

Analysis of the Impact of Terrorism on Mining Production in Nigeria

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Article History

Received: 15.03.2025

Accepted: 22.04.2025

Published: 29.04.2025

Abstract: The research studied the impact of terrorism on mining production in Nigeria from 1990 to 2023 by studying other independent variables such as capital stock (CPST), technology (TECH) and human development index (HDI) which were sourced from institute for economic and peace (IEP): Global economic index, World Bank data portal, and Climate change knowledge portal. The study employed the Ordinary Least Square (OLS) multiple regression model with Auto-Regressive Distributive Lag (ARDL) model as tool for parameter estimation. The results of the study showed terrorism to have a negative and significant impact on mining production both in the long and short run period. Capital stock impacted negatively on mining in the long run but impacted positively in the short run with both relationships insignificant. Technology impacted negatively on mining in the long run and positively in the short run with both relationships being significant. human development index impacted positively and significantly on mining both in the long and short run. The study recommended proper monitoring and supervising of security projects to ensure transparency and accountability, regular investment in capital stock, organizing periodic training for workers, and increase allocation for science and technology among others.

Keywords: Terrorism, Mining, Capital, Human, Security.

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1.0 INTRODUCTION

Militancy in the south-south region, especially the part of Niger Delta hosting oil installations and facilities, has remained unabated despite introducing the Presidential Amnesty Programme (PAP), which secured a reduction of attacks on oil facilities. Following the introduction and activities of the PAP, the Niger-Delta region is

described as enjoying a relative peace. However, structural violence which led to the violent conflicts in the first instance has remained mainly unsolved (Ndubuisi, 2017). According to him this region consisting of about 31 million people, has continued to be experiencing various forms of insecurity from cultism to sea robbery, land struggles, electoral violence and gang activities etc.

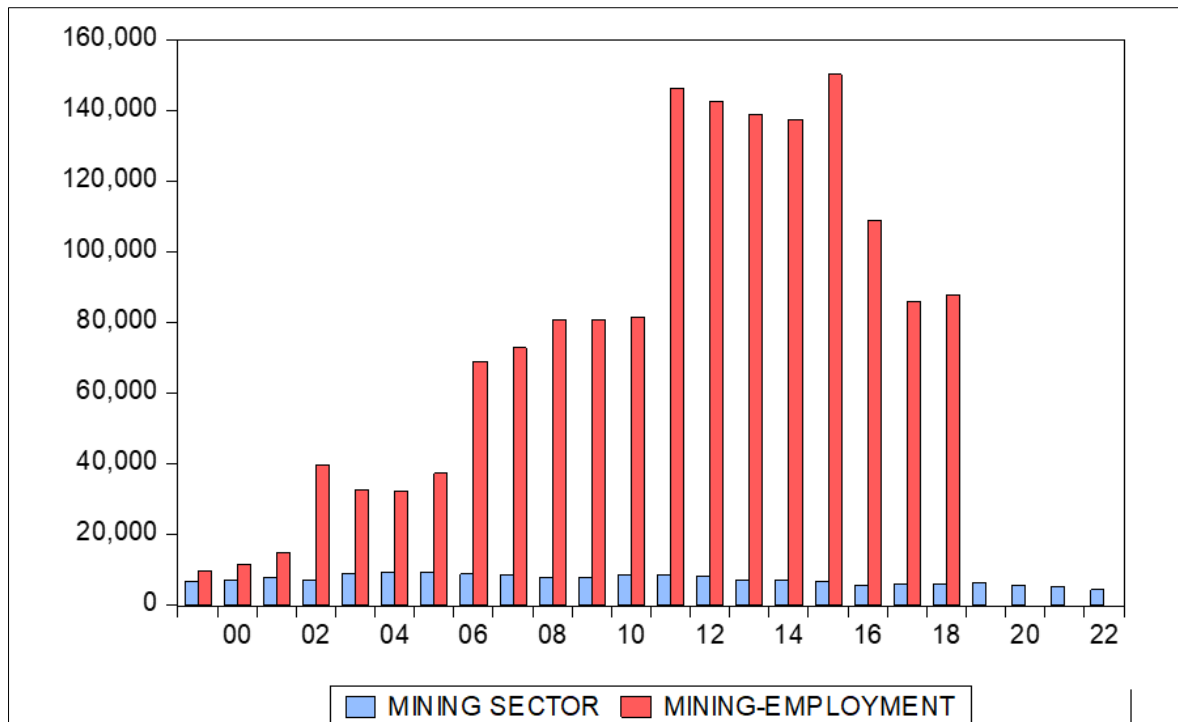


Figure 1.5: Contributions of Mining Sector to GDP and Employment Generation in Nigeria
Source: Central Bank of Nigeria Statistical Bulletin (2022)

From the diagram, y axis gives the contributions of mining sector to GDP and employment generation, while the x axis shows the years. Insecurity around the mining sites reduced the number of miners who access mining sites. This equally reduced the number of companies investing in this sector, and thus reduced the sector's contribution to overall GDP. According to the report from UNDP (2023), about 100 miners were kidnapped across mining sites in 2021. The fear of being killed, abducted or kidnapped which reduced the number of miners in mining sites has however led to the decline of the sector's contributions to GDP. The mining sector performed very poorly with average of 0.17% contribution to GDP between 2018 and 2022. Its contribution to GDP was 4.71% in 2022, which is lower than the rate of 5.25% in 2021. On employment generation, the sector also saw a decline. In 2005, the sector employed 69,001 people while in 2021, it declined to 25,618 number of employment (CBN, 2022).

The mining sector is not left out of the adverse effect of terrorism, as miners could not access mining sites due to the fact that mineral resources are found mostly in remote areas. Many foreigners who are licensed to explore these mineral resources had to leave for other countries, thereby, causing foreign direct investment inflows to decline and employment generation in the sector to decline. The share of employment generation in the mining sector in 2017 was 0.17% and 0.2% in 2022. With this

meager contribution of the sector to employment generation, the potential of the sector has not been fully realized. The sector's contribution to GDP in 2005 was 0.13% and 0.23% in 2022. This shows that mining sector poorly contributed to GDP over the years (CBN, 2022). All these seriously inhibit the growth of Nigerian economy.

Similarly, prior to the emergence of terrorism in 2009, the economy demonstrated stronger performance with an economic growth rate ranging from 7% to 8.4%. However, following the spike in insecurity in 2011, the growth rate declined to 5.3%, and subsequently plummeted to 3.3% in 2022, underscoring the negative influence of terrorism on Nigerian economy (NBS, 2022).

It is in the light of this, that this study investigates the impact of terrorism on the Nigerian economy using autoregressive distributed lag model (ARDL) to delve into both the short and long-term impact.

1.1 Research Questions

Following the statement of the problem, this study is aimed at providing answers to these questions posed thus:

1. What impact does terrorism have on mining in Nigeria?
2. To what extent does capital stock impact on mining in Nigeria?
3. What is the relationship between technology and mining in Nigeria?

4. How does human development index affect mining in Nigeria?

1.2 Objectives of the Study

The broad objective of conducting this study is to examine the impact of terrorism on Nigeria's Mining production. The following specific objectives of this study include;

1. To investigate the impact of terrorism on mining in Nigeria.
2. To ascertain the extent at which capital stock affect mining in Nigeria.
3. To determine how technology impact on mining in Nigeria.
4. To which extent does human development index Impact on mining.

1.3 Research Hypotheses

The null hypotheses guiding this study are highlighted as follows;

1. Terrorism does not have significant impact on mining.
2. Capital stock does not have significant impact on mining.
3. Technology has no significant impact on mining.
4. Human development index has no impact on mining.

2.0 LITERATURE REVIEW

Terrorism

The term terrorism is a violent armed rebellious group who practice guerrilla warfare from rural base to a larger authority if not controlled. (Fearon, & Laitin, 2003, Kalyvas & Balcells, 2010). According to World Health Organization (2002), it is an intentional use of physical force or power to cause harm against one-self, another person and against a group or community which results to death or injury or mental harm. It continues to be used interchangeably and inexactly with warfare such as irregular warfare, unconventional warfare, revolutionary and even terrorism. Moore (2007) further posits that "the interchangeability of terms is understandable, given the diverse nature and adaptability of those who wage terrorism and the overlapping traits of these types of conflict". A different scholar defined terrorism as a group whose aim of existence may have been out of government ignorance to their demand and then formulate to overthrow a constituted government. Based on the focus of this study as it focuses on all the geo-political zones, the definition given by US Government (2012) serves as the working definition of this study. This is because the definition explicitly outlines terrorism and those conflicts that are categorized as terrorism, which captures all the insecurity in the six geo-political zones of Nigeria.

2.1 Mining

According to the definition of Balsuramanian (2016) mining is the exploitation of valuable economic and ecological materials from the earth surface and beyond to the inner part which could be from body of ore, lode, seam, vein, place deposit or reef. He further stressed that right from the time when the world start to experience civilization mineral materials from stone such as ceramics and variant classes of metals and other earthly minerals were found in the earth and they serve as major sources of power and inputs for the industries. Some earthly materials are used for the manufacture of fertilizers, tools, machines and weapons in the early days.

The activities of miners are being obstructed in some parts of Nigeria especially Zamfara state in the north west where there is large deposit of gold, Kogi, Niger in the north central state with large volume of coal and Enugu in the south east with large deposit of coal also.

2.2 Empirical Review

Rashmawati *et al* (2024) wrote on the threat of terrorism to mining activities in Indonesia: a case study at the Grasberg gold mine, Papua. Their study focused on investigating and analyzing the impact of terrorism threats on mining activities, look at the security measures put in place to curb security threats and to suggest what could be done to improve security against threats in mining areas that are most vulnerable to terrorism threats most especially at the Grasberg mining operation site and investment in Indonesia. They used the qualitative approach, adopting the content analysis technique and found that security incident impacted negatively on gold mining operation and investment in Indonesia. Strengthening of security system and cooperation of stakeholders mining in the country among others was made.

A research brief by national consortium for the study of terrorism and response to terrorism (NCSTRT) University of Maryland (2015) conducted a research on terrorism trends with a focus on energy and mining. The research was conducted to make available information on the frequency and nature of terrorist attack (the major actors and sponsors) on mining and energy related target from 1970 to 204 and revealed that terrorism has high potential of causing significant economic damage and damage to lives and communities thereby resulting in displacement and unwarranted economic loss.

A study by GIABA (2019) on money laundering and terrorist financing linked to the extractive industry/mining sector in West Africa revealed that the industry is one of the largest in the

world and constitutes significant parts of the economies for many African countries producing a large share of their gross domestic product. According to this paper, terrorist activities have the productivity of the sector by way of exploitation by terrorist as a source of financing their nefarious ventures leading to a considerable amount of the revenue generated from the sector being laundered and unproductively wasted by the terrorists.

The United Nation Security Council Counter-Terrorism Committee Executive Directorate (CTED) concern over the use of proceeds from mineral exploitation, trade, and trafficking of natural resources for the purpose of terrorism has discovered that terrorists use revenue generated from exploitation, trade and trafficking of natural resources for financing terrorism and recommended all states to take all measures that would bring end to illicit trade in natural resources especially gold mining sector and to bring perpetrators to book to ensure these terrorist groups do not benefit from their illegal activities.

Ejiofor (2025) wrote on accumulation by/for terrorism: the political economy of terrorism financing in Nigeria. His study focused on the various sources of finance for terrorist activities in North West Nigeria by uncovering the myriad of financing sources for terrorist activities generated from

ransom, extortion, robbery, forced labour, illegal mining, cattle rustling and so on. The study found unemployment, corruption and lack of government action in bringing criminals to book by appropriately punishing them. It recommended creation of employment, sincere tackling of corruption and the activeness of government in serving the appropriate punishment to offenders to serve as deterrent to others.

3.0 MODEL SPECIFICATION

The model is developed to estimate parameters and to capture the impact of terrorism on mining in Nigeria, considering other core variables such as capital stock, technology, and human capital development.

$$MINO = f(TERR, CPST, TECH, HDI) \tag{1}$$

Where,
 MINO = Mining production
 TERR = Terrorism
 CPST = Capital stock
 TECH = Technology
 HDI = Human development index

The models are mathematically specified as

$$MINO_t = \beta_0 + \beta_1TERR_t + \beta_2CPST_t + \beta_3TECH_t + \beta_4HDI_t + \mu_{t3} \tag{2}$$

$$\Delta \ln MINO_t = \beta_0 + \sum_{i=1}^p \beta_1 \Delta \ln MINO_{t-1} + \sum_{i=1}^p \beta_2 \Delta \ln TERR_{t-1} + \sum_{i=1}^p \beta_3 \Delta \ln CPST_{t-1} + \sum_{i=1}^p \beta_4 \Delta \ln TECH_{t-1} + \sum_{i=1}^p \beta_5 \Delta \ln HDI_{t-1} - \mu_{t2} \tag{3.20}$$

Where,
 β_0 = intercept,
 $\beta_1, \beta_2, \beta_3$ and β_4 = parameters of estimation
 μ = error term

3.1 Variables Explanation and measurement.

- i. **Mining Production:** It is the total output of production made by the mining sub-sector. It is one of the variables that explain economic growth in model one, and dependent variable in model three. The variable was measured in billions of naira and it is expected to have positive impact on economic growth in Nigeria.
- ii. **Terrorism:** Terrorism is a violent armed rebellious act practiced in form of guerrilla warfare from rural base to a larger authority if not controlled. (Fearon, & Laitian, 2003;

Lewis, 2020: Kalyvas & Balcells, 2010). It is the major independent variable of concern in this study and it is proxied by terrorism index.

- iii. **Capital Stock:** this is proxied by general government capital stock and it is measured in billions of Naira.
- iv. **Technology:** this variable is a measure of government expenditure on research and development and measured in billions of Naira
- v. **Human Development index:** HDI is a measurement for decent standard of living and it is measured in gross national income per capita in purchasing power parity term in dollar.

4.0 DATA PRESENTATION, ANALYSIS AND RESULT DISCUSSION

Table 1: Summary of the ADF Unit Root Test

Variables	ADF Statistics	Critical Value @5%	Order of Integration	Remarks
TERR	-3.4262	-3.4599	I (1)	Stationary
MINO	-5.0170	-2.9981	I (1)	Stationary
TECH	-3.3212	-2.9919	I (0)	Stationary
CPST	-3.0909	-3.0049	I (0)	Stationary
HDI	-6.9752	-29980	I (1)	Stationary

Source: Researcher’s Computation Using Eviews 12.

The Augmented Dickey Fuller test presented in **Table 2** is presents the stationarity results. From the results, TERR, MINO, and HDI are stationary at first difference, meaning they are integrated of order one. On the other hand, TECH, and CPST are stationary at level. This is seen in the ADF statistics against the critical values at 5 percent as the ADF values in absolute terms are greater than the critical

values at 5 percent level. This leads to the rejection of the null hypothesis that the variables have unit root. It is then concluded that the variables are stationary and the estimates can produce consistent and unbiased results. Based on this mixed order of integration, the ARDL Bounds test was conducted to show the long run relationship.

Table 2: Summary of ARDL Long Run Estimates

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TERR	-0.014335	0.004835	-2.964999	0.0039
CPST	-0.013867	0.014093	-0.983932	0.3279
TECH	-0.098217	0.333594	-2.992309	0.0036
HDI	0.732623	3.376268	5.131769	0.0000
C	6.280478	0.748883	8.386457	0.0000

Source: Researcher’s Computation Using Eviews 12.

The long run model results in **Table 2** reveals that terrorism (TERR), capital stock (CPST) and technology (TECH) have negative impact on mining sector growth (MINO) in Nigeria. The values which are -0.0143, -0.0139 and -0.0982 show that on average, if TERR, CPST and TECH are increased by 1 percent, MINO will decrease by 1.4%, 1.3% and 9.8% respectively. Conversely, human capital development (HDI) has positive relationship with mining sector growth in Nigeria. This indicates that on average, 1

percent increase in HDI will increase MINO by roughly 73%.

4.2 ARDL Bounds Test for Cointegration

The next step after determining the order of integration of the variable is to apply a bound F-test in order to establish a long-run relationship among the variables. The results of the bounds test for ARDL co-integration approach alongside with critical values are reported in **Table 3**.

Table 3: ARDL Bounds Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I (0)	I (1)
F-statistic	3.520108	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Researcher’s Computation Using Eviews 12.

Table 3 presents the summary of ARDL Bounds test for co-integration for the three models to establish a long run relationship among the variables. The result however shows that there is cointegration among the variables since the F statistic value of 3.5201 is greater than the upper and lower bounds at

5 percent critical level. This leads to the rejection of the null hypothesis which states that there is no long run relationship among the variables. It is therefore concluded that there is long run relationship amongst the variables.

4.4 ARDL Error Correction Model

Table 4: Summary of ARDL Error Correction Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.961334	0.248106	3.874686	0.0002
D (MINO (-1))	0.153067	0.041741	3.667036	0.0004
D (TERR (-1))	-0.002194	0.000893	-2.457594	0.0160
D (CPST (-1))	0.002123	0.002398	0.885290	0.3785
D (TECH)	0.152794	0.058607	-2.607078	0.0108
D (HDI (-1))	0.652074	0.701151	3.782458	0.0003
CointEq (-1)	-0.153067	0.032378	-4.727430	0.0000
R-squared	0.698815	Mean dependent var		-0.001844
Adjusted R-squared	0.682293	S.D. dependent var		0.019058
S.E. of regression	0.013713	Akaike info criterion		-5.699813
Sum squared resid	0.017111	Schwarz criterion		-5.592281
Log likelihood	274.7411	Hannan-Quinn criter.		-5.656362
Durbin-Watson stat	2.123755			
F-statistic	3.520108			

Source: Researcher’s Computation Using Eviews 12.

From the error correction model in **Table 4**, the coefficient of the lagged value of terrorism (TERR) is negative with a value of -0.0219, which implies that on average, 1 percent increase in the lagged value of TERR will cause mining production to decrease by approximately 2.2%. This finding agreed with GABI, Ejofor and CTED.

Capital stock (CPST), technology (TECH) and human development index (HDI) showed positive relationships with coefficients of 0.0021, 0.6521 and 0.0652 respectively. This means that on average, 1 percent increase in CPST, TECH and HDI will increase MINO by 0.2% and 65% and 6.5% respectively. The error correction term (ECM) of -0.1531 with the prob. value of 0.0000 shows that any disequilibrium in the previous year will be adjusted for with about 15% in the current year.

The Coefficient of Determination (R²) shows the proportion of the variations in the dependent variable that are explained by independent variables. From the result, for model one the R² of 0.6988 suggests that 70% variations in mining sector growth are explained by terrorism, capital stock, technology and human development index, while 31% can be explained by other variables captured by the error term.

4.5 Knowledge Gap

The study covered 1990 to 2023 using core variables that affect mining production just like any other production. These core variables in addition to terrorism are capital stock, technology and human development index for human capital development. As a result of the difference in variables used, the

study faced a major challenge of enough related literatures for review.

5.0 CONCLUSIONS

The study examines the impact of terrorism on mining in Nigeria for the period 1999 to 2022. In order to gain more insights into the topic, conceptual issues on terrorism and mining were reviewed. However, the definition of US Government (2012) formed the working definition of the study. Theories are also reviewed to gain theoretical background for the study. Amongst the theories that were reviewed are; frustration-aggression theory, relative deprivation theory, cognitive dissonance theory and endogenous growth model by Lucas and Romer. The endogenous growth model however formed the theoretical framework for the study. Similarly, other related issues were reviewed under which the overview of terrorism, Boko Haram activities were discussed. The empirical works were thematically reviewed both for Nigeria and other countries of the world based on availability of the empirical works. In the course of reviewing works, empirical and methodological gap were found which this study filled by employing ARDL and using parameters that have received limited attention.

Furthermore, before applying the ARDL, unit root test, using ADF test was conducted to ensure the variables are stationary. It was found that RGDP, TECH, and CPST, are stationary at level, while TERR, MINO and HDI, are stationary at first difference. The variables were also tested for long run relationship by employing ARDL Bounds test. It was revealed that long run relationship exists among the variables. Then, both the long run and short run estimates were carried out. On the contrary, terrorism has negative

impact on economic growth while capital stock have positive relationships with mining growth.

For model one, CPST, LFPR, DEFS and INFL are positive both in the long and short run. The positive values indicate that if on average, CPST, are increased by 1 percent, economic growth will increase by 0.07%, in the long run and by 0.08%, respectively. In a similar vein, terrorism and poverty have negative impact on both AGRO and MINO with the values of -0.01%, -0.89%, -0.002%, and 0.15% in the short run and negative values of -0.03%, -0.63%, -0.01% and -0.098% in the long run. The error correcting term for the model have the expected sign of 0.15 for model one. The R² for the model shows that 70% variations in the dependent variables are explained by the explanatory variables of the model. The post estimation tests conducted show that the models are reliable for economic predictions.

5.2. CONCLUSION

Terrorism had a negative and significant relationship with mining Nigeria both in the long and short run period, meanings that it significantly impact on mining production in the country. So, conclusively it is one of the factors that decrease mining output in the country.

The relationship between capital stock and mining was also negative but insignificant in the long run and positive and insignificant in the short run, meaning that they are having indirect and insignificant relationship in the long run and a direct and insignificant relationship in the short run. It is concluded as one variable that does not significantly impact on mining in Nigeria.

Technology is seen to negatively and significantly impact on mining operation in the long run but positively and significantly related to mining in the short run. We conclude that it is one of the factors that significantly and positively affect mining in the short run and negatively in the long run.

Human development index as a proxy for human capital development had a positive and significant relationship with mining both in the long and short run. Technology is therefore concluded as one of the factors that impact on mining production in Nigeria.

5.3. Policy Recommendations

We have seen that terrorism retard mining operation in Nigeria and should be taken serious by all levels of government. Fund earmarked for defense should be properly channeled toward that purpose. It should be objectively done with all transparency and with sincerity. All funds released for security purpose should be accounted for through periodic retirement

and any corrupt personnel should be disciplined accordingly.

Investment in capital stock should be encouraged both in the private and public sector especially in the mining sector. There should also be encouragement in public-private partnership in mining to create synergy in tackling terrorism in Nigeria. This will ensure greater output in the mining sector with reduced terrorists' activities.

Improvement in science and technology through education and investment in capital stock will increase mining output in the country. The government should therefore increase allocation to science and technology, establish industries that produce machines and equipment that are useful in the sector.

The government should organize periodic training for miners to quire new knowledge in the field of mining and safety so s to be productive and proactive at the same time. Workers can also attend institution on study leave to improve themselves on recent scientific discoveries and innovations.

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