

Causal Linkages between agricultural sector and industrial sector of the Nigerian economy (2010q1-2017q2)

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Submitted: 01-03-2021

Revised: 09-03-2021

Accepted: 12-03-2021

ABSTRACT: This paper estimates the causal linkage between the agricultural sector and industrial sector of the Nigerian economy using quarterly data from the first quarter of 2010 to second quarter of 2017. The variables captured in the model are industrial value added to GDP, agricultural value added to GDP, monetary policy rate, inflation rate and exchange rate. The paper used Granger causality test, impulse response functions and variance decomposition as techniques of data analysis. The study finds that there is unidirectional causality running from industrial sector to agricultural sector and monetary policy rate, while unidirectional causality runs from exchange rate to industrial sector. Furthermore, no evidence of causality runs between industrial sector and inflation rate. The result of impulse response functions indicates that one standard deviation innovation on agricultural sector, inflation and exchange rate reduces the contribution of the industrial sector in the short and medium terms. Additionally, the variance decomposition result suggests that, a significant variation in the industrial contribution to the economy is due to changes in exchange rate, inflation rate, monetary policy rate and then lastly agricultural sector. This evident the role played by the monetary authority and government in improving the performance of the industrial sector in Nigeria. It is recommended that, to achieve viable industrial sector, government in collaboration with the private individuals should increase their investment into the sector, exchange rate and interest rate policies that take into cognizance the performance and sustain positive growth of the sector vis-à-vis overall economy should be persuaded.

Keywords: Agricultural sector, Industrial sector, Granger causality, Impulse response, Variance decomposition.

I. INTRODUCTION

The inter-relationship between agricultural sector and industrial sector has been a long debated issue in most of the developing countries including Nigeria. The linkage between agricultural sector and industrial sector of every economy is of paramount importance to country's overall economic performance. In every economy, be it developed or otherwise, the growth of the agricultural sector heavenly depends on the industrial demand for agricultural productivities industrial demand on the other hand depends on the increase on the patronage of the agricultural sector for industrial products and on the supply of the materials used by the industries (Koo & Lou, 1997).

A country in the classification of A. P. Thirlwall, "Growth and Development", becomes economically developed when the productivity of the agricultural sector approximately matches those of the industrial and service sectors. The causal linkages between the two sectors cannot be overemphasized because agriculture plays key macroeconomic roles in the industrialization of developing countries by relieving saving, aggregate demand, fiscal, and foreign exchange constraints on the industrial sector.

Agriculture and industry are well known integral component of growth and development process in every economy because of their mutual interdependence and symbiotic relationship. The contribution of agriculture to the economy in general and to industry in particular is well known in almost all the developing countries such that one cannot do without the other. However, the degree of interdependence may vary and also change over time.

In the theory and empirical literature, the inter-relationship between agriculture and industry has been discussed from different channels. First, agriculture supplies food grains to industry to facilitate absorption of labour in the industry sector. Secondly, agriculture supplies the inputs like

raw cotton, jute, tea, coffee etc. needed by the agro-based industries. Thirdly, industry supplies industrial inputs, such as fertilizer, pesticides, machinery etc. to the agricultural sector. Fourthly, agriculture influences the output of industrial consumer goods

through demand. Fifthly, agriculture generates surpluses of savings, which can be mobilized for investment in industry, and other sectors of the economy. Sixthly, fluctuations in agricultural production may affect private corporate investment decisions through the impact of the terms of trade on profitability (Ahluwalia, 1986 and Rangarajan, 1982). Whereas some of these channels emphasize the „agriculture-industry“ linkage on the supply side or production side, others stress the linkages through the demand side (Dilip S., 2009).

The production linkages basically arise from the interdependence of the sectors for meeting the needs of their productive inputs, whereas the demand linkage arises from the interdependence of the sectors for meeting final consumption. Further, the linkages between the two sectors can also be categorized into two groups based on the direction of interdependence. One is the backward linkage, which identifies how a sector depends on others for their input supplies and the other is the forward linkage, which identifies how the sector distributes its outputs to the remaining economy. More importantly, these two linkages can indicate a sector's economic pull and push, because the direction and level of such linkages present the potential capacity of each sector to stimulate other sectors and then reflect the role of this sector accordingly. Dilip S. (2009).

There are many different ways for economic growth and development in a country. It is well documented that agriculture, industrial and oil sectors have significant role in accelerating economic growth of a country, however, the emphasis of the causal linkages of such sectors varies according to different countries. At the first stage of economic development, agricultural and industrial sectors are affective elements for an economy, because such sectors can provide more job opportunities, security in producing sufficient food, and then poverty reduction (Michael & Stephen, 2001). Thus, both sectors are backbone of the country's economy, for the fact that countries cannot exist without agricultural development, and cannot develop without industrialization. The agricultural and industrial sectors are two sectors with great impact on the economic growth of a country. Both sectors are vital for economic

development in increasing GDP and decreasing employment among others.

And yet, beyond the lasting political-economic influence of agrarian structure, agriculture

also plays macroeconomic roles in industrialization. They include providing saving and foreign exchange to finance capital accumulation, as well as a home market for industry (Johnston and Mellor, 1961). Their fulfilment is identified as a key ingredient of successful industrialization.

Thus, the study of this nature is of great importance to Nigeria, so as to provide a framework of sustain linkages between the sectors and also help to realize balance and sustainable growth of the economy as a whole. The major objective of this paper is to identify the nature and direction of causality between agricultural sector and industrial sector of the Nigerian economy and to find the dynamic future response between agricultural sector and industrial sector. The working research questions are: One, what is the nature and direction of causality between agricultural sector and industrial sector? Two, what is the dynamic future response between agricultural sector and industrial sector? The remaining part of the paper is organized as follows: Section 2 reviews the relevant theoretical and empirical literature underpinning the study. In section 3, the data and methodology employed are presented. Section 4 covers the findings and analysis of the results and section 5 provides summary, recommendation and the conclusion aspects of the study.

II. THEORETICAL FRAMEWORK AND EMPIRICAL REVIEW

2.1. Theoretical Underpinning

The literature on the interaction between agriculture, industry and economic growth as highlighted by Onakoya (2013) has commanded considerable attention and interest. W.A. Lewis (1954), provides one of the pioneering theoretical pedestals on interaction between agriculture and the industrial sectors of the economy. The model which is applicable to developing countries manifests economic duality where both the technically advanced and primitive sector exists. In the dual economy, advanced technology is applied for industrial production and to extract minerals resources while at the same time, significant sections of the country operate at subsistence level (Silverman, 1992). The dual economic theory suggests that agriculture plays an important role at the early stages in development by providing important resource as inputs to the industrial sector.

Since the wage rate in the agricultural sector is likely to be less than that of the industry, resources are transferred from the sector to the manufacturing sector. Furthermore, the industrial value marginal product of labour (VMPL) which is higher than what obtains in the agricultural sector propels the rural agricultural workers to migrate to urban areas where manufacturing sectors are concentrated. This exacerbates the economic gulf. The Neo-Classical economic theory suggests that increases in income will lead to increased demand for normal goods; the magnitude of which depends largely on the income elasticities of goods as a result of shift in demand. The income elasticities are smaller for agricultural products than manufactured goods because the creation of primary products directly depends upon uncertain natural climatic conditions. Inadequate rainfall for example, may lead to low agricultural yield and consequential price increase. However, the production of manufactured goods which depend on more assured machinery output engender greater production availability and therefore, prices. Where a greater share of additional income is spent on manufactured goods, the industrial sector will grow faster than the agricultural sector leading to further dichotomy necessitating structural adjustment in the economy. The spill-over effects of such structural transformation arising from increased income is expected to rub off on the agricultural sector thereby ensuring positive linkage between the two sectors.

On the basis of the law of comparative advantage however, a deleterious link between industrialization and agricultural productivity emerges when the manufacturing sector competes with the latter for scarce labour. Under the perfect competition, marginal manufacturing firms are attracted to the market thereby increasing the demands for land, labor and capital. This may lead to transfer of resources away from the less marginally profitable agricultural sector. In order to reverse the harmful impact, the productivity of the agricultural sector is increased through better yielding seedlings, improved technology, labour skills among others. The income elasticities for service are greater than those for food and manufacturing goods as the economy enters into a higher level of development (Jacoby, 2013). The value marginal product of labour which could be enhanced in the agricultural sector in reaction to the invasion of the industrial sector cannot be replicated at the same level in the service sector. This is as a result of the greater proportion of human intervention required in most of the service sector jobs. Therefore, productivity of labour

cannot grow at the same speed as those of the agricultural and manufacturing sectors. This accounts for the continuous labour growth in the service sector while the employment in other sectors slows as a result of technological progress. Similar to the manufacturing sector, the impact of the service sector could be damaging to the growth in the agricultural sector due to changes in productivity and differences in income elasticities. It can be inferred from the leading sector / political revolution thesis propounded by (Rostow, 1960) that service sector has replaced the manufacturing sector as the leading sector in most industrial economies. Consequently, as the economy grows, the ever increasing demand for service jobs will attract more and more resources from the manufacturing and agricultural sectors. This could create a negative linkage to the other sectors. The alternative contention is that the growth in the service sectors (banking, telecommunication and transport, for instance) could allow other sectors to take advantage of the benefits of economies of scale and make positive linkages to rest of the economy. Unlike the agricultural and manufacturing jobs, most of the service jobs cannot be fully substituted by machines, and therefore, the need for quality service personnel will continually increase, further reinforcing positive externalities to the rest of the economy. The extent of the international openness of economies, as explicated by (Subramaniam, & Reed, 2009) accounts for the mixed linkage-effects between agriculture and industrialisation. An economy endowed with rich arable land would ceteris paribus generate high productivity and output in the agricultural sector. Combined with favourable terms of trade, the world market influences the prices in an open economy without offsetting the changes in relative prices and squeezing out manufacturing output. The reliance on importation of agricultural products, in an open economy on the other hand, may in the absence of arable land, stifle agriculture. The linkage impact between the oil and gas industry and agriculture can also be mixed. The exploration and exploitation of oil and gas have led to deleterious effect on agriculture as a result of serious damages to the eco-system. Oil spills have culminated into damaged farm lands and polluted waters, making fishing and other aquatic professions inoperable. The Niger Delta area of the Nigerian federation is a veritable case. On the other hand, petroleum derivatives including non-organic fertilizers are critical to and have proved beneficial to agrobusiness. According to UNCTAD/CALAG 2006, strong linkages between manufacturing and the oil and gas sector

enhance the growth of industrial firms through improved technology, managerial capabilities and production efficiency. The foreign oil firms also benefit from domestic outsourcing which improves their flexibility, cut costs, and improves operational efficiency. From the discussions so far, the linkages between the different sectors is complicated and multi-directional. The equilibrium is attained when the value of marginal product of resources is equalized among the sectors. At this higher equilibrium level, the average wage rates and the Productivity of resources will be increased across these sectors. The technological changes will lead to higher profits in the short run with the consumers also enjoying lower prices in the long run. The consequential economy will record higher growth rate (Jacoby, 2013).

2.2. Empirical Review

The causal linkage between the agricultural and industrial sectors has been widely investigated in the development literature most especially within different countries. There are important linkages and dynamic interactions between different sectors of the economy such that, the relationship between agriculture and industry is one of interdependence and complementarities.

Kanwar (2000) studied the cointegration of the different sectors of the Indian economy in a multivariate vector autoregressive framework, and estimated the relations between agriculture and industry using the Johansen procedure. He found that the agriculture, infrastructure, and service sectors significantly affect the process of income generation in the manufacturing and construction sectors, but the reverse has not been true. Matahir (2012) apply the cointegration technique and causality test procedures in investigating the agricultural-industrial sectors relationship in Malaysia from 1970 to 2009. The study finds evidence of cointegrated agricultural and industrial sectors in the long run. The causal relationship also shows that there is a one-way causality direction from industrial to agricultural sectors both in the short run and long run.

Also, from Nigeria, Onakoya (2013), investigates the contributions of the agricultural sector to Nigeria's economy by estimating a macroeconomic model which is a system of simultaneous equations that seeks to explain the behaviour of key economic variables at the aggregate level, based on the received theories of economics. Within the context of the inter-linkages of the various sectors of the real economy, the estimates incorporate the linkages among agriculture, manufacturing, oil and gas and the

service sectors, especially how the effect of the other sectors influence the growth of agriculture. The findings are that inter-sectoral relationships are complicated and multi-directional. The spill-over effects and externalities generated by the interactions and linkages between the different sectors attest to the dynamic nature of the economy. Also, the economic role of the agricultural sector is a one-way path as the flow of capital is mainly towards the industrial, oil and gas and the tertiary services sectors. This study establishes that sectoral linkages are not always beneficial especially between agriculture and the oil sector and recommends the modernization of the industrial and services sectors in order to generate increase in local content value addition to agriculture. Antai, Udo, and Effiong (2016) determined the contributions of the different sectors in the Nigerian economy other than the oil and gas sector, to assess the sectors that are underutilized productively and suggest possible solutions towards boosting economic activities in these sectors with the aim of achieving inclusive growth in Nigeria. The study adopts a quantitative method to analyse annual time series data from 1960 – 2013 by using an econometric technique like pair wise Granger causality and vector autoregressive (VAR) to evaluate the empirical evidence of the relationship between sectoral output and economic growth in Nigeria. The result shows that Service sector do not only promote the level of economic growth in the economy but also connect every other sector, while GDP does not promote output growth in the services sector. Also, agricultural output is observed to be directly related to growth. Therefore, for Nigeria to achieve a rapid and sustainable economic growth, policies should be made to diversify the economy and invest more in the agricultural and service sectors to harness the potentials available in these sectors. Similarly, Kamil, Sevin and Festus (2017), empirically examines the impact of agricultural sector on the economic growth of Nigeria, using time series data from 1981 to 2013. Findings revealed that real gross domestic product, agricultural output and oil rents have a long-run equilibrium relationship. Vector error correction model result shows that, the speed of adjustment of the variables towards their long run equilibrium path was low, though agricultural output had a positive impact on economic growth. It was recommended that, the government and policy makers should embark on diversification and enhance more allocation in terms of budgeting to the agricultural sector

Moreover, Henneberry et al. (2000) concluded in his study that, industry tends to benefit more from agricultural growth in case of Pakistan. Craigwell et al. (2008) described in their research on Barbados economy that, state industrial output is associated with lower agricultural GDP in the long run but in the short run, changes in industrial output promoted agricultural output. Hye (2009) investigated the link between agricultural and industrial output; using the data of autoregressive distributed lag model. The author found bidirectional long run relationship between agriculture and industrial output in Pakistan. As far as the adjustment term is concerned, the research indicates that agricultural output adjusted more quickly from short run disequilibrium to long run equilibrium if the shock in industrial output in the short run. In another dimension, Chebbi (2010) examines the link between agriculture and other sectors growth of the economy (i.e., manufacturing, transportation, commerce and telecommunication, tourism and service sector); using the J.J. Co-integration and Granger causality in the case of Tunisia. The author concluded the existence of a long run relationship between agricultural growth and other sectors of the economy. In addition, he rejected the weak exogeneity for agricultural sector and suggests possible long run linkages between agriculture and other sectors of the economy. The main objective of the research is to investigate the same issue for Iran, since it has not yet been discussed at extent.

Furthermore, in a different research, Edwins (2018) explored the causal relationship between manufacturing and other sectors of the Namibian economy. The analyses were carried out using the simple pairwise Granger causality test to determine the causal relationship based on lead and lag relationship in forecasting as developed by Granger (1969). The study used annual data for the period 1980 to 2015 obtained from the World Bank's website. The results showed that there was no causal relationship between manufacturing and the agricultural sector. Similarly, there was no causal relationship found between manufacturing the industry sector as well as manufacturing and service sector in the Namibian context. These findings on Namibia could be due to the fact that the manufacturing sector is very small. Therefore, its linkage to the other sectors could also be non-existent if not weak. Similarly, Hamid and Qazi (2012) in an empirical study of Inter-sectoral Linkages and Economic Growth, finds that the structural changes of an economy entail that in the

long run, the dynamics of sector shares (industrial, agricultural and services) are related to each other and to economic growth as well. In this study, the hypothesis that there is a long-term relationship between agricultural growth and other economic sectors growth is tested for the case of Iran, using autoregressive distributed lag model (ARDL) and variance decomposition analysis also. The time series data consists of data for the period 1959-2010. The results indicate that the long run relationship exists when the variables gross domestic product (Y), industrial value added (IN), agricultural value added (AG), services value added (SS) and oil and gas value added (O and S) remain to be dependent variables. The long run elasticity also shows that one percent increase in value added of IN, AG, SS and Oil and Gas, will cause the gross domestic product to increase by 0.216, 0.091, 0.431 and 0.156 percent respectively. Finally, Youni, Biaban and Burhan (2015) in their study on Sharing the Agriculture and Industrial Sectors in the Economic Growth of Iraq using Ordinary Least Squares (OLS), multiple regressions _ Double log with economic analysis and the secondary data from 1980 to 2014 was used to estimate the contribution level of economic sectors to economic growth. The empirical result shows that political and security instability had negative effects on the agriculture and industrial sectors as well as on the economic growth. This study also found that both agriculture and industrial sectors had positively affected on gross domestic product (GDP). Nevertheless, the effect of industrial sector was smaller, if compared to agriculture sector. Iraqi government should give opportunities to extensively develop Agriculture and Industrial sectors and in the process help to increase gross domestic product (GDP). Furthermore, government should consider agriculture and industrial diversification as necessary strategies to develop Iraq's economy.

III. METHODOLOGY

This study used quarterly data from 2010q1 to 2017q2. The data was sourced from Central Bank Statistical Bulletin. The justification of choosing the study period is based on the availability of data on all the variables captured in the model. The variables in the system equation are industrial value added to GDP (GDP_IND), agricultural value added to GDP (GDP_AGRIC), monetary policy rate (MPR), inflation rate (CPI) and exchange rate (BDC). The econometric model is specified as:

$$LGDP_IND_t = \beta_0 + \beta_1 LGDP_AGRIC_{t-1} + \beta_2 MPR_{t-1} + \beta_3 CPI_{t-1} + \beta_4 BDC_{t-1} + \mu_t \dots\dots (1)$$

Moreover, the study used Granger Causality test, impulse response functions and variance decomposition. The granger causality test model is given as:

$$\Delta LGDP_IND_t = \beta_0 + \sum_{i=1}^n \beta_1 \Delta LGDP_IND_{t-i} + \sum_{i=1}^n \beta_2 \Delta LGDP_AGRIC_{t-i} + \mu_t \dots\dots\dots (2)$$

$$\Delta LGDP_AGRIC_t = \alpha_0 + \sum_{i=1}^n \alpha_1 \Delta LGDP_AGRIC_{t-i} + \sum_{i=1}^n \alpha_2 \Delta LGDP_IND_{t-i} + \mu_t \dots\dots\dots (3)$$

Where μ_t is the error term, $\beta_0 - \beta_2$ and $\alpha_0 - \alpha_2$ are the coefficients of the variables. Causality is determined by testing the null hypotheses that $\sum_{i=1}^n \beta_2 = 0$ and $\sum_{i=1}^n \alpha_2 = 0$ against the alternative hypotheses $\sum_{i=1}^n \beta_2 \neq 0$ and

$$\sum_{i=1}^n \alpha_2 \neq 0$$

IV. RESULT AND DISCUSSION

Table 4.1: Result of the Granger Causality Test.

Null Hypotheses	Obs.	F-statistics	P-values
LGDP_AGRIC does not Granger Cause LGDP_IND	27	0.69431	0.5663
LGDP_IND does not Granger Cause LGDP_AGRIC	27	7.6638	0.0013
MPR does not Granger Cause LGDP_IND	27	0.3269	0.8059
LGDP_IND does not Granger Cause MPR	27	3.4873	0.0349
CPI does not Granger Cause LGDP_IND	27	1.1807	0.3421
LGDP_IND does not Granger Cause CPI	27	1.2206	0.3281
BCD does not Granger Cause LGDP_IND	27	3.7314	0.0280
LGDP_IND does not Granger Cause BCD	27	0.6883	0.5697

Source: Authors' computation using Eviews Output

From Table 4.1, it is indicated that there is unidirectional causality running from the output of industrial sector to agricultural sector output. This is due to statistically significant probability value of the F-statistics of industrial sector (i.e. 0.0013). The result also shows that industrial sector output granger cause interest rate and exchange rate. This is also indicated by their respective probability values of F-statistics (i.e. 0.0349 and 0.0280). The foregoing results are in line with the study's

expectation. This is because an increase in the output of industrial sector will lead to an increase in the level of output of tradable goods and the growth in tradable goods will generate inclusive growth of the economy and exchange rate appreciation. Additionally, the result shows that there is no evidence of causality between industrial sector output and inflation rate in Nigeria over the sample period.

Table 4.2: Impulse Response Function

Period	LGDP_IND	LGDP_AGRIC	MPR	CPI	BDC
1	0.046344	0.000000	0.000000	0.000000	0.000000
2	-0.014181	-0.007206	0.007529	-0.005944	-0.026930
3	0.016520	-0.006904	-0.002098	-0.008447	-0.021158
4	-0.007090	-0.012009	0.011308	-0.015353	-0.021172
5	0.004076	-0.006581	0.010608	-0.009146	-0.006732
6	-0.002599	-0.004056	0.014432	-0.005146	0.003538
7	0.002701	0.001566	0.009763	0.002523	0.012998
8	0.001670	0.004351	0.005296	0.005817	0.014948
9	0.003825	0.005611	-0.001222	0.007056	0.011994

10	0.002728	0.003605	-0.005243	0.004792	0.004292
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Source: Authors' Computation from Eviews Output.

Having confirmed the direction and nature of causality among the variables, we then proceed to estimate the impulse response functions and variance decomposition. These estimates will show the exact shocks and the degree of variations that the independent variables have on the dependent variable and the dependent variable's own shocks. Table 4.2 displays the impulse response functions of industrial performance, agricultural output, interest rate, inflation rate and exchange rate in Nigeria over the study period. The result shows that the response of industrial output to its own shocks is very strong and positive for the period one (i.e. 1st period) before it changes to negative from 2nd, 4th and 6th periods respectively. This means that any unexpected rise in the industrial performance will cause negative shock on its own in the short run. The output in the industry experience positive shocks from 7th period toward period 10th. This also indicates that in the long run any unanticipated change in the industrial output will lead to positive shock on its own. The impulse response function for agricultural sector in the short run shows a negative shock to industrial performance in

Nigeria. The sector also shows a positive shock to the industrial sector in the long run. This is due to the fact that investment in the agricultural sector over a long period will feeds industrial sector with the desired raw materials. The response of interest rate to industrial performance is negative in 3rd, 9th and 10th periods respectively. This indicated that any unexpected change in the rate of interest in both short run and long run will generate negative shocks to the performance of industrial sector. This is true because increase in the rate of interest will reduce the capability or willingness of industrial sector to borrow more money which will affect the performance and investment anticipations of the sector in a negative way. Inflation and exchange rate displays negative shocks from the initial period. The foregoing portrays that in the short run unforeseen changes or fluctuations in the inflation and exchange rate will tend to produce undesirable shocks to industrial sector in the study area. Furthermore, in the long term the inflation and exchange rate exert positive shocks to industrial performance over the study period.

Table 4.3: Variance Decomposition

Period	S.E.	LGDP_IND	LGDP_AGRIC	MPR	CPI	BDC
1	0.046344	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.056728	72.99038	1.613597	1.761595	1.097964	22.53647
3	0.063735	64.54353	2.451689	1.503917	2.626360	28.87451
4	0.071193	52.72042	4.810327	3.728195	6.755710	31.98535
5	0.073279	50.07055	5.346916	5.614311	7.934312	31.03392
6	0.075102	47.78923	5.382240	9.037579	8.023340	29.76761
7	0.076946	45.64939	5.168806	10.21944	7.750953	31.21141
8	0.078916	43.44353	5.217987	10.16589	7.912070	33.26052
9	0.080430	42.04947	5.510057	9.809837	8.386660	34.24398
10	0.080983	41.59031	5.633153	10.09546	8.622584	34.05849

Source: Authors' Computation from Eviews Output

Meanwhile, impulse response functions measure the relative influence of shocks among the variables in the system equation, variance decomposition approach quantify the proportionate changes of error variance in one variable explained by the innovations in itself and the other variables. Based on the estimate, the result from Table 4.3 show that, the shock to industrial performance account for 100% to its own shock in the 1st period (short run), it decreases to 64% in the 3rd period and continue to decline until it reaches an average of 41% in the 10th period. Similarly, 1% shock or

variation to agricultural output can cause an average of about 2.45% fluctuations of industrial sector in the short run. In the long run, agricultural output account for about 5.63% changes in the industrial performance. This simplify that investment in agricultural sector is very crucial to the expansion of industrial output since agricultural sector help to channel the desired inputs to industrial sector for its processes. The variance of interest rate account for about 1.5% variation of industrial performance in the 3rd period, rises to 5.35% in the 5th period and further spiral up to an

average of about 10.09% in long run (10th period). This confirmed the causality result that industrial sector causes interest rate. The innovation or shock or variation of inflation to industrial output account for almost 2.63% in the short run (period three) and further move up to 8.62% in the 10th period (long run). With the exception of its own shock (i.e. industrial output), exchange rate causes the highest variation to the industrial output. For instance, in the 3rd period exchange rate causes industrial output to fluctuate at the rate of about 28.87%, increase to 31.03% in the 5th period and finally upswing to 34.06% in the 10th period. This complement the causality result that exchange rate causes industrial output and exchange rate plays significant role toward the development of industrial sector both within and outside the economy.

V. CONCLUSION AND RECOMMENDATIONS

This study investigates on the causal linkage between agricultural sector and industrial sector of the Nigerian economy. The result from the granger causality test shows a unidirectional causality running from the output of industrial sector to agricultural sector output, this thus suggest a much higher concentration of the Nigerian government on the agricultural sector through increase in general government investment in the sector and diversification of necessary strategies that will help in boosting the aggregate agricultural activities in the economy such that the effect can be felt fully by the industrial sector of the economy. The result of impulse response functions indicates that one standard deviation innovation on agricultural sector, inflation and exchange rate reduces the contribution of the industrial sector in the short and medium terms. Additionally, the variance decomposition result suggests that, a significant variation in the industrial contribution to the economy is due to changes in exchange rate, inflation rate, monetary policy rate and then lastly agricultural sector. This evident the role played by the monetary authority and government in improving the performance of the industrial sector in Nigeria. The study recommends that, to achieve viable industrial sector, government in collaboration with the private individuals should increase their investment into the sector, exchange rate and interest rate policies that take into cognizance the performance and sustain positive growth of the sector vis-à-vis overall economy should be persuaded.

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**International Journal of Advances in
Engineering and Management**

ISSN: 2395-5252



IJAEM

Volume: 03

Issue: 03

DOI: 10.35629/5252

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