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FOREIGN TRADE, EXCHANGE RATE, AND HUMAN DEVELOPMENT NIGERIA

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ABSTRACT

The study aimed to examine the relationship between foreign trade, exchange rate and human development in Nigeria over the period of 1980 to 2022. The study made use of a total of four (4) variables namely, Human Development Index (HDI), Gross Domestic Product per capita (GDPPC), the official exchange rate (OER), and trade openness (TO) sourced from the World Bank developmental indicator (WDI). The analysis of the data was done using ARDL model and Toda-Yamato granger with the aid of E-views version 10. The analysis showed that all the series are not stationary with the exception of trade openness which stationary at levels. The diagnostics analysis conducted showed that the model designed passed all diagnostic tests. The ARDL model explains a significant portion of the variation in the human development index in Nigeria, with an R-squared value of 0.702045 and an adjusted R-squared value of 0.547109. The analysis employs Human Development Index (LHDI) as the dependent variable, while the independent variables are Gross Domestic Product per capita (LGDPC), official exchange rate (LOER), and trade openness (TO). The long-run estimates reveal that the official exchange rate (LOER) has a positive and statistically significant impact on human development in Nigeria, with a 1% increase in the official exchange rate associated with a 0.042449% increase in the HDI. However, the coefficient of trade openness (TO) is positive but statistically insignificant in the long run, indicating that the impact of trade openness on human development is not conclusive in the Nigerian context. The coefficient of LGDPC is positive and highly significant in the short run, indicating that the impact of economic growth on human development may take time to manifest. The TY Granger Causality/Block Exogeneity Wald Tests table reveals a bidirectional causal relationship between the Human Development Index (LHDI), official exchange rate (LOER), trade openness (TO), and Gross Domestic Product per capita (LGDPC). This suggests economic growth and human development have a reinforcing effect, emphasizing the need for holistic policymaking. Based on the findings, the study recommends that policymakers should focus on sustainable economic growth, promoting private sector development, and diversifying the economy beyond oil exports. Trade openness can lead to trade-related gains, but barriers should be addressed. Exchange rate management should be holistic, maintaining a stable regime for export competitiveness and mitigating inflationary pressures. Investing in human capital development and social infrastructure, such as education and healthcare, can maximize the benefits of economic growth, trade, and exchange rate policies.

***Keywords**: Human development index, exchange rate, trade openness, ARDL, T-Y causality*

INTRODUCTION

The pursuit of human development, which encompasses improvements in areas such as education, health, and living standards, has been a central goal for nations worldwide. Achieving sustainable human development is crucial for fostering economic growth, reducing poverty, and promoting overall societal well-being. In this context, the role of foreign trade and exchange rate dynamics has garnered significant attention from researchers and policymakers alike.

Empirical studies have explored the potential impacts of international trade on human development across various countries and regions. For instance, Jawaid and Waheed (2017) investigated the contribution of international trade to human development in Pakistan, while Mirajul Haq and Muhammad Luqman (2014) examined how international trade enhances human capital accumulation and economic growth in nine Asian countries. However, the relationship between foreign trade, exchange rates, and human development indicators may vary across nations due to differences in economic structures, trade patterns, and policy environments.

Despite Nigeria's significant role in the African economy and its unique economic challenges, there is a lack of comprehensive and up-to-date empirical research that specifically investigates the intricate interplay between foreign trade, exchange rate dynamics, and human development indicators within the Nigerian context. Most existing studies either focus on cross-country analyses (Kabadayı, 2013; Rahman et al., 2020; Intisar et al., 2020) or examine individual countries other than Nigeria (Mbang, 2022; Sardar et al., 2022).

Nigeria's diverse economy, which includes a substantial oil export sector, and its history of exchange rate volatility warrant a dedicated study that accounts for these country-specific factors. While some studies have explored the impact of foreign trade on economic misery in African countries with low human development (Nwogwugwu and Umeghalu, 2021), there is a need for a more comprehensive analysis of the multidimensional nature of human development in Nigeria, encompassing not only income-related indicators but also aspects such as education, health, and gender equality.

Furthermore, the existing literature highlights the importance of investigating the causal relationships between foreign trade, exchange rates, and human development indicators, as demonstrated by studies like Jawaid and Waheed (2017), which employed causality analysis. A similar approach, tailored to the Nigerian context, could provide valuable insights into the direction and strength of the causal links between these variables, informing policies and strategies aimed at promoting sustainable human development in the country.

2.0 Literature Review

2.1 Theoretical Framework

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, provide a comprehensive framework for addressing economic, social, and environmental challenges faced by countries around the world, including Nigeria. The SDGs are particularly relevant in understanding the interplay between foreign trade, exchange rate dynamics, and human development in Nigeria.

Foreign trade plays a crucial role in achieving several SDGs, such as Goal 8 (Decent Work and Economic Growth), Goal 9 (Industry, Innovation, and Infrastructure), and Goal 17

(Partnerships for the Goals). Nigeria's engagement in international trade can contribute to economic growth, employment opportunities, and access to global markets and technologies (Goal 8) (United Nations, 2015). However, the impact of foreign trade on human development in Nigeria is often influenced by the country's exchange rate policies and fluctuations.

Exchange rate dynamics can have significant implications for the competitiveness of Nigeria's exports and the affordability of imports, affecting the country's trade balance and economic performance (Goal 8) (Obstfeld, & Rogoff, 1995). An overvalued exchange rate can make exports less competitive, while an undervalued currency can make imports more expensive, potentially hindering access to essential goods and services (Rodrik, 2008). Exchange rate volatility can also create uncertainty for businesses and investors, hampering long-term economic growth and development (Goal 8) (Aghion, et al., 2009).

The link between foreign trade, exchange rates, and human development in Nigeria can be further explored through the lens of Goal 1 (No Poverty), Goal 2 (Zero Hunger), Goal 3 (Good Health and Well-being), and Goal 4 (Quality Education). These goals focus on reducing poverty, ensuring food security, promoting health and well-being, and providing quality education – all of which are crucial components of human development (United Nations Development Programme, 2020).

A well-managed exchange rate policy that supports export competitiveness and facilitates access to affordable imports can contribute to economic growth and job creation, thereby reducing poverty (Goal 1) and improving overall living standards (Hausmann, Pritchett, & Rodrik, 2005). Additionally, a stable exchange rate can help maintain the affordability of essential imported goods, such as food, medicine, and educational materials, directly impacting food security (Goal 2), health and well-being (Goal 3), and access to quality education (Goal 4) (Arndt, 2008).

However, it is essential to recognize that the relationship between foreign trade, exchange rates, and human development is complex and multidimensional. Other factors, such as governance, infrastructure, access to finance, and socio-economic inequalities, can also play a significant role in shaping the outcomes of trade and exchange rate policies on human development in Nigeria (Fosu, 2017).

In summary, the Sustainable Development Goals provide a comprehensive framework for understanding the interplay between foreign trade, exchange rates, and human development in Nigeria. By aligning trade and exchange rate policies with the SDGs, Nigeria can leverage international trade as a means to achieve economic growth, create employment opportunities, reduce poverty, improve food security, promote health and well-being, and enhance access to quality education, ultimately contributing to overall human development in the country.

2.2 Empirical Review

Human development and its relationship with various factors such as international trade, foreign direct investment (FDI), economic growth, and others have been extensively studied in the empirical literature. This review aims to synthesize the major findings from several research papers on this topic.
Mbang (2022) investigated the impact of FDI on human development in Cameroon, employing an autoregressive distributed lagged model (ARDL) and Vector Error Correction

Model (VECM). The study found a positive long-term relationship between FDI and human development, attributed to increased trade openness and access to larger markets. However, in the short term, the relationship was negative, potentially due to the lack of investment in human capital enhancement or education spending.

Sardar et al. (2022) explored the influence of aid for trade on human development in South Asia using a pooled mean group-autoregressive distributed lag (PMG-ARDL) model. Their findings revealed a positive and significant impact of aid for trade on human development, both in the short and long run, highlighting the importance of such aid in improving human development in the region.

Nwogwugwu and Umeghalu (2021) examined the relationship between international trade and economic misery in African countries with low human development. Using the System Generalized Method of Moments (System-GMM), they found that factors such as balance of payments, total exports, manufactured exports, per capita GDP growth rate, and exchange rate had a positive and significant effect on economic misery. The study recommended strategic engagement in international trade to achieve a favorable balance of payments and discouraged obsolete trade policies.

Rahman, Raja, and Ryan (2020) employed panel regression to investigate the impact of human development on economic growth. They discovered a significantly positive relationship between the Human Development Index (HDI) and economic growth in both developed and developing economies. However, life expectancy and primary gross enrollment ratio, used as measures of health and education respectively, had a negative impact on economic growth.

Intisar et al. (2020) compared the impact of trade openness and human capital on economic growth in Asian countries using fully modified ordinary least square (FMOLS) and dynamic ordinary least square (DOLS) models. Their results indicated a significant and positive relationship between trade openness, human capital, and economic growth in Southern Asia, while in Western Asia, trade openness and human capital had a positive effect, but labor force participation had a negative impact on economic growth.

Redmond and Nasir (2020) examined the role of natural resource abundance, international trade, and financial development in the economic development of selected countries. They found that while natural resource abundance had a significantly positive impact on economic growth, it had a primarily negative and insignificant effect on human development. Interestingly, international trade and broad money had significantly negative impacts on economic development.

Tsokalida and Yang (2019) studied the relationship between trade by destination, innovation, and human development in the Forum on China-Africa Cooperation (FOCAC) countries. Using generalized methods of moments (GMM), they found that innovation from China and the rest of the world had negative and insignificant impacts on human development.

Aniegboka, Ijeoma, and Godly (2018) investigated the impact of foreign trade on economic development in Nigeria from 1980 to 2016 using the ARDL Bound Test Co-integration approach. Their results showed that the ease of doing business had a negative and substantial impact on economic growth rate, while exchange rate had a positive and significant relationship with unemployment and a decisive impact on human development.

Jawaid and Waheed (2017) examined the contribution of international trade to human development in Pakistan using cointegration tests. They found that various components of international trade, such as total trade, aggregate exports, aggregate imports, exports of different product categories, and imports of consumer goods, capital goods, and raw materials, had significant impacts on human development.

Mirajul Haq and Muhammad Luqman (2014) studied the contribution of international trade to economic growth through human capital accumulation in nine Asian countries using panel regression. Their empirical analysis substantiated that international trade enhances human capital accumulation and contributes positively to economic growth through this channel.

Finally, Kabadayı (2013) investigated the relationship between human development and trade openness in developing countries using cross-section dependency tests and panel one-way fixed effect estimation. The study found a positive effect of openness on living standards, further highlighting the importance of international trade in promoting human development.

2.3 Empirical Literature Gap

While the empirical literature review provides valuable insights into the relationships between foreign trade, exchange rates, and human development, there appears to be a research gap specific to the Nigerian context. Most of the studies reviewed either focus on cross-country analyses (Kabadayı, 2013; Rahman et al., 2020; Intisar et al., 2020) or examine individual countries other than Nigeria (Mbang, 2022; Sardar et al., 2022). Despite Nigeria's significant role in the African economy and its unique economic challenges, there is a lack of comprehensive and up-to-date empirical research that specifically investigates the intricate interplay between foreign trade, exchange rate dynamics, and human development indicators within the Nigerian context.

The existing literature highlights the potential impacts of trade openness, exchange rate fluctuations, and economic growth on human development, but the specific mechanisms and magnitudes of these effects may vary across countries due to differences in economic structures, trade patterns, and policy environments. Nigeria's diverse economy, its reliance on oil exports (Aniegboka et al., 2018), and its history of exchange rate volatility warrant a dedicated study that accounts for these country-specific factors. Additionally, while some studies have examined the impact of foreign trade on economic misery in African countries with low human development (Nwogwugwu and Umeghalu, 2021), there is a need for a more comprehensive analysis of the multidimensional nature of human development in Nigeria, encompassing not only income-related indicators but also aspects such as education, health, and gender equality, which are crucial for sustainable development.

Furthermore, the literature review reveals the importance of investigating the causal relationships between these variables, as highlighted by studies like Jawaid and Waheed (2017), which explored the contribution of international trade to human development in Pakistan using causality analysis. A similar approach, tailored to the Nigerian context, could provide valuable insights into the direction and strength of the causal links between foreign trade, exchange rates, and various dimensions of human development.

3.0 Methodology

3.1 Sources of Data

The data that used for this study includes, Human Development Index (HDI), Gross Domestic Product per capita (GDPPC), the official exchange rate (OER), and trade openness (TO) which were sourced from the World Bank developmental indicators (WDI). The data are annual data covering the period of 1980 to 2022.

3.3 Model Specification

The model of this study captures the aim of the study; the functional form of the model can be specified as follows:

Human Development Index $=f$ (gross domestic growth per capita, official exchange rate, trade openness).

$$HDI_t = f\ (GDPpc_t, , OER_t, TO_t) \qquad (3.2)$$

The mathematical form for the first model can be expressed as;

$$HDI_t = \beta_o + \beta_1 GDPpc_t + \beta_2 OER_t + \beta_3 TO_t \qquad (3.3)$$

The equation above is deterministic in nature. In order to allow for the inexact relationship among the variables as in the case of most economic variables, the stochastic error term "ε_t" is added the equation. Thus, the study expresses the econometric form of the model as:

$$LHDI_t = \beta_o + \beta_1 LGDPC_t + \beta_2 LOER_t + \beta_3 TO_t + \varepsilon_t \qquad (3.4)$$

Where, HDI_t, = Human development index
$GDPpc_t$, = is the Gross Domestic Product per capita
OER_t = official exchange rate
TO_t = trade openness
β_i = represents the estimated coefficients of all independent variables
ε_t= stochastic error term.

3.4 Techniques for Data Analysis

The first step analysis of variables is testing the order of integration of the individual series. Under this consideration the three most popular unit root test procedures was employed to the test of order of integration. The most popular ones are Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981).

3.5 Autoregressive Distributed Lagged (ARDL) Model

To capture the long run and short-run dynamic relationship population explosion and economic growth in Nigeria, the study employs Autoregressive distributed lag bound testing approach developed by Pesaran et al., (2001).

$$\Delta LHDI_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \ x \ \Delta LGDPpc_{t-1} + \sum_{j=0}^{q} \beta_2 \ x \ \Delta LOER_{t-j} + \sum_{m=0}^{r} \beta_3 \ x \ \Delta TO_{t-m} + \beta_4 \ x \ LHDI_{t-1} + \beta_5 \ x \ LGDPpc_{t-1} + \beta_6 \ x \ LOER_{t-1} + \beta_7 \ x \ TO_{t-1} \qquad (3.5)$$

Initially, a joint significance test, which implies no-cointegration hypothesis (H_0: B_1=…B_k=0 Absence of co-integration) against the alternative hypothesis (H_1:$B_1 \neq \ldots B_k \neq 0$ Presence of co-integration), should be performed for Eq. (3.5).

The bounds testing approach to cointegration requires the F-test to be carried out on the selected ARDL models including appropriate lag lengths of selection criteria such as the

Akaike Information Criterion (AIC) and the Schwarz Information Criterion (SIC). The AIC criterion provides better results than the other criterion.

At the second stage, it is also possible to perform for the selected ARDL representation a general error correction model (ECM) of Eq. (3.6) formulated as follows:

$$\Delta LHDI_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \, x \, \Delta LHDI_{t-1} + \sum_{j=0}^{q} \beta_2 \, x \, \Delta LGDPc_{t-j} + \sum_{m=0}^{r} \beta_3 \, x \, \Delta LOER_{t-m} + \sum_{n=0}^{s} \beta_4 \, x \, \Delta TO_{t-n} + \delta \, x \, ecm_{t-1} + \psi_t \quad (3.7)$$

where Δ is the first difference term, δ is the error correction parameter (s the coefficients for measuring speed of adjustment), ecm_{t-1} the error correction mechanism lagged for one period ψ_t is the residuals that are obtained from the estimated cointegration model of Eq. (3.7), and t is the disturbance term assumed to be uncorrelated with zero means

Table 3.1 Definitions, Measurement of Variables and Sources of Data

Definitions of Variables	Measurement of Variables	Sources of Data
HDI	Human development index (HDI)	World Bank Development Indicator (WDI,) data base
OER	Official exchange rate (LCU per US$, period average)	World Bank Development Indicator (WDI,) data base
GDPpc	Gross Domestic Product per capita, current in thousands of U.S. dollars	World Bank Development Indicator (WDI,) data base
TO	Ratio of imports and exports to GDP	World Bank Development Indicator (WDI,) data base

Source: Prepared by Researcher (2024)

4.0 DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

4.1 Descriptive Statistics and Correlation Matrix

Table 4.1 Descriptive Statistics

	HDI	GDPPC	OER	TO
Mean	0.420663	1915.73	112.9787	0.27342
Maximum	0.539	2679.554	425.9792	0.633512
Minimum	0.296528	1408.209	0.546781	0.023721
Std. Dev.	0.082562	460.1578	119.0566	0.117385
Skewness	0.182731	0.341708	1.050324	0.092895
Kurtosis	1.404081	1.466962	3.278607	4.201722
Sum	18.08852	82376.38	4858.084	11.75706
Observations	43	43	43	43
Correlation matrix				
	HDI	*GDPPC*	*OER*	*TO*
HDI	1			
GDPPC	0.880381	1		
OER	0.878358	0.782648	1	
TO	0.047305	0.184231	0.024906	1

Source: computed by the author using E-views. Version 10 (2024)

The descriptive statistics presented provide insights into the characteristics of the variables used in the study which are, the Human Development Index (HDI), Gross Domestic Product per capita (GDPPC), the official exchange rate (OER), and trade openness (TO).

The Human Development Index (HDI) is a composite index that measures the average achievement in key dimensions of human development, including a long and healthy life,

knowledge, and a decent standard of living. The mean HDI value for the observations is 0.420663, indicating a relatively low level of human development. However, the maximum value of 0.539 suggests that there is potential for improvement, as some observations have achieved a higher level of human development. The minimum value of 0.296528 highlights the existence of significant disparities within the sample, with some observations experiencing very low levels of human development. The relatively low levels of human development, as indicated by the mean HDI value, suggest that Nigeria has not achieved its full potential in terms of improving the overall well-being of its population. This could be related to various factors, including economic performance, investment in education and healthcare, and the distribution of resources

The Gross Domestic Product per capita (GDPPC) is a measure of a country's economic output divided by its population. The mean GDPPC value of 1915.73 suggests a relatively low level of economic output per person. However, the maximum value of 2679.554 indicates that there are periods or observations where economic output per capita has been higher. The minimum value of 1408.209 further emphasizes the economic disparities within the sample. The relatively low level of economic output per capita, as indicated by the mean GDPPC value, suggests that there is room for improvement in terms of economic growth and development. Sustained economic growth is essential for creating employment opportunities, generating resources for investment in human capital, and improving overall living standards

The official exchange rate (OER) is a crucial variable that reflects the value of the Nigerian currency (Naira) relative to other currencies, particularly the US dollar. The mean OER value of 112.9787 suggests a relatively high exchange rate, which could potentially impact the competitiveness of Nigerian exports and the cost of imports. The maximum value of 425.9792 and the minimum value of 0.546781 highlight the significant fluctuations in the exchange rate over the observed period, which could have implications for international trade and economic stability. The fluctuations in the official exchange rate, as evidenced by the high maximum and minimum values, could have significant implications for Nigeria's international trade. A stable and competitive exchange rate is crucial for promoting exports and managing the cost of imports, which can impact economic growth, employment, and ultimately, human development

Trade openness (TO) is a measure of a country's economic integration with the rest of the world, calculated as the sum of exports and imports divided by GDP. The mean value of 0.27342 suggests a relatively low level of trade openness, indicating that Nigeria's economy is not highly integrated with the global economy. However, the maximum value of 0.633512 and the minimum value of 0.023721 indicate substantial variations in trade openness over the observed period, which could be attributed to changes in trade policies, economic conditions, or other factors. The low level of trade openness, as indicated by the mean TO value, suggests that Nigeria's economy is not highly integrated with the global economy. Increasing trade openness through appropriate trade policies and reforms could potentially contribute to economic growth, employment opportunities, and overall human development

The standard deviations for each variable provide information about the dispersion of the data around the mean. The HDI and GDPPC have relatively low standard deviations, suggesting that the values are clustered around the mean. In contrast, the OER and TO have higher standard deviations, indicating greater variability in these variables over the observed period.

The skewness and kurtosis values provide information about the distribution of the data. The HDI and GDPPC have relatively low skewness values, suggesting that their distributions are approximately symmetric. However, the OER and TO have positive skewness values,

indicating that their distributions are skewed to the right, with more observations clustered towards the lower end of the distribution. The kurtosis values for the OER and TO are higher than 3, suggesting that their distributions have heavier tails and more extreme values compared to a normal distribution.

The correlation matrix shows the bivariate correlations between four variables: human development index (HDI), gross domestic product per capita (GDPPC), official exchange rate (OER), and trade openness (TO). Looking first at the relationships between HDI, GDPPC, and OER, we can see strong positive correlations, with all coefficients above 0.78. This suggests that as GDPPC and exchange rates increase, human development tends to increase as well in Nigeria. This makes intuitive sense - higher economic output and currency value are generally associated with greater human well-being.

GDPPC and exchange rates also show a moderately strong positive relationship of 0.782, indicating that economic growth has tended to coincide with a stronger national currency. A higher exchange rate makes the country's exports more expensive for foreign buyers and imports cheaper, so currency appreciation is normally expected to accompany economic prosperity. Overall, the matrix supports the notion that foreign trade, when combined with GDP growth and exchange rate stability, can foster greater human development.

However, the key variable of interest - trade openness (TO) - shows surprisingly weak correlations with the other factors. Its coefficient is only 0.047 with HDI, 0.184 with GDPPC, and 0.025 with OER. This suggests trade openness per se has not historically driven human development gains, economic growth, or exchange rate performance in Nigeria.

4.2 Unit Root Test

The unit root test was conducted to determine the stationary conditions of the series and also to know their order of integration. In order to be consistent with the analysis done, the ADF unit root test was conducted to identify whether time series suffers from transitory or permanent shocks.

Table 4.2 Unit Root Tests

Variables	ADF	P-Values	Remakes	Order of Integration
		@LEVELS		
LHDI	-1.058260	0.7233	Not Stationary	Unknown
LGDPC	-1.275273	0.6317	Not Stationary	I(0)
LOER	-2.025922	0.2750	Not Stationary	Unknown
TO	-4.351729	0.0012	Stationary	Unknown
		@FIRST DIFFERENCE		
D(LHDI)	-6.100464	0.0000	Stationary	I(1)
D(LGDPC)	-3.372615	0.0180	Stationary	I(1)
D(LOER)	-5.494095	0.0000	Stationary	I(1)

Source: computed by the author using E-views. Version 10 (2024)

The unit root tests provide useful information about the time series properties and order of integration of the key variables - logarithm of human development index (LHDI), logarithm of GDP per capita (LGDPC), logarithm of official exchange rate (LOER), and trade openness (TO). At levels, the ADF test statistics for LHDI, LGDPC and LOER are not significant at the 5% level, indicating the null hypothesis of a unit root cannot be rejected - these variables are deemed non-stationary or integrated of order zero (I(0)).

Only trade openness is found to be stationary at levels based on its highly significant ADF statistic. This implies that shocks to the TO series are temporary and do not have permanent effects. The variables related to economic size and development (GDP, exchange

rates) tend to exhibit stochastic trends and continue wandering over time without bound unless differenced. Their levels contain a unit root and are theoretically not mean-reverting.

However, after first differencing the series, the ADF tests show the changes in LHDI, LGDPC and LOER (DLHDI, DLGDPC, DLOER) are all stationary, meaning their first differences are I(1). This establishes that these key variables are in fact integrated of order one. Their stochastic trends are removed by differentiation, allowing for regression analysis and interpretation of results in terms of changes rather than levels. Since the variables are of mixture of different order i.eI(1) and I(0). The ARDL bounce test to cointergration will be used for this analysis

4.3 ARDL Bounced test and Regression Analysis

Table 4.3 ARDL BOUNDS TEST Results, Null Hypothesis: No Long-run Relationship

Model Specification	Lag Length	K/n	F-Statistic (FPSS)	Pesaran et al. (2001) Critical Values (5%)	Narayan (2005) Critical Values (5%)
Linear	ADRL(4, 2, 4, 4)	3/39	4.574276	I(0) 2.79 I(1) 3.67	I(0) 4.310 I(1) 5.544

Source: computed by the author using E-views. Version 10 (2024)

The ARDL Bounds Test was conducted to examine the long-run relationship between key variables related to human development, trade, and economic growth in Nigeria. Specifically, it analyzes the long-run cointegrating relationship between the logarithm of human development index (LHDI), logarithm of GDP per capita (LGDPC), logarithm of official exchange rate (LOER), and trade openness (TO).

The optimal lag structure selected for the test was an ARDL(4,2,4,4) model. With 3 regressors (K=3) and 39 observations (n=39), the computed F-statistic for assessing the joint significance of the lags of the variable levels was 4.574276. This F-statistic exceeds both the 5% upper bound critical value of 3.67 provided by Pesaran et al. (2001) as well as the more recent and higher Narayan (2005) 5% upper bound of 5.544.

Since the computed F-statistic is greater than the critical value bounds, the null hypothesis of no long-run cointegrating relationship can be conclusively rejected. This indicates there is cointegration among the variables, providing evidence of a stable long-run equilibrium relationship between them. Specifically, the results show LHDI, LGDPC, LOER, and TO move together over the long-term and share common stochastic trends.

The finding of cointegration validates applying the Autoregressive Distributed Lag (ARDL) modeling approach, which has distinct advantages over other cointegration techniques in that it provides valid inferences even when regressors are purely I(0), purely I(1), or mutually cointegrated. This helps establish a credible framework for analyzing how trade, growth, and exchange rates influence human development over both the short- and long-run in Nigeria. In summary, the ARDL Bounds Test provides strong support for a cointegrated relationship and justifies further econometric examination of the determinants of human development using the bounds testing methodology.

4.4 ARDL Regression Analysis

Having established that the variables have a long relationship the next step is to estimate the Long-run cointegration using the ARDL bounds testing approach and Short-run regression coefficients with Error-correction terms to determine the rate of adjustment between the cointegrating variables. The ARDL regression estimates of variables are shown in table 4.5 below.

Table 4.4 ARDL Estimates

Dependent Variable: D(LHDI)				
ARDL Long-Run Estimates				
Variables	**Coefficient**	**S.E**	**t-values**	**P-Value**
LOER	0.042449***	0.012485	3.400017	0.0027
TO	0.256804	0.221371	1.160063	0.2590
LGDPC	0.487247***	0.073139	6.661922	0.0000
C	-4.770048	0.478880	-9.960847	0.0000
ARDL Short-Run Estimates				
Variables	**Coefficient**	**S.E**	**t-values**	**P-Value**
Δ(LHDI(-1))	0.299135**	0.139541	2.143716	0.0439
Δ(LOER)	-0.000950	0.019390	-0.049010	0.9614
Δ(LOER(-1))	0.038077**	0.016652	2.286666	0.0327
Δ(TO)	0.141391**	0.064533	2.190981	0.0399
Δ(TO(-1))	-0.256417***	0.059193	-4.331885	0.0003
Δ(LGDPC)	-0.038074	0.153921	-0.247362	0.8070
Δ(LGDPC(-1))	0.466370***	0.135433	3.443547	0.0024
ECT_{t-1}	-0.564823***	0.108244	-5.218030	0.0000
Model Fit	**Statistic**			
R-squared	0.702045			
Adjusted R-squared	0.547109			
F-statistic	100.0739			
Prob(F-statistic)	0.000000			

Source: computed by the author using E-views. Version 10 (2024)
*Note: *** Statistical significance at the 1 per cent levels,**Statistical significance at the 5 per cent levels.*
**Statistical significance at the 10 per cent levels,*

The model fit statistics indicate that the ARDL model explains a substantial portion of the variation in the human development index, with an R-squared value of 0.702045 and an adjusted R-squared value of 0.547109. The F-statistic (100.0739) is highly significant, confirming the overall statistical significance of the model. The provided Autoregressive Distributed Lag(ARDL) estimates shed light on the long-run and short-run relationships between foreign trade, exchange rate, and human development in Nigeria. The analysis employs the logarithm of the Human Development Index (LHDI) as the dependent variable, while the independent variables are the logarithm of Gross Domestic Product per capita (LGDPC), the logarithm of the official exchange rate (LOER), and trade openness (TO).

Trend Analysis

Over the years, there has been concern about the central relationship between trade policies and exchange rate volatility in Nigeria and its relationship to the welfare of the citizens, most especially the human development index.

The graph on Human Development Index (HDI), Gross Domestic Product per capita (GDPPC), and Official Exchange Rate (OER) for Nigeria from 1980 to 2022, including an analysis of the relationship between HDI and GDPPC, as well as HDI and OER.

The data shows a positive relationship between HDI and GDPPC in Nigeria over the period from 1980 to 2022. Both variables exhibit an overall increasing trend, albeit with some fluctuations. The HDI rose from 0.296528 in 1980 to 0.536333 in 2022, while GDPPC increased from 2201.688 in 1980 to 2449.588 in 2022.

Source: Data from World Bank 2022

The trend suggests that as Nigeria's economic output per capita (GDPPC) grew over time, it contributed to improvements in the country's human development, as measured by the HDI. This aligns with the broader understanding that economic growth can generate resources for investment in areas such as education, healthcare, and infrastructure, which are crucial for enhancing human development.

The HDI for Nigeria exhibits an overall increasing trend from 1980 to 2022, indicating gradual improvements in human development over the period. The HDI rose from 0.296528 in 1980 to 0.536333 in 2022, with the most significant gains observed after the early 2000s. However, the rate of improvement varied across different periods, with slower progress in some years.

However, it is important to note that the relationship between HDI and GDPPC is not always linear or consistent. There are periods in the data where GDPPC experienced declines or slower growth rates, while HDI continued to improve, albeit at a slower pace. This could be attributed to factors such as the distribution of economic gains, government policies, and investment in social sectors, which can influence the translation of economic growth into human development outcomes.

Source: Data from World Bank 2022

The GDPPC data shows a more volatile trend, with periods of growth and decline. After an initial decline from 1980 to 1984, the GDPPC fluctuated around a relatively stable level until the early 2000s. From 2003 onwards, there was a more sustained upward trend, with the GDPPC reaching its highest value of 2679.554 in 2015. However, in recent years, the GDPPC has experienced a slight decline, dropping to 2449.588 in 2022.

The analysis of the relationship between HDI and OER reveals a more complex picture. In the earlier years of the dataset, from 1980 to the late 1990s, there appears to be a positive relationship between HDI and OER. As the OER increased (indicating a depreciation of the Naira), the HDI also improved, albeit at a slower pace. This positive relationship could be attributed to the potential benefits of a weaker currency for export competitiveness and economic growth, which in turn can contribute to human development through increased income and investment in social sectors.

The OER, representing the value of the Nigerian Naira against the US dollar, exhibits a clear upward trend over the entire period, indicating a significant depreciation of the Naira. While the OER remained relatively stable until the late 1990s, it experienced a sharp increase from 1999 onwards, rising from 92.3381 in 1999 to 425.9792 in 2022. This trend reflects the economic challenges and currency pressures faced by Nigeria, particularly in the later years, which could be attributed to factors such as fluctuations in oil prices, fiscal imbalances, and domestic economic policies.

Source: Data from World Bank 2022

However, after the late 1990s, when the OER began to rise sharply, the relationship between HDI and OER became less clear. While the HDI continued to improve, the rate of improvement appears to have slowed down, especially in the latter years of the dataset. This could suggest that the benefits of currency depreciation for human development may have diminished or been offset by other factors, such as economic instability, inflationary pressures, or a decline in the purchasing power of households.

It is important to note that the relationship between HDI and OER is complex and influenced by various other economic, social, and political factors. A depreciating currency can have both positive and negative effects on different aspects of human development, depending on the country's economic structure, trade patterns, and policy environment.

Source: Data from World Bank 2022

The data for trade openness, measured as the sum of exports and imports divided by GDP, shows a fluctuating pattern. The TO was relatively high in the early years, reaching a peak of 0.633512 in 1980. However, it experienced a significant decline in the mid-1980s and remained at lower levels throughout the 1990s and early 2000s. From the mid-2000s onwards, the TO exhibited an upward trend, peaking at 0.462255 in 2005 before declining again in recent years to 0.259098 in 2022. This trend suggests that Nigeria's economy has experienced varying degrees of integration with the global economy, potentially influenced by factors such as trade policies, economic diversification efforts, and the performance of key export sectors.

In the case of Nigeria, the sharp depreciation of the Naira in recent years may have initially boosted export earnings and economic growth, but the sustained weakness of the currency could also have negative consequences, such as higher import costs for essential goods and services, inflationary pressures, and reduced purchasing power for households, potentially hampering progress in areas like health, education, and living standards.

The trend analysis highlights the complex dynamics between economic indicators, exchange rates, trade openness, and human development in Nigeria. While economic growth and stability appear to have contributed to improvements in HDI, the impact of exchange rate fluctuations and trade openness on human development outcomes may be more nuanced and dependent on specific economic and policy contexts. Nigeria's efforts to promote sustainable human development likely require a multifaceted approach that addresses various economic, social, and governance factors simultaneously.

Long-Run Estimates:

The long-run estimates reveal that the official exchange rate (LOER) has a positive and statistically significant impact on human development in Nigeria. Specifically, a 1% increase in the official exchange rate is associated with a 0.042449% increase in the Human Development Index (HDI), holding other factors constant. This finding suggests that a depreciation of the Nigerian currency (Naira) relative to other currencies may have a favorable effect on human development in the long run, potentially by boosting export competitiveness and economic growth.

However, the coefficient of trade openness (TO) is positive but statistically insignificant in the long run, indicating that the impact of trade openness on human development is not conclusive in the Nigerian context. This result contrasts with some previous studies that have found a significant positive relationship between trade openness and human development (e.g., Intisar et al., 2020).

On the other hand, the long-run coefficient of LGDPC (logarithm of Gross Domestic Product per capita) is positive and highly significant, suggesting that economic growth, as measured by GDP per capita, is a crucial driver of human development in Nigeria. A 1% increase in GDP per capita is associated with a 0.487247% increase in the HDI, holding other

factors constant. This finding aligns with the existing literature, which highlights the importance of economic growth in fostering human development (Rahman et al., 2020).

Short-Run Estimates:
The short-run estimates reveal a more nuanced picture of the relationships between the variables. The coefficient of the lagged dependent variable (Δ(LHDI(-1))) is positive and statistically significant, indicating that human development in Nigeria exhibits persistence, where past levels of human development influence current levels.

In the short run, the impact of the official exchange rate (Δ(LOER)) is statistically insignificant, but its lagged value (Δ(LOER(-1))) is positive and significant, suggesting that the effects of exchange rate changes on human development may take time to materialize.

Interestingly, the short-run coefficient of trade openness (Δ(TO)) is positive and significant, while its lagged value (Δ(TO(-1))) is negative and significant. This result implies that an increase in trade openness may initially boost human development, but the effect may reverse in the subsequent period, potentially due to adjustment costs or other factors specific to the Nigerian economy.

The coefficient of LGDPC (Δ(LGDPC)) is statistically insignificant in the short run, but its lagged value (Δ(LGDPC(-1))) is positive and highly significant, indicating that the impact of economic growth on human development may take time to manifest.

The error correction term (ECTt-1) is negative and statistically significant, confirming the existence of a long-run equilibrium relationship between the variables. The magnitude of the coefficient (-0.564823) suggests a moderate speed of adjustment towards the long-run equilibrium following a shock to the system.

In summary, the ARDL estimates reveal significant relationships between foreign trade, exchange rate, and human development in Nigeria, but the nature and magnitude of these relationships vary between the long run and short run. While economic growth emerges as a robust driver of human development, the impacts of the exchange rate and trade openness are more nuanced, with potential adjustment costs and time lags playing a role. These findings highlight the importance of considering both short-run and long-run dynamics when formulating policies aimed at promoting human development through trade and exchange rate channels in Nigeria.

4.5 Diagnostics test

The Diagnostic test describes various tests performed in multiple linear regression models to determine whether the model variables met the various assumptions of the Ordinary Least Square method. In the Classical Linear Regression Model,

Table 4.5 Diagnostics analysis

Diagnostic test	Statistic	P-Values
Jarque-Bera-Normal	1.830441	0.400428
Breusch-Godfrey Serial Correlation LM Test	0.630913	0.5429
Heteroskedasticity Test: Breusch-Pagan-Godfrey	1.658457	0.1352
Ramsey RESET Test	2.738406	0.1136

Source: computed by the author using IBM SPSS version 20 (2024)

It is important to check that the estimated ARDL model satisfies the classical assumptions of linear regression in order to have confidence in the results. This set of diagnostic tests provides useful information about the validity and correct specification of the model.

The Jarque-Bera test examines whether the residuals are normally distributed. The insignificant statistic fails to reject the null hypothesis of normally distributed errors. This implies the residuals align reasonably well with a normal distribution.

Serial correlation in the residuals can cause issues such as unreliable t-statistics. The Breusch-Godfrey LM test returns an insignificant result, indicating no evidence of autocorrelation after including lags in the model. This demonstrates the model has adequately captured the dynamic relationships between the variables over time.

Heteroskedasticity refers to non-constant error variances which can bias test statistics and standard errors. However, the Breusch-Pagan-Godfrey test shows heteroskedasticity is not present based on the insignificant test statistic.

Finally, the Ramsey RESET test checks that the correct functional form is specified to avoid omitted variable bias. The insignificant F-statistic provides reassurance that variables unnecessary for the regression have been excluded.

4.6 Stability Test

A crucial test to determine whether the stability of the ARDL model estimate is the stability test. The cumulative sum of recursive residuals test and the cumulative sum of squares test were used to assess the stability of the coefficient.

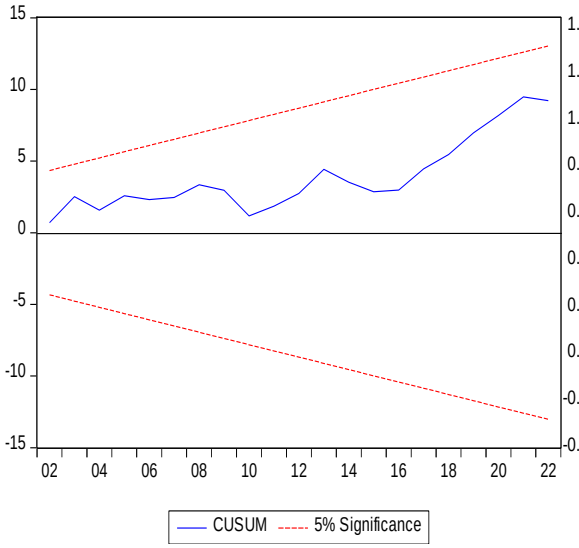


Figure 4.1 CUSUM

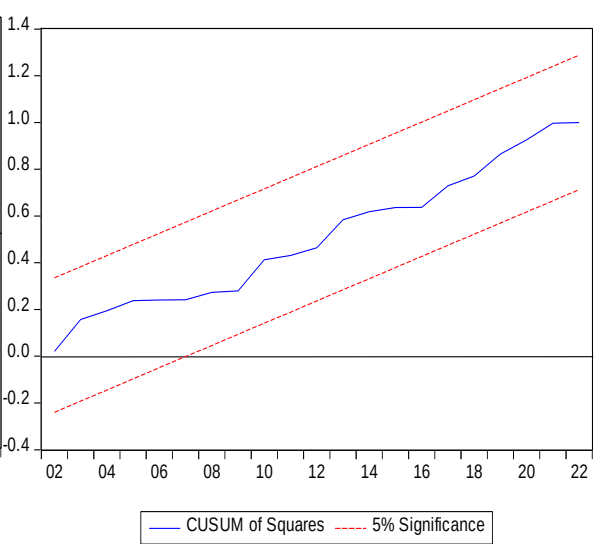


Figure 4.2:CUSUMsq

The CUSUM and CUSUMsq tests were used to investigate the stability of the ARDL bounds testing estimates, and the results are shown in Figs 4.1 and Figs 4.2. The CUSUM statistics plots were well within the critical bounds of 5%. The CUSUM of squares statistical plots were just 5% beyond the required range. This shows that the ARDL estimates were precise and reliable. Because the cumulative sum (blue lines) does not surpass the region between the two crucial boundaries, the tests demonstrate that the coefficients were stable (red lines).

4.7 Toda Yamamoto Granger Causality Analysis

The Granger causality test assesses whether past values of one variable help predict current values of another variable. It determines statistical causality and the direction of influence between the variables.

Table 4.6: TY Granger Causality/Block Exogeneity Wald Tests

Variables	Chi-Square statistic	P-Values
LHDI – LOER	0.331690	0.5647
LHDI – TO	0.931907	0.3344
LHDI – LGDPC	13.81555	0.0002
All	13.87175	0.0031
LOER – LHDI	0.023857	0.8773
LOER – TO	2.152547	0.1423
LOER – LGDPC	1.049125	0.3057
All	2.690068	0.4419
TO – LHDI	0.017247	0.8955
TO – LOER	0.681889	0.4089
TO – LGDPC	1.138721	0.2859
All	1.645399	0.6491
LGDPC – LHDI	5.794419	0.0161
LGDPC – LOER	0.891447	0.3451
LGDPC – TO	0.107846	0.7426
All	8.210385	0.0419

****, ** and * denote the significance at 1%, 5% and 10% respectively.*
Computed by the author using E-views. Version 10 (2024)

The TY Granger Causality/Block Exogeneity Wald Tests table provides insights into the causal relationships between the variables under study: the logarithm of the Human Development Index (LHDI), the logarithm of the official exchange rate (LOER), trade openness (TO), and the logarithm of Gross Domestic Product per capita (LGDPC). The table presents Chi-square statistics and their corresponding p-values for various pairwise and joint causality tests.

LHDI and LOER: The Chi-square statistic of 0.331690 and the corresponding p-value of 0.5647 suggest that there is no evidence of Granger causality between LHDI and LOER in either direction. This implies that changes in the official exchange rate do not Granger-cause changes in the Human Development Index, and vice versa.

LHDI and TO: With a Chi-square statistic of 0.931907 and a p-value of 0.3344, the test fails to reject the null hypothesis of no Granger causality between LHDI and TO in either direction. This indicates that trade openness does not Granger-cause changes in the Human Development Index, and changes in the Human Development Index do not Granger-cause trade openness.

LHDI and LGDPC: The Chi-square statistic of 13.81555 and the corresponding p-value of 0.0002 suggest a strong causal relationship between LHDI and LGDPC. Based on the low p-value, the null hypothesis of no Granger causality is rejected, implying that changes in GDP per capita Granger-cause changes in the Human Development Index, or vice versa, or both.

All variables to LHDI: The Chi-square statistic of 13.87175 and the p-value of 0.0031 indicate that the joint null hypothesis of all the independent variables (LOER, TO, and LGDPC) not Granger-causing LHDI is rejected. This suggests that at least one of the independent variables Granger-causes changes in the Human Development Index. LHDI, TO, and LGDPC to LOER: With a Chi-square statistic of 2.690068 and a p-value of 0.4419, the test fails to reject the null hypothesis that LHDI, TO, and LGDPC do not jointly Granger-cause LOER. LHDI, LOER, and LGDPC to TO: The Chi-square statistic of 1.645399 and the

p-value of 0.6491 suggest that the null hypothesis of LHDI, LOER, and LGDPC not jointly Granger-causing TO cannot be rejected. LHDI, LOER, and TO to LGDPC: The Chi-square statistic of 8.210385 and the p-value of 0.0419 indicate that the joint null hypothesis of LHDI, LOER, and TO not Granger-causing LGDPC is rejected at the 5% significance level. This implies that at least one of the variables (LHDI, LOER, or TO) Granger-causes changes in GDP per capita.

The Granger causality tests provide valuable insights into the causal relationships between the variables. The most notable finding is the bidirectional causal relationship between LHDI and LGDPC, suggesting that economic growth (as measured by GDP per capita) and human development have a reinforcing effect on each other. This aligns with the existing literature highlighting the importance of economic growth in fostering human development and vice versa.

Furthermore, the joint causality tests indicate that the independent variables (LOER, TO, and LGDPC) jointly Granger-cause changes in the Human Development Index, and that at least one of the variables (LHDI, LOER, or TO) Granger-causes changes in GDP per capita. These findings reinforce the interconnected nature of these variables and the need for a holistic approach to policymaking.

5.0 Discussions, Conclusion and Recommendations

5.1 Discussions

The analysis provides insights into the relationships between foreign trade, exchange rates, and human development in Nigeria. When comparing these findings with the empirical literature reviewed, we observe both areas of agreement and disagreement.

The results indicate a positive and highly significant long-run relationship between GDP per capita (LGDPC) and the Human Development Index (HDI) in Nigeria. This finding is consistent with several studies from the literature review, such as Rahman et al. (2020), who found a significantly positive relationship between HDI and economic growth in both developed and developing economies. Intisar et al. (2020) also reported a positive relationship between GDP per capita and economic growth in their study on Asian countries.

The results reveal that the impacts of certain variables, such as exchange rates and trade openness, may take time to materialize or exhibit adjustment costs in the short run. This observation aligns with the findings of Mbang (2022), who reported a positive long-term relationship between FDI and human development in Cameroon but a negative short-term relationship, potentially due to adjustment costs or lack of investment in human capital enhancement.

The findings suggest that the impact of trade openness on human development in Nigeria is positive but statistically insignificant in the long run, and exhibits a mixed pattern in the short run. This contrasts with studies like Intisar et al. (2020), who found a significant and positive relationship between trade openness and economic growth in Southern Asia. Additionally, MirajulHaq and Muhammad Luqman (2014) substantiated that international trade enhances human capital accumulation and contributes positively to economic growth in Asian countries.

While the analysis indicates a positive and significant long-run impact of exchange rates on human development in Nigeria, the short-run impact is insignificant. This finding differs from the study by Aniegboka et al. (2018), which reported a decisive and compelling impact of exchange rates on human development in Nigeria. Nwogwugwu and Umeghalu

(2021) also found that exchange rates had a significant positive effect on economic misery in African countries with low human development.

These areas of disagreement highlight the complex and context-specific nature of the relationships between foreign trade, exchange rates, and human development. Several factors, such as the country's economic structure, trade patterns, policy environment, and time periods under consideration, may contribute to the divergent findings.

Additionally, the multidimensional nature of human development, which encompasses education, health, and living standards, may interact differently with trade and exchange rate variables across different contexts. The analysis focused on the overall Human Development Index, while some studies in the literature review may have examined specific dimensions of human development separately.

In summary, while the analysis aligns with some findings from the empirical literature, such as the positive impact of economic growth on human development and the presence of time lags and adjustment dynamics, it also diverges in areas like the role of trade openness and exchange rates. These discrepancies underscore the need for country-specific and context-sensitive analyses to inform policies aimed at promoting human development through trade and exchange rate channels.

5.2 Conclusions

The analysis has provided valuable insights into the relationships between foreign trade, exchange rates, and human development in Nigeria. Several key conclusions can be drawn from the findings:

The analysis confirms the critical role of economic growth, as measured by GDP per capita, in fostering human development in Nigeria. This finding aligns with the broader literature, highlighting the importance of sustained economic growth in generating resources for investment in education, healthcare, and overall improvements in living standards.

While trade openness is often touted as a catalyst for human development, the analysis reveals a more nuanced picture in the Nigerian context. The long-run impact of trade openness on human development is positive but statistically insignificant, suggesting that the benefits of trade openness may be counterbalanced by other factors specific to Nigeria's economy.

The analysis highlights the positive and significant long-run impact of exchange rates on human development in Nigeria. This finding suggests that exchange rate policies may play a crucial role in promoting human development, potentially by enhancing export competitiveness and economic growth.

The analysis indicates that the effects of certain variables, such as exchange rates and trade openness, may take time to manifest or exhibit adjustment costs in the short run. This observation underscores the importance of considering both short-run and long-run dynamics when formulating policies aimed at promoting human development.

5.3 Recommendations

Based on the conclusions drawn from the analysis, several recommendations can be made to policymakers and stakeholders in Nigeria:

i Given the strong positive relationship between economic growth and human development, policymakers should prioritize strategies that foster sustainable and

inclusive economic growth. This may involve diversifying the economy beyond oil exports, investing in productive sectors, and promoting an enabling environment for private sector development.

ii While the benefits of trade openness are not conclusive in the long run, efforts should be made to evaluate existing trade policies and address potential barriers that may hinder the realization of trade-related gains for human development. This could involve streamlining trade regulations, enhancing trade facilitation, and strategically promoting export-oriented industries.

iii The significant long-run impact of exchange rates on human development underscores the need for a holistic approach to exchange rate management. Policymakers should strive to maintain a competitive and stable exchange rate regime that supports export competitiveness while mitigating potential inflationary pressures and adverse impacts on imports of essential goods.

iv To fully capitalize on the potential benefits of economic growth, trade, and exchange rate policies, it is crucial to invest in human capital development and social infrastructure. This includes prioritizing education, healthcare, and other social services that directly contribute to improving the living standards and capabilities of the Nigerian population.

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