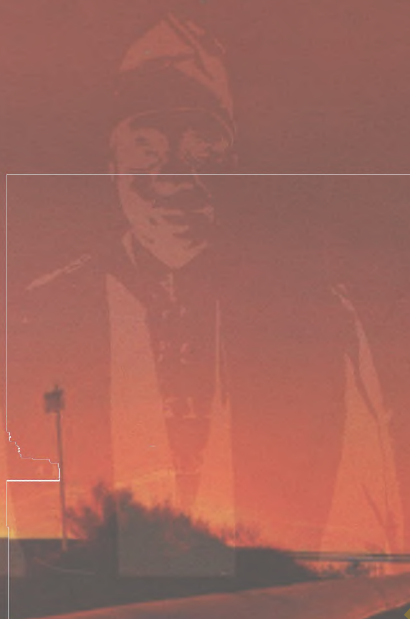


CONTEMPORARY ISSUES OF THE NIGERIAN PETROLEUM INDUSTRY



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A Festschrift in Honour of Distinguished
PROFESSOR OLUKAYODE OLADIPO AMUND

Edited by

Oluwafemi Sunday Obayori | Matthew Olusoji Ilori

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PETROLEUM EXPLORATION AND PRODUCTION IN NIGERIA: A BLESSING OR A CURSE?

Abel Idowu Olayinka¹ and Felix Obere²

¹ Department of Geology,
University of Ibadan, Ibadan.

² A-Z Consultants Ltd,
Block B13, Maben Terrace,
Chevron Drive,
Lekki, Lagos.

Abstract

Oil exploration in Nigeria started in 1903; however, drilling activities started in 1951. In 1956, Shell-British Petroleum (BP) made a significant discovery of oil in the Oloibiri community (present-day Bayelsa State). Crude oil production began in 1957, and in 1960, 849,075 tonnes of crude oil were exported. To date, approximately 1,500 exploration wells have been drilled, with most of these being onshore, whereas the rest are in shallow offshore and deepwater. The exploration success rate has increased primarily due to three-dimensional seismic and sequence stratigraphy advancements. Oil and gas exports contribute significantly to Nigeria's economy, mainly federal government revenue and foreign exchange earnings. In this Chapter, the authors have examined the history of oil exploration in Nigeria, operating agreements, contributions of oil and gas to Nigeria's economy, the Petroleum Industry Act (PIA) (as the new framework for participation and regulation) and challenges faced during oil exploration and production in the country.

1.1 Introduction

Nigeria is Africa's second-largest oil and gas producer, with crude oil reserves in 2021 of approximately 36.89 billion barrels. Since 1960, income and profits from the petroleum industry have substantially supported the country's economy and budget. According to statistics, as of February 2021, the oil industry in Nigeria generates roughly 9% of the country's total Gross Domestic Product (GDP). The country's primary oil reserves are mainly concentrated around the Niger Delta. Section two looks at the history of oil exploration in Nigeria, including major dates and recent history. Section three outlines operating agreements. Section four examines the contributions of oil and gas to Nigeria's economy, whereas Section 5 looks at the challenges with the oil and gas sector in Nigeria. Finally, section six comprises the conclusion.

1.2 History of oil exploration in Nigeria

The history of oil exploration in Nigeria goes back to 1903, when the Nigerian Bitumen Corporation conducted exploratory work there. After that, D'Arcy Exploration Company

and Whitehall Petroleum were given licences, but neither company found oil of commercial value, returning their licences in 1923. A new licence covering 920,000 square kilometres (357,000 square miles) was given to Shell D'Arcy Petroleum Development Company of Nigeria, a consortium of Shell and BP. They began exploration work in 1937.

In 1951, drilling started in Owerri, where the first test well was drilled. However, it was in 1956 that Shell-BP made a significant discovery of oil in the Oloibiri community (now in Bayelsa State). This was four years before Nigeria gained its independence. Crude oil production began in 1957, and in 1960, 849,075 tons of crude oil were exported. Towards the late 1950s, non-British firms, including Mobil in 1955, Tenneco in 1960, Gulf Oil, later Chevron in 1961, Agip in 1962, and Elf in 1962, were granted a licence to explore oil. Before oil discovery, Nigeria (like many other African countries) strongly relied on agricultural exports to support its economy. Figure 1.1 is a generalised geological map of Nigeria, showing the Niger Delta as the main hydrocarbon-bearing province of the country. <https://www.legit.ng/1119014-history-crude-oil-nigeria.html>

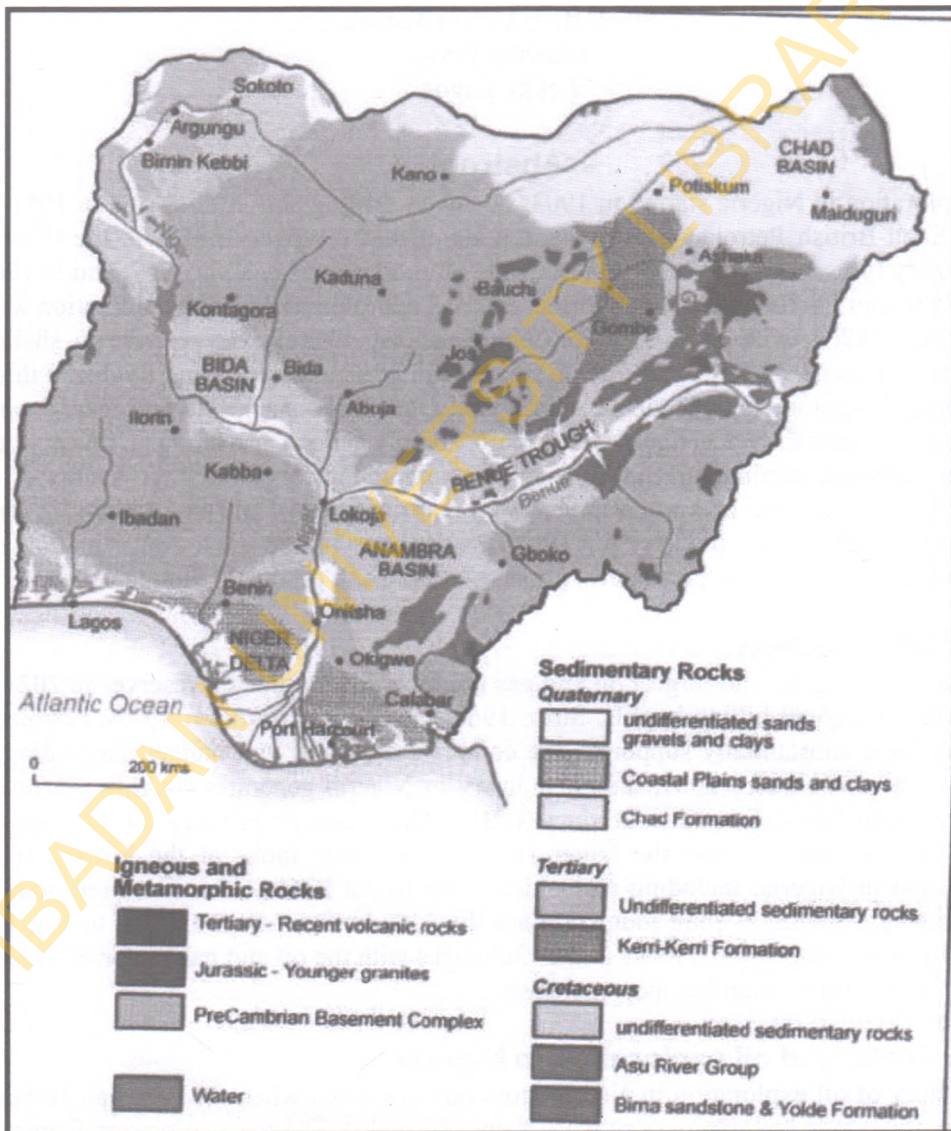


Figure 1.1: Generalised Geological Map of Nigeria (After Nigerian Geological Survey Agency)

1.3 Major dates in the history of Nigerian oil production

1961: Shell's Bonny Terminal was commissioned; Texaco Overseas started operations in Nigeria.

1962: Elf started operations in Nigeria (as Safrap), Nigeria Agip Oil Company started operations in Nigeria.

1963: Elf discovered Obagi field and Ubata gas field, Gulf's first production.

1965: Agip found its first oil at Ebocha, Phillips Oil Company started operations in the then Bendel State.

1966: Elf started production in Rivers State with 12,000 barrels/day.

1967: Phillips drilled its first well (dry) at Osari -I, Phillips first oil discovery at Gilli-Gilli -I

1968: Mobil Producing Nigeria Limited was formed, Gulf's Terminal at Escravos was commissioned.

1970: Mobil started production from four wells at Idoho Field, Agip started production, Department of Petroleum Resources Inspectorate started.

1971: Shell's Forcados Terminal was commissioned, Mobil's terminal at Qua Iboe was also commissioned.

1973: First Participation Agreement; Federal Government acquires 35% shares in oil companies, Ashland started Production Sharing Contract with NNOC (now NNPC), Pan Ocean Corporation drilled its discovery well at Ogharefe -I

1974: Second Participation Agreement; Federal Government increases equity to 55%, Elf changed its name from "Safrap", Ashland's first oil discovery at Ossu -I.

1975: First oil lifting from Brass Terminal by Agip, DPR upgraded to the Ministry of Petroleum Resources.

1976: MPE was the renamed Ministry of Petroleum Resources (MPR), Pan Ocean started production via Shell-BP's pipeline at a rate of 10,800 barrels/day.

1977: The federal government established the Nigerian National Petroleum Corporation (NNPC) by Decree 33 (NNOC and MPR extinguished).

1979: Third Participation Agreement (throughout NNPC) increases equity to 60%; Fourth Participation Agreement; BP's shareholding was nationalised, leaving NNPC and Shell with 80% equity and 20% in the Joint Venture, respectively. Shell changed its name to Shell Petroleum Development Company of Nigeria (SPDC).

1984: Agreement consolidating NNPC/Shell Joint Venture.

1986: Signing of a Memorandum of Understanding (MOU).

1988: Formation of 12 strategic business units, covering the entire spectrum of oil industry operations: Nigerian Petroleum Development Company (NPDC), Nigerian Gas Company (NGC), Products and Pipelines Marketing Company (PPMC), Integrated Data Services Limited (IDSL), National Engineering and Technical Company Limited (NETCO), Hydrocarbon Services Nigeria Limited (HYSON), Warri Refinery and Petrochemical Co. Limited (WRPC), Kaduna Refinery and Petrochemical Co. Limited (KRPC), Port Harcourt Refining Co. Limited (PHRC), NNPC Retail, Duke Oil.

1989: Fifth Participation Agreement; (NNPC = 60%, Shell = 30%, Elf = 5%, Agip = 5%).

1.4 Recent history (1991–date)

1991: Signing of the MOU & Joint Venture Operating Agreement (JVOA)

1993: Production Sharing Contracts signed as Shell Nigeria Exploration and Production Company (SNEPCO), Sixth Participation Agreement (NNPC = 55%, Shell = 30%, Elf = 10%, Agip = 5%), the coming on-stream of Elf's Odudu blend, offshore OML 100.

1995: SNEPCO starts drilling its first exploration well, Nigeria Liquefied Natural Gas (NLNG) Final Investment Decision taken

1999: NLNG's First shipment of gas out of Bonny Terminal.

2000: NPDC/NAOC Service Contract signed.

2001: Production of Okono offshore field.

2002: New PSCs agreement signed, liberalisation of the downstream oil sector, NNPC started retail outlet scheme.

(Article Source: https://EzineArticles.com/expert/Nosa_Tunde-Oni/2322886)

Obilaja (2023) showed that the exploration success rates in the Niger Delta have improved over time. It was relatively low from 1966 to 1976 when only 40% of the exploration wells were successful. Interestingly, this success rate increased from 52% in the 1990s and 2000s to 68%. This has been attributed to the advancement in seismic data acquisition, processing and interpretation from two- (2D) to three-dimensional (3D) seismic and sequence stratigraphy in contemporary times.

1.5 Operating agreements

As of 1999, the details and nature of the relationship between the government and the *operating* companies were governed by three types of agreements, joint ventures, production-sharing contracts and service contracts.

Joint venture companies

Shell (British)

SPDC (Shell Nigeria): A joint venture operated by Shell, accounts for 50% of Nigeria's total oil production (899,000 barrels (142,900 m³) per day in 1997) from more than 80 oil fields. The joint venture comprises NNPC (55%), Shell (30%), TotalFinaElf (10%) and Agip (5%) and largely operates onshore on dry land or in the mangrove swamp in the Niger Delta. The company has more than 100 producing oil fields and a network of more than 6,000 km of pipelines flowing through 87 flow stations. Additionally, SPDC operates two coastal oil export terminals. The Shell Joint Venture produces approximately 50% of Nigeria's total crude. Shell Nigeria owns concessions on four companies: SPDC, SNEPCO, Shell Nigeria Gas (SNG), and Shell Nigeria Oil Products (SNOP), holding a major stake in NLNG. Shell formerly operated alongside BP as Shell-BP, but BP has since sold its Nigerian concessions. Most of Shell's operations in Nigeria are conducted through the Shell Petroleum Development Company (SPDC).

Chevron (American)

Chevron Nigeria Limited (CNL): This is a joint venture between NNPC (60%) and Chevron (40%) that has in the past been the second largest producer (approximately 400,000 barrels per day (64,000 m³ per day)), with fields located in the Warri region, west of the Niger river, and offshore in shallow water. It aimed to increase production to 600,000 barrels per day (95,000 m³ per day).

ExxonMobil (American)

Mobil Producing Nigeria Unlimited (MPNU): This is a joint venture between the NNPC (60%) and ExxonMobil (40%) that operated in shallow water off Akwa Ibom State in the southeastern delta. MPNU averaged production of 632,000 barrels per day (100,500 m³ per day) in 1997, making it the second largest producer, as against 543,000 barrels per day (86,300 m³ per day) in 1996. Mobil also held a 50% interest in a Production Sharing Contract for a deep-water block further offshore and increased output to 900,000 barrels per day (140,000 m³ per day) by 2000. Oil industry sources indicated that Mobil could overtake Shell as the largest producer in Nigeria within the next five years if current trends continue, mainly due to its offshore base that allows Mobil refuge from the strife Shell experiences onshore. Mobil has been headquartered in Eket and operates in Nigeria under the subsidiary of Mobil Producing Nigeria (MPN).

Agip (Italian)

Nigerian Agip Oil Company Limited (NAOC): This is a joint venture operated by Agip and owned by the NNPC (60%), Agip (20%) and ConocoPhillips (20%) that produces 150,000 barrels per day (24,000 m³ per day) mostly from small onshore fields.

Total (French)

Total Petroleum Nigeria Limited (TPNL): This is a joint venture between NNPC (60%) and Elf (now Total) that produced approximately 125,000 barrels per day (19,900 m³ per day) in 1997, both on and offshore. Elf and Mobil are in dispute over the operational control of an offshore field with a production capacity of 90,000 barrels per day (14,000 m³ per day).

Texaco (now merged with Chevron)

NNPC Texaco-Chevron Joint Venture (formerly Texaco Overseas Petroleum Company of Nigeria Unlimited): A joint venture operated by Texaco and owned by NNPC (60%), Texaco (20%) and Chevron (20%) produced about 60,000 barrels per day (9,500 m³ per day) from five offshore fields in 1999.

There are also independent and indigenous oil and gas companies operating in Nigeria.

A comparison of the proven oil reserves in some African countries is shown in Figure 1.2. Nigeria is the most populous country in Africa and the 7th in the world, with a population currently estimated at 206.1 million (<https://www.worldometers.info>). A comparison of the population of Nigeria with selected oil-producing African countries is shown in Figure 1.3.

Although Nigeria is ranked second in Africa in terms of proven oil reserves, when this is normalised in terms of the population, it can be seen that Nigeria ranks low, with a per capita oil reserve of 179 barrels, compared with 7,038 barrels for Libya, 522 barrels for Congo Brazzaville, 335 barrels for South Sudan, 278 barrels for Algeria and 237 barrels for Angola (Figure 1.4).

Moreover, Nigeria's population is increasing at an annual rate of 2.4%, and it is expected to be about 377 million by 2050. However, the poverty level increases since economic growth is lower than population growth.

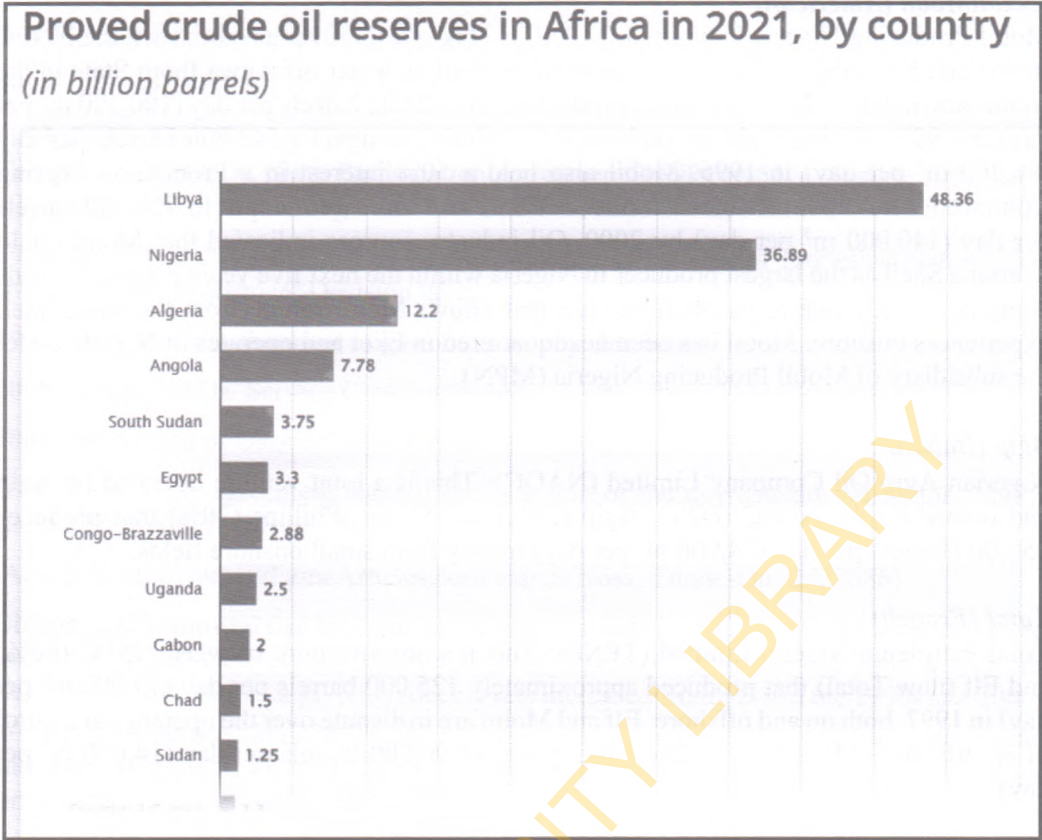


Figure 1.2: Proven crude oil reserves in Africa in 2021 by country, in billion barrels (Source: <https://www.statista.com>)

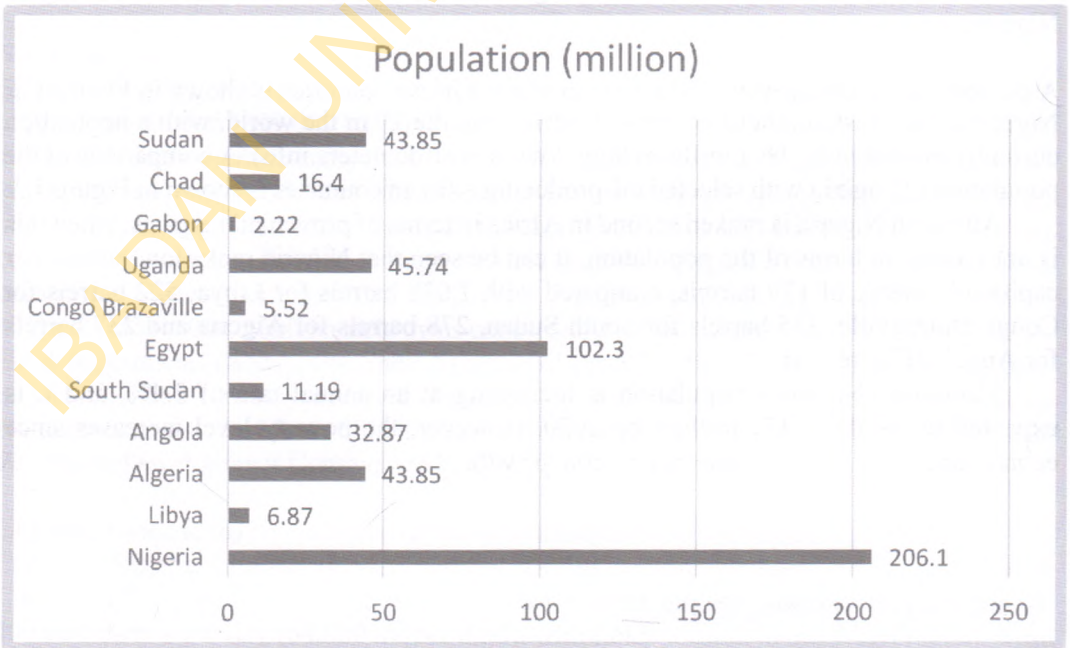


Figure 1.3: Comparison of the population of Nigeria with those of selected top oil-producing countries in Africa. (Source: <https://www.worldometers.info> Downloaded 27th March 2023).

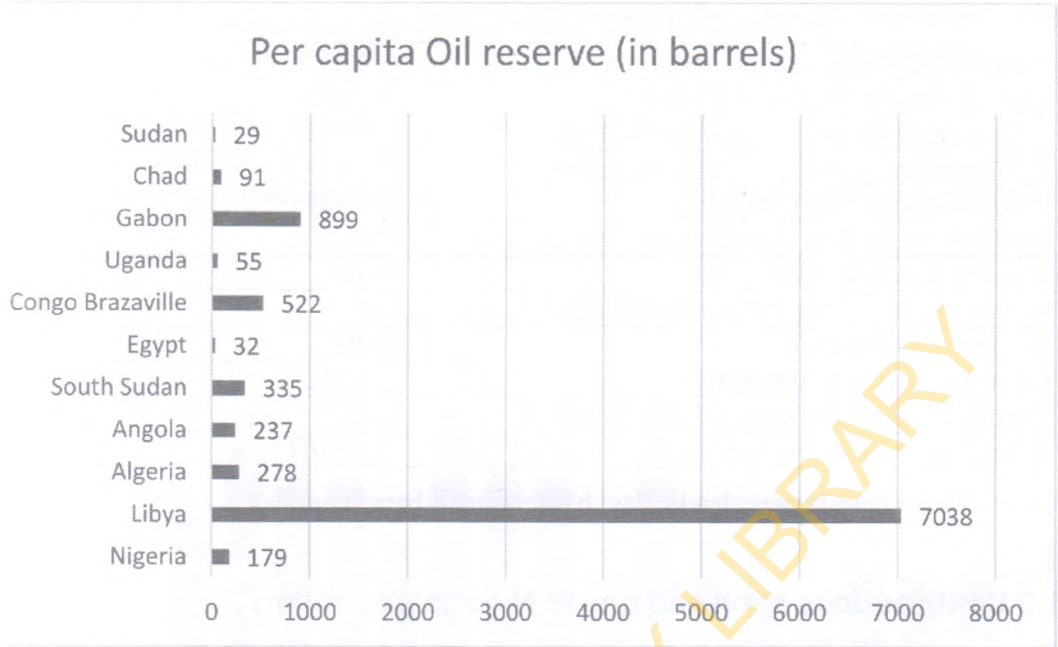


Figure 1.4: Per capita proved crude oil reserve in barrels for selected African countries.

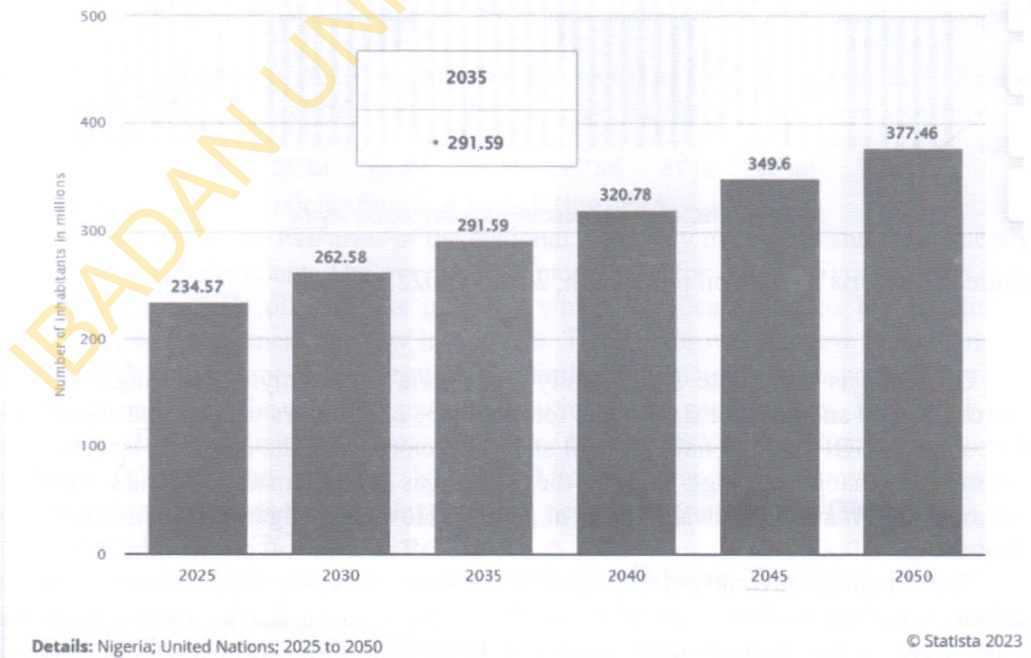


Figure 1.5: Population forecast in Nigeria in selected years between 2025 and 2050 (in millions) (www.statista.com)

Table 1.1 presents some facts about the oil Industry in 2021.

Table 1: Some facts about the oil Industry 2021 (OPEC Annual statistical Bulletin 2022: https://www.opec.org/opec_web/en/about_us/167.htm)

Value of petroleum exports (million \$)	41,378
Current account balance (million \$)	3,638
Proven crude oil reserves (million barrels)	37,050
Proven natural gas reserves (billion cu. m.)	5,848
Crude oil production (1,000 b/d)	1,323
Marketed production of natural gas (million cu. m.)	48,572
Refinery capacity (1,000 b/cd)	486
Output of petroleum products (1,000 b/d)	5
Oil demand (1,000 b/d)	495
Crude oil exports (1,000 b/d)	1,592
Exports of petroleum products (1,000 b/d)	11
Natural gas exports (million cu. m.)	38,464

bcd represents barrels per calendar day; b/d represents barrels per day

1.6 Contributions of oil and gas to Nigeria's economy

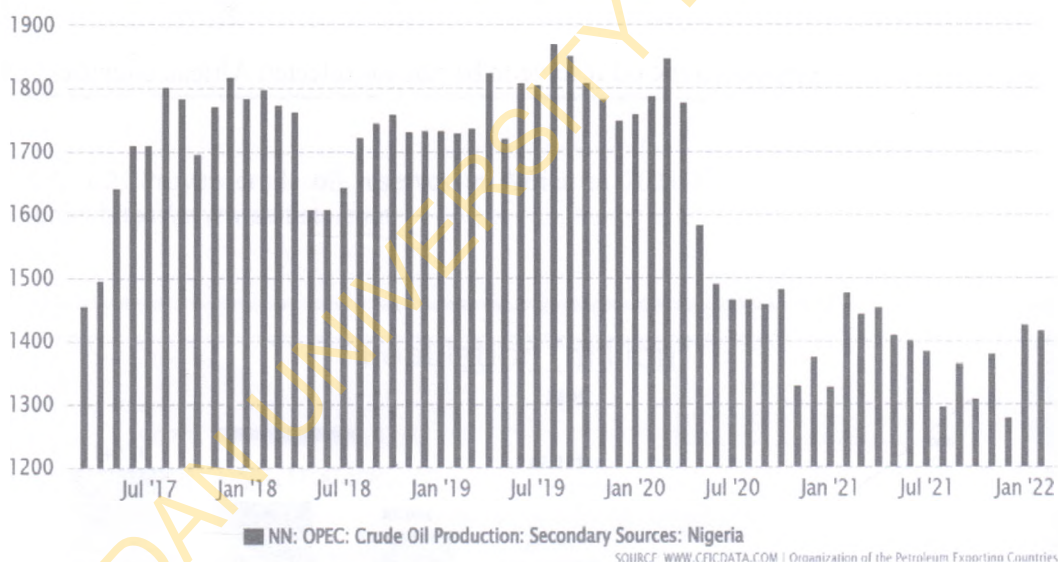


Figure 1.6: Nigeria's crude oil production, 2017 to 2022.

Oil and gas contribute significantly to Nigeria's economy. According to various sources, the oil and gas sector accounts for over 90% of Nigeria's exports and about 9% of the country's GDP. Additionally, the oil and gas sector is also the country's largest source of foreign exchange earnings. Overall, the oil and gas sector remains Nigeria's economy's backbone and mainstay (Uwakonye et al., 2006). However, Nigeria has failed to benefit from the global oil price boom recently due to the fall in crude oil production.

The Nigerian government has used oil revenue to build social amenities, such as schools, hospitals, roads and rail lines. The oil and gas sector is also a lucrative investment opportunity, with observers believing that it offers opportunities for marketing essential capital equipment and technology for extraction and production (The International Trade Administration, U.S. Department of Commerce: www.trade.gov/country-commercial-guides/nigeria-oil-gas-and-mining-sectors). Figure 1.7 shows the contribution of the oil and natural gas sector to GDP in Nigeria from the 4th quarter of 2018 to the 3rd quarter of 2022.

Oil production

Nigeria's crude oil production has varied over the past few years. In January 2023, Nigeria's crude oil production was reported at 1,336,000 barrels/day, an increase from the previous month's 1,271,000 barrels/day production. As of 2020, Nigeria was ranked as the eleventh-largest oil producer in the world, with an average daily production of approximately 1.8 million barrels.

In 2022, Nigeria's oil output fell below 1 million barrels daily, the lowest since 1990. However, the outlook for Nigeria's upstream oil and gas sector in 2023 is positive, with a forecast recovery of onshore volumes and incremental growth from shallow water projects.

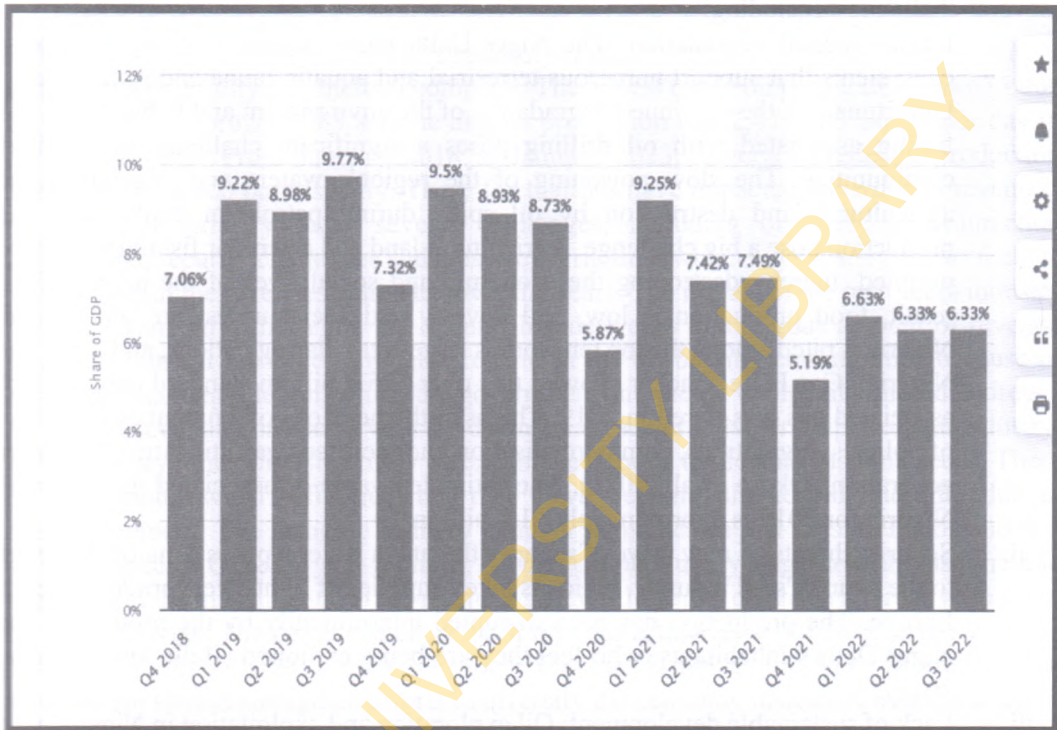


Figure 1.7: Contribution of the oil and natural gas sector to GDP in Nigeria from the 4th quarter of 2018 to the 3rd quarter of 2022 (<https://www.statista.com/statistics>. Downloaded 26 March 2023)

New Framework for Participation and Regulation: PIA

The PIA is passed by the two arms of the National Assembly of Nigeria and subsequently assented to by the President. The overarching intention of the Nigerian government is to overhaul the country's oil and gas industry, which has been plagued by decades of corruption, mismanagement and low investment. The PIA provides a new framework for the industry's governance and regulation, aiming to increase transparency, attract investment, and boost the country's revenue from its oil and gas resources. Key provisions of the act include the creation of new regulatory bodies, such as the Nigerian Upstream Regulatory Commission and the Nigerian Midstream and Downstream Petroleum Regulatory Authority, the establishment of a new fiscal regime for the industry, the unbundling of the NNPC into separate entities and the introduction of measures to encourage local participation and development in the industry. The PIA is expected to significantly impact Nigeria's economy, as the oil and gas sector accounts for a large proportion of the country's GDP and foreign exchange earnings. However, implementing the act may face some challenges, as it requires the cooperation of various stakeholders, including the government, industry players and local communities.

The NNPC, a government monopoly since its establishment in the 1970s, shed its public coat and became a fully commercial entity called NNPC Limited, a transformation greeted with mixed reactions. Despite the positive impact of the oil and gas sector, challenges, such as crude oil theft, illegal bunkering and pipeline vandalism, have prevented Nigeria from benefiting from a global oil boom, affecting the accretion of the country's foreign reserves. These are outlined in the next section.

1.7 Challenges

Nigeria is a major player in the global oil and gas industry. However, the industry faces several challenges, including:

- i. **Environmental degradation:** The Niger Delta region consists of highly diverse ecosystems that support numerous terrestrial and aquatic fauna and flora species. Unfortunately, the continued degradation of the environment and habitat from gas flaring associated with oil drilling poses a significant challenge to the host communities. The slow poisoning of the region's waters and vegetation and agricultural land destruction by oil spills during petroleum exploration and production pose a big challenge. Agricultural land and rivers for fishing have been polluted, thereby destroying the economic and social lives of the people. As a result, food production is low, and poverty and social unrest are widespread. Nigeria is rated among the top ten world's largest gas-flaring nations, and data from Nigerian Gas Flare Tracker showed that over 425.9 billion standard cubic feet of associated gas was flared in 2019. This is at the peak of government enforcement of policies, regulations, commercialisation and increased gas utilisation for power generation (Okoro et al., 2021). The estimated value of associated gas flared in Nigeria for 2019 is approximately \$1.1 billion.
- ii. **Security threats:** A new wave of security threats in Nigeria poses a major challenge to the country's oil industry, which is a key supplier of light sweet crude grades to Europe. The production has been disrupted intermittently by the protests of the Niger Delta's inhabitants, who feel they are being exploited (Bello and Nwaeke, 2020).
- iii. **Lack of sustainable development:** Oil exploration and exploitation in Nigeria have posed significant challenges to sustainable development in the Niger Delta region. Rural communities in the region are highly vulnerable to environmental hazards, which have affected their livelihoods.
- iv. **Indigenous participation:** The Nigerian Content Act imposes limits on foreign management and the content of the petroleum sector, stipulating specific indigenous participation in engineering, welding and fabrication projects, which presents significant barriers to foreign participation and imports in the sector (Enyoghasim et al., 2019)
- v. **Obsolete laws and regulations:** The oil and gas industry in Nigeria faces several challenges, such as ambiguous laws and regulations, pipeline vandalism, corruption and lack of government funding.
- vi. **Increasing demand:** The global population is increasing, and there is a need to produce more energy at lower costs with fewer emissions. This challenge requires innovation and investment in research and development.

Therefore, there is a need to deepen private sector participation to address some challenges bedevilling the Nigerian oil and gas industry.

1.8 Conclusion

Nigeria is the second-largest producer of oil and gas in Africa. The history of oil exploration in Nigeria goes back to 1903, when the Nigerian Bitumen Corporation conducted exploratory work there. Shell made a commercial discovery at Oloibiri in 1956. Since then, Nigeria has continued to produce oil and gas mainly from the Niger Delta with many International Oil Companies and Independents. Since 1960, income and profits from the petroleum industry have substantially supported Nigeria's economy and budget. According to statistics, as of February 2021, the oil industry in Nigeria generates roughly 90% of the country's total GDP. The regulatory framework has evolved to the current PIA, making NNPC a fully commercial company. The lowest crude oil production was 675,000 barrels/day in February 1983 and the highest production was 2,475,000 barrels per day in November 2005. From January 2018 to January 2023, Nigeria's crude oil production averaged 1,916,000 barrels daily. These fluctuations have impacted government revenue.

The oil industry faces several challenges, including oil theft, environmental degradation, security challenges and massive corruption, which have made citizens feel the little impact of the revenues generated over the years. The impact of the petroleum industry has been a mixed grill. While the country has derived a humongous amount of revenue from this mineral resource, problems remain in the oil-bearing communities because of environmental degradation, which the government and the oil companies should address.

There are many problems with the downstream sector of Nigeria's petroleum industry, as the country relies almost entirely on expensive imports to meet its gasoline needs. There are four state-owned refineries, but they have become dilapidated and idle due to mismanagement. The Dangote refinery is under construction just outside Lagos and is a private concern. Once up and running, it will reliably supply Nigeria with gasoline and diesel. With the investment by the private sector, it is hoped to create an alternative to state-owned refineries. The combined capacity of the four refineries is 450,000 barrels per day, compared with 650,000 barrels per day for the Dangote refinery. Moreover, the government should strengthen efforts to diversify the economy instead of over-reliance on crude oil.

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