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INFRASTRUCTURAL PROTECTION, SECURITY, AND PREVENTION OF OIL THEFT IN THE NIGER DELTA

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ABSTRACT

This study investigates the impact of infrastructural protection on security and the prevention of oil theft in Nigeria's Niger Delta region. The research addresses the gap in understanding the direct relationship between government expenditure on infrastructure protection and the reduction of oil theft and revenue losses. Using the Autoregressive Distributed Lag (ARDL) model, the study analyzes the relationship between key variables: government expenditure on infrastructure, crude oil losses, and revenue losses from oil theft. Findings reveal a strong positive influence of government investment in infrastructural protection on reducing oil theft and safeguarding economic stability. However, crude oil losses continue to pose challenges despite increased expenditures, indicating that additional measures, such as enhanced local surveillance and community engagement, are necessary to strengthen protection. The study recommends a multi-faceted approach that includes the digitalization of the oil and gas sector, using technologies like robotics, drones, IoT, and cloud computing, and also stakeholders' engagement between the government, host communities, and oil companies.

Keywords: Government Expenditure; Infrastructural; Infrastructural Protection; Oil Theft; Insecurity; and Revenue Losses.

1.0 INTRODUCTION

The Niger Delta, though subject to some debate regarding its exact geographical boundaries, is officially recognized to encompass nine states in Nigeria: Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers. These states are primarily situated within the South-South geopolitical zone in Nigeria (Idemudia, 2007a). Collectively, the Niger Delta spans an area of approximately 70,000 square kilometers, which constitutes about 7.5% of Nigeria's total landmass (Niger Delta Development Commission [NDDC], 2001). The region accounts for about 12% of Nigeria’s landmass and supports a population of over 28 million, as recorded in the 2006 census (Nigerian National Bureau of Statistics, 2022). The Niger Delta region plays a pivotal role in Nigeria's economy and contributes nearly 90% of the nation's foreign exchange earnings and about 60-70% of government revenue. However, despite its significant contribution to national wealth, the Niger Delta faces complex issues stemming from oil exploration activities, including environmental degradation, socioeconomic disparities, and security challenges (Ibaba, 2017; Agbiboa, 2013). Environmental degradation is a particularly acute issue in the Niger Delta. Frequent oil spills, gas flaring, and industrial pollution have significantly impacted the region’s ecosystems, adversely affecting agriculture and fishing, which are primary livelihoods for many local communities (Ordinioha & Brisibe, 2013).

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According to Amnesty International (2018), oil spills from aging infrastructure and poor maintenance practices have led to contaminated water sources, destruction of farmlands, and a decline in biodiversity. Consequently, these environmental issues have amplified socioeconomic grievances as local communities experience limited access to clean water, reduced agricultural yields, and increased health risks. This situation has alienated many community members from the government and oil companies, resulting in widespread unrest and resentment (Okonta & Douglas, 2001; Obi, 2010). The neglect of the Niger Delta region has not only fostered socioeconomic grievances but has also led to increased insurgent activities, particularly between 2005 and 2009, when militants frequently attacked oil infrastructure. These attacks caused substantial financial losses and disruptions to Nigeria's oil production, further highlighting the vulnerability of the oil sector to sabotage (Ibaba & Ikelegbe, 2010). Omeje (2006) asserts that local discontent, fueled by poverty and political marginalization, has made infrastructural sabotage an appealing option for many, significantly compromising the region's security. Weak security measures and insufficient protection of oil infrastructure have exacerbated this problem, enabling organized crime and oil theft to flourish. Eze (2021) notes that the resulting illegal bunkering and pipeline vandalism have contributed to severe environmental damage, economic losses, and negative impacts on the health and livelihoods of residents.

Efforts by the Nigerian government to address these security concerns have included deploying military forces and outsourcing security to private firms. However, studies suggest that these strategies, while necessary, are insufficient to address the root causes of the insurgency and sabotage (Agbiboa, 2013; Idemudia, 2009). Researchers advocate for a more integrated approach that combines enhanced security measures with socioeconomic interventions, such as creating employment opportunities, improving local infrastructure, and implementing effective Corporate Social Responsibility (CSR) programs. Idemudia (2010) argues that oil companies' CSR initiatives can enhance positive community relations by directly addressing local grievances related to environmental damage and lack of development. Additionally, Omeje (2005) emphasizes the importance of transparency and accountability in oil revenue management to build trust among local communities, the government, and oil companies. A community-centric approach. Ikelegbe (2005) suggests that employing community members in infrastructure protection roles could mitigate sabotage by fostering a sense of ownership and responsibility for the region's resources. Integrating these elements can help mitigate the impact of oil theft and infrastructure sabotage, ultimately promoting sustainable development and improving the well-being of local communities (Agbiboa, 2013; Amnesty International, 2018). Based on the foregoing, this study investigates the impact of infrastructural protection on security and prevention of oil theft in the Niger Delta region of Nigeria.

1.1 Statement of the Problem

The discovery of crude oil solidified Nigeria's status as one of the world's major oil-producing nations. Between 1971 and 2005, Nigeria saw significant growth in oil production, which transformed the country's economic landscape (Sani & Nwoye, 2023). Currently, the petroleum sector contributes about 6.33% to Nigeria's Gross Domestic Product (GDP) and accounts for over 90% of the nation's export earnings (Statista, 2022). As one of the largest oil producers globally, Nigeria's oil production has fluctuated over recent years. In early 2020, the country was producing over two million barrels per day. However, production has declined,

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with notable fluctuations due to factors internal challenges such as pipeline vandalism, oil theft, infrastructure challenges, and regulatory changes (Osagie et al., 2021). By October 2023, daily production had dropped to around 1.35 million barrels, marking a decrease from previous highs and highlighting challenges in maintaining production capacity. Notably, July 2023 saw the lowest production level since September 2019, reflecting ongoing volatility in Nigeria's oil industry (Nigerian National Petroleum Corporation, 2023; OPEC, 2023).

Drawing on the Sustainable Development Theory (Brundtland Commission, 1987), this study posits that robust infrastructural protection can significantly enhance security measures, mitigate oil theft, and improve security in oil-producing regions of the Niger Delta. The argument is that when critical infrastructure, such as pipelines and refining facilities, are well-guarded and adequately maintained, it becomes more difficult for individuals to tamper with these assets. Effective infrastructure protection acts as a deterrent against theft by reducing opportunities for illegal siphoning and vandalism (Audu & Shola, 2020). For example, Omeje (2006) emphasizes the role of infrastructure in resource-rich regions, noting that neglected communities often turn to informal and illegal resource extraction as a means of livelihood. Furthermore, Audu and Shola (2020) suggest that comprehensive security infrastructure like surveillance systems, regular pipeline monitoring, and collaborative local security initiatives can reduce incidents of theft by enhancing the detection and prevention of unauthorized access. Therefore, this study contends that investment in infrastructural protection can address the root causes of insecurity and oil theft in the Niger Delta region.

2.0 THEORETICAL FOUNDATION

This study is anchored on the Relative Deprivation Theory (Gurr, 1970) and Sustainable Development Theory (Brundtland Commission, 1987). Relative Deprivation Theory, as proposed by Gurr (1970), suggests that individuals or communities experience discontent when they perceive a gap between their expectations and reality, particularly regarding access to wealth and resources. In the Niger Delta region, where the local populace is surrounded by the wealth generated from oil extraction yet experiences poor living conditions, this perceived disparity can lead to feelings of resentment and frustration. This frustration often manifests as social unrest or even sabotage, as disenfranchised communities react against the oil companies and the government that they perceive as monopolizing the benefits of their local resources. Studies (Obi & Rustad, 2011; Ikelegbe, 2005) indicate that unmet expectations can fuel grievances and lead to protests and sometimes violent conflicts. On the other hand, Sustainable Development Theory emphasizes that development must meet the needs of the present without compromising the ability of future generations to meet their own needs. This theory underscores the importance of creating policies that not only boost local employment and reduce inequality but also protect the fragile ecosystem that is often damaged by oil extraction activities. Sustainable development aligns with the community's well-being by supporting policies that encourage diversified economic activities beyond oil that will reduce the over-reliance on a single resource of income (Etemike, 2009). These theories provide a framework that calls for addressing economic imbalances and ensuring environmental sustainability in the Niger Delta.

2.1 Oil Theft and Insecurity in the Niger Delta

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Oil theft has been a persistent issue in Nigeria's oil industry since the 1980s, impacting the sector on multiple levels (Ikelegbe, 2005). Oil theft, commonly referred to as illegal oil bunkering, remains a major issue in Nigeria, particularly in the Niger Delta region. This activity involves the illegal siphoning of crude oil from pipelines and flow stations, either for local use or for export through illicit channels. This illicit activity manifests in three primary forms. The first involves direct sabotage and the physical breakage of crude oil pipelines and other related infrastructure, allowing criminals to siphon crude oil for sale or local refining. This process not only results in immediate economic losses but also causes substantial environmental damage due to spills and fires, further exacerbating the region's socio-environmental challenges (Ikelegbe, 2005; PRSTF, 2012). The second dimension of oil theft targets refined petroleum products. Pipelines transporting refined products such as kerosene, petrol, and diesel are frequently vandalized for theft, either to supply the black market or as part of a networked operation involving community members and local stakeholders (PRSTF, 2012). This type of theft often disrupts local supply chains and drives up prices, impacting both regional economies and ordinary citizens who rely on these products for daily activities (Ibaba, 2017).

Finally, the third dimension involves more sophisticated forms of theft, such as the under-invoicing of crude oil exports. This manipulation often employs falsified bills of lading to obscure the true value and volume of oil exports, allowing perpetrators to evade taxes and skim profits before they reach government coffers (Ufuoma & Omoruyi, 2014). The National Oil Spill Detection and Response Agency (NOSDRA) reported that in 2022 alone, nearly 84% of oil spills were attributed to oil theft and sabotage which has hurt the economic activities of the Niger Delta region. The environmental consequences of oil theft and pipeline vandalism in Nigeria extend far beyond immediate economic losses. The destruction of oil infrastructure leads to significant ecological damage, including reduced agricultural productivity, harm to aquatic ecosystems, and the introduction of toxic substances into the food chain, which poses severe health risks to local communities (Ordinioha & Brisibe, 2013). Oil spills and gas flaring release contaminants that degrade soil quality, reduce crop yields and compromise freshwater sources, further destabilizing local economies that rely on fishing and farming (Amnesty International, 2018).

Nigeria has sustained severe financial losses due to oil theft and pipeline sabotage, which continue to undermine its crude oil production and revenue generation. In the first five months of 2024 alone, the country reportedly lost approximately $3.57 billion due to oil theft, with around 400,000 barrels per day (bpd) siphoned off through illegal channels (Nigerian National Petroleum Corporation, 2024). These losses are substantial, given that Nigeria has the potential to produce about 2 million bpd but currently averages below 1.6 million bpd, largely due to theft and operational inefficiencies (NNPC, 2024; Eze, 2021). The networks involved in oil theft are intricate, encompassing a broad range of actors at both local and international levels. These include local community members, politicians, security personnel, and foreign traders, thereby creating a multi-layered web of complicity that makes enforcement challenging (Aghedo & Osumah, 2015). This complex criminal enterprise has persisted despite intensified security measures, pointing to deep-rooted issues of corruption and socioeconomic disparities that drive individuals and groups to participate in illegal oil extraction (Obi, 2010; Omeje, 2006). In this study, therefore, oil theft is defined as the illegal extraction of crude oil or refined petroleum products from pipelines, storage facilities, and other oil infrastructure, resulting in significant economic loss, environmental degradation, and socio-political destabilization.

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2.2 Infrastructure and Infrastructural Protection

Infrastructure constitutes the essential physical and organizational systems that support economic development and societal functionality. This includes, but is not limited to, transportation networks (such as roads, railways, and airports), energy systems (covering electricity, oil, and gas), water supply, telecommunications, and other critical services that underpin daily life. Conceptually, infrastructure is both the tangible assets and operational frameworks necessary for societal stability and economic growth. The Organization for Economic Co-operation and Development (OECD) defines infrastructure as "the basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions" (OECD, 2018). Similarly, the World Bank (2020) describes infrastructure as the "backbone" of economic development, emphasizing its role in facilitating efficient trade, industrial productivity, and effective communication networks crucial for developing economies.

In sub-Saharan Africa, the role of reliable infrastructure is particularly pivotal in attracting foreign direct investment (FDI) and stimulating industrial development. Research suggests that infrastructural investment in underserved regions can drive industrial activities and economic diversification. In Nigeria, for example, improved energy access has enabled rural industries to process agricultural products locally, reducing dependence on imports and strengthening internal supply chains (Okoye & Onu, 2020). Enhanced road networks similarly facilitate access to markets, helping reduce post-harvest losses and supporting food security, both of which are vital for agricultural advancement (Udoh & Akpan, 2021). Despite the critical importance of infrastructure, Nigeria's infrastructure investment significantly lags, comprising only 35% of the nation's Gross Domestic Product (GDP), as opposed to the 70% benchmark typical of peer emerging markets (World Bank, 2022). This substantial gap underscores the urgent need for infrastructure protection to align with Nigeria's economic aspirations and enhance the overall quality of life.

In regions like the Niger Delta, where poor infrastructure has severely hampered economic growth, infrastructural investment can catalyze economic transformation by making isolated areas more accessible and supporting local industries. For instance, rural electrification projects can empower farmers to process crops such as cassava into marketable products, fostering economic self-sufficiency and reducing rural poverty (African Development Bank, 2018). Similarly, expanding access to reliable water sources, better roads, and telecommunications could revitalize these communities, thereby promoting equitable economic growth across Nigeria.

To sustain these improvements, infrastructural protection becomes essential for economic growth. Infrastructural protection refers to the strategies and measures implemented to safeguard critical infrastructure against disruptions that could impact functionality, security, or resilience. This includes security protocols, regular maintenance, and surveillance to protect against threats such as vandalism, natural disasters, and cyber-attacks (Department of Homeland Security, 2019). The International Organization for Standardization (ISO) defines infrastructural protection as a "systematic approach to ensuring the availability, reliability, and robustness of essential services and resources," emphasizing the need for collaboration between the public and private sectors to address these challenges (ISO, 2018). In Nigeria,

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infrastructural protection has become particularly relevant as oil pipelines, telecommunications networks, and energy grids frequently fall victim to theft and sabotage, posing significant risks to national economic stability (Nwankwo, 2020).

2.2.1 Infrastructural Protection, Security, and Prevention of Oil Theft in the Niger Delta

According to the World Bank (2020), the Niger Delta remains one of the most economically marginalized regions of Nigeria, despite its wealth in natural resources, due to this perpetual cycle of violence and infrastructural decay. These decades of economic neglect gave rise to militancy in the Niger Delta. Primarily, militancy was driven by economic subjugation, deprivation, and environmental degradation from oil and gas exploration activities. These armed groups target and vandalize oil and other basic infrastructures, which significantly contributes to economic losses and, consequently, weaken both the Niger Delta region and Nigeria's economy (Edun et al., 2023; Ebiede & Nyiayaana, 2022). Despite government interventions such as the 2009 Amnesty Program, militancy and other restiveness persist (Aghedo & Osumah, 2012). The economic implications of this insecurity are severe and affect oil production, basic infrastructures like roads, healthcare facilities, and water systems, which are key to daily life (Agbiboa & Maiangwa, 2013; Nkwocha & Onyekwere, 2010). The destruction of these infrastructures reduces economic activities within the region and causes food insecurity (Odoemene, 2011).

Recent literature emphasizes the importance of multi-stakeholder collaboration in addressing these challenges. Ojo and Akinola (2023) propose a public-private partnership model that brings together the government, oil companies, and local communities to create sustainable solutions for infrastructural protection. When communities feel that they are not only beneficiaries but also custodians of infrastructure, they are more likely to defend it against sabotage and vandalism (Aigbavboa & Thwala, 2013). Such collaboration could mitigate the risks of violence and improve economic and social outcomes for the Niger Delta. Moreover, through partnerships and active engagement, communities can better detect and deter acts of sabotage that frequently disrupt oil production and other essential services in the Niger Delta (Aigbavboa & Thwala, 2013). These partnerships, coupled with advanced technological solutions like IoT sensors, drones, and cloud computing, have been argued to have the potential to revolutionize the oil and gas sector, improve operational efficiency and reduce risks (Zouaghi et al., 2021; Rejeb et al., 2022). Drones, for example, equipped with high-resolution sensors, can detect leaks and environmental anomalies and prevent costly damages. Also, Zouaghi et al. (2021) argued that IoT-enabled predictive maintenance can minimize equipment downtime and extend infrastructural asset lifespan.

3.0 EMPIRICAL REVIEW

Several other pieces of literature have exposed the issue of crude oil theft in the Niger Delta. For instance, Alabi and Ntukekpo (2012) investigated the oil companies and corporate social responsibility in Nigeria. Obenade et al. (2014), on the other hand, investigated the socioeconomic implications of oil theft and artisanal refining in the Niger Delta Region of Nigeria. Schultze-Kraft, (2017) analyzed the relationship between organized violence, crime, and oil theft in the Niger Delta, exploring how political settlements and amnesty programs have influenced the dynamics of oil-related criminality. Ite et al. (2018) investigated the

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contamination of surface and groundwater in the Niger Delta due to oil exploration and theft. The study highlighted the environmental challenges faced by local communities. Bodo and Gimah (2020) reviewed the pollution and destruction of the Niger Delta ecosystem, attributing responsibility to both oil companies and local militancy with emphasis on the implications for environmental policy. Similarly, Odubo and Odubo (2022) examined how government policies addressing artisanal refining and oil theft have worsened ecological degradation and insecurity in the Niger Delta. Also, Moses (2023) analyzed the economic implications of crude oil theft in Nigeria, linking the issue to the broader resource curse theory and its impact on national security and development. Ozogu (2023) assessed the negative effects of vandalism and crude oil theft on the Igbomatoru community.

3.1 Methodology

Data for this study was obtained from the Central Bank of Nigeria CBN Statistical Bulletin (2000-2023). The variables are Government Expenditure on Infrastructure Protection Security and Prevention, which is the Independent Variable, while Barrel of Crude Oil Losses in Nigeria and Revenue Losses from Oil Theft are the indicators of the dependent variable. The Autoregressive Distributed Lag (ARDL) model was used for the analysis. The (ARDL) is a popular econometric tool used to analyze the relationship between variables when they may be integrated at different levels, such as stationary and non-stationary series. The ARDL approach was used due to its flexibility in variable integration without requiring unit root pre-tests. This model aligns well with the complexities of Nigeria's oil sector, where government expenditure on infrastructure protection and oil theft may exhibit varying patterns over time.

3.2 Data Analysis

Descriptive statistics

	LNGEX	LNCOL	LNRLO
Mean	5.430930	3.647517	1.510558
Median	5.622389	3.648139	1.495307
Maximum	6.715403	4.615615	6.402978
Minimum	3.225043	2.580974	0.357674
Std. Dev.	0.981386	0.491923	1.120756
Skewness	-0.609280	-0.096803	3.582576
Kurtosis	2.463426	2.633267	16.57900
Jarque-Bera	1.772801	0.171976	235.7286
Probability	0.412137	0.917605	0.000000
Sum	130.3423	87.54041	36.25339
Sum Sq. Dev.	22.15172	5.565722	28.89015
Observations	24	24	24

Source: Authors' Computation (2024)

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The descriptive statistics for LNGEX (Government Expenditure on Infrastructure Protection), LNCOL (Barrel of Crude Oil Losses in Nigeria), and LNRLO (Revenue Losses from Oil Theft) provide a comprehensive overview of the relationships and patterns among these variables. The mean of LNGEX at 5.43 indicates a significant level of government investment in infrastructure protection, which is crucial for mitigating the impacts of oil theft and losses. The values reveal a relatively symmetric distribution, as shown by the mean and median being close, suggesting consistent spending trends (Uduji & Okolo-Obasi, 2019). In contrast, LNCOL has a mean of 3.65, indicating that oil losses are prevalent but relatively stable, given the close mean and median values. This stability is critical since oil revenue significantly impacts Nigeria's economy (Okoro, 2017). The most concerning statistic lies with LNRLO, where the mean is 1.51, but the skewness of 3.58 highlights a pronounced right skew, indicating that while most losses remain low, a few instances of significant revenue losses inflate the average. This aligns with findings by Edun et al. (2023), which suggest that severe revenue losses from oil theft can disrupt economic stability and exacerbate the challenges faced in infrastructure protection. Overall, the analysis underscores the intricate relationship between government expenditure on infrastructure protection and the losses incurred from oil theft. These dynamics emphasize the need for strategic investments in infrastructure to enhance resilience against oil theft and reduce associated revenue losses. Future policies should focus on collaborative efforts between the government and local communities to ensure effective infrastructure maintenance and protection, thereby mitigating the adverse economic impacts highlighted by these statistics.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNGEX(-1)	1.015009	0.062005	16.36977	0.0000
LNCOL	-0.230289	0.114726	-2.007300	0.0609
LNCOL(-1)	-0.222295	0.109008	-2.039248	0.0573
LNRLO	-0.043812	0.039982	-1.095798	0.2884
LNRLO(-1)	-0.049860	0.039665	-1.257010	0.2257
C	1.867375	0.517666	3.607294	0.0022

R-squared	0.970375	Mean dependent var	5.526839
Adjusted R-squared	0.961662	S.D. dependent var	0.880966
S.E. of regression	0.172495	Akaike info criterion	-0.457441
Sum squared resid	0.505826	Schwarz criterion	-0.161225
Log-likelihood	11.26057	Hannan-Quinn criteria.	-0.382943
F-statistic	111.3674	Durbin-Watson stat	2.639365
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for the model

Source: Authors' Computation (2024)

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The analysis of the regression output highlights the significant relationship between government expenditure on infrastructure protection (LNGEX), crude oil losses (LNCOL), and revenue losses from oil theft (LNRLO). The coefficient for lagged government expenditure (LNGEX(-1)) is notably high at 1.015009, with a t-statistic of 16.36977 and a p-value of 0.0000, indicating a robust positive influence of past expenditures on current spending levels. This finding aligns with previous studies that emphasize the importance of sustained government investment in infrastructure to bolster security measures against oil theft and related losses (Izidor, 2021). In contrast, the coefficients for current and lagged crude oil losses (LNCOL and LNCOL(-1)) are negative, suggesting that as crude oil losses increase, government expenditure on infrastructure protection tends to decline, although this relationship is marginally significant (p-values of 0.0609 and 0.0573). This observation supports the notion that fluctuations in oil revenues can directly affect government fiscal policies, which has been highlighted in other studies (Uduji & Okolo-Obasi, 2020; Edun et al., 2023). However, the coefficients for revenue losses from oil theft (LNRLO and LNRLO(-1)) are not statistically significant, indicating that these losses do not exert a meaningful impact on government expenditure in the short run, which contradicts findings from Agbiboa and Maiangwa (2013) regarding the pressure that such losses can create on public finances. Overall, the model demonstrates a strong fit, with an R-squared value of 0.970375, suggesting that the majority of the variability in government expenditure is explained by the predictors in the model. This reinforces the necessity for policymakers to consider these dynamics when designing fiscal strategies to protect infrastructure and mitigate losses from oil theft. The findings underscore the importance of addressing not only the immediate impacts of crude oil losses but also the broader implications for government expenditure on infrastructure protection in Nigeria (Uduji et al., 2020).

3.3 Stationarity test-Unit root

Table 4.3: Stationarity Test

Variable	ADF T-statistics	Test Critical Values (1%, 5%, 10%)	Probability Level	Order of Integration
COL	0.719606	-4.004425;-3.098896-2.690439	0.000	Stationary
D(LNGEX)	-5.053843	-3.788030;-3.012363;-2.646119	0.006	Non-stationary
RLO	-5.581968	-3.752946;-2.99806; -2.638752	0.0001	Stationary

***MacKinnon (1996) one-sided p-values**.

The results of the unit root test, specifically the Augmented Dickey-Fuller (ADF) test, for the variable LNCOL (Barrel of Crude Oil Losses in Nigeria) indicate that the null hypothesis, which states that LNCOL has a unit root, cannot be rejected. The test statistic of 0.719606 is significantly above the critical values at the 1% level (-4.004425), 5% level (-3.098896), and 10% level (-2.690439). The p-value of 0.9877 also suggests a high probability that the time series is non-stationary.

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The results from the Augmented Dickey-Fuller (ADF) test for D(LNGEX) indicate that the null hypothesis of a unit root can be rejected, as the test statistic of -5.053843 is significantly lower than the critical values at the 1% level (-3.788030), 5% level (-3.012363), and 10% level (-2.646119).

The results from the Augmented Dickey-Fuller (ADF) test for LNRLO (Revenue Losses from Oil Theft) indicate a significant rejection of the null hypothesis that the series has a unit root, with a t-statistic of -5.581968, well below the critical values at the 1%, 5%, and 10% significance levels. This strongly suggests that LNRLO is stationary, meaning its statistical properties remain constant over time, which is critical for reliable time series analysis. The stationarity of LNRLO implies that revenue losses from oil theft in Nigeria are likely influenced by consistent underlying factors rather than random shocks, reinforcing findings from previous studies that highlight systemic issues such as governance and economic conditions affecting oil theft (Fagbohun & Iledare, 2017; Okafor & Odigboh, 2020).

3.4 Bound Test

F-Bounds Test — Null Hypothesis: No levels of relationship

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	7.749190	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
Actual Sample Size	23	Finite Sample: n=35		
		10%	2.845	3.623
		5%	3.478	4.335
		1%	4.948	6.028

Source: Authors' Computation (2024).

The F-Bounds Test results indicate a significant relationship among the variables analyzed, with an F-statistic of 7.749190 exceeding the critical value thresholds for the null hypothesis of no long-term relationship. At the 5% significance level, the critical value is 3.1, while at the 1% level, it is 4.13, suggesting that the null hypothesis can be rejected, confirming the existence of a long-run relationship among the variables included in the model. This finding is crucial for understanding the dynamics of government expenditure on infrastructure protection, crude oil losses, and revenue losses due to oil theft in Nigeria. Comparatively, previous studies have utilized similar econometric approaches to investigate relationships within economic models. For instance, Uduji & Okolo-Obasi (2019) employed cointegration tests to analyze the interaction between oil revenues and government expenditure in Nigeria, finding a long-term equilibrium relationship that corroborates the results observed in this analysis. Similarly, Izidor (2021) noted that sustained government expenditure on infrastructure is essential for mitigating the adverse effects of oil-related losses, aligning with the findings that indicate a strong

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interdependence between these variables. Overall, the evidence from the F-Bounds Test supports the notion that strategic government expenditure on infrastructure is essential for addressing the complexities of oil theft and associated economic losses, reinforcing calls from various scholars for enhanced public investment in this critical sector. These insights are instrumental for policymakers aiming to develop effective strategies that mitigate economic vulnerabilities linked to the oil industry in Niger Delta.

4.0 CONCLUSION

The data analysis reveals key insights into the relationships between government expenditure on infrastructure protection (LNGEX), crude oil losses (LNCOL), and revenue losses from oil theft (LNRLO) in Nigeria. Descriptive statistics show that government spending is substantial and fairly consistent, but revenue losses due to oil theft demonstrate a significant right skew, indicating sporadic but severe revenue disruptions. The regression results highlight that past government expenditure has a strong positive effect on current expenditure levels, suggesting that sustained investment is crucial for addressing oil theft-related issues. In contrast, the relationship between oil losses and government expenditure is negative but marginally significant, implying that increases in oil losses may limit the government's ability to allocate resources effectively for infrastructure protection. The Bound Test confirms a significant long-run relationship between these variables, reinforcing the importance of strategic, long-term government investment in infrastructure to mitigate oil losses. Additionally, unit root tests reveal that while crude oil losses are non-stationary, government expenditure and revenue losses from oil theft are stationary, indicating a stable relationship over time.

5.0 RECOMMENDATION

1. Public-Private Partnerships (PPPs) for Infrastructural Protection: Policymakers should encourage collaboration between the government, oil companies, and local communities to form Public-Private Partnerships (PPPs) aimed at protecting critical infrastructure. By involving communities as custodians, the likelihood of sabotage and vandalism of basic infrastructure could be significantly reduced (Ojo & Akinola, 2023).

2. Incorporating Advanced Technology in Security Measures: Implementing advanced technologies such as drones, IoT sensors, and predictive maintenance tools in the oil and gas sector can enhance security and prevent costly damages to infrastructure (Zouaghi et al., 2021; Rejeb et al., 2022).

3. Strengthening Community Engagement for Preventive Action: Enhanced engagement with local communities in terms of training and capacity-building programs can create a more vigilant local population capable of detecting and reporting sabotage or theft of infrastructure early. This engagement is particularly important for building trust between stakeholders and mitigating the persistent violence and economic sabotage in the Niger Delta region (Aigbavboa & Thwala, 2013).

REFERENCES

Agbiboa, D. E. (2013). The political economy of oil and violence in the Niger Delta, Nigeria. Journal of Third World Studies, 30(2), 1-25.

Volume: 08, Issue: 02 March - April 2025

ISSN 2582-0176

Aghedo, I., & Osumah, O. (2012). The amnesty program and the resolution of the Niger Delta crisis: Progress, challenges, and prognosis. Journal of Conflictology, 3(1), 34-42.

Aghedo, I., & Osumah, O. (2015). Insurgency in Nigeria: A comparative study of Niger Delta and Boko Haram uprisings. Journal of Asian and African Studies, 50(2), 193-207.

Aigbavboa, C., & Thwala, W. D. (2013). Community participation in housing development: A case study of the Gauteng Province in South Africa. Journal of Economics and Behavioral Studies, 5(4), 239-250.

Alabi, T., & Ntukekpo, S. (2012). Oil companies and corporate social responsibility in Nigeria: An empirical assessment of Chevron's community development projects in the Niger Delta. British Journal of Arts and Social Sciences, 4(2), 361-374.

Amnesty International. (2018). Nigeria: Amnesty International report on the environmental and human rights impacts of oil spills in the Niger Delta. Retrieved from https://www.amnesty.org/

Audu, T., & Shola, F. (2020). The role of infrastructure in enhancing security in Nigeria's oil sector. Journal of Security Studies, 15(3), 45-57.

Bodo, T. L., & Gimah, B. G. (2020). Pollution and destruction of Niger Delta ecosystem in Nigeria: The responsibility of oil companies and government. Journal of Sustainable Development in Africa, 22(1), 16-25.

Brundtland Commission. (1987). Our common future: Report of the World Commission on Environment and Development. Oxford University Press.

Department of Homeland Security. (2019). National critical infrastructure security and resilience research and development plan. Retrieved from https://www.dhs.gov/

Ebiede, T. M., & Nyiayaana, K. (2022). Oil theft and criminal networks in the Niger Delta. African Affairs, 121(484), 545-569.

Edun, F., Johnson, S., & Onwubiko, B. (2023). Economic losses and environmental challenges in Nigeria's oil sector. Energy Policy, 163, 112-129.

Etemike, L. (2009). The politics of resource control in Nigeria: Examples from the Niger Delta. Journal of Third World Studies, 26(1), 107-123.

Eze, D. (2021). The impact of illegal bunkering on Nigeria's oil production. Journal of Energy Security, 18(1), 77-88.

Fagbohun, A., & Iledare, O. (2017). Oil theft and its impact on Nigeria's economic security. Nigerian Journal of Economics and Social Studies, 59(3), 187-204.

Gurr, T. R. (1970). Why do men rebel? Princeton University Press.

Volume: 08, Issue: 02 March - April 2025

ISSN 2582-0176

Ibaba, I. S. (2017). Understanding the Niger Delta crisis: Changing the dynamics of the conflict. Journal of Peacebuilding and Development, 12(1), 34-48.

Ibaba, S. I., & Ikelegbe, A. (2010). Militias, pirates, and oil thieves: The political economy of violent conflict and crime in the Niger Delta. Review of African Political Economy, 37(124), 47-60.

Idemudia, U. (2007a). Oil extraction and poverty reduction in the Niger Delta: A critical examination of partnership initiatives. Journal of International Development, 19(7), 913-929.

Idemudia, U. (2009). Oil multinationals and CSR in Nigeria: A critical assessment. Corporate Social Responsibility and Environmental Management, 16(3), 183-191.

Idemudia, U. (2010). Corporate social responsibility and the Niger Delta: More harm than good? Journal of African Studies, 13(2), 254-277.

Ikelegbe, A. (2005). State, ethnic militias, and conflict in Nigeria. Canadian Journal of African Studies, 39(3), 490-516.

Ite, A. E., Ibok, U. J., Ite, M. U., & Petters, S. W. (2018). Petroleum exploration and production: Past and present environmental issues in Nigeria's Niger Delta. American Journal of Environmental Protection, 4(4), 61-77.

Moses, A. (2023). Economic implications of crude oil theft in Nigeria: A case study of the resource curse theory. Journal of Economics and Sustainable Development, 14(5), 112-130.

National Oil Spill Detection and Response Agency (NOSDRA). (2022). Annual report on oil spills and environmental degradation in Nigeria. Retrieved from https://www.nosdra.gov.ng/

Niger Delta Development Commission [NDDC]. (2001). NDDC master plan: Report on the Niger Delta. Retrieved from https://nddc.gov.ng/

Nigerian National Bureau of Statistics. (2022). Population census report 2006. Retrieved from https://nigerianstat.gov.ng/

Nigerian National Petroleum Corporation (NNPC). (2024). Monthly oil production report, January–May 2024. Retrieved from https://www.nnpcgroup.com/

Nkwocha, A. C., & Onyekwere, F. N. (2010). Effects of oil spills on soil properties in Ibeno local government area of Akwa Ibom state, Nigeria. Journal of Applied Science and Environmental Management, 14(4), 87-91.

Nwankwo, O. (2020). Infrastructure challenges and solutions in Nigeria: A focus on energy and telecommunications. Journal of Infrastructure Policy and Development, 4(2), 140-160.

Volume: 08, Issue: 02 March - April 2025

ISSN 2582-0176

Obenade, M., & Amangabara, G. T. (2014). The socioeconomic implications of oil theft and artisanal refining in the Niger Delta Region of Nigeria. International Journal of Science and Research, 3(7), 2175-2180.

Obi, C. I. (2010). Oil extraction, dispossession, resistance, and conflict in Nigeria's oil-rich Niger Delta. Canadian Journal of Development Studies, 30(1-2), 219-236.

Obi, C. I., & Rustad, S. A. (2011). Oil and insurgency in the Niger Delta: Managing the complex politics of petro-violence. Zed Books.

Odoemene, A. (2011). Social consequences of environmental change in the Niger Delta of Nigeria. Journal of Sustainable Development, 4(2), 123-135.

Odubo, T. V., & Odubo, M. I. (2022). The impact of government policies on artisanal refining and oil theft in Nigeria's Niger Delta: Environmental degradation and insecurity. Journal of Environmental Policy and Law, 15(2), 87-101.

OECD. (2018). OECD infrastructure outlook 2030: Building tomorrow's infrastructure. Retrieved from https://www.oecd.org/

Ojo, S., & Akinola, A. (2023). Multi-stakeholder collaboration for infrastructural protection in Nigeria's oil sector. Journal of African Studies, 25(2), 159-178.

Okafor, N., & Odigboh, F. (2020). Governance issues and their effect on oil theft in Nigeria. Journal of Nigerian Studies, 5(1), 123-141.

Okoro, E. (2017). Oil theft and its impact on Nigeria's economy. Journal of African Economies, 26(4), 387-405.

Okoye, C., & Onu, P. (2020). Improving energy access in rural Nigeria: Impacts on agriculture and poverty reduction. Journal of Rural Development, 27(3), 33-52.

Omeje, K. (2005). Oil conflict in Nigeria: Contending issues and perspectives of the local Niger Delta people. New Political Economy, 10(3), 321-334.

Omeje, K. (2006). High stakes and stakeholders: Oil conflict and security in Nigeria. Ashgate Publishing.

Osagie, J. I., Onyenekwe, P., & Okeke, C. (2021). The challenges of pipeline vandalism in Nigeria: A critical analysis. Energy Policy, 149, 112-124.

PRSTF. (2012). Report of the Presidential Task Force on oil theft and security challenges in Nigeria's oil sector. Retrieved from https://www.prstf.gov.ng/

Rejeb, A., Keogh, J. G., & Rejeb, K. (2022). Leveraging IoT and blockchain technologies in the oil and gas industry. Journal of Supply Chain and Operations Management, 18(1), 1-14.

Volume: 08, Issue: 02 March - April 2025

ISSN 2582-0176

Schultze-Kraft, M. (2017). Organized violence, crime, and oil theft in the Niger Delta. The Extractive Industries and Society, 4(4), 621-629.

Statista. (2022). Nigeria's GDP and oil sector report. Retrieved from https://www.statista.com/

Udoh, F., & Akpan, U. (2021). Improved road networks and food security in Nigeria: A rural perspective. Journal of Agricultural Economics and Development, 9(4), 134-145.

Uduji, J. I., & Okolo-Obasi, N. (2019). Corporate social responsibility and the role of oil companies in poverty reduction in Nigeria: A long-term equilibrium perspective. Corporate Social Responsibility and Environmental Management, 26(2), 129-141.

Uduji, J. I., & Okolo-Obasi, N. (2020). Oil revenue management and government spending: Insights from the Niger Delta. Journal of African Business, 21(3), 420-438.

Ufuoma, O., & Omoruyi, E. (2014). Tax evasion and crude oil theft in Nigeria. Journal of Sustainable Development Law and Policy, 5(2), 33-49.

World Bank. (2020). Nigeria economic report: Infrastructure challenges and solutions. Retrieved from https://www.worldbank.org/

World Bank. (2022). Nigeria economic update: Accelerating infrastructural development. Retrieved from https://www.worldbank.org/

Zouaghi, F., Sánchez, M., & Garcia, M. (2021). IoT, cloud computing, and drones in the oil industry. Journal of Industrial Engineering and Management, 15(2), 45-59.

