Trade Facilitation and Manufacturing Capacity Utilization in Nigeria

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ABSTRACT

This study examined the impact of trade facilitation on manufacturing capacity utilization in Nigeria from 1985 to 2024. The objectives of the study are to: examine the impact of trade openness and logistic performance on manufacturing capacity utilization in Nigeria. The econometric technique of ARDL model was used to analyse annual secondary data sourced from Central Bank of Nigeria (CBN) Statistical Bulletin and World Development Indicator (WDI). The results showed that: there is a long–run relationship among the dependent and independent variables. The ARDL short run result showed that, trade openness and logistic performance positively increase the manufacturing capacity utilization rate in Nigeria during the period of study. Based on the results, it was concluded that, trade facilitation has direct impact on manufacturing capacity utilization in Nigeria. Thus, it was recommended that, boosting capacity utilization in the manufacturing sector remains essential for achieving broad-based economic growth. Also, government should pursue trade policy that liberalizes the manufacturing sector in order to advance the efficiency of the sector capacity utilization rate.

KEYWORDS

ARDL, Capacity, Trade openness, Logistic performance, Utilization

I. INTRODUCTION

Given the essential role that international trade and supply chains play in accessing essential supplies, many nations of the world have renewed their efforts to facilitate or simplify trade. In a broader sense, trade facilitation includes issues of transport infrastructures and transit, customs efficiency, institutional reforms, banking and insurance that aid international trade. Trade facilitation is both a policy objective and a process to reduce trade costs. As a country's trade costs increase, its ability to trade according to international trade theories decreases according to various trade theories, such as comparative advantage, theory of intra-industry trade, heterogeneous firms' theory.

Empirically, there are two categories of studies on trade facilitation (those using the narrow definition and those using the broad definition by integrating infrastructure in their analysis). The empirical works on the effects of trade facilitation on expanding trade have used more the narrow aspect of trade facilitation. Their estimates suggest that, logistics infrastructure positively influences export values and has a greater impact on the extensive margin than the intensive margin. However, using a gravity model, Odebiyi and Alege (2019), showed that, the indicators of trade facilitation such as administrative procedures in exporting and importing countries do not have a significant influence on bilateral trade in ECOWAS.

Similarly, Hendy and Zaki (2021) found that, at the sectorial level, agriculture and manufacturing sectors performance are affected by trade facilitation indicators.

Contributing further, Aderibigbe (2022) opined that facilitation of international trade contributes to attracting foreign direct investment (FDI) in the manufacturing sector by creating a conducive business environment, reducing investment risks, and improving market access for foreign investors. Efficient customs procedures, transparent regulations, and reliable logistics infrastructure signal a commitment to openness, transparency, and investor-friendly policies, which can attract multinational corporations and foreign investors seeking to establish manufacturing firms in a country. In like manner, Agu, Onah and Okoroafor (2022) stated that trade facilitation helps reduce trade costs for manufacturing firms. Lower trade costs make it more affordable for manufacturers to import raw materials, intermediate goods, and capital equipment, as well as to export finished products. By reducing input costs and transaction costs, trade facilitation enhances the competitiveness of the manufacturing sector, leading to increased production, exports, and profitability.

Nigeria being a developing economy has been battling over the years with the actualization of the development process not only socially and politically but also economically. One of the earlier policies adopted in Nigeria to enhance the growth process through trade liberalization is the IMF Structural Adjustment Program (SAP) in 1986. The main objective of the SAP program was to restructure and diversify the productive base of the economy. In addition, the program was also designed to create and enhance a realistic and sustainable exchange rate system, tariff reform, liberalization, commercialization and privatization of public enterprises. Moreover, to further actualize the trade liberalization, the Nigerian Government specifically removed import and export licensing, seventy-four (74) items on import prohibition list were reduce to 16 and also took off the eleven (11) items listed on export prohibition. All these are aimed at making the economy to be more open so as to enhance the growth of all sectors of the Nigeria economy.

Ude and Agodi (2015) established that trade enables developing countries such as Nigeria to import capital equipment and intermediate inputs that are critical to long-run growth which will be expensive or impossible to be produced domestically. It also encourages the flow of goods and services unhindered by government-imposed restrictions. Such restrictions could be high taxes, tariffs and even non-tariffs barriers such as regulatory legislation and quotas. Trade facilitation therefore permits an economy to make better use of its resources by allowing import of goods and services at a lower cost than they could be produced at home (following the theory of comparative cost advantage). Ilemona and Adejoh (2021) noted that trade facilitation stimulates domestic production and innovation in the manufacturing sector by providing easier access to imported inputs, raw materials, and technology. Streamlined customs procedures, reduced trade barriers, and efficient logistics networks enable manufacturers to source high-quality inputs and components from global suppliers at competitive prices. Access to imported inputs and technology stimulates domestic production, encourages investment in innovation and technology adoption, and enhances the competitiveness of domestic manufacturing firms.

Furthermore, Obaji, Ogbonna and Atuma (2022) established that trade facilitation measures facilitate the integration of manufacturing firms into global value chains by enabling smoother trade flows and reducing transaction costs. Manufacturers can participate in global

value chains by sourcing inputs from multiple countries, leveraging comparative advantages, and specializing in specific stages of production. Efficient customs procedures, transparent regulations, and reliable logistics networks support the seamless movement of goods along value chains, enabling manufacturers to achieve economies of scale, increase efficiency, capture value-added opportunities and increase manufacturing output. Other possible benefits of trade facilitation according to Ude and Agodi (2015) include more intense competition, which obliges local firms to operate more efficiently than under protection, and greater awareness of new foreign ideas and technologies.

Drawing from the foregoing, this study is set out to determine the effect of trade facilitation on the manufacturing capacity utilization in Nigeria.

II. LITERATURE REVIEW

A. Theory of Production

In economics, the Cobb-Douglas functional form of production functions is widely used to represent the relationship of an output and two inputs. In 1928 Charles Cobb and Paul Douglas published a study in which they modelled the growth of the American economy during the period 1899-1922. They considered a simplified view of the economy in which production output is determined by the amount of labour involved and the amount of capital invested. While there are many other factors affecting economic performance, their model proved to be remarkably accurate.

The function they used to model production was of the form; Y=P (AL, K) =〖BL〗^α K^β.

Where:

P = total production (the monetary value of all goods produced in a year)
L = labour input (the total number of person-hours worked in a year)
K = capital input (the monetary worth of all machinery, equipment, and buildings)
A=Technology
B = total factor productivity (efficiency coefficient)

$\alpha \, and \, \beta$ is the output elasticity of labour and capital, respectively? These values are constants determined by available technology

In this production function, the sum of exponent $\alpha \, and \, \beta$ measures return to scale.

The theory of production provides the analytical framework for most empirical research on manufacturing productivity. At the core of the theory is the production function, which postulates a well-defined relationship between a vector of maximum producible outputs and a vector of factors of production.

Criticisms of the Production Function: These following restrictions suggest that, while the Cobb-Douglas function is useful for simplified macroeconomic modelling, it often fails to accurately represent specific, complex industries. The model assumes that capital and labour

can be substituted for one another at a constant rate, which rarely holds true in real-world scenarios. While often assuming, many industries actually experience increasing or decreasing returns to scale rather than constant.

Despite the criticisms, it is critical to manufacturing for modelling output based on labour and capital inputs, enabling firms to optimize resource allocation and calculate returns to scale.

B. Trade Openness and Manufacturing Sector Performance

Olukemi and Bolatito (2022) evaluated the evidence on trade openness's impact on the performance of small- and medium-scale enterprises (SMEs) in Nigeria using autoregressive distributed lag (ARDL) methodology and Toda-Yamamoto causality test. The findings show that, trade openness exerts a positive but insignificant impact on the performance of SMEs. Causality test results indicate that variations in exchange rate, infrastructure, labour force and foreign direct investment influence the performance of SMEs. Also, Ilemona and Adejoh (2021) assessed trade openness and industrial output growth in Nigeria spanning the period of 1986 to 2019 using Toda-Yamamoto (T-Y) causality procedure. Findings from the T-Y estimation revealed that, there was no causal relationship between trade openness and industrial output growth in the country.

Eshiozemhe and Aminu (2021) examined the effect of openness on agricultural output in Nigeria from 2010Q1 to 2020Q2 with the use of Autoregressive Distributed Lag Methods. Empirical result of the study shows that increase in trade openness will lead to a positive but insignificant increase in agricultural output while increase in financial openness will lead to a significant decrease in agricultural output in the country.

Akintunde, Akanbi, Oladipo and Adedokun (2021) examined the relationships between trade openness and manufacturing sector output in 12 selected countries in West Africa from 1980 to 2019 using Dynamic Ordinary Least Square (DOLS) and Fully Modified Ordinary Least Square (FMOLS). The results of FMOLS and DOLS therefore, revealed that, all the coefficients are positively associated and significant with manufacturing sector output except for trade openness that is not significant and inflation rate is negatively significant.

C. Logistic Performance and Manufacturing Sector

Shepherd's (2011) analysis of logistics data, covering 45 countries, revealed that, on average, the logistics sector accounts for about 5 percent of the gross domestic product (GDP), with a range of 2 percent to 12 percent. Furthermore, he found that, pre-shipment delays were associated with a lower degree of export diversification in developing countries.

Arvis, Mustra, Ojala, Panzer, and Naula (2007) presented descriptive statistics suggesting a positive association between logistics performance and important outcome indicators, such as trade openness. Also, Dee and Findlay (2006) in their survey of literature on trade facilitation indicated that infrastructure quality is associated with significant increases in trade.

Hoekman and Nicita's (2010) analysis of logistic performance index in a gravity model of trade revealed a significant positive association between logistics performance and trade intensity. These authors also noted that the effect was quantitatively important: increasing the average low-income country's LPI score to the middle-income average would increase trade by around 15 percent.

D. Capacity Utilisation and Manufacturing Sector

Eze and Ude (2023) assessed the relationship between capacity utilization, industrial productivity, and economic growth using annual data from 1991 to 2022 and employing the Ordinary Least Squares (OLS) and Granger Causality techniques. Their study found a unidirectional causality running from capacity utilization to economic growth, suggesting that industrial efficiency drives GDP performance rather than the reverse. The findings showed that low-capacity utilization due to infrastructural deficits, exchange rate volatility, and weak investment climate significantly constrains Nigeria's productive capacity.

Okeoma, Nwaobilor and Amaechi (2022) analysis of the impact of manufacturing capacity utilisation on Nigeria's economy. From 1981 to 2021, the research examined the connection between GDP, the manufacturing productivity index (MPI), and capacity utilisation (CU). The Central Bank of Nigeria (CBN) Statistical Bulletin and other pertinent government institutions provided the data, which were then analysed using E-views 8 econometric models. The findings showed a substantial and positive correlation between the industrial capacity indicators and economic growth.

Akinlo and Ojo (2022) examined capacity utilization and its macroeconomic implications for Nigeria's economic growth between 1990 and 2021 using a Vector Error Correction Model (VECM) approach. Their analysis focused on how underutilization of industrial capacity constrains output expansion and GDP growth. The empirical findings indicated a long-run equilibrium relationship between capacity utilization, capital formation, and economic growth, confirming that declining utilization levels significantly dampen growth prospects. The study further established that a 1% increase in capacity utilization could raise GDP growth by approximately 0.4%, underscoring its critical role in economic recovery.

Olorunfemi and Adediran (2021) investigated the impact of capacity utilization on Nigeria's economic growth from 1985 to 2020 using the Autoregressive Distributed Lag (ARDL) model. The results revealed a significant positive relationship between capacity utilization and economic growth both in the short and long run. The authors concluded that improved industrial capacity utilization—achieved through stable energy supply, better infrastructure, and access to finance—enhances industrial output and stimulates overall economic performance in Nigeria.

III. METHODOLOGY

Annual data that ranged from the year 1985 to 2024 was used for this study. The data were sourced from World Bank Indicators (WDI) and Central Bank of Nigeria (CBN) statistical bulletin. The variables of this study are classified as dependent and independent variable: The dependent variable is the performance of manufacturing sector and it is proxied by

manufacturing sector GDP. On the other hand, the independent variable is trade facilitation and it is proxied by trade tariff, customs duties and exchange rate

Data analysis techniques include the pre-estimation test which is basically the Unit Root Test to determine the stability of variables of study. Also, the estimation test involved the use of Auto Regressive Distributed Lag (ARDL) method to determine both short run and long run relationship between the dependent and the independent variables

Model Specification

This study relied on the model of Aderibigbe (2022) with slight modification.

Expressing the model in its functional forms as:

$$MGDP = f(TRF,\ CSD,\ \ EXR) \quad (3.1)$$

Transforming equation (3.1) into a mathematical model, to have:

$$MGDP = \alpha_0 + \alpha_1 TRF + \alpha_2 CSD + \alpha_3 EXR + u_{1t} \quad (3.2)$$

Where; *MGDP* = Manufacturing sector GDP, TRF=Trade tariff, , *EXR* = Exchange rate, *CSD* = Customs Duties, α_0 and β_0= Intercept Parameters, α_1-α_3 = Parameters of independent variables, U_{1t}= Disturbance or error term

IV. RESULTS AND DISCUSSION

A. Pre-Estimation Test Result

The pre-estimation test via the Augmented Dickey Fuller unit root test was conducted to determine the stability of variables of study as presented on Table 1 below

Table 1: Stationarity Test

Variables	ADF	P-value (Prob.*)	Decision	Order of Integration
		At Levels (order zero)		
Log(MCU)	-1.826835	0.3624	Non-stationary	
LPI	-0.741303	0.8242	Non-stationary	
Log(TOP)	-3.496309	0.0134	Stationary	I(0)
	At First Difference			
Log(MCU)	-6.430272	0.0000	Stationary	I(1)
LPI	-5.974032	0.0000	Stationary	I(1)

The results on Table 1 showed that, only trade openness (TOP) was stationary at level, I (0). While Manufacturing capacity utilization (MCU) and logistic performance index (LPI) which were not stationary at level, became stationary at order one, I (1) after adjustment or differenced once. This showed that, the null hypothesis of presence of unit root was rejected after first differencing the variables.

Table 2: Bound Test for the Estimated MGDP Model

Bound Test for MGDP Model
f-statistic = 13.28337*
Upper Bound
3.353(10%)
3.920 (5%) **

From Table 2, the result of the bound test shows that, the f-statistic value of 13.28337 is higher than the upper bound value of 3.920 at 5%. This means that, long run relationship exists between the dependent and independent variables.

Table 3: Long Run Coefficient for the Estimated MGDP Model

Regressors	**Coefficient**	**t-Statistic**	**P-Value**
LPI	-21.18852	-2.280086	0.0358
Log(TOP)	0.337683	1.325928	0.2024
C	-102.1765	-2.821751	0.0118

Moreover, the long run coefficient results show that, while LPI showed negative relationship with MCU, TOP showed positive relationship with MCU. Based on the findings above, the study concludes that, a percentage increase in trade openness will bring about an increase in manufacturing capacity utilization by 33.7683percent. But a percentage increase in logistic performance index will bring about a reduction in manufacturing capacity utilization by 21.18852percent.

Table 4: Short-Run Result for MCU Model

Regressors	**Coefficients**	**t-Statistic**	**P-Value**
LogMCU(-1))	0.360288	2.143768	0.0468
LPI	7.250992	2.393243	0.0285
Log(TOP(-1)	0.216020	1.324600	0.2028
ECM(-1)	-0.639712	-5.576335	0.0000
R-squared = 0.6729	Adjusted R-Squared=0.5023	Prob(F-statist) =0.00014	DW= 1.8885

Table 4 showed the estimated ARDL short-run coefficients to determine the short run relationship between the independent and the dependent variables. Based on the result above, all the independent variables exhibited a positive short run relationship with manufacturing capacity utilization (MCU) in Nigeria within the period under review.

In specific terms, the estimated result showed that, a percentage change in logistic performance index will bring about 7.250992percent increase in manufacturing capacity utilization. More so, logistic performance index has significant impact on

manufacturing capacity utilization since the p-value of 0.0285 is less than the critical p-value at 5percent level of significance.

Furthermore, the estimated result showed that, a percentage change in trade openness will bring about 21.6020percent increase in manufacturing capacity utilization. But trade openness has no significant impact on manufacturing capacity utilization since the p-value of 0.2028 is greater than the critical p-value at 5percent level of significance.

Meanwhile, the short-run dynamic model presented on Table 4 showed that, the coefficient of the lag value (current value) of the manufacturing capacity utilization is negatively signed and significant with the past value. Thus, a percentage increase in the lag value of manufacturing capacity utilization will decrease the manufacturing capacity utilization by 61.0396percent.

The coefficient of determination denoted by Adjusted R-squared is 0.5023, means that, the dynamic model is a good fit. Thus, the variation in manufacturing capacity utilization (MCU) brought about by the explanatory variables is about 50percent.

As a matter of fact, one of the importance parameters in the estimated ARDL short-run model is the coefficient of the ECM, which theoretical must be negative and statistically significant. From the estimated model, the coefficient of ECM has the hypothesized negative sign and statistically significant at 5percent level. Thus, the deviations from the short-term in manufacturing capacity utilization adjusted to long-run equilibrium with the speed of 0.639712. This showed that, the disequilibria in manufacturing capacity utilization in the previous year were corrected for in the current year at a speed of about 63.97percent. Moreover, the approximate coefficient of the Durbin Watson (DW) test is 1.8885 which is not too far from 2.0; based on rule- of-thumb implies that, the model is free from positive first order correlation. Thus, the independent variables in the model are not serially dependent (correlated). Therefore, the model is valid for policy making and implementation.

V. CONCLUSION AND RECOMMENDATIONS

This study empirically analysed the effect of trade facilitation on the manufacturing capacity utilization in Nigeria from the year 1985 to 2024 with the adoption of the econometric technique of ARDL model. The summary of the findings showed that, there is a long–run relationship among the dependent and independent variables. The ARDL short run result showed that, both trade openness and logistic performance index positively increase the manufacturing capacity utilization rate in Nigeria during the period of study.

Based on the findings, the study concludes that, trade facilitation significantly affects the performance of manufacturing capacity utilization in Nigeria. Therefore, to check the scourge of escalating negative net export, there is the need for fundamental changes in Nigeria's economic structures, especially in its production and consumption patterns. Thus, it was recommended that, boosting capacity utilization in the manufacturing sector remains essential for achieving broad-based economic growth. Also, government should pursue trade policy that liberalizes the manufacturing sector in order to advance the efficiency of the sector capacity utilization rate.

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