



IMPACT OF ILLEGAL REFINING IN THE **OIL AND GAS INDUSTRY: ENVIRONMENTAL POLLUTION AND REGULATORY IMPLICATIONS**

ABSTRACT

Nigeria is Africa's energy behemoth and the continent's most prolific crude oil producer, However, one of the main causes of oil spills in the area is the illegal refining of stolen oil, which has significant negative social, economic, and environmental effects. Waste from nonstandard refining plants is dumped into adjacent rivers

***JULIET NGOZI CHIJOKE-CHURUBA; AND
SAHABO MOHAMMED MUSTAPHA

*Antan Producing Limited Sinoki House (2nd floor)
Plot 770, Samuel Ademulegun Avenue Cadastral Zone
Central Business District Abuja, Nigeria.
**Department of Civil and Environmental
Engineering Air Force Institute of Technology
Kaduna.

INTRODUCTION

Petroleum is composed of hydrocarbons and is mostly extracted through crude oil drilling (Angela et. al., 2018). It is refined and distilled into a variety of consumer goods, including gasoline (petrol), kerosene, asphalt, and chemical reagents used in the plastics, insecticide, and pharmaceutical sectors (Karras, 2010). It will be necessary to comprehend the elements of crude oil that make it such a threat to the environment and mankind. As a result, crude oil is a thick, foul-smelling liquid that ranges in color from colorless to green, yellow, and black. Oil is classified into four kinds based on its density, volatility, and toxicity: light/light distillates,



without treatment, causing significant damage to environment. Illegal oil refining is rife in Nigeria's South-South region, and it is a major cause of environmental degradation, wreaking havoc on estuaries and other bodies of water. Consequently, this review article aims to draw attention to the impact of illicit refineries on the ecosystems of the area, the reasons behind the rise in illegal refineries and potential remedies and also regulatory issues surrounding illegal oil refining. The report reveals the significant impact of illegal refinery activities on the environment in host communities and gives recommendations to all stakeholders in the petroleum industry. Overall, the study supports the necessity for immediate strategic action against illegal refining of crude oil to control the direct impacts of pollution on environment in the Niger Delta. Furthermore, recommendations on how to alleviate the impact of illegal refining on host communities are provided to the Nigerian government.

Keywords: Pollution, Crude oil, Niger Delta, impact, Illegal refining

middle distillates, medium oils, and heavy fuel oils (Karras, 2010). It comprises a complex mixture of volatile organic molecules, gaseous, liquid, and solid hydrocarbons derived from sulfur, nitrogen, and oxygen, as well as heavy metals such as nickel and vanadium, which are major environmental pollutants (Madu et al., 2011). For nearly five decades, the discovery and extraction of crude oil has been Nigeria's backbone (Sam and Zabbey, 2018). It is the sixth largest crude oil exporter (Albert et al., 2018), with the Niger Delta accounting for roughly 37.4 billion barrels of crude oil reserves in addition to housing one of the world's most bio-diverse ecosystems (Sam and Zabbey, 2018). The Nigerian Niger Delta region is home to the world's third biggest mangrove forest, with enormous fresh and saltwater wetlands and a diverse range of plant and animal species (Anejionu et al., 2015). The Niger Delta region of Nigeria is one of the most



environmentally devastated locations in the world as a result of crude oil pollution caused by lax laws (Elenwo and Urho, 2017). In the Niger Delta region, air pollution is mostly caused by flares from nearby crude oil refining facilities (Naanen, 2019). The mangrove vegetation, rivers, marshes, and estuaries in the Niger Delta are severely contaminated due to the activity of the regional crude oil refiners.

Illegal crude oil refining has become a prevalent and worrisome business in Nigeria's Niger Delta region. Camps are established deep within the forest of the Niger Delta and utilized for local crude oil refinement (Albert et. al., 2018). The level of environmental damage caused by illegal refining is commonly acknowledged to be dependent on the refining method, beneficiation processes, operating scale, location, and features of the receiving environmental media (Lein, 2012). The economic benefits to the refiners are obvious, but the host communities are badly impacted by the actions of the 'illegal crude oil refiners' (Anejionu et al., 2015). Waste from nonstandard refining plants is dumped into adjacent rivers without treatment, causing significant damage to aquatic life and surrounding vegetation (Asimiea and Omokhua, 2013). Farmlands have been devastated and fishing villages have been evacuated as a result of pollution in rivers and estuaries, resulting in the loss of life and property (Onakpohor et. al., 2020). Soil pollution from nearby crude oil refineries, such as polycyclic aromatic hydrocarbon (PAH), has resulted in decreased agricultural output due to soil quality loss, leaching, and erosion (Nwaejije et al., 2017). According to Edoho (2008), petroleum spills and pollution harm farmlands, food security, marine life, and human health. Crude oil spills into the soil from nearby crude oil refineries disrupt healthy microbial interactions, posing serious health hazards due to their poisonous, mutagenic, and carcinogenic qualities (Yakubu, 2017). Compared to the conventional refining process, the illicit and local crude oil refining method generates a lot more waste (Naanen and Tolani, 2014). Waste known as "dark sludge" is released into the environment, covering vast stretches of land and producing a wilderness-like atmosphere (Naanen, 2019). The local crude oil refining industry has an



impact on the aquatic environment and groundwater system due to its waste generation, which is dumped into nearby wetlands and vegetation (Kalagbor et. al., 2019). This review article aims to ascertain how local crude oil refiners in the Niger Delta affect the host communities they serve and how best to offset that damage, the reasons behind the rise in illegal refineries and potential mitigation and also regulatory issues surrounding illegal oil refining.

Impact of illegal refinery

Hydrocarbons are readily absorbed by aquatic species through a variety of pathways when petroleum or its refined products are exposed to the environment (Anejionu et. al., 2015). When people consume these hydrocarbons, the hydrocarbons are then transferred to them (Onyegeme-Okerenta et al., 2016). Every innovation, though, has unique difficulties. Numerous studies have found that the artisanal petroleum refineries in the Niger delta region have an impact on the environment; Naanen and Tolani (2014) concentrated on this issue and documented the detrimental effects on the ecology and society, as well as the financial benefits of the refining process. The detrimental effects of oil drilling operations in the Niger Delta region of Nigeria cannot be overemphasised. Black soot is causing air and water pollution in Nigeria (Kalagbor et al., 2019). This is referred to as "kpofire" in the local dialect and is caused by long-term leaks, unintentional oil spills, operational errors, and artisanal or illicit crude oil refining. These activities are now a significant cause of environmental degradation and pollution, which makes the environment unfavourable to both people and aquatic life (Dominic, 2016). For the residents of these towns, these coastal rivers offer food, drinkable water, transportation, and other economic opportunities (Onyegeme-Okerenta et al., 2016). The following are common issues linked to illegal refineries: air, land, and water pollution, yield cuts produced with subpar specifications; fires and explosion scenarios; loss of capital infrastructure and government profits; bad reputation of the nation; community disputes; and plant and animal deaths (Odunlami et al., 2018).



Government buildings, multinational oil companies (MNOCs), inadequate infrastructure, pipeline vandals' and thieves' illegal activities, illicit refining, seismic blasting, and hole drilling have all contributed to oil drilling, which has resulted in spills, gas flares, soot, and the venting of hazardous chemicals, all of which have a detrimental impact on the ecosystem and the economy (Obuah, and keke, 2022). The "Gbo fire," or the artisanal refiners' refining of stolen oil, is a major cause of spills because the thieves never secure the violated pipelines at the locations where they have vandalized them (Onuoha, 2008). In a study by Bebetidoh et. al., (2020), they demonstrated how the host communities' farmlands and product yields have been impacted by the operations of nearby crude oil refiners. Hydrocarbon components have contaminated the soil as a result of the transportation of crude oil to the nearby crude oil refineries and the refining procedure used by the illegal crude oil refiners (Onakpohor et. al., 2020). Erosion, leaching, and a reduction in soil quality have resulted from this. A rise in hydrocarbon spillage could reduce product yield and the income of farmers. Since rivers and streams are the main sources of drinking water for the affected communities, the pollution of such streams and rivers by crude oil becomes a major source of concern for host communities (Nwankwoala et. al., 2017). Farmers usually rely on rivers and streams for irrigation; however, the runoff from local refineries, which drains crude oil and refined products into them, makes the water hazardous for irrigation, farm activities (Maclean and Steve, 2019) and vegetation (Asimiea and Omokhua, 2013).

This ongoing soil pollution has an adverse effect on farmlands and food security. Methods for disposing of garbage from nearby refineries are another big worry for those surveyed. Local refineries dispose of waste into neighbouring streams, rivers, and adjacent vegetation after refining crude oil. Aside from contaminating the water and killing fish, the release of seized petroleum products from nearby crude oil refineries' camps into streams and rivers has also harmed the aquatic habitat (Bebetidoh et. al., 2020). FAO states that because of the chemicals used in illegal mining operations,



pollution has been a negative impact on inland fishing activity. According to a study by Onakpohor et al. (2020) in the Niger Delta, the emissions of HC and CO, as well as partially breached SO² and H₂S, above the permitted limit when compared to the FEPA, 1991 set standard limit for emissions from stationary sources. However, NO_x emissions were deemed to be within norm, even though they totally exceeded the EGASPIN, 2018 limitations. Despite the environmental and health effect of the illegal refining in the Niger Delta over the years, there has been a constant issue of regulations and laws to prevent illegal refining in the region.

Regulatory challenges

The Niger Delta region's illegal refineries are a rapidly expanding industry that have taken root in every community that has access to oil fields. One of the main reasons for the rise in illegal refineries in the Niger Delta is poverty and a low standard of living despite the region's abundance of resources (Bello and Amadi, (2019). Poverty and practical cooperation between security agencies and other players, comparatively cheap setup costs, and the careless attitude of oil firms toward the restoration of damaged oil facilities are some of the factors leading to the emergence of illicit refineries (Douglas, 2018). The foundation of sustainable development is robust and efficient regulation, a commitment to environmental monitoring, and the enforcement of standards (Romsom, 2022).

The Nigerian government has kept an eye on the actions of the local crude oil refiners because of the significant financial losses they have caused the country (Dominic, 2016). Nevertheless, the government is still unable to properly enforce the rules despite having these agencies and legislation in place. Rather than eradicating the threat, the government's approach has actually made matters worse for the environment (Channels, 2015). The environmental protection organizations' lack of commitment to implementing long-lasting improvements in environmental protection (Elenwo and Urho, 2017). There are a number of environmental rules that govern the safe exploration and production of oil and gas, however these



laws are not well implemented or enforced (Elenwo and Urho, 2017). The government has passed rules that control the handling of hydrocarbon spills and the trash that results from them. The task of managing oil spill response falls to government organizations such as the National Environmental Standards and Regulation Enforcement Agency (NESREA), the Directorate of Petroleum Resources (DPR), the National Emergency Management Agency (NEMA), and the National Oil Spill Detection and Response Agency (NOSDRA) (Yakubu, 2017). According to Yakubu (2017), the pollution policy offers practical components that motivate all parties involved to act responsibly toward the environment. Hazardous waste cannot be transported, deposited, or disposed of in the air, on land, or in water according to the NESREA establishment Act of 2007. The NESREA, even though the agency has been given a lot of authority to oversee the environment, Section 7 of the Act exempts the petroleum industry from its purview. The law has to be reviewed to take into account the pollution of oil and gas caused by unlawful refineries' activities and to reflect the present economic realities of the industry, with the maximum penalties for defaulters (Olujobi et. al., 2022).

According to Section 44(3) of the Federal Republic of Nigeria's 1999 Constitution (as modified), the Federal Government now owns the private ownership of oil, taking it away from indigenous landowners. Due to the laws' removal of land, minerals, and oil from communities that are oil-bearing, ties between the government, oil companies, and native landowners have been strained (Olujobi et. al., 2022). This legal framework does not address the exploitation of their land as a result of the detrimental effects that oil processing has on the ecosystem (Efenakpo et. al., 2022). Hence, local communities do not cooperate with regulators or comply to the regulations. Although these legal and regulatory frameworks in place in Nigeria are sufficient, environmental degradation is allowed to continue because of lax enforcement and inadequate application of the laws that are already in place. they have not been sufficiently enforced. These laws haven't, lessened the significance of externalities. A lack of oversights,



widespread mismanagement, and capacity have made it difficult to enforce environmental regulations and set standards in a proactive manner." (Efenakpo et. al., 2022). This is a result of the government's lack of political will to end the oil industry's corruption and resolve these issues. Obuah and Keke (2022) assert that the international community, MNOCs, civil society organizations, and the Nigerian government lack the steadfast political will necessary to enact laws that would address issues with poverty, militancy, insufficient infrastructure, and restive young people. Another factor is that regulatory agency employees may be susceptible to powerful interest groups in the oil and gas sector due to their lack of integrity, technical proficiency, and professionalism.

Conclusion

In Nigeria's Niger Delta, the processing of illicit crude oil has grown to be a significant and concerning industry. Deep in the Niger Delta's forest, camps are set up and used for the indigenous processing of crude oil. Air, land, and water pollution, the destruction of farms and fisheries, fires and explosions, the loss of capital infrastructure and government income, community conflicts, and the mortality of plants and animals are some of the usual problems associated with illegal refineries. Therefore, to mitigate the effects of illegal refining on the environment and economy, it would be beneficial to convert the current illicit refining activities to conventional modular processes. If clusters are positioned strategically to channel intermediate products and comprehensive operational training on crude oil refining is implemented, this strategy will become more efficient. Meeting local demand might also benefit from overall design capacities. Given that a modular refinery is comparatively less expensive than a fully developed traditional refinery, investors and private citizens will also be encouraged.

Recommendations

It is advised that the government legalize these refineries' operations in order to facilitate regulatory actions and reduce the environmental impact of pollution. This would raise the standard of refining and ensure that there



is an adequate supply and output of refined petroleum products in Nigeria for domestic use. Strong legislative reform is necessary to provide energy security and sustainability since illegal refining operations in oil-bearing areas are hazardous to Nigeria's economy and environment and are challenging. Expanding the capacity of local refineries through private participation is required to support domestic gas and the use of renewable energy, which is an environmentally preferable energy source, as well as to enhance local production and markets for refined petroleum products. It will recommend that active involvement of native people in the states that produce oil in the administration of oil and gas resources will help in reducing the environmental destruction of the environment.

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