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The Role of Institutions in Promoting Innovation on the Manufacturing Output in Nigeria

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Abstract

This study examines the role of institutions in promoting innovation on the manufacturing output in Nigeria. Annual secondary time series data which span the period 1996 to 2024 was analyzed with the use of Autoregressive Distributed Lag (ARDL). The variables incorporated are manufacturing output, institutional quality, research and development as proxy for innovation, inflation, and real gross domestic product. The result indicated that institutional quality has a positive impact on manufacturing output, although in the short run it was significant. Innovation, and real GDP per capita has positive and significant effect on manufacturing output. Whereas inflation has positive and insignificant impact on manufacturing output in the long-run, however in the short run it has an inverse relationship. The study recommends that government should strengthen the institutions, improve efficiency of research and development expenditure, as this can help to accelerate the impact of R&D in the manufacturing output in Nigeria.

Keywords: *Institutions, Manufacturing output, innovation, and ARDL*

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Background to the Study

The manufacturing sector is essential to every nation's industrialization and development on a global scale. Moreover, the manufacturing sector serves as a catalyst to quicken the rate of economic diversification and structural change, allowing a nation to make use of its natural resources and reduce its reliance on imported raw materials or finished items (Adediran & Obasan, 2010). In today's global economy, innovation is a vital engine of economic development and competitiveness, particularly in the manufacturing sector institutional quality has been found to be a crucial component in fostering innovation and propelling economic growth (Acemoglu & Robins, 2012; Rodrik, 2004). By creating a favorable economic climate for the manufacturing industry, nations with strong institutions—such as strong intellectual property rights, efficient regulatory frameworks, excellent governance, and promoting investment in R&D—can promote innovation on a global scale (Hall & Jones, 1999; Kaufmann et al., 2009). It's interesting to note that innovation may boost industrial production by boosting competitiveness, productivity, and product quality.

According to Ademu and Ezie (2017), the manufacturing sub-sector is best characterized as the engine for economic growth and development because it generates investment capital more quickly than any other sector of the economy while fostering stronger and more efficient connections between various sectors. Thus, the growth of the manufacturing sector is essential for significant and long-term national growth and development in many rising nations, including Nigeria. Additionally, the Nigerian manufacturing sector exemplifies a key tenet of the government's strategy to restructure the economy and diversify its base of production. According to Imoughele and Ismaila (2014) it provides a means of boosting productivity through export growth and import substitution, generating foreign exchange earning potential, and growing employment and per capita income, all of which contribute to a rise in consumption patterns.

Fiscal policy reforms to increase government spending on the manufacturing sector and provide tax incentives for deserving manufacturing firms are just a few of the policies the Nigerian government has implemented over the years to improve institutional quality and innovation in the manufacturing sector. The Economic Recovery and Growth Plan (ERGP), which was implemented from 2017 to 2020, aimed to increase investment in the manufacturing sector, improve infrastructure, and promote economic diversification. The Anti-Corruption Laws is another policy. In addition, the manufacturing sector support programs—which include facilitating financial access, enhancing infrastructure, and encouraging investment—were put in place to aid in the expansion of the manufacturing sector.

Nigeria's industrial sector has been declining in terms of production recently, despite the government's commendable efforts to stimulate the sector. For example, the manufacturing sector contributed about 24.10 percent of GDP between 1986 and 1992. Between 1993 and 1999, it averaged 11.14 percent, and between 2000 and 2006, it averaged 9.70 percent. Between 2007 and 2019, it contributed a slight and inconsequential increase of 10.07 percent, but in 2020, it fell to 4.4 percent (World Bank, 2022; Central Bank of Nigeria, CBN, 2019).

The sector's average capacity utilization rate, which was 44.46 percent on average between 1995 and 2019, was continuously below the 58 percent threshold (CBN, 2019).

The difficulties impeding the manufacturing sector's performance are the cause of this downturn. Corruption, weak institutions that significantly impede innovation and manufacturing output by raising transaction costs, decreasing investment, and restricting access to financing, and infrastructure deficiencies like intermittent increases in the price of diesel and fuel used to run generators as a source of private power supply are some of these issues (Ndulu et al., 2008). Furthermore, the high rate of inflation and foreign exchange, which have raised production costs, are blamed for the manufacturing sector's poor performance. According to the Global Innovation Index (GII) 2022, Nigeria dropped from 110th place in 2014 to 114th place out of 132 nations in 2022. One of the main barriers to innovation is the country's underdeveloped institutions (GII, 2022). Also, the high rate of corruption in Nigeria is discouraging. According to Transparency International's Corruption Index, Nigeria was placed 154th out of 180 nations in 2021.

Strong institutions may promote innovation output in the economy, according to a growing body of empirical research that links institutional quality with economic growth. Yusuf and Malarvizhi (2014) make this point critically. While Adhikari and Agrawal (2016) and Donges et al. (2020) stress the function of informal institutions and social mores, He and Tian (2020) also emphasized the significance of institutions in fostering innovation. Innovation obstacles and their effects on manufacturing and innovation enterprises are the main topics of Hartono and Kusumawardhani's (2019) study. Qamruzzaman et al. (2021) concentrate on innovation, institutional quality, and foreign capital influx.

It is against this backdrop that this present study seeks to investigate the role of institutional quality in promoting innovation on the manufacturing output in Nigeria. To the best of our knowledge, the extant literature primarily focuses on either institutional quality and innovational drive, institutional quality and the manufacturing sector, or innovation and the manufacturing sector, with limited attention to the institutional factors that affect innovation in the Nigerian manufacturing sector. Hence, this present study contributes to the existing literature, and fill the gap in this regard by investigating the role of institutions in promoting innovation on manufacturing output in Nigeria.

This paper implements the following structure. Section 2 concentrates the literature review in detail, such as the conceptual clarification, theoretical framework and empirical review. Section 3 deals on source of methodology of the study, nature and sources of data, variables description, and measurement, model specification. Section 4 present results of econometrical model estimation findings and their interpretation. Lastly, conclusion and policy implications are displayed in Section 5.

Literature Review

Conceptual Clarification

Institutional Quality

The World Bank report on Africa in 1989 defined governance as the use of political authority to manage a nation's affairs. Later, the World Bank (1992) defined governance as "the way in which a nation's economic and social resources are managed for development through the use of power." Institutions are the guidelines of the game, or more precisely, the formal and informal restraints that humans have created to influence human relationships, according to North (1990). North also asserted that formal institutions are essentially laws, constitutions, and explicit government policies that are codified and enforced by impersonal processes, chief among them the state with its structure and coercive authority. Governance metrics were identified by Kaufmann et al. (2010). These metrics relate to six institutional quality factors or indices. They include voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, the rule of law" and "control of corruption.

Innovation

Innovation is the process of creating a new concept and turning it into a new product, method, or service. This creates pure profit for the inventive commercial firm and contributes to the dynamic expansion of the national economy and job creation. Innovation is never an isolated event; rather, it is a protracted and cumulative process involving several organizational decision-making processes, from the ideation stage to the execution stage.

Manufacturing Output

This is the total amount of items produced in the manufacturing sector, which is a vital part of economic expansion. A number of variables, including trade regulations, institutional frameworks, and technical developments, can affect manufacturing output. The total value of goods produced by the manufacturing sector, including those produced by domestic and foreign-owned businesses, is referred to as the manufacturing output (United Nations, 2020). refers to the entire number of items produced by the manufacturing sector, including both durable and non-durable commodities, according to the International Labour Organization (2020). The entire value of items produced by the manufacturing sector, including both formal and informal firms, as defined by the Bureau of Statistics (2020). The total amount of goods produced by the manufacturing sector, which includes both domestic and foreign-owned businesses, is referred to as manufacturing output (CBN, 2020). World Trade Organization (2020) defines manufacturing output as the entire value of products produced by the manufacturing sector, including both local and foreign-owned firms.

Theoretical Framework

The foundation of the Endogenous Growth Theory (EGT) is Paul Romer in (1980). Paul Romer postulated that innovation and knowledge play a key role in economic progress. The theory made clear that internal factors—like spending on Research and Development (R&D) rather than external ones are what propel economic growth. It also presupposes growing returns to scale where investment in knowledge and innovation leads to increasing productivity and economic growth. By fostering investment in R&D, safeguarding intellectual property rights, and creating a favorable economic climate. Moreover, strong institutions may foster innovation. Additionally, via lowering transaction costs, advancing property rights, and stimulating investment, institutional quality can affect the output of innovation (Hall & Jones, 1999). According to EGT, industrial production is a vital component of economic growth, and innovation is a major engine of economic growth. Innovation in manufacturing has the potential to boost competitiveness, productivity, and product quality. Strong institution may foster innovation in manufacturing by giving support for research and development, preserving intellectual property rights, and promoting investment in new technology.

Empirical Review

Zhang et al (2025) analyzed the role of technological innovation and institutional quality in environmental and economic growth sustainability in emerging Asian countries. The study uses second-generation augmented mean group and common correlated effects mean group panel methods in its analysis. The findings show that every 1% expansion of technological innovation can strongly reduce per capita carbon dioxide emissions by 0.329%, while effectively boosting per capita economic growth by 0.397%. However, every 1% improvement in institutional quality can effectively promote per capita carbon dioxide emissions and per capita economic growth by 0.243% and 0.362% respectively. Moreover, renewable energy strongly reduces environmental emissions and promote economic enhancement, while non-renewable energy considerably stimulates environmental pollution and economic progress. The study recommends that emerging markets in Asia should strengthen their respective institutional quality to focus on investing in green technology innovation and renewable energy projects to achieve sustainable development goals.

Liko (2024) investigated institutional quality and economic growth in developing countries. The study employed the cointegration technique by Pedroni (2004), the fully modified ordinary least squares (FMOLS) and the dynamic ordinary least square (DOLS) method by Kao and Chiang (2001) to carry out its analysis. The findings show the existence of a positive and significant relationship between institutions and economic growth. It also shows that education supported growth, and unemployment has restricted growth. The study recommends that improving institutional quality and education is necessary for supporting growth and employment.

Barri et al (2023) investigated the impact of marketing innovation on economic development in Nigeria. The study employed a qualitative research method using a deductive approach. The study found out that marketing innovation has a huge impact on economic development in Nigeria. Business innovation is influencing learning capacity and marketing innovation not only in SMEs but also in larger organizations. The study recommends that marketing innovation be viewed as a primary driver of Nigeria's economic growth. Policy makers in Nigeria should restructure the economy in such a way creativity becomes the primary engine. Patrick (2023) studied institutional quality and output performance in Nigeria. The study used an annual time series data; the data was analyzed with the aid of Autoregressive Distributed Lag (ARDL) model. The study findings show that all the explanatory variables except the gross fixed capital formation were significant in the long run. However, only the institutional quality and inflation rate exhibit negative impact on economic growth, while all the other explanatory variables exert positive impact on economic growth along the horizon. In the short run, only the institutional quality, labour force growth rate, and financial development have significant impact on economic growth. Additionally, only institutional quality and inflation rate exhibit negative correlation with economic growth, while the other explanatory variables exert positive correlation with output performance along the short run horizon. The study recommended that the Nigerian government should adopt policies and strategies that can improve the quality of institutions in the country.

Imougele and Okoro (2021) examined fiscal policy, institutional quality and the quest for growth of manufacturing sector in Nigeria. The study employed cointegration and error correction methodology to carry out its analysis. The findings from regression results show that fiscal policy contributed significantly to the growth of Nigeria's manufacturing sector while institutional quality has no robust effect on the growth of Nigeria's manufacturing productivity because of poor institutional structure in the Nigerian economy. The study recommended that the Nigerian government fine-tune its fiscal responsibility by increasing its expenditure to the manufacturing sector. The government should put in place functional agencies that would monitor the implementation of tax incentives meant for deserving manufacturing firms, and lastly improve the overall institutional quality in the country. Do international capital flows, Institutional quality matter for innovation output: the mediating role of economic uncertainty was carried out by Qamruzzaman et al (2021), the study employed a dynamic panel quantile regression and system-GMM specification causality test. The study findings disclosed negative statistically significant effects running from EPU to innovation output except innovation measured by R&D. The study recommended that both fiscal and monetary policy formulation and their effective implementation should be targeted to mitigate the state of uncertainty in the economy.

Utile, Nwakobi, and Okoli (2021) analyzed the impact of institutional quality on economic growth in Nigeria. The study utilizes the autoregressive distributed lag model and time series data from 2001 to 2019. The study which agrees to the existence of a long run relationship among the variables found out that institutional quality exercises an important adverse effect on economic growth. The study proposes that the quality of institutions in Nigeria can be improve by establishing a strong match against institutional variables like corruption, improved accountability and liberty of expression, enhanced regulatory authority and augmented government effectiveness.

Ogbuabor et al (2020) examined institutional quality and economic performance in Nigeria. The study adopted the ARDL approach which used a bound test approach based on unrestricted error correction model (UECM), used data from 1982Q1 to 2016Q4. The findings indicate that the quality in the institutions impacts negatively but insignificantly on growth in Nigeria, both at the aggregate and sectorial levels. However, initial output growth levels, capital and labor were found to be important drivers of growth in the country, while trade is growth retarding. The study suggested that there is need to improve the quality of socio-economic and political institutions in the country so that a more robust impact of these institutions can be felt in the economic performance of the country both at the aggregate and sectorial levels.

Financial development, institutional quality and manufacturing output growth in Nigeria was conducted by Aminu, Raifu, and Oloyede (2019) the study employed autoregressive distributed lag method (ARDL) to analyze the time series data. They found out that institutional quality including democratic accountability, bureaucratic quality and control of corruption, moderates the positive impact of financial development on manufacturing output, showing that strong institutions are crucial for encouraging innovation and enhancing manufacturing performance in Nigeria. The study recommended that the government should improve in the quality of institutions, enhance financial development, promote synergy between financial development and institutional quality, and implement policy reforms.

Juste (2018) investigated industrial policy, institutions and performance of manufacturing sector output in Africa. The study employed dynamic panel techniques (system GMM) to analyze the panel data. The empirical results show that the overall index of governance, as well as its indicators including government effectiveness, regulatory Quality, and Rule of law, have positive impacts on manufacturing value added per capita; but only the effect of regulatory quality indicator is found to be statistically significant. The study recommended promoting good governance as a key instrument in promoting manufacturing sector in Africa, and the good governance need to also result in better infrastructural development in order to magnify its impact on manufacturing value added per capita.

Methodology

Nature and sources of Data

The study investigates the role of institutional quality in promoting innovation on the manufacturing output in Nigeria. The study employs the use of secondary annual time series data which span the period 1996 to 2024, the data were sourced from Central Bank of Nigeria (CBN) statistical bulletin, World bank, World development Indicators (WDI), and World Governance Indicator (WGI).

Variables Description, and Measurement.

Manufacturing output (MOT, Dependent variable): When all outputs are added up and intermediate inputs are subtracted, the net output of a manufacturing sector is referred to as manufacturing output. Manufacturing value added as a proportion of GDP is used to measure it.

Institutional Quality Index (IQI, Independent variables): Principal Component Analysis (PCA) was used to aggregate the institutional quality indicators in order to prevent the possibility of multicollinearity. The new variable is called the institutional quality index (IQI). Institutional quality is measured by the average indices of world governance indicators, which include government effectiveness (GE), regulatory quality (REQ), rule of law (RUL), political stability (PS), and absence of violence/terrorism (AVT). It is measured in scale of 0.5 to -2.5,

Innovation (R & D, Independent variables): Gross domestic research and development (R&D) expenditures are referred to as innovation. It covers both capital and ongoing expenses in the four primary sectors: government, business, private sector, and non-profit higher education. Basic research, applied research, and experimental development are all included in R&D. Innovation is quantified as a proportion of GDP and by research and development.

Real Gross Domestic Product Per-capital Income (RGDP, control variable): Real GDP per capita refers to the total outputs of a country's economy, adjusted for inflation, divided by its total population. It is measured as a percentage of GDP.

Inflation rate (INF, control variable): The annual percentage change in the typical consumer's cost of purchasing a basket of goods and services—which may be constant or vary at predetermined intervals, and it is annually is known as inflation. The Consumer Price Index calculates inflation as percentage.

Model Specification

The study adopted the exogenous growth model, and adapted the work done by Aminu et al (2019), whose model was specified in their functional form as;

MOT=*f* (IQ, FD, RD)--------------(1)

Where;
MOT represent manufacturing output,
RD research and development as proxy for innovation,
RGDP as real gross domestic product,
FD represent financial development.

The model was modified by eliminating FD, and replacing it with real gross domestic product, and inflation, this is because inflation can reflect the effectiveness of monetary policy and the overall business environment, additionally high inflation might undermine the positive effects of good institutional quality on manufacturing output by creating uncertainty and instability

The functional and econometric forms of the modified model are presented in equation (2) and (3), respectively.

MOT=*f* (IQI, RD, INF, RGDP,) --(2)

Where;
MOT represent manufacturing outputs,
IQI represent institutional quality index,
RD denote research and development as proxy for innovation,
INF represent inflation rate, and
RGDP denote real gross domestic product,
f represent *functional notation*.

$$Y = \beta o + \beta_1 IQI + \beta_2 RD + \beta_3 INF + \beta_4 RGDP + \mu t \text{-------------} (3)$$

Transforming the above into a regression form, the model is inscribed

$$MOT = \beta_0 + \beta_1 IQI_t + \beta_2 RD_t + \beta_3 INF_t + \beta_4 RGDP_t + \mu_t \text{--------}(4)$$

Where;

Y	= MOT.
β_O	= intercept of the model or constant term of stochastic term
$\beta_1 \beta_2 \beta_3 \beta_4$	= coefficient of explanatory variables
U	= error term
T	= time period (1996 to 2024).

Apriori Expectation: *$\beta_1>0$, $\beta_2>0$, $\beta_3<0$, & $\beta_4>0$,*

Therefore, the ARDL model used in this study is presented in equation (5)

$$MOT = \beta 0 + \sum_{i=i}^{p} \beta 1 MOT + \sum_{i=i}^{q} \beta 2\, IQI + \sum_{i=i}^{R} \beta 3 RD + \sum_{i=i}^{S} \beta 4 INF + \sum_{i=i}^{T} \beta 5 RGDP + \varphi \qquad (5)$$

$$\Delta MOTit = \alpha_0 + \sum_{i=i}^{p} \Delta MOT_t + \sum_{i=i}^{q} \Delta IQI_{t-i} + \sum_{i=i}^{R} \Delta RD_{t-i} + \sum_{i=i}^{S} \Delta INF_{t-i} + \sum_{i=i}^{T} \Delta RGDP_{t-i} + \varphi 1 \Delta MOT_t - i + \varphi 2 \Delta IQI_t - i + \varphi 3 \Delta RD_t - i + \varphi 4 \Delta INF_t - i + \varphi 5 \Delta RGDP_t - i + + \delta ECM_{t-1} + \varepsilon_t \text{--}(6)$$

Where: β0: Intercept (or regression constant) $\varphi_1 - \varphi_7$ short-run coefficients, dynamic coefficients convergence to long-term equilibrium, Δ represent the difference or signify variables with short run coefficient, and δECM_{it-1} epitomizes the speed of adjustment parameter and error correction model initiated from the estimated equilibrium association.

Estimation Procedure

This work adopted the autoregressive distributed lag model (ARDL). Although ARDL can also be employed when the variables are of the same order of integration i.e. 1(1) or mixture of 1(0) and 1(1). Before conducting the unit root stationarity test, the study first conducts the descriptive statistics on all the data this gives us a hint of the nature of the variables such as the mean, median, minimum, kurtosis, skewness, and Jarque Bera. The Augmented Dickey Fuller test (ADF) and the Phillip Peron (PP) respectively was used to conduct the stationarity test on all the variables, the essence of conducting the unit root test is to ascertain the order of integration and to ensure that the outcome of this study is reliable and genuine, the general conception for unit root test is to circumvent spurious regression result. The study proceeds to employ the use of Autoregressive Distributed Lag (ARDL) technique afterward, both the bound co-integration test was used to check for long run relationship and if its exist then the error correction technique was used to check for short run, also Wald test was conducted to test for the hypothesis stated. Subsequently, the post diagnostic test such as heteroscedasticity, serial correlation, normality test and Cusum of square was employed.

Presentation of Results and Discussion of Finding

Table 1: Descriptive Statistics

	MOT	IQI	RD	INF	RGDP
Mean	11.63685	0.002035	299265.1	13.70072	1.972598
Median	10.86157	0.469600	326010.0	12.53783	1.507232
Maximum	19.19853	1.597745	600151.3	29.26829	12.21039
Minimum	6.552817	-3.705125	14863.60	5.388008	-4.018925
Std. Dev.	3.614395	1.502565	195662.7	5.974139	3.221178
Skewness	0.592017	-1.250656	-0.068783	1.068494	0.740119
Kurtosis	2.291875	3.744011	1.578709	3.740805	5.001159
Jarque-Bera	2.299917	8.228890	2.463783	6.181237	7.486520
Probability	0.316650	0.016335	0.291740	0.045474	0.023677
Observations	29	29	29	29	29

Source: Authors computation from E-views 10; result output (2025).

From the result in table 1 it is obvious that innovation which is proxy by research and development (RD) has the highest mean value of 299265.1 it indicates that there is high capacity for innovation, leading to the development of new product and processes in the manufacturing sector output in Nigeria. The corresponding minimum values of all the variables are less than the mean values of each of the variables. For the skewness, all the variables except IQI and RD has a negative value it implies that they are long left tail. Institutional quality, inflation and real GDP per capita income are all leptokurtic because their corresponding values of 3.744, 3.740 and 5.001 are greater than 3, implying that the distribution peaked relative to normal distribution. Whereas manufacturing output, research and development are both platokurtic because their value of 2.291 and 1.578 are less than 3. For the Jarque-Berra and its equivalent probability values of all the series, the null hypothesis of a normal distribution of each variable was accepted from 1996 to 2024.

Table 2: Unit Root Test

	ADF Test			PP Test		
Variables	**Level**	**1st Difference**	**Remark**	**Level**	**1st Difference**	**Remark**
MOT	-0.820	0.472	NO	-1.919	3.979	1(1)
	(3.769)^{n}	(-3.004)^{n}		(-2.971)^{n}	(-2.976)**	
IQI	-2.426	-3.480	1(1)	-1.725	-4.229	1(1)
	(-2.981)^{n}	(-2.986)**		(-2.971)^{n}	(-2.976)**	
RD	0.141	-4.198	1(1)	0.053	-4.198	1(1)
	(-2.971)^{n}	(-2.976)**		(-2.971)^{n}	(-2.979)**	
INF	-3.511	-7.464	1(0)	-3.782	-9.387	1(0)
	(-2.971)**	(-2.976)		(-2.971)**	(-2.971)	
RGDP	-2.824	-7.371	1(1)	-2.842	-7.517	1(1)
	(-2.971)^{n}	(-2.976)**		(-2.971)^{n}	(-2.979)**	

Note: *, ** and ******* represent significance levels at 10%, 5% and 1% respectively. The letter denotes no significance or no stationarity.

Source: Author's computation from E-views 10; result output (2025).

In table 2 above the unit root test result of both Augmented Dickey Fuller (ADF) and Phillip Perron (PPP), shows that the variables such as manufacturing output (MOT), institutional quality index (IQI), research and development (RD) proxy for innovation and real GDP per capita income (RGDP) are all stationary at first difference 1(1), because the corresponding values are greater than the 5% chosen critical value. Only but inflation (INF) that was found to be stationary at level 1(0). Hence this suggest that the appropriate technique of analysis to employ is the Autoregressive Distributed Lag (ARDL).

Table 3 ARDL Bound Cointegration Test

Computed F-statistics: 12.22**	1(0)	1(1)
Critical values bound (10%)	2.2	3.09
Critical value bounds (5%)	2.56	3.49
Critical value bounds (2.5%)	2.88	3.87
Critical value bounds (1%)	3.39	4.37

Note: *** denotes 1% level of significance

Source: Authors computation from E-views 10; result output, (2025).

The result of the ARDL bound cointegration test presented in table 3 shows that the calculated F-statistic is 12.22, which is considerably greater than the critical values for the lower and upper bounds of 5% level of significance. Inferring that there is long run relationship between manufacturing output, institutional quality index, innovation proxy by research and development, inflation and real GDP per capita income in Nigeria between 1996 to 2024. Therefore, this means that the short run Error Correction Mechanism (ECM) can be estimated to ascertain the speed of adjustment.

Result of ARDL model Estimation

Table 4: ARDL Long run and short run Estimated Results (3,3,3,3,3,3)

Panel A: Long Run Coefficient-Dependent variable GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MOT	-0.568075	0.261991	-2.168301	0.0296
IQI	-0.311713	0.315068	-0.989351	0.3603
RD	3.500551	1.510050	2.308268	0.605
INF	0.168787	0.047230	3.573734	0.0114
RGDP	-0.179933	0.055873	-3.220420	0.0119
C	3.081965	1.721859	1.789905	0.1237
Panel B: Short Run				
D(MOT)	0.568075	0.077223	7.356246	0.0003
D(IQI)	0.311713	0.166937	1.867245	0.1111
D(RD)	-3.508005	5.101106	-6.851763	0.0005
D(INF)	-0.168787	0.018965	-8.899911	0.0001
D(RGDP)	0.179933	0.029205	6.161021	0.0008
CointEq(ECM-1)*	-0.461239	0.039769	-11.59797	0.0000

R-squared =0.994865 **F-statistics** =32.137263 **DW=** 2.677673

Adjusted R-squared = 0.978604. **Prob** (F-statistics) 0.000025.

Source: Authors computation from E-views 10; result output, (2025).

The long run and short run estimation result is presented in table 4, from the result manufacturing output (MOT) was seen to have a negative impact on its self in the long run, while in the short run it was found to have a positive coefficient of 0.5680, the corresponding p-value of 0.0296 and 0.0003 in both long run and short run shows that it is statistically significant. Institutional quality index (IQI) with a coefficient of -0.311713 was found to have a negative impact on MOT in the long run, holding other variables constant a unite increase in IQI will lead to 31% decrease in MOT, this does not conform to the apriori expectation, it agrees with the study done by Ogbuafor et al (2020); Imougele and Okoro (2021) who found IQ to have an inverse relationship with manufacturing output. While in the short run with a positive coefficient of 0.311713 indicates that IQI has a positive relationship with MOT this conform to the apriori expectation, a unit increase in IQI will lead to 31% increase in MOT, but in both period IQI was found not to be statistically significant this is in consonance with the study by Patrick (2023). It implies that due to the positive effect of IQ as a result of improved institutional quality will lead to increased economic growth by promoting a favourable business environment, encouraging investment, and enhancing productivity in the manufacturing sector in Nigeria. Also, institutions that promote competitiveness, innovation, and entrepreneurship can enhance the competitiveness of Nigeria's manufacturing sector in the global market.

In the long run innovation proxied by research and development (RD), was found to have a positive coefficient of 3.500511, a unit increase in innovation will lead to 3.500 increase in MOT, this conforms to the apriori expectation, though with a corresponding p-value of 0.605 indicates that it is not significant to MOT, this positive and insignificant effect of innovation implies that manufacturing sector in Nigeria may not be adopting new technologies or innovations, possibly due to lack of awareness, resources, and or incentives. This finding agrees with the study done by Aminu et al (2019). While in the short run RD was found to have a negative coefficient of -3.508005 this means that it has an inverse relationship with MOT, albeit it was found to be statistically significant to MOT because the p-value of 0.0005 is less than 5% critical value. This negative and significant effect of innovation on manufacturing output infer that the costs associated with innovation, such as investment in new technologies or retraining of personnel, may outweigh the benefits, leading to decline in manufacturing output in Nigeria.

In the long run inflation was found to have a positive relationship with MOT and is statistically significant, this implies that a unit increase in INF will lead to 16% increase in manufacturing output, this does not conform to the apriori expectation, firms may adapt to inflationary pressures over time, adjusting their production processes and pricing strategies to mitigate the negative effect, also positive effect of inflation will lead to increased investment and economic growth, which can benefit the manufacturing sector. In the short run INF was found to have a negative coefficient of -0.168787 and is statistically significant to MOT, this implies that a unit increase in INF will lead to 16% decrease in MOT, this conforms to the apriori expectation, this implies that inflation in the short run may lead to increased costs of production, such as higher prices of raw materials and labour, which can negatively impact the manufacturing output.

Real GDP per capital income was found to have a negative impact on manufacturing output in the long run and is statistically significant to manufacturing output in Nigeria, this infers that a unit increase in RGDP will lead to 17% decrease in MOT this does not conform to the apriori expectation, it implies that RGDP in the long run may support the resource curse hypothesis, where an increase in wealth from natural resources (e.g. oil) leads to a decline in the manufacturing sector in Nigeria. While in the short run it was found to have a positive coefficient of 0.179933, and is statistically significant it means that a unit increase in RGDP will lead to 17% increase in MOT holding other variables constant, this conforms to the apriori expectation. The positive and significant effect in the short run implies that increase RGDP may lead to increased investment and consumption, which can benefit the manufacturing sector in the short run.

The error correction term (ECM) satisfies the economic criteria presumed that it must have a negative sign and it should be statistically significant at 5% significance level. The ECM result shows that 46.12% of shocks within the system are corrected within one year by the economy. The constant term of the equation stood at (c) 3.081965 revealed that the value of MOT when it was not affected by any of the independent variables, this implies that the MOT would be 0.1237 if all the exogenous variables of MOT was accounted for by joint variation of a combination of the explanatory variables. The R^2 value of 0.994865 shows that about 99 percent of the variations in the dependent variable (MOT) are explained by variations in the model (independent variables) this is substantially acceptable as it is above 50 percent. Correspondingly, the F-statistics regressor of 61.18255 and its probability of 0.000025 shows that the independent variables are jointly statistically significant and hereafter reliable. Whereas the Durbin Watson value of 2.677673 established the regression is not spurious.

Table 5: ARDL Model Diagnostic Test

	F-statistics	**Probability**
Serial Correlation	3.9193	(0.1142)
Heteroscedasticity (Harvey)	4.429	(0.0367)
Ramsey Reset (J)	0.17359	0.8690
	(0.0301)	(0.8690)

Source: Authors computation from E-views result output, (2025).

In table 5 the Breusch-Godfrey serial correlation test shows that the F-statistic of (3.9193) is greater than the probability value of (0.1142) and also higher than the critical value of 0.05. This submits that the residual in the short run ADRL model has no presence of serial correlation. The F-statistic value of 4.429 of the Harvey heteroscedasticities shows that it is greater than the P-value of (0.0367). Hence, this means that there is no presence of heteroscedasticity, relatively the variables observed from 1996 to 2024 are homoscedastic. The Ramsey Reset test is used to checks if the estimated model is properly specified. It tests the null hypothesis that the model is specified appropriately. This hypothesis is rejected if the p-value of F-statistic is lower than the critical value of 0.05. As shown in the table above, the p-value of 0.8690 is higher than the critical value of 0.05. This suggests that the estimated ARDL model in this study was correctly specified.

Stability Test and Cusum of Square Result

In figure one (1) below the results of the Stability test obviously shows that the model's regression coefficients are stable. The CUSUM lines rest within the upper- and lower critical lines of 5%, as such this is in consonance with the null hypothesis, which states that the coefficients are stable from 1996 to 2024

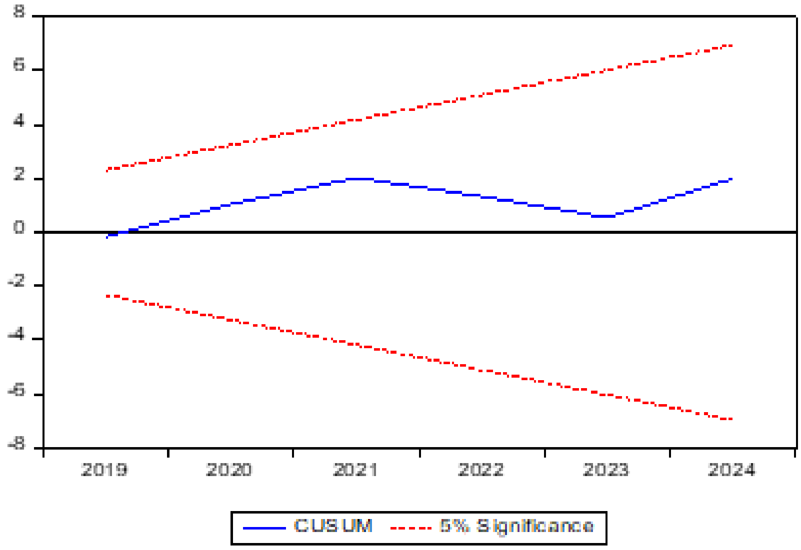

Fig 1: Stability Test

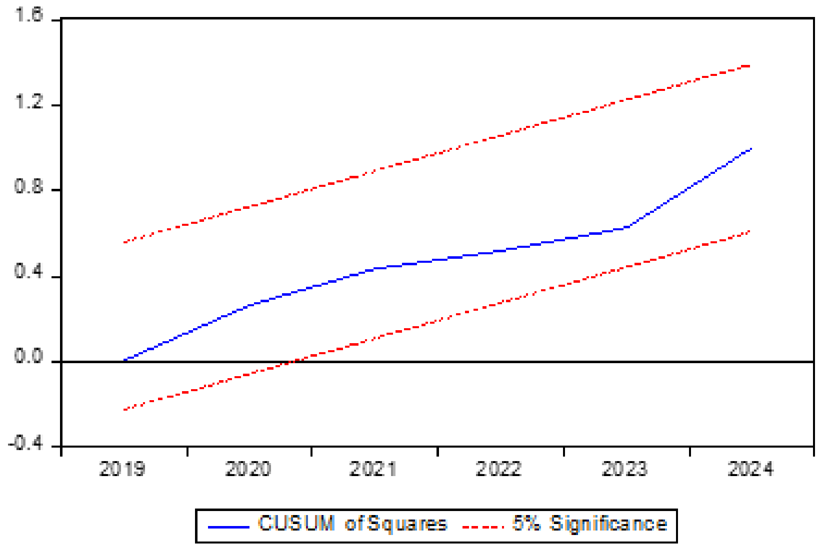

Fig 2: Cusum of Square

Harmoniously, the model in fig 2 of the Cusum of Square exhibited no structural breaks given that the CUSUM of squares line lies between the upper and lower critical lines. Therefore, the null hypothesis—which states that from 1996 to 2024 the model contains no structural breaks—is accepted.

Conclusion and Recommendations

This study investigates the role of institutions in promoting innovation on the manufacturing output in Nigeria from 1996 to 2024. It employed the use of ARDL to analyze the data. The outcome of the result shows that institutional quality plays a crucial role in fostering innovation on the manufacturing sector in the short run, also innovation was found to have a positive effect on manufacturing sector in the long run although it was insignificant to manufacturing output, but in the short run it was found to be significant, though with a negative effect on manufacturing output. Inflation and real gross domestic product per capita both have a significant effect on manufacturing output, albeit they had a mixed sign in short run and long run. The study contributes to the literature on innovation and economic growth by highlighting the importance of improving institutional frameworks, such as governance, rule of law, and regulatory quality, to create an enabling environment for innovation and manufacturing output growth in Nigeria. Also, the study used a novel methodology to investigate the relationship between institutional quality, innovation and manufacturing output, whereas, other studies only focus on either institutions and manufacturing output, or innovation and manufacturing output. The study focuses on only Nigeria, which may limit the generalization of the findings to other regions such as west African countries, Sub-Saharan Africa or Africa at large, using a panel data will give a robust analysis. Therefore, to pursue the quest for improvement in the Nigerian manufacturing sectors output the following recommendations are advocated.

i. Firstly, government should strengthen the institutions, improve efficiency of research and development expenditure, as this can help to accelerate the impact of R&D in the manufacturing output in Nigeria.
ii. The Nigerian government need to provide support for the manufacturing sector, such as infrastructural development, training programs, and incentives for innovation.
iii. The government should ensure that economic diversification effort should focus on promoting manufacturing activities that can drive growth and employment in Nigeria.
iv. Lastly, the government should adopt a multifaceted approach to manage inflation, considering both the short run and the long run effects on manufacturing output. By prioritizing price stability, investing in productivity-enhancing measures, and provide support for firms in the manufacturing sector.

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