at 5% the level of significance. This implies that the series are all integrated at first difference. Thus, the Johansen co-integration is the most appropriate.

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RESULTS OF PAIRWISE GRANGER CAUSALITY TEST

The results of the VEC granger causality test are presented in Table 6.

Table 6: Results of VEC Granger Causality Test

Variables (Dependent)	Excluded	Probability At 5%	Chi-Square Value	Decision at 5% Level of Significance
D(GDP)	Variables (None)			
	Joint (All)	0.7650	4.930699	Not Significant
D(INN)	Variables			
	(DIV)	0.0482***	3.902592	Significant
	Joint (All)	0.2722	9.899393	Not Significant
D(VAA)	Variables (None)			
	Joint (All)	0.9389	2.925476	Not Significant
D(VAM)	Variables (None)			
	Joint (All)	0.9938	1.431564	Not Significant
D(VAI)	Variables (None)			
	Joint (All)	0.8843	3.685539	Not Significant
D(VAS)	Variables (None)			
	Joint (All)	0.8156	4.438355	Not Significant
D(GSP)	Variables (None)			
	Joint (All)	0.7006	5.521822	Not Significant
D(FDI)	Variables (None)			
	Joint (All)	0.6436	6.032618	Not Significant
D(DIV)	Variables (None)			
	Joint (All)	0.8670	3.888801	Not Significant

Source: Culled from E-views 11 output

The results from Table 6 reveal a unidirectional relationship running from domestic investment to innovation in Nigeria at 5% level of significance. This implies that changes in domestic investment have the capability of affecting the level of innovation in Nigeria. More so, the study found that none of the variables granger-cause economic growth nor economic structural changes (value addition in agriculture, value addition in manufacturing, value addition in industry, and value addition in the service sector). The study also revealed that none of the variables granger-cause government spending, foreign direct investment, and domestic investment, and the joint effect is also not statistically significant at 5% significance level.

Determination of Long-run Relationship among the Variables

The Johansen hypothesized co-integration test was carried out to determine the number of co-integrating relationships. The results are presented in Table 7.

Table 7: Unrestricted Cointegration Rank Test Results (Trace & Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.961056	318.9092	197.3709	0.0000*	100.6145	58.43354	0.0000*
At most 1	0.864728	218.2947	159.5297	0.0000*	62.01453	52.36261	0.0039*
At most 2	0.817015	156.2802	125.6154	0.0002*	52.64891	46.23142	0.0091*
At most 3	0.721466	103.6313	95.75366	0.0128*	39.62463	40.07757	0.0562
At most 4	0.537984	64.00663	69.81889	0.1333	23.93685	33.87687	0.4602
At most 5	0.419175	40.06979	47.85613	0.2200	16.84246	27.58434	0.5935
At most 6	0.313434	23.22733	29.79707	0.2351	11.65762	21.13162	0.5817
At most 7	0.246318	11.56971	15.49471	0.1788	8.766346	14.26460	0.3061
At most 8	0.086463	2.803362	3.841465	0.0941	2.803362	3.841465	0.0941

Source: Culled from E-views 11 output

Note: *denotes rejection of the hypothesis at the 0.05 level. **Mackinnon-Haug-Michelis (1999) p-values

Table 7 reveals that there are 4 co-integrating equations among the variables in the model based on the Trace statistics. This is because the Trace statistic value for at most 3 hypothesized number of cointegration equations is greater than its respective critical value at 5% level of significance. The researcher rejects the null hypothesis that there is at most 3 hypothesized number of cointegration equations among the variables in the model. Also, the Max-Eigen statistics test rejects the null hypothesis of at most 2 hypothesized number of cointegration equations since the Max-Eigen statistic is greater than its critical value at 5% level of significance. From the results of these tests, the researchers can infer that that there is a long-run relationship among the variables incorporated in the model.

Long-run Impact of Innovation and Economic structural changes on Economic Growth in Nigeria

To determine the nature of the long-run relationship between innovation and economic growth and the between economic structural changes and economic

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growth, the study used the long-run estimates from the Vector error correction model. The equation for the long-run impact of innovation and economic structural changes on economic growth is stated as:

GDP = 9.74INN + 8.47VAA + 1.60VAM + 7.49VAI + 10.15VAS - 2.16GSP -4.24FDI + 0.106DIV
(0.483) (1.914) (0.244) (1.873) (1.934) (0.309) (0.345) (0.073)
[20.165] [4.425] [6.557] [3.998] [5.248] [-6.990] [12.289] [1.452]

Note: Standard Errors are in parentheses

From the long-run estimates, the estimated coefficient of innovation is positive and statistically significant at 5% level of significance. This implies that changes (say, increase) in innovation leads to significant changes (say, increase) in economic growth in Nigeria in the long-run and vice versa, *ceteris paribus*. This finding is consistent with Andreea, Olivera, and Florina (2015) who found a positive relationship between innovation and economic growth in Nigeria in the long-run. This result indicates that innovation in Nigeria spurs economic growth. Also, the estimated coefficients of value addition in agriculture, value addition in manufacturing, value addition in industry, and value addition in the service sector are theoretically plausible and statistically significant at 5% level of significance. This explains that there is a strong positive and significant impact of economic structural changes on economic growth in Nigeria in the long-run.

Furthermore, the estimated coefficients of government spending and foreign direct investment are negative and statistically significant at 5% level of significance. This implies that an increase in government spending and inflows of foreign direct investment retards economic growth in the long run and vice versa, *ceteris paribus*. This means that government spending may not be channeled to productive investments and therefore become counterproductive. More so, the negative influence of foreign direct investment inflows may be attributed to the repatriation of profit and some sharp practices of foreign investors such as over-invoicing that turns not to exert location advantage to the host country but rather wind off infant industries. However, domestic investment exert an insignificant influence on economic growth in Nigeria in the long-run

Short-run Impact of Innovation and Economic structural changes on Economic Growth in Nigeria

The result of the error-correction test measures the short-run relationship. The results are summarized in Table 8.

Table 8: Short-run Impact of Innovation and Economic structural changes on Economic Growth

Variables	Coefficient	Std. Error	t-Statistic	Prob.
CointEq1	-0.02356	0.123072	-0.19147	0.8484
D(GDP(-1))	-0.62114	0.252769	-2.45734	0.0149
D(INN(-1))	0.365243	0.948851	0.384931	0.7007
D(VAA(-1))	-4.93133	3.701226	-1.33235	0.1844
D(VAM(-1))	-1.03769	0.741616	-1.39922	0.1635
D(VAI(-1))	-4.72612	3.662771	-1.29031	0.1986
D(VAS(-1))	-4.94723	3.756849	-1.31686	0.1896
D(GSP(-1))	-0.69064	0.919913	-0.75076	0.4538
D(FDI(-1))	0.333087	0.684108	0.486891	0.6269
D(DIV(-1))	-0.2211	0.359274	-0.6154	0.5391
C	-0.57018	0.980038	-0.5818	0.5614

$R^2 = 0.638031$ $\overline{R}^2 = 0.557046$

The short-run estimates in Table 8 show that innovation is not statistically significant at influencing economic growth in Nigeria in the short-run at 5% level of significance. This may not be unconnected to the processes that manifest after every innovation. This is in line with the argument by Howitt (2015) that innovation is related to only long-run growth. The results further show that economic structural changes have a weak influence on economic growth in Nigeria. This is because value addition in the agricultural sector, value addition in manufacturing, value addition in industry, and value addition in the service sector have a negative and statistically insignificant impact on economic growth in the country. This means economic structural changes in the Nigerian economy take a long period to exert a positive influence on growth of the country. Government spending and domestic investment do not have a strong influence on economic growth in Nigeria at 5% level of significance. Furthermore, the estimated coefficient of foreign direct investment reveals a positive and insignificant impact on economic growth in Nigeria. This implies that changes in foreign direct investment inflows to Nigeria have a positive but insignificant impact on economic growth in the short-run at 5% level of significance.

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The coefficient of error correction term for the model is with the expected sign and low magnitude (-0.023564). Its magnitude indicates that in case of any deviation, the long run equilibrium is adjusted slowly were about 2.3% of the disequilibrium may be removed each period (that is each year). It is also obvious from the coefficient of multiple determination (R^2) that the model has a good fit as the independent variables jointly explain 63.8% of the movement in the dependent variable with the R^2-adjusted ($\bar{R}^2$) of 55.7%.

Impulse Response of Economic Growth to Shock in Innovation and Economic structural changes in Nigeria

The result of the impulse response of economic growth to shock in innovation and economic structural changes is presented in Figure 1.

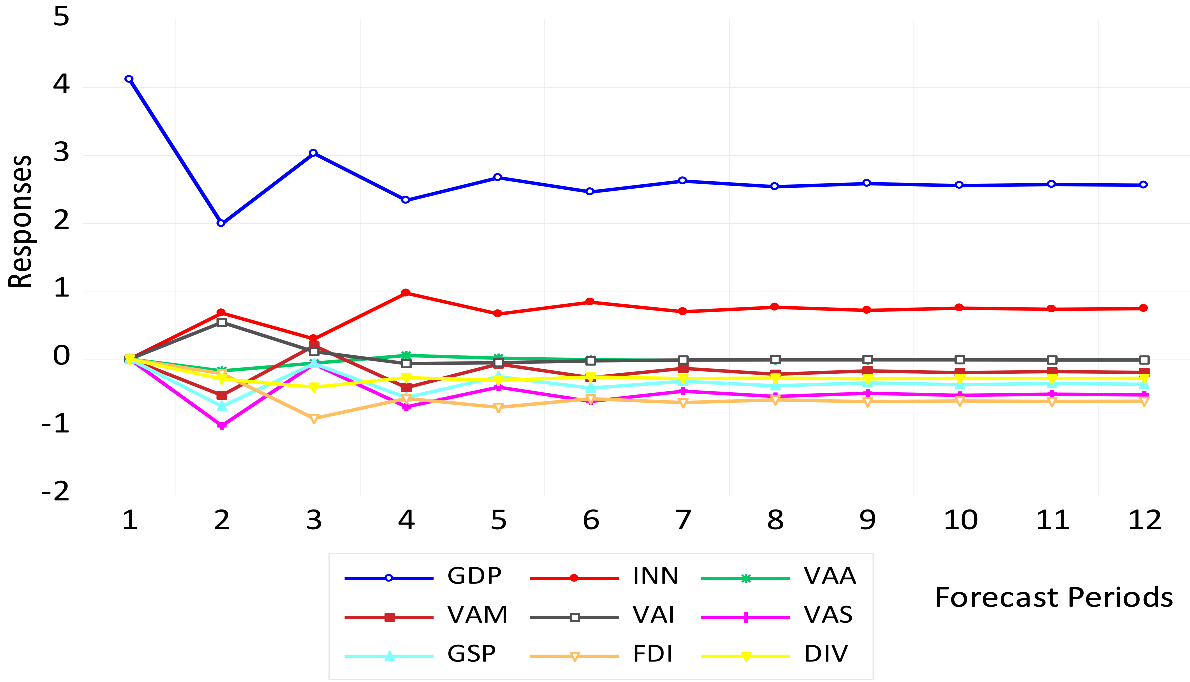

Figure 1: Response of Economic Growth to Innovations

The result of the 12-year forecast shows that shock in innovation and own its shocks rate has a positive and permanent influence on economic growth in Nigeria. The response to own shock would decline slightly in the second year of the forecast period and increase subsequently with a relatively stable response in the remaining forecast period. The study further shows that the response of economic growth to shock in innovation would respond positively and permanently throughout the forecast period. The study also found that economic growth would respond negatively and permanently but infinitesimally to shock in value addition in the agricultural sector, value addition in manufacturing, value addition in the industry, value addition in the service sector, government spending, foreign direct investment and domestic investment in Nigeria. This explains that innovations in value addition in agricultural sector, value addition in manufacturing, value addition in industry, value addition in service sector, government spending, foreign direct investment, and domestic investment would impede economic growth in Nigeria. This may be attributed to the low levels of investment and technology that have bedeviled the economic structural changes in the sectors.

Impulse Response of Innovation to Shock in Economic Growth and Economic structural changes in Nigeria

The result of the impulse response of innovation to shock in economic growth and economic structural changes is presented in Figure 2.

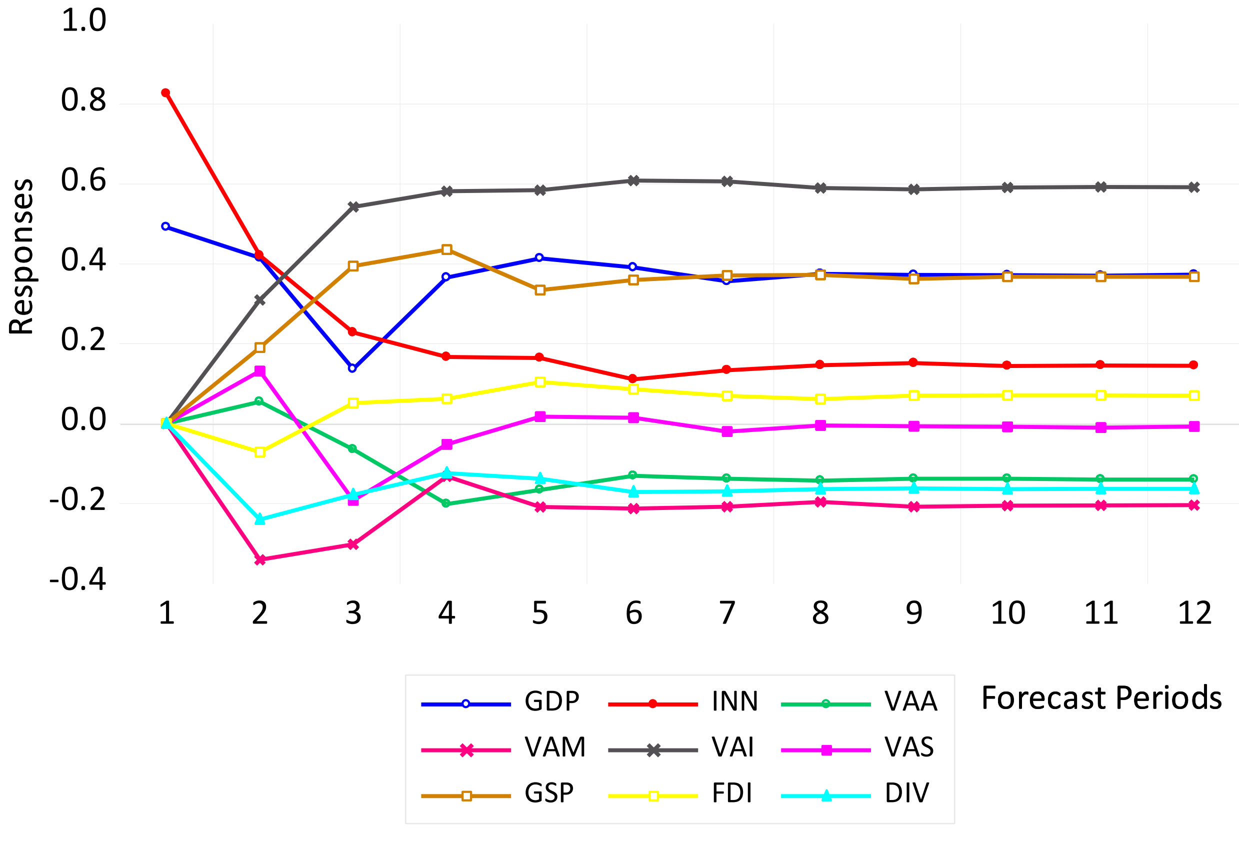

Figure 2: Response of INN to Innovations

The result in Figure 2 shows that own shocks and shock in value addition in industry, economic growth, and government spending would exert positive and permanent response to innovation in Nigeria throughout the forecast period. This implies that shocks in value addition in industry, innovation,

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economic growth, foreign direct investment, and government spending would influence innovation in Nigeria positively. More so, the response of innovation to shock in domestic investment, value addition in manufacturing, value addition in agriculture is negative throughout the forecast period. However, shock in value addition in the service sector would exert positive response on innovation in the short-run (2nd year) but revert to negative temporary with the tendency of converging to zero response in the long-run.

Impulse Response of Economic structural changes to Shock in Economic Growth and Innovation in Nigeria

The result of the impulse response of economic structural changes to shock in economic growth and innovation is presented in Figure 3.

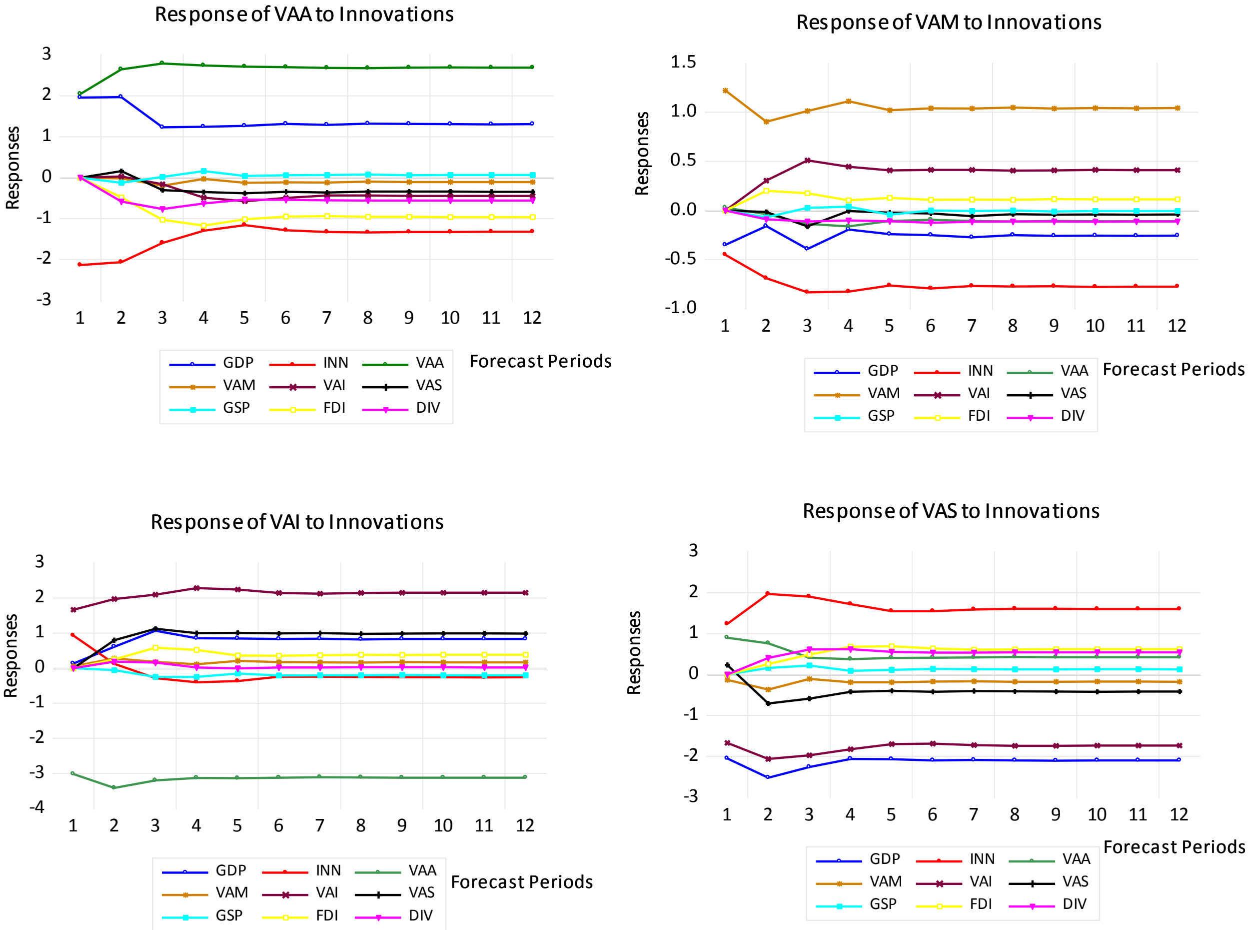

Figure 3: Responses of Economic Structural Changes to Innovations

The study forecast in Figure 3 shows that value addition in the agricultural sector and manufacturing sector responds negatively to innovations while value addition in the agricultural sector responds positively to its shock and shock in economic growth. However, the response of value addition in the services sector to shock in innovations is positive and permanent. The study forecast also reveals that value addition in industry responds positively at the initial periods but reverts in the third period to negative and remains negative through the forecast period. The result implies that economic structural changes in the Nigerian economy would not respond positively to shock in innovations except in the service sector. This may be attributed to the level of technology in other sectors.

The Accumulated Forecast Error Variance of Economic Growth to Shocks

The results of the accumulated forecast error variance of economic growth are summarized and presented in Table 9.

Table 9: Variance Decomposition of Economic Growth to Shocks

Period	S.E.	GDP	INN	VAA	VAM	VAI	VAS	GSP	FDI	DIV
Short-run (3rd year)	5.816	88.980	1.611	0.098	0.950	0.899	2.869	1.447	2.384	0.762
Long-run (12th year)	10.312	83.262	5.522	0.035	0.740	0.294	3.421	1.747	4.048	0.930

Source: Extraction from E-views 11 Output

The result of the accumulated forecast error variance of economic growth to shock in innovation and other variables presented in Table 9 suggests that innovation accounts for minimal variations in economic growth in Nigeria in the short run and long run. However, the variations in economic growth would improve overtime in an event of shock in innovation. Similarly, shock in value addition in the service sector, government spending, foreign direct investment, and domestic investment explains minimal accumulated forecast error variance in economic growth in the short-run but turns to improve over the forecast period. The study forecast also shows that shock in value addition in agriculture, value addition in manufacturing and value addition in industry accounts for minimal variations in economic growth in the short-run that turns to decline over the forecast period. This implies that economic structural changes in the service sector would exert increasing variations in economic growth in the long-run with the current trend of economic activities. Also, the variations in economic growth due to own shock has the majority of the variations in economic growth in the short-run and long-run but declines over time. The relative impact of a shock in innovation is followed after its shock.

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The Accumulated Forecast Error Variance of Innovations to Shocks

The results of the accumulated forecast error variance of innovation in an event of shock in other variables are summarized and presented in Table 10.

Table 10: Variance Decomposition of Innovation to Shocks

Period	S.E.	GDP	INN	VAA	VAM	VAI	VAS	GSP	FDI	DIV
Short-run (3rd year)	1.514	18.890	39.777	0.312	9.041	17.016	2.366	8.352	0.338	3.908
Long-run (12th year)	3.002	18.998	12.258	2.321	6.263	39.424	0.645	15.939	0.647	3.504

Source: Extraction from E-views 11 Output

From the results of the accumulated forecast error variance of innovation to shock in economic growth and other variables in Nigeria presented in Table 10 suggest that shock in economic growth, value addition in agriculture, value addition in industry, government spending and foreign direct investment accounts minimal variations in the short-run but improve greatly in the long-run. This implies that the variations in innovation due to shocks in economic growth, value addition in agriculture, value addition in the industry, government spending, and foreign direct investment would increase over time but remains minimal. The result shows that economic growth, value addition in industry, and government spending has a relative higher impact on innovation in Nigeria. Also, own shock and shocks in value addition in manufacturing, value addition in the service sector, and domestic investment would account for 39.777%, 9.041%, 2.366% and 3.908% in the short-run and 12.258%, 6.263%, 0.647% and 3.504% in the long-run respectively. This implies that own shock and shocks in value addition in manufacturing, value addition in service sector, and domestic investment would exert decreasing variations in innovation in Nigeria during the forecast period.

The Accumulated Forecast Error Variance of Economic structural changes to Shocks

The results of the accumulated forecast error variance of economic structural changes in an event of shock in other variables are presented in Table 11.

Table 10: Variance Decomposition of Economic Structural Changes to Shocks

Period	S.E.	GDP	INN	VAA	VAM	VAI	VAS	GSP	FDI	DIV
Variance Decomposition of VAA:										
Short-run (3rd year)	6.479	21.964	27.049	45.231	0.092	0.065	0.281	0.037	3.081	2.200
Long-run (12th year)	12.356	15.949	17.417	55.308	0.089	1.319	0.796	0.048	6.610	2.464
Variance Decomposition of VAM:										
Short-run (3rd year)	2.347	5.462	24.930	0.381	60.580	6.399	0.477	0.103	1.295	0.372
Long-run (12th year)	4.83	3.684	29.397	0.591	56.593	8.146	0.167	0.039	0.806	0.576
Variance Decomposition of VAI:										
Short-run (3rd year)	6.861	3.252	2.042	65.857	0.236	23.470	4.020	0.141	0.854	0.127
Long-run (12th year)	13.962	4.003	0.875	60.855	0.186	27.401	5.510	0.224	0.913	0.033
Variance Decomposition of VAS:										
Short-run (3rd year)	6.261	39.924	23.069	3.976	0.421	27.953	2.306	0.192	0.771	1.387
Long-run (12th year)	11.776	39.655	23.176	2.231	0.323	27.499	1.771	0.154	2.821	2.370

Source: Extraction from E-views 11 Output

The study found that shock in innovation exerts relative higher economic structural changes in agriculture, manufacturing and service sectors. The implication is that variations in value addition are the manufacturing sector and value addition in the service sector would increase over the forecast period in an event of shock in innovation in Nigeria. However, the variations in value addition in agricultural sector and value addition in the industry would decline over time. The study can infer that apart from variations in value addition in agriculture and value addition in manufacturing in an event of own shock, shock in innovation accounts for more variations in value addition in the agricultural sector and value addition in the manufacturing sector in Nigeria. Furthermore, shock in value addition in the agricultural sector accounts for a relatively higher impact on variations in value addition in the industry in the short-run and long-run while variations in the service sector are majorly accounted for by shock in economic growth and value addition in the industry in Nigeria in the short-run and long-run.

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Model Checking (Diagnostics)

A diagnostic check was carried out to establish whether the model is valid. In other words, if the model developed has a problem or not. Residual tests were conducted to examine whether estimates are reliable and residuals have exhibited a distribution that can be considered normal and whether estimates can yield reliable statistical inferences. The results of the VEC residual serial correlation Long run Model and VEC residual heteroskedasticity tests indicate that there is no incidence of serial correlation and heteroskedasticity in the model. The study also examined the VEC residual normality tests. The result also shows that the model is proven dynamically stable using the result of inverses roots of Autoregressive AR characteristic polynomial. This means that results or estimates produced are reliable and can stand statistical inferences.

CONCLUSION

The study concludes that there is a unidirectional relationship running from domestic investment to innovation in Nigeria and no causal relationship between innovation and economic structural changes. Innovation and economic structural changes do no granger cause economic growth in Nigeria. The study also infers that there is a strong influence of innovation, value addition in agriculture, value addition in manufacturing, value addition in industry, and value addition in the service sector on economic growth in Nigeria in the long-run. We can, therefore, infer the impact of innovation and economic structural changes on economic growth is long-run phenomena.

POLICY RECOMMENDATIONS

This study, therefore, recommends the following:

Government spending in Nigeria should be channeled towards productive investments and improve research and development that could advance the level of technology, support patent rights, and accelerate the economic structural changes in the country. The current level of domestic investment seems insignificant. This necessitates the creation of enabling business environment through the development of infrastructural facilities for domestic investors to strive, establishing investment incentives such as soft loans, and implement trade policies that could favour the growth of the domestic infant industries. The study also recommends huge investment in value addition activities in all the sectors that could change the economic structure of the Nigerian economy thereby creating room for growth. Value addition in the service sector has impact strongly on the growth of the Nigerian. However, this sector is mostly driven by foreign investors. The study, therefore, recommends favourable investment policies and investment promotion strategies that could exert a positive influence on the foreign investment on the growth of the Nigerian economy.

REFERENCES

Aghion, P. & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica,* 60: 323–51.

Andergassen, R., Nardini, F., & Ricottilli, M. (2009). Innovation and growth through local and global interaction. *Journal of Economic Dynamics and Control,* 33(10): 1779–1795.

Andreea, M., Olivera, E. & Florina, S. (2015). Innovation and Economic Growth: An Empirical Analysis for CEE countries. 4th World Conference on Business, Economics and Management, WCBEM. 461-467.

Arrow, K. J. (1962). The economic implications of learning by doing. *Review of Economic Studies,* 29(1): 155–73.

Arthur, W.B., (1994). *Increasing Returns and Path Dependence in the Economy.* University of Michigan Press.

Bae, S. H., & Yoo, K. (2015). Economic modeling of innovation in the creative industries and its implications. Technological Forecasting and Social Change, 96: 101–110.

Chukwuemeka, O. (2015). An overview of endogeneous growth models: theory and critique. International Journal of Physical and Social Sciences, 5(3): 498-514

European Central Bank (2017). How Innovation Lead to Growth. Eurosystems.

Franco, M. & Fabio, M (2004). Structural Change in Innovative Activities in Four Leading

Ganti, A. (2019). Structural Change. Retrieved from https://www.investopedia.com/terms/s/structural_change.asp on 19th June, 2020.

Grossman, G. M. & Helpman, E. (1991). Trade, Knowledge Spillovers and Growth. *European Economic Review.* 35, 517-526.

Grossman, G.M., & Helpman, E. (1991a). *Innovation and Growth in the World Economy.* Cambridge, MA: MIT Press.

Grossman, G.M., & Helpman, E. (1991b). Quality Ladders in the Theory of Growth. *Review of Economic Studies*, 58: 43 – 61.

Howitt, A. (2015). Product Variety. Retrieved from https://www.brown.edu/Departments/Economics/Faculty/Peter_Howitt/2070-2015/Aghion_Howitt_Ch3-ProductVariety.pdf on 19th June, 2020.

Johan, B. Alfons, G.J & Ruud, B.M. (2008). The Impact of Innovation, Firm Growth and Perceptions on Technical and Scale Efficiency. *Agricultural Economics Review*. 2: 65-85.

Mansfield, E. (1972). Contribution of research and development to economic growth of the United States. Papers and Proceedings of a Colloquium on Research and Development and Economic Growth Productivity, National Science Foundation, Washington DC.

Minniti, A., & Venturini, F. (2013). R&D Policy and Schumpeterian Growth: Theory and Evidence. University of Bologna, Working Paper, no. 945: 1-43.

Nadiri, I. (1993). Innovations and technological spillovers. Working Paper, No. 423, National Bureau of Economic Research, Cambridge, MA.

Norris, E.D., Kersting E., & Verdier, G. (2010). Firm Productivity, Innovation and Financial Development, International Monetary Fund, Working Papers, WP/10/49, 3-34.

OECD (2007). Innovations and growth: Rational for an innovation strategy of the capitalist process, New York: McGraw-Hill. 3-29.

Pessoa, A. (2007). Innovation and Economic Growth: What is the actual importance of R&D?", University of Porto, FEP Working Papers, no. 254, 1-17.

Petrariu, I.R, Bumbac, R., & Ciobanu, R. (2013). Innovation: a path to competitiveness and economic growth. The case of CEE countries, *Theoretical and Applied Economics*, 5 (582), 15-26.

Rana, P. Maradana, R P., Saurav D., Kunal G., Manju. J., & Debaleena C. (2017). Does Innovation Promote Economic Growth? Evidence from European countries. *Journal of Innovation and Entrepreneurship*. 6(1): 1-23.

Romer, P. (1990). Endogenous Technological Change. *Journal of Political Economy*, 98: 71 – 102.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94: 1002–1037.

Romer, P. M. (1994). The Origins of Endogenous Growth. *The Journal of Economic Perspective*. 8(1): 3-22.

Santacreu, A. M. (2015). Innovation, diffusion, and trade: theory and measurement. *Journal of Monetary Economics*, 75: 1–20.

Schumpeter, J. A. (1911). *The Theory of Economic Development*. Cambridge: Harvard University Press.

Schumpeter, J.A. (1942). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press.

Schumpter, J.A. (1939). Business Cycles: A theoretical, historical and statistical analysis

Sectors. *Revue Économique*, 55: 1051-1070.

Solow, R. (1956). A contribution to the theory of economic growth. Quarterly Journal of Economics, 70(1), 65–94.

Ulku, H. (2004). R&D, Innovation, and Economic Growth: An Empirical Analysis", International Monetary Fund Working Papers, WP/04/185, 2-35.

Vitaliy, R. & Leonid, G. (2015). Structural changes in the National Innovation System: Longitudinal Study of Innovation Process in Russia. Economic Change and Restructuring.

Westmore, B. (2013). R&D, Patenting and Growth: The Role of Public Policy, OECD Economics Department Working Papers, no. 1047, OECD Publishing, 2-48.

World Bank (2019). *World Development Indicator*.