Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics

Master's Thesis

Impact of Covid-19 on Petroleum Industry in Nigeria for the Year 2020

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Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

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Economics and Management
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Thesis title

The impact of COVID-19 on petroleum industry in Nigeria

Objectives of thesis

The COVID-19 pandemic has created an unprecedented and global crisis that will cause regions, countries, sectors, companies and individuals to experience a reaction, resilience, recovery and adjustment for a "new reality." It is causing the tragic loss of many lives, affecting the way many people live and work and leading to social and economic change that is likely to have implications for many years to come. Government's actions to deal with the pandemic are changing all parts of the economy and life. One of the sectors that is indeed experiencing significant challenges is the oil and gas sector, globally and in Africa.

In this light, the main aim of the present Master thesis becomes identification of key developmental trends in crude oil/gas production and trade on the example of Nigeria, the largest oil and gas producer in Africa. Since the Federal Republic of Nigeria is richly endowed with natural resources and petroleum production can be referred to as a central to the domestic economy (it plays a crucial role, accounting for 40% of GDP and 80% of government earnings), it becomes interesting to answer the following research questions:

1. what is the current state (in 2020) of oil and gas producing industry in Nigeria and what was it 20 years ago?
2. what countries are the main importers of Nigerian crude oil and gas (in 2000 and 2020)?
3. what was the impact of COVID-19 pandemic on oil and gas industry in Nigeria?
4. what are the relationships among selected macroeconomic indicators and oil industry in the Republic (via regression analysis)?
5. what government reactions (implemented policies and regulation) were launched to tackle pandemic challenges?

Methodology

Theoretical part of the Diploma thesis will be mainly based on a relevant literature review (represented by printed literature, scientific articles, surveys, web sources) and the research of similar studies, using such methods as abstraction, inductive reasoning, analysis, synthesis and deduction.

Practical part will contain descriptive statistical analysis and qualitative thematic synthesis of the main economic indicators (selected for the analysis variables). For a descriptive overview of the oil and gas industry, 20 major companies will be used: 5 upstream company, 5 midstream companies and 10 downstream companies. A purposive sampling technique will be used to select the major companies. Necessary information will be also collected through administering questionnaire to senior managerial level staffs of the 20 companies in Nigeria that will be selected as sample firms for this study.

An econometric model will be constructed to answer the 5th research question of the DT.

The results of regression analysis along with other main outputs and author's recommendations will be provided in the Diploma's conclusion.

The proposed extent of the thesis

60-80 pages

Keywords

Nigeria, Petroleum industry, COVID-19, Economic performance

Recommended information sources

GUJARATI, D N. *Econometrics by example.* London: Palgrave Macmillan Education, 2015. ISBN 978-1-137-37501-8.

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WOOLDRIDGE, J M. *Introductory econometrics : a modern approch.* Mason: South-Western Cengage Learning, 2009. ISBN 978-0-324-66054-8.

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Prague on 31. 03. 2022

Declaration

I declare that I have worked on my master's thesis titled "The Impact of Covid-19 on Petroleum Industry in Nigeria for Year 2020" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on date of submission _____31st March 2022_____

Acknowledgement

I would like to thank Dr Elena Kuzmenko and all other persons, for their advice and support during my work on this thesis. A special thanks goes to my parents for the constant love and care been given to me.

Impact of Covid-19 on Petroleum Industry in Nigeria for Year 2020

Abstract

Nigeria's oil and gas industry is the biggest in the African continent. With the incidence of the covid 19 pandemic, this industry was shaken on a large scale which brought about the need for this study. The study identified the current situation of the oil and gas industry and looked at how the industry was as at 20years ago. It identified the major export destination of the Nigerian crude oil export and then investigated on the impact which the covid 19 pandemic brought into the oil and gas industry. A regression analysis was done to determine the relationship between the petroleum export of Nigeria and macroeconomic indicators which include covid cases, oil price, balance of payment, population and GDP. Data was collected for the time period of 2001 till 2020 for petroleum export (million USD), covid cases (thousands), oil price (USD/year), balance of payment (million USD/year), population (million) as well as GDP (million USD/year) using OPEC data. Result showed that covid cases, oil price, balance of payment and GDP have a direct (positive) relationship with petroleum export. Furthermore, population has an indirect (negative) relationship with petroleum export. Going further to test for the influence of each factor on petroleum export for the year 2020, result indicated that oil price as its elasticity coefficient as the highest amongst all factors involved in the model for the time period of 2020. The regression model is suitable for forecasting purposes. The government measure and policies to tackle the covid-19 pandemic was also reviewed. The study found out that the covid-19 pandemic severely affects the Nigerian oil and gas industry and the government need to ensure adequate policies are to be implemented and constantly reviewed.

Keywords: Oil and gas, Industry, Covid-19, Petroleum Export, Pandemic, Population, GDP, Oil price, Regression, Policies.

Dopad Covid-19 na ropný průmysl v Nigérii pro rok 2020

Abstrakt

Nigérijský ropný a plynárenský průmysl je největší na africkém kontinentu. S výskytem pandemie covid 19 byl tento průmysl otřesen ve velkém měřítku, což vyvolalo potřebu této studie. Studie identifikovala současnou situaci ropného a plynárenského průmyslu a sledovala, jak na tom byl průmysl před 20 lety. Identifikovala hlavní exportní destinaci nigerijského exportu ropy a poté zkoumala dopad, který pandemie covid 19 přinesla do ropného a plynárenského průmyslu. Byla provedena regresní analýza, aby se určil vztah mezi exportem ropy z Nigérie a makroekonomickými ukazateli, které zahrnují případy covid, cenu ropy, platební bilanci, počet obyvatel a HDP. Data byla sbírána za období 2001 až 2020 pro export ropy (mil. USD), případy covid (tisíce), cenu ropy (USD/rok), platební bilanci (mil. USD/rok), populaci (mil.) a také HDP (mil. USD/rok) pomocí údajů OPEC. Výsledek ukázal, že případy covid, cena ropy, platební bilance a HDP mají přímý (pozitivní) vztah k exportu ropy. Kromě toho má populace nepřímý (negativní) vztah k exportu ropy. Při dalším testování vlivu každého faktoru na export ropy pro rok 2020 výsledek ukázal, že cena ropy jako její koeficient elasticity je nejvyšší ze všech faktorů zahrnutých v modelu pro časové období roku 2020. Regresní model je vhodný pro prognostické účely. Byla také přezkoumána vládní opatření a politiky pro řešení pandemie covid-19. Studie zjistila, že pandemie covid-19 vážně postihuje nigerijský ropný a plynárenský průmysl a vláda musí zajistit, aby byly implementovány a neustále přezkoumávány odpovídající politiky..

Klíčová slova: Ropa a plyn, Průmysl, Covid-19, Ropa Export, Pandemicky, Obyvatelstvo, HDP, Cena ropy, Regrese, Politiky.

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1. Introduction

The current pandemic has caused a phenomenal and worldwide emergency that now affects regions, countries, sectors, companies and individuals to experience a reaction, versatility, recuperation with change for "another reality." On the 31st of December 2019, a situation of obscure reason was accounted for to the World Health Organization from Wuhan, China. This peculiarity has proceeded to be commonly known as the COVID-19 virus which was proclaimed as a general wellbeing crisis by the World Health Organization on the 30th of January 2020, and a pandemic on the 11th of March 2020 (KPMG, 2020).

As of the 31st of December 2020, the pandemic was accounted for to have spread to at minimum 210 countries infecting more than 100million people and resulting in the deaths of over 2million people across the globe. As a feature of endeavors to diminish the spread of the virus, major economies have instituted lockdowns aimed at minimizing human-to-human interactions, but this has in turn resulted in economic challenges and while a cure/vaccine for the virus was still being developed, countries had to figure out how to adjust the economical shocks of these drawn out lockdowns/limitations with the related general wellbeing risks. Coronavirus is significantly affecting all nations of the world. It is causing the shocking loss of many lives, influencing the manner in which many individuals live and work and causing social and monetary change that is probably going to have implications for a long time to come. Government's activities to manage the pandemic are advancing all pieces of the economy and life and one area seeing significant change is the oil industry.

The Coronavirus (COVID-19) brought unthinkable changes to the world. Its effect and the essential reaction of states implied that the following one to two years basically will be extremely trying for financial and social advancement in all nations of the world. One of the areas that will see critical difficulties is the oil sector, worldwide and in Africa

The global petroleum industry has been hit hard by the fall in oil prices, demand reduction and a weak global economic outlook, primarily due to the Covid-19 pandemic. The oil and gas pipeline sector are not left out, with a few significant forthcoming pipeline projects such as Liberty Oil and Red Oak in the US slowed down because of unfriendly economic situations (Offshore Technology, 2020). This coronavirus pandemic had revealed many weaknesses in the world’s major economies, and its overall effect is conspicuously visible and cut across

several institutions and industries: from the financial institutions to health, agriculture, tourism and hospitality, electricity, oil and gas. This has brought about extraordinary absolute lockdown of urban areas, lower working hours, staggered and declining creation, less handling, sub-standard assembling and need dispersion. The progressing or new undertakings across oil and gas esteem anchor are probably going to confront various difficulties with regards to project execution, arranging and managing from the pandemic.

As regards to the oil and gas sector, there are combinations of factors responsible for the fall in oil price; there are insinuations that Saudi Arabia and Russia oil price war was partly responsible for it. Another reason responsible for the persistent fall in international oil and gas prices in 2020 is the sharp decrease in worldwide oil and gas utilization since significant production and manufacturing exercises in the main industrial capitals of the world has been grounded to an halt following the Covid-19 pandemic, and the monetary outcomes and harm is on the ascent. The current market instability and low prices have been a significant reason for worry among OPEC's and non-OPEC Member nations.

Oil prices kept on falling in the initial ten days of February 2020 in light of the huge decrease in crude oil interest from China as state-possessed and independent petroleum processing plants were drastically diminished their races to long term lows in the midst of rising oil item stocks and lower homegrown interest. In mid-February, oil price settled and recuperated somewhat after reports showed an easing back in the quantity of new Covid-19 cases in central area China. Be that as it may, oil price turned around their vertical pattern and declined pointedly during the last seven day stretch of the month, coming around about $9 in a single week in the midst of a sharp sell off in worldwide value and oil markets in the midst of worries about oil interest as the spread of Covid-19 sped up external China (OPEC-MOMR, 2020).

The Covid has additionally prompted a decrease sought after for crude oil and a potential stock overabundance could pressure costs further. Oil Plunges 24% for most awful day ever since around 1991, and hits long term low after OPEC bargain disappointment, initiated price battle in the midst of COVID-19 outbreak (Stevens, 2020). The current national budget of most oil-dependent nations like Nigeria must be amended in light of the fact that it will never again mirror the current economic reality since the financial plan wasvalued at a higher oil cost from

2019, therefore, the public financial plan of some oil-dependent nations ran into huge shortfalls (Ozili and Arun, 2020).

Foreign direct investment in the Nigerian petroleum industry has been witnessing a gradual decline, especially in 2020. The overall capital inflow received in Q2 is $6.55 million (compared to $10.09 million received in Q1 2020). This amounts to 0.51% of the overall foreign investments into the Nigerian economy realised in the second quarter with the largest coming from capital importation by shares with 35.88% (KPMG, 2020).

The investment inflow for Q2 is the most reduced the sector has gotten beginning around 2015. 2019 finished with an overall capital inflow of $216.23 million, which was a 61% expansion contrasted with $133.51 million recorded in 2018 while 2017 and 2016 figures stood at $331.36 million and $720.15 million, respectively. It is troubling that, notwithstanding the undeniable open doors in the oil and gas industry and the way that the Nigerian economy is subject to this industry, there is by all accounts dithering by foreign financial backers to coordinate their interests into this area. While the lessening in 2020 could without a doubt be credited to the overall monetary hardships as a result of the COVID-19 crisis, industry partners have continued to blame the nonattendance for vicious managerial and money related changes as the avocation behind declining new pursuits. It is, in this way, trusted that the section of the Petroleum Industry Bill, in the National Assembly, would proclaim a defining moment for the standpoint of foreign interest in the business (KPMG, 2020).

In a period of 6 months, global crude oil prices saw one of the sharpest drops in history (69%+) from a peak of $60.94/bbl in December 2019 to $18.84/bbl in April 2020 (World bank 2021). This was set off by Russia and Saudi Arabia, both of whom couldn't settle on oil price slices to match the falling demand because of decreased economic activities by the COVID-19 pandemic. Subsequently, both nations have taken steps to sustain their market dominance against US shale producers who couldn‘t compete effectively at lower prices. With economic activity slowly resuming, oil prices have started to rebound and as of June 2020, prices have risen up to $43.71/bbl indicating a healthy recovery trend (KPMG, 2020).

For African petroleum exporting nations, the anticipated fall in demand means that exports of crude oil in 2020 will go down by nothing less than 10% on average compared to previous years. Crude petroleum prices are additionally expected to decline. At $40/barrel or lower, the

worth of African petrol commodities could decline to levels last seen 20 years prior. These lower costs alongside decreased yield drop could see Africa's huge oil makers looking more than $20 billion of lost oil esteem in 2020. For consuming nations, the low per capita utilization of oil for transportation in numerous African nations won't altogether acquire from lower costs which restricted by low interest and a possible limit on capacity (KPMG, 2020).

The 2020 financial plan was downsized by 45% by the National Government of Nigeria because of COVID 19 and the oil glut that accompany it. Capital expenditure was slashed by 20%, and recurrent expenditure also by 25%, but no State government discussed their budget yet. This was important as the crude oil benchmark of $57 per barrel has been adjusted to $30 per barrel after the crash in worldwide prices. As at Friday, May 1, 2020, bonny light unrefined oil was being traded for $10 per but without purchasers. Nigeria has joined OPEC and OPEC+ to cutunrefined petroleum supply by up to 10 million barrels each day from May to June 2020, and 8 million bpd from July till December 2020, and 6 million bpd between January 2021 and April 2022 trying to touch off prompt transient value bounce back and security. This infers that Nigeria will restrict her raw petroleum creation to 1.412 million bpd, 1.495 million bpd and 1.579 million bpd individually as agreed. It is anticipated that with the new mediation by OPEC+, unrefined petroleum costs will bounce back by somewhere around $15 per barrel temporarily (Afaha et al, 2021).

Given this background, this study seeks to evaluate the impact of Covid-19 on the petroleum industry in Nigeria.

2. Objectives and Methodology

Objectives

Given the background introduction, the main objective of this diploma thesis becomes identification of key developmental trends in crude oil/gas production and trade of Nigeria, the largest oil and gas producer in Africa. Since the Federal Republic of Nigeria is richly endowed with natural resources and petroleum production can be referred to as a central to the domestic economy (it plays a crucial role, accounting for 40% of GDP and 80% of government earnings), it becomes interesting to answer the following research questions:

1. What is the current state (in 2020) of oil and gas producing industry in Nigeria and what was it 20 years ago?

2. What countries are the main importers of Nigerian crude oil and gas?

3. What was the impact of COVID-19 pandemic on oil and gas industry in Nigeria?

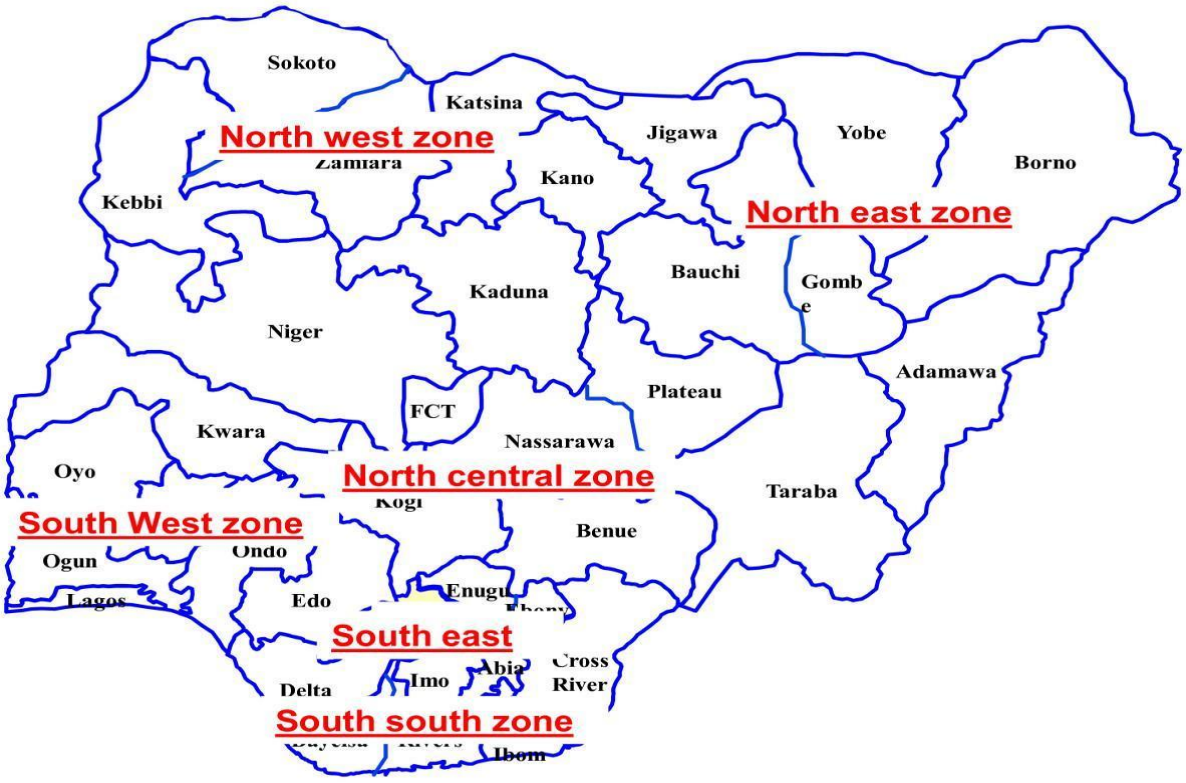
4. What are the relationships among selected macroeconomic indicators and oil industry in the Republic (via regression analysis)?

5. What government reactions (implemented policies and regulation) were launched to tackle pandemic challenges?

Methodology

The study area is Nigeria with focus on states where crude oil production is prominent.

Figure 1: Map of Nigeria showing the geographical zones



Source: NNPC 2022

Theoretical part of the Diploma thesis is mainly based on relevant literature reviews (represented by printed literature, scientific articles, surveys, web sources) and the research of similar studies, using such methods as abstraction, inductive reasoning, analysis, synthesis and deduction.

Practical part contains descriptive statistical analysis and qualitative thematic synthesis of the main economic indicators (selected for the analysis variables). For a descriptive overview of the oil and gas industry, the use of tables and graph was incorporated into the study. An econometric model was constructed to answer the 4th research question of the DT. The results of regression analysis along with other main outputs and author's recommendations is provided in the Diploma's conclusion.

3. Literature Review

3.1 History of the Nigerian Petroleum Industry

Oil was found in Nigeria in 1956 at Oloibiri in the Niger Delta after 50 years of investigation. The revelation was made by Shell-BP, at the time the sole concessionaire. Nigeria joined the positions of oil producers in 1958 when its first oil field came on stream creating 5,100 bpd. After 1960, investigation rights in coastal and seaward regions abutting the Niger Delta were stretched out to other unfamiliar organizations. In 1965 the EA field was found by Shell in shallow water southeast of Warri (NNPC, 2021).

In 1970, the finish of the Biafran war corresponded with the ascent on the planet oil price, and Nigeria had the option to procure moment wealth from its oil production. Nigeria joined the Organization of Petroleum Exporting Countries (OPEC) in 1971 and laid out the Nigerian National Petroleum Company (NNPC) in 1977, a state claimed and controlled organization which is a central part in both the upstream and downstream areas (NNPC, 2021).

Following the revelation of raw petroleum by Shell D'Arcy Petroleum, trailblazer production started in 1958 from the organization's oil field in Oloibiri in the Eastern Niger Delta. By the last part of the sixties and mid seventies, Nigeria had accomplished a production level of north of 2 million barrels of unrefined petroleum daily. Despite the fact that creation figures dropped in the eighties because of monetary rut, 2004 saw an absolute revival of oil production to a record level of 2.5 million barrels each day. Current improvement procedures are pointed toward expanding production to 4million barrels each day constantly 2010(PPPRA, 2021).

Oil and gas production and export assume a prevailing part in Nigeria's economy and records for around 90% of her gross profit. This has pushed farming, the customary pillar of the economy, from the mid fifties and sixties to the background.

Table 1: Major Events in the history of the Nigerian Oil and Gas

YEAR	HISTORICAL ACTIVITIES
1908	Nigerian Bitumen Co. & British Colonial Petroleum commenced operations around Okitipupa.
1938	Shell D'Arcy granted Exploration license to prospect for oil throughout Nigeria.
1955	Mobil Oil Corporation started operations in Nigeria
1956	First successful well drilled at Oloibiri by Shell
1956	Changed name to Shell-BP Petroleum Development Company of Nigeria Limited
1958	First shipment of oil from Nigeria
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
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 Bendel State
1966	Elf started production in Rivers State with 12,000 b/d
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 started operations
1970	Mobil started production with 4 wells at Idoho Field and Agip also started production. Department of Petroleum Resources Inspectorate started
1971	Shell's Forcados Terminal Commissioned, Mobil's terminal at Qua Iboe commissioned
1973	First Participation Agreement; Federal Government acquires 35% shares in the Oil Companies Ashland started PSC with then NNOC (NNPC) Pan Ocean Corporation drilled its very first discovery well at Ogharefe –I
1974	Second Participation Agreement, Federal Government equity rised to 55%. Elf formally 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 Ministry of Petroleum Resources
1976	MPE renamed Ministry of Petroleum Resources (MPR), Pan Ocean commenced production via Shell-BP's pipeline at a rate of 10,800 b/d
1977	Government established Nigerian National Petroleum Corporation (NNPC) by the Decree 33, (NNOC & MPR extinguished).
1979	Third Participation Agreement (throughout NNPC) increases equity to 60%. Fourth Participation Agreement; BP's shareholding nationalised, leaving NNPC with 80% equity and Shell 20% in the joint Venture. Changed name to Shell Petroleum Development Company of Nigeria (SPDC)
1984	Agreement consolidating NNPC/Shel1 joint Venture
1986	Signing of Memorandum of Understanding (MOU)
1989	Fifth Participation Agreement; (NNPC-60%, Shell-30%, Elf-5%, Agip-5%).
1991	Signing of Memorandum of Understanding & joint Venture Operating Agreement (JOA)
1993	Production Sharing Contracts signed -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 first Exploration well. NLNG's 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 commences retail outlet scheme

Source: NNPC 2021

3.2 Operators in Nigerian Petroleum Industry

The Department of Petroleum Resources (DPR)

This governmental agency is responsible for the regulation and oversight of all the operations being executed under licenses and leases in the petroleum industry. Their activities incorporates the exploration, production and marketing of crude oil and processed petroleum products (NNPC, 2021).

The Nigerian National Petroleum Corporation (NNPC)

The NNPC is appointed with the sole obligation regarding upstream and downstream turn of events, which involves taking advantage of, refining, and advertising Nigeria's raw petroleum. The NNPC through the NAPIMS regulates and oversee government interest in the petroleum industry. Since its initiation, the NNPC and its auxiliaries have gone through key rebuilding, which have kept it side competitive in national and worldwide circles. NNPCs oil and gas activities are embraced both in upstream and downstream operations (NNPC, 2021).

Table 2: Showing Petroleum product output in Nigeria

	PETROLEUM PRODUCTS OUTPUT (1000 B/D)				
Year	**Gasoline**	**Kerosene**	**Distillates**	**Residuals**	**Others**
2001	**53.75**	**30.41**	**45.08**	**53.22**	**21.29**
2002	**55.53**	**29.02**	**48.87**	**45.69**	**8.43**
2003	**27.45**	**17.83**	**33.35**	**25.97**	**1.41**
2004	**21.35**	**14.36**	**27.42**	**21.59**	**14.38**
2005	**32.22**	**22.54**	**43.92**	**34.97**	**44.43**
2006	**16.54**	**11.97**	**18.38**	**34.99**	**21.82**
2007	**3.39**	**6.80**	**9.52**	**13.84**	**13.54**
2008	**15.94**	**13.90**	**23.87**	**30.35**	**15.74**
2009	**10.58**	**7.03**	**10.67**	**12.38**	**1.11**
2010	**17.81**	**10.20**	**15.35**	**17.92**	**3.97**
2011	**19.66**	**10.56**	**14.39**	**16.64**	**5.06**
2012	**25.12**	**11.80**	**17.20**	**16.85**	**4.39**
2013	**29.51**	**15.34**	**17.83**	**20.07**	**3.18**
2014	**15.87**	**8.99**	**12.05**	**13.30**	**1.92**
2015	**10.60**	**2.97**	**3.88**	**3.11**	**0.22**
2016	**13.51**	**7.34**	**12.27**	**6.19**	**8.24**
2017	**19.81**	**9.54**	**14.33**	**11.12**	**4.30**
2018	**8.59**	**5.87**	**7.13**	**10.33**	**1.19**
2019	**2.39**	**1.25**	**1.89**	**2.40**	**0.23**
2020	**0.00**	**0.03**	**0.41**	**0.18**	**0.31**

Source: OPEC Database 2022

All NNPC upstream tasks for example crude oil, are at present overseen under the Exploration and Production Directorate which comprises of the accompanying Strategic Business Units (SBUs) that works entirely under the NNPC:

1. National Petroleum Investment Management Services(NAPIMS)
2. Crude Oil Sales Division (COSD)
3. Integrated Data Services Limited (IDLS)
4. Nigerian Petroleum Development Company (NPDC)
5. Nigerian Gas Company (NGC)

These SBUs are all things considered liable for reviews, seismic information examination and translation, unrefined petroleum investigation, creation, transportation, stockpiling and advertising

The downstream activities encompass crude oil and gas change into refined and petrochemical items and better synthetic compounds, and gas treatment as well as transportation and

showcasing of the oil based commodities. The Downstream plants under the NNPC incorporate the four treatment facilities with a complete introduced capacity of 445,000 barrels each day; two are present in Port Harcourt (210 000b/d), one located in Warri and the other in Kaduna (125,000b/d and 110,000b/d respectively) treatment facilities. Likewise, three petrochemical plants in Warri and Kaduna are important for downstream activities. Nigeria has 5000 kilometers of pipeline distribution, twenty-one (21) capacity terminals and nine (9) LPG stations (DPR, 2021).

3.3 Current Status of the Petroleum Industry in Nigeria

Sedimentary Basins

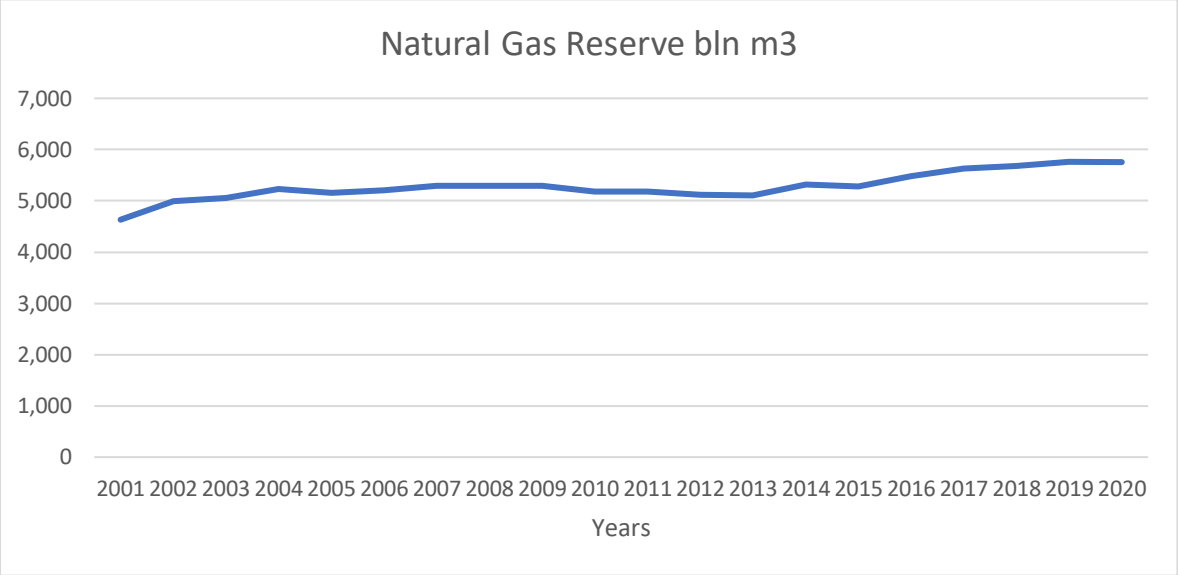
Nigeria has 7 primary sedimentary basins with principle supplies, exploratory status and so forth. The main producing regions cover some 60% of the complete land of around 31,105 sq. km. The distant regions stay a critical resource yet to be taken advantage of (NNPC, 2021).

Oil and Gas Reserves

A 2003 gauge showed recoverable unrefined petroleum holds at 34 billion barrels. The reserve base is supposed to increment because of extra investigation and evaluation drilling. As of now, more than 900 million barrels of raw petroleum of recoverable reserves have been distinguished. The public authority has additionally set an objective to accomplish a reserve of 60 billion barrels by 2030 (NNPC, 2021).

Nigeria has an expected 159 trillion cubic feet (Tcf) of demonstrated natural gas reserves, giving the country one of the main ten petroleum gas enrichments on the planet. Because of an absence of utilization foundation, Nigeria actually flares around 40% of the gaseous petrol it produces and yet again infuses 12% to improve oil recuperation. Official Nigerian arrangement is to end gas erupting totally by 2008. The World Bank appraises that Nigeria represents 12.5% of the world's complete gas flaring. Shell appraises that about portion of the 2 Bcf/d of related gas - - vaporous side-effects of oil extraction - - is erupted in Nigeria yearly. The new business system is to gather the related gas and cycle it into liquefied natural gas (LNG), extraordinarily improving Nigerian petroleum gas incomes while at the same time diminishing carbon dioxide emanations (NNPC, 2021)

Figure 2: Natural Gas Reserve of Nigeria



Source: OPEC Database 2022

Oil Fields

Of the 606 oil fields in the Niger Delta region, 355 are on-shore while the excess 251 are seaward. Of these, 193 are presently functional while 23 have been closed in or deserted because of unfortunate prospectivity or all out evaporating of the wells. Outside the Niger Delta, an aggregate of 28 exploratory oil wells have been penetrated all showing different degrees of prospectivity. These wells incorporate two (2) disclosure wells in Anambra State, one (1) revelation well each in Edo State and Benue State each and Twenty-four (24) wells in the Chad Basin. Nonetheless, creation is yet to initiate from any of the wells(DPR, 2021).

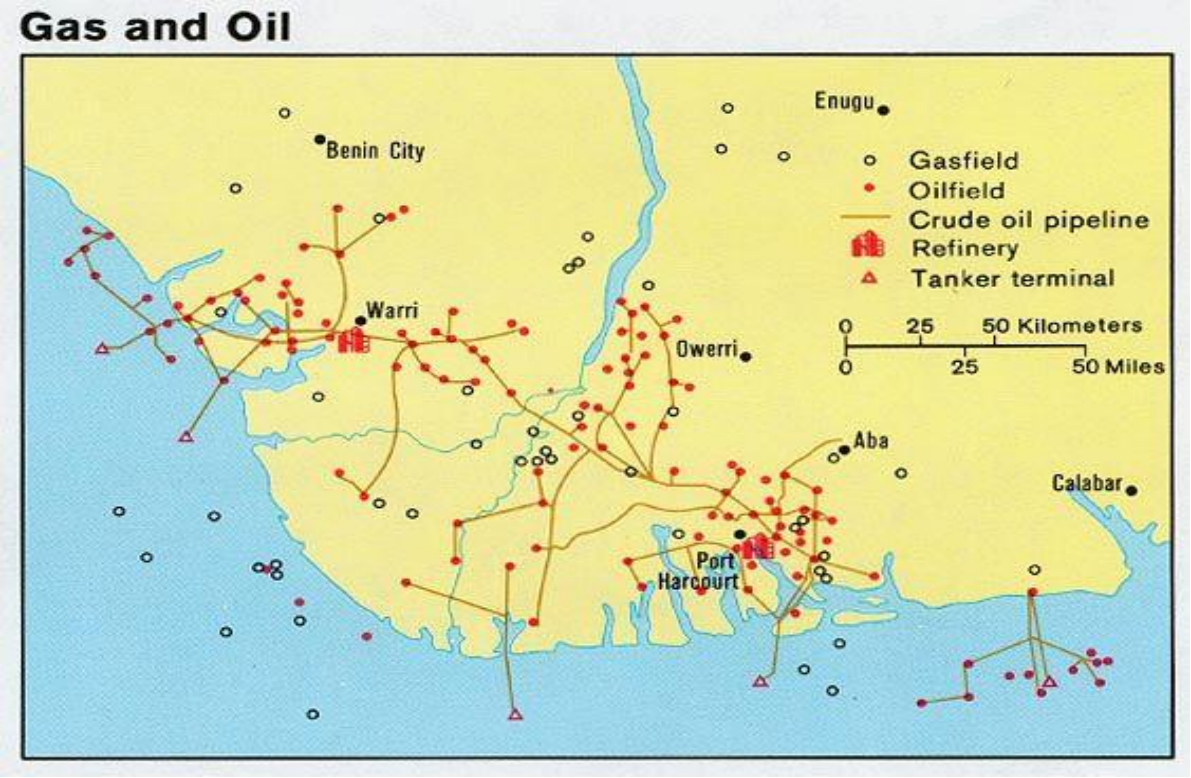
Table 3: Showing the Refineries Capacity in Nigeria

	REFINERIES CAPACITY (1000 B/CD)						
Year	**PHRC**	**WRPC**	**KRPC**	**PHRC**	**NDPR**	**Niger Delta Refining**	**Waltersmith Petroman Oil Ltd**

2001	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2002	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2003	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2004	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2005	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2006	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2007	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2008	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2009	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2010	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2011	**150**	**125**	**110**	**60**	**na**	**na**	**na**
2012	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2013	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2014	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2015	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2016	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2017	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2018	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2019	**150**	**125**	**110**	**60**	**1**	**na**	**na**
2020	**150**	**125**	**110**	**60**	**1**	**10**	**5**

Source: OPEC Database 2022

Figure 3 : Locations of Oil and Gas Industry in Nigeria

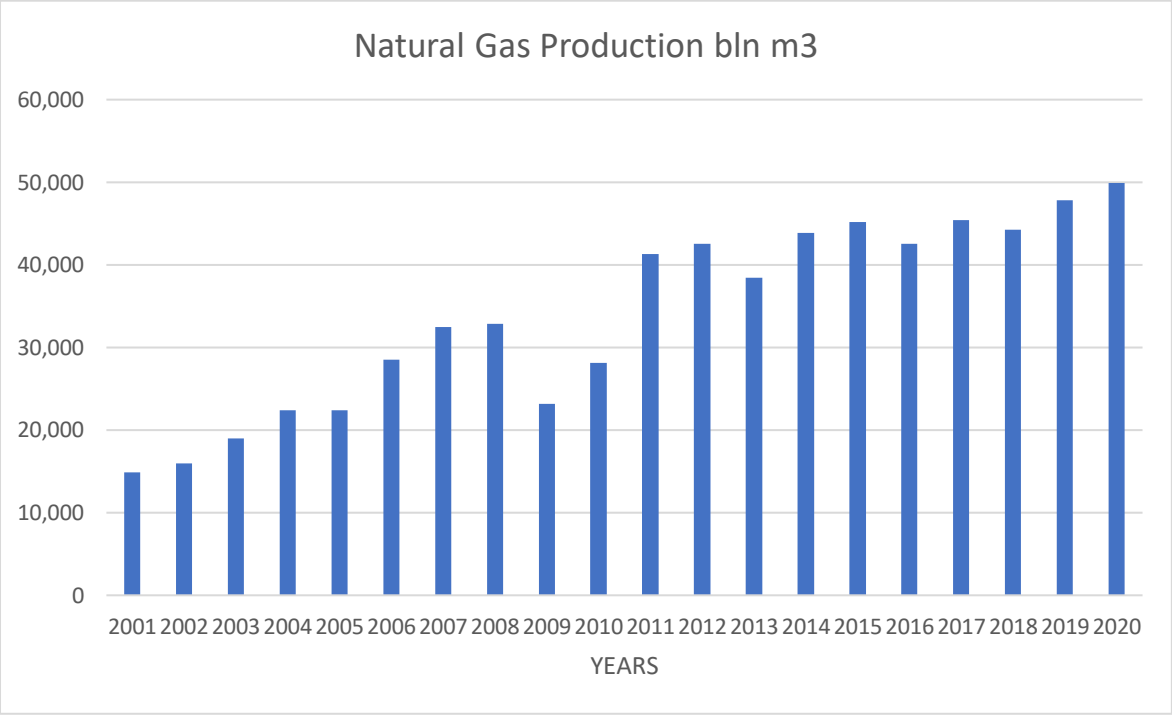


Source: DPR 2022.

Nigerian liquefied Natural Gas

The Nigerian LNG project is being executed in stages with the initial production from two trains. The plant is located at Bonny Island. NLNG has successfully secured market for its moderate production volume from its base project and train three.

Figure 4: The Volume of Natural Gas Production



Source: OPEC Database 2022

Sources of Gas:

The bulk of the gas for base project is majorly NAG supplied from the following gas supplier fields: SPDC - SOKU;

NAOC - OBIAFU OBIKROM;

EPNL - OBITE;

The bulk of gas for train three will contain more of associated gas from which both LNG and LPG will be produced.

Gas Supply Contract:

The NLNG had consented to Gas Supply Arrangements (GSAs) with three upstream gas makers in 1992. This is pointed toward getting satisfactory and customary inventory of gas for the venture. These gas makers are:

The Shell Petroleum Development Company of Nigeria Limited (SPDC) - NNPC/SPDC/NAOC/EPNL JV: administrator and venders' agent - SPDC (Shell subsidiary); Nigerian Agip Oil Company restricted (NAOC) - NNPC/NAOC/POCNL JV: administrator and merchants' delegate - NAOC (Agip member);

Elf Petroleum Nigerian restricted (ELF), (then, at that point, Elf Nigerian Limited) - NNPC/EPNL JV: administrator and venders' delegate - EPNL (Elf member). These three joint endeavors are supposed to supply the gas prerequisite for the undertaking for the following 22 years (NNPC, 2021).

Gas Supply Contract Quantities:

The joint endeavor will supply an aggregate of 302.17 billion standard cubic meters (BSCM) of feed-gas expected for the NLNG's three trains. The feed-gas for the three trains will be a mix of related and non-related gas. At the point when NLNG's train three turns out to be completely functional, a sum of around 41.83 million standard cubic meters will be expected by the plant everyday (NNPC, 2021).

Licenses and Leases.

There are two kinds of licenses given to oil makers in Nigeria in particular: the Oil Prospecting License (OPL) and the Oil Mining License (OML) with legitimacy periods going from 5 to 20 years separately. As at February 1999, there were an aggregate of 48 OML's and OPL's given chiefly to Joint Ventures with government cooperation (DPR 2021).

3.4 Nigerian Petroleum Industry in Year 2020

3.4.1 Crude Oil Price Volatility

Brent crude, the worldwide benchmark, lost up to 13% in 2020 to hit a low of $24.72 a barrel, a level last seen in 2003. US benchmark, West Texas Intermediate, fell significantly more, losing 23% to hit a low of $20.48 a barrel (Financial times, 2020). The International Energy Agency (IEA) has proactively cautioned of the financial hit to more poorer producers, for example, Iraq and Ecuador, saying that their incomes from oil and gas deals could fall as much as 85% this year. For nations reliant upon energy deals to finance government spending plans, a breakdown in income could sabotage wellbeing frameworks set to be tried by the Covid's spread (IEA and Financial times, 2020). Notwithstanding the torment of plunging oil costs, neither Russia nor Saudi Arabia appeared to be prepared to withdraw on their arrangement to help production and flood the market. In any case, Russia is on record demonstrated as depicted by the monetary times it would lean toward higher oil costs, as it uncovered that the new crash implied it would run a financial plan deficiency this year yet gave little sign of it intends to pull back from its a showdown with Saudi Arabia in the oil market (Financial times, 2020).

Several oil analyst accept Saudi Arabia is attempting to push Russia back to the negotiation table. Yet, the degree of the breakdown in oil request currently gauge with whole European nations lock downs and significant US urban areas forcing limitations might make it challenging for the two energy giants to figure out a successful reaction, regardless of whether they were on better conditions.This issue was at its most intense May 2020, WTI showcased that oil demand was at its weakest, partly since full coronavirus containment measures in place across much of the US. Storage at the Oklahoma facility became full within weeks. As of 10th April 2020, Cushing’s tanks housed 55million barrels of crude, or 72% of working storage capacity of 76.1million barrels (Financial Times, 2020). It was noted that Russia’s readiness to offer steep discounts for its oil was designed to bankrupt U.S. shale. This led to Saudi Arabia accusing Russia of breaking up the OPEC+ coalition agreement (World Oil, 2020). However, a new OPEC + deal was reached, the new OPEC+ deal put the Saudi-Russia feud behind and was an effort to respond to the glut threatening to fill up global storage within weeks as demand crashed amid the COVID19 pandemic.

The nearly 10 million bpd cut would be for just two months May and June 2020 after which the producers will soften the cuts (Oil price, 2020). To mitigate their storage crises Crude Oil Importing Countries (Crude Oil Buyers) urged deeper production cuts from OPEC; and placed further tariffs on foreign oil imports; freeing up more storage capacity, including National Strategic Petroleum Reserves (SPR). A major strategy deployed was paying producers to keep oil in the ground; or extending financial support to oil companies (Financial Times, 2020). The recent intervention by the Organization of Petroleum Exporting Countries (OPEC) and its allies, led by Russian, to cut global crude oil will not impact the market immediately, market analysts say the record output cuts by OPEC+ (expected to take effect from May 1st, 2020) needs some time to rebalance the market (Premium Times, 2020).

The 2020 May WTI contract briefly touched USD $40/bbl. intraday. The severe drop on was driven in part by a technicality of the global oil market. Oil is traded on its future price and May futures contracts expired on Tuesday, 26th May. Traders were keen to offload those holdings to avoid having to take delivery of the oil and incur storage costs. It is probably the first time in history that a negative price formed in the futures market (Electricity and natural gas have been traded at negative prices in spot markets in various locations). Although unprecedented, the actual significance of this move is smaller than the headline news may suggest. On expiry of the 2020 May WTI contract, it is normal that the futures prices are volatile during the last few days of trading. Yet the negative price is unprecedented and largely due to the fear of running out of storage capacity in Cushing (the delivery point of WTI). The June WTI contract and the Brent also dropped around 10%, but less than history-making. This implies oil makers are taking care of purchasers to take the item their hands over feelings of dread that capacity limit could run out in May. Thus, oil firms have depended on leasing big haulers to store the excess stockpile and that has constrained the cost of US oil into a negative area.

A nearer assessment of sub-areas inside the business uncovers how much each will be impacted:

• International oil organizations (IOCs) finds it progressively hard to develop naturally, with specific significant expense and abandoned resources being discounted. Notwithstanding, there will be more M&A open doors as more modest players battle to contend.

• National oil companies (NOCs) with huge, minimal expense hold positions will push to speed up creation, yet those with greater expense structures will battle. Because of diminished oil and gas income, lower public financial plans will increase banter about prioritization between oil reinvestment and social requirements. A few legislatures might utilize the emergency to spike support for energy change programs.

• Refiners will confront low edges and returns for a long time because of primary overcapacity, heterogenous interest advancement and stricter item quality norms. In like manner, a few limited scope plants can not recuperate their working and upkeep cash costs.

• Oilfield administrations players face extremely low resource use as a result of undertaking scratch-offs or deferrals and creation closures. Extreme limit reductions and enormous representative cutbacks are probably going to go on in this portion

3.4.2 Impact of Crude Price Volatility Caused by the COVID – 19 Pandemic on Nigeria

Nigeria is Sub Saharan Africa's largest economy and relies heavily on oil as its main source of foreign exchange earnings and government revenues. Nigeria produces only about 2.7% of the world's oil supply (in comparison, Saudi Arabia produces 12.9%, Russia produces 12.7% and the United States produces 8.6%). The petroleum sector is important, as government revenues still heavily rely on this sector, the recent pandemic caused by corona virus has further exposed the economy of Nigeria and oil price crash put the country just like others in a state of impending recession (Financial Time, 2020). Nigeria depends on crude oil revenue for the greater part of government incomes and practically the entirety of its foreign trade and the past time oil costs plunged, in 2015, the nation sank into a downturn from which it has as of late, and scarcely, recuperated. Financial analysts said that slump was both exacerbated and drawn out by strategy blunders, including national bank protection from what was an unavoidable naira degrading In 2020 Nigeria's Finance Ministry stated that Nigeria being Africa's biggest crude exporter seeks $7bn in emergency funds to couching the effect of oil price shook in the face of imminent recession.

The Nigerian Finance Ministry has already reduced the government's projection of 2.1million barrels a day of oil production to 1.7million and is working to cut Nigeria's record $35bn budget for 2020, passed in December 2019 which was based on an oil price of $57 a barrel, by about 15% (Financial Times, 2020), with Oil trading at an average of USD$30. The IMF is considering Nigeria's emergency request for $3.4bn funding and World Bank release of $82m

instead of the $2.5bn sought by the country. In the response to the Covid-19 pandemic, the Nigerian government formed an Economic sustainability committee (ESC) of a seven member team chaired by the Vice president of the country on the directive by the Nigerian President that the Committee in collaboration with domestic sectors of the Nigerian economy, work out how the country can improve its economic stimulus packages for citizens from what is gotten from International Monetary funds (IMF) and Word Bank. The committee is made up of Minister of Finance, Budget and Planning; Industry, Trade and Investment; Labour and Employment; Minister of State Petroleum Resources; CBN Governor; NNPC Group Director and Permanent Secretary, Cabinet Secretariat who serves as secretary of the committee (ThisDayLive, 2020).

The oil price drop has pushed the Nigerian government to finally attempt to remove the petrol subsidy, which had fixed fuel at N145 per litre and absorbed billions of dollars in spending. Economists have long advocated an end to the costly subsidy regime, and recently the head of the state-owned Nigerian National Petroleum Corporation (NNPC), acknowledged on local media that the subsidy had mainly benefited multiple car-owning elites (Financial Times, 2020). The Management of Nigeria's Nigerian National Petroleum Corporation (NNPC) has assured the Nigerian citizenry that the slump of crude oil price below $0 per barrel would not have any reflection on the reality of the global oil mark and that of Nigeria's oil production (Premium Times, 2020). The NNPC further indicated that it was not the real crude oil price but the traders paper figure just showing the details at the close of their business for the month (Premium Times, 2020). An additional statement with regards to Shale Oil was put out by the NNPC leadership stating the US shale oil (which is West Texas Intermediate oil) does not influence Nigeria, since Nigeria trades in Brent and Bonny light which from all indications maintained an average of $20 per barrel, in fact highlighting that Nigeria achieved the highest oil production because of the current situation with Nigeria approaching 2.45million barrels per day (Premium Times, 2020).

The rise of COVID-19 and its rising rate in Nigeria has called for exceptional audit and changes in the previous income assumptions and financial projections. Contrasted with occasions that prompted downturn in 2016, the present status of the worldwide economy acts more hardships ahead like the oil cost is as of now beneath US$30 with projections that it will plunge further going by the cost battle among central participants in the business (Global thinkers, 2020). Sadly, the country has terribly underachieved in saving an adequate number of cushions for

stormy days, for example which it faces before long. In tending to these overwhelming financial difficulties, the current contemplations to update the spending plan descending is unavoidable. Notwithstanding, certain contemplations that are normal in the survey should not be forgotten about. The suspicions and benchmarks should be founded on feasible edges and gauges to guarantee ideal financial plan execution, particularly on the non-oil income parts (Madueke et al, 2020).

3.4.3 Implications of the falling oil prices on Nigeria's oil revenue.

The Federal Republic of Nigeria, located on the western bend of the African continent is the world's ninth-largest exporter of oil. The republic was declared in 1960 and has since become a nation with a $375.8 billion gross domestic product (GDP). Nigeria exported 3.8% of the world's total in 2018 with a value of $43.6 billion. Based on land size, the country is comparable to Texas. According to OPEC figures, the oil and gas sector accounts for about 10 percent of Nigeria's gross domestic product (GDP), while petroleum export revenues make up nearly 83 percent of the country's total export revenue (Tsvetana Paraskova, 2020).

Thus, COVID-19 will influence the Nigeria's oil and gas industry through the following, I) Decreased degree of interest for raw petroleum and income loss for Nigeria-this achieves supply overabundance - abundance supply of unrefined petroleum in the market with not many or no buyers. b) Increased tension on the Naira and foreign revenue COVID-19 has put "expanding strain on the Naira and foreign reserves as the raw petroleum deals receipts decline and the country's large scale monetary viewpoint deteriorates" (Economic Confidential, 2020). c) Buyer shortage. d) DPR statement of power majeure. e) Cost slashing measures - downsizing on ventures and decreasing their labor force. A significant Nigerian independent oil and gas firm, Seplat Petroleum Development Company Plc, are as of now hoping to reduce expenses by no less than 30% to counter an accident in crude costs (Femi, 2020).

3.4.4 Covid-19 Implications on the Petroleum Industry

The global lockdown caused by the COVID-19 pandemic has forced a transition of the industry into a state of crisis. The Progressive weakening of global oil demand at the beginning of 2020 has been intensified by the increasing systemic oversupply induced by the Russia-Saudi Arabia OPEC market share war. Together, these two variables have driven oil prices to a 20-year low.

Although some production cuts were later decided upon by OPEC, Russia and other producers, these price-support efforts have had a relatively modest impact (Rogers et al, 2020).

The transmission instrument through which the Covid-19 pandemic affects the Nigerian economy are in five primary ways: a) borrowers' ability to support credits; b) oil request shocks, constraining the sharp decrease in oil costs (unrefined petroleum and homegrown gas/premium engine spirits (PMS) or fuel; c) worldwide supply network shocks is far reaching as numerous importers shut down their industrial facilities and shut their boundaries, especially China and Nigeria; d) the public financial plan; e) significant shocks in the Nigerian securities exchange. Following this, the reviews shows the effect of the pandemic on the petroleum industry, with the Nigerian perspective.

While the Covid 19 has spread across more than 213 nations turning into a worldwide pandemic, there has been an uncommon decrease in oil interest from nations in Europe and Asia who are significant purchasers of Nigeria's crude oil as they have kept instances of the infection in their nations. The oil and gas industry to a great extent represent more than 90% of the country's foreign trade profit. Be that as it may, the episode of the Covid 19 in December, 2019 in Wuhan, China has negatively affected the area universally. Following the breakout of the infection is the Saudi-Russia cost war, which has additionally represented a danger to the industry.

Nigeria is normally alluded as the 49th biggest export economy on the planet with oil and petrol gas ruling the commodity market comprising around 93% of exports and the rest of non-oil wares. Trades are overwhelmed by crude petroleum establishing around 76% of all product sends out in Nigeria, trailed by petroleum gas comprising around 13.8% (OEC, IMF, 2016). Thusly, a fall in oil cost is unfortunate for the Nigerian economy. Given the flare-up of the pandemic, decreased interest for crude petroleum universally has left the country in a place of unsold vessels of crude petroleum and LNG. The circumstance is deteriorated for Nigeria as significant world oil makers like Saudi Arabia and Iraq could give discount on their provisions because of their minimal expense of production and in a bid to draw in deals. The current expense of crude petroleum production in Nigeria ranges between 15 to 17 dollars as against Saudi Arabia's expense of somewhere in the range of 4 and 5 dollars for each barrel (Uzoho,2020).

The vast majority of Nigeria's exchanging partners in terms of products have been comparably hit by the pandemic, compelling them to close down their economies. There is a wide decrease in worldwide raw petroleum interest because of the blend of the effect of COVID-19 and the lockdown strategy reactions executed to control the spread of the infection. This discouraged interest has sifted to the interest of Nigeria's significant oil shipper. For instance, the best 5 significant oil destination in 2019, India, Spain, Netherlands, France, South Africa and the US are for the most part doing combating the pandemic and are under lockdown. There by declining monetary exercises among Nigeria and its exchanging partners, this influences national income in the meantime.

The economic downturn created by the COVID-19 crisis is likely to deliver a big blow to many businesses, with the oil & gas industry currently stuck in a period of oversupply, low prices and uncertainty. Over the past 10 years, investors have considered the sector increasingly unattractive. As the conventional oil & gas business models becomes much riskier and less financially viable, any more prolonged period of oil prices is likely to see them divert their resources elsewhere (Rogers et al 2020). While the global economy will eventually recover, it is unlikely to return to its pre-Covid-19 “business as usual” condition quickly (if at all). Instead, due to lower economic activity and increasing pressure to use greener energy sources, the oil & gas industry is likely to face prolonged, significantly reduced demand. Similarly, oversupply problems whether due to burgeoning oil volumes from US shale or the battle for market share between OPPs, must also be tackled by the industry.

A “Back to Normal” scenario depends on an early, bounce-back of the global economy, combined with failure to progress the climate-change/renewables agenda. At the same time, it requires major oil producers to agree production cuts that are sufficiently rapid and deep that current oversupply is reduced. Achieving these conditions seems unlikely. The scenario of Stagnation, in which the global economic recovery and the effects of oil demand appear to be far more likely. In this scenario, the continued implementation of renewables and low-carbon sources of energy holds back the sow demand recovery. In this case, however producers can gradually reduce oversupply in order to encourage moderate prices that ensure the feasibility of many ventures. Undoubtedly, the worst possible scenario is “Severe injury”, perhaps mixed with accelerated demand destruction induced by the transition to renewables, combined with

persistent over-supply, owing to repeated failures by major producers to consent to sufficiently deep production cuts.

On the positive side, any lasting decrease in demand will provide strong political and financial incentives for OPEC and other major producers to adjust output to an acceptable price level. This makes this situation less probable. The level of injury inflicted on both individual players and the broader industry will therefore largely depend on whether, perhaps at the cost of market share, OPEC will commit to supporting prices in this way. Given these conditions, the "New Normal" scenario is another possible outcome. In this case, after a few months the economy is bouncing back combined with a relatively slow erosion of demand due to tightening climate change policies, oil prices should be boosted. Even if OPEC and other manufacturing struggle to curb supply as much as in the past, this would be the case (Rogers et al 2020).

Diminished degree of interest for unrefined petroleum - Without uncertainty, the decrease in oil interest and the low crude price brought about by COVID 19 and the worldwide price war will unfavorably affect an unrefined petroleum based economy like Nigeria. The episode of COVID-19 in a considerable lot of the nations that buy unrefined petroleum from Nigeria and the actions carried out have impacted Nigeria's piece of the pie. Significant purchasers of Nigeria's raw petroleum, like India, Spain, France, Italy, Canada, have been affected by COVID-19, which has taken a negative work on their economies and diminished their degree of interest for unrefined petroleum. The undeniable impact of the decrease in unrefined petroleum request is that there is a stock overabundance - abundance supply of raw petroleum in the market with not many or no purchasers (KPMG, 2020).

Purchaser shortage - According to the Group Managing Director of the Nigerian National Petroleum Corporation ("NNPC"), Mele Kolo Kyari, Nigeria has experienced issues in tracking down purchasers for its unrefined petroleum and liquified natural gas (LNG) cargoes. NNPC recorded that around 50 cargoes of unrefined petroleum and 12 cargoes of LNG were abandoned on the global market as at 11 March 2020. Because of its failure to discard these cargoes, NNPC limited the authority selling costs for Bonny Light and Qua Iboe by US$5 per barrel to get an overabundance free from unsold April-stacking cargoes (Premium Times, 2020).

Expanded tension on the Naira and oversea reserves - The constant drop in the cost of unrefined petroleum in the global market has proactively negatively affected the country's rough income subordinate economy - oil and gas represent more than 90% of Nigeria's foreign trade profit and over 60% of the nation's profit. As indicated by the Minister of Finance, Budget and National Planning, Zainab Ahmed (the "Pastor of Finance"), COVID-19 has put "expanding tension on the Naira and unfamiliar stores as the unrefined petroleum deals receipts decline and the country's full scale monetary standpoint deteriorates" . Nigeria's spending plan for 2020, which was set at an oil benchmark of US$57 per barrel, has now been investigated against the foundation of the effect of the Coronavirus pandemic on the worldwide economy and worldwide oil costs. Following the audit of the 2020 financial plan, the Minister of Finance affirmed a survey of the financial plan oil benchmark from US$57 to US$30 per barrel (Premium Times, 2020).

DPR presentation of force majeure - The Department of Petroleum Resources (the "DPR" - the controller of the Industry) because of measures presented by the Nigerian government, as of late coordinated oil administrators, workers for hire and specialist co-ops to restrict the quantity of staff at undertaking and construction sites and proclaimed the current circumstance ought to be considered as "force majeure". Almost certainly these actions will affect production in Nigeria. (DPR, 2020)

Cost slashing measures - Oil firms in Nigeria, similar to their partners in different regions of the planet, are probably going to start on cost cutting measures, including downsizing on projects and decreasing their labor force. A significant Nigerian autonomous oil and gas firm, Seplat Petroleum Development Company Plc, is now hoping to reduce expenses by somewhere around 30% to counter crisis in crude price (KPMG, 2020).

Premium motor spirit cost review - It isn't just the upstream area of the Industry that is impacted - the downstream part is likewise affected. In responding to the dive in unrefined petroleum costs, the Petroleum Products Pricing Regulatory Agency as of late surveyed the siphon cost of premium motor spirit descending from N145 to N125 per liter compelling 19 March 2020. A further decrease to N123 per liter was made viable 1 April 2020. The new value, which will endure all through the long stretch of April, was presented on the rear of the consistent decrease in the cost of crude petroleum in the global market (NNPC, 2020)

3.4.5 Global Spillover to other Sectors

At first, the discernment was that the COVID-19 pandemic would be confined in China in particular. It later spread across the world through the migration of individuals. The monetary aggravation became extreme as individuals were approached to remain at home, and the seriousness was felt in different areas of the economy with movement boycotts influencing the flight business, game undoings influencing the games business, the denial of mass get-togethers influencing the occasions and media outlets (Horowit, 2020; Elliot, 2020).

There are matches between the COVID-19 emergency and the occasions of 2007-2008: as in 2020, many individuals in the previous downturn accepted the effects would to a great extent be restricted (all things considered in light of a presumption that the subprime contract emergency would be a somewhat minor issue influencing just the US, in any case influencing the worldwide monetary framework) (Elliot, 2020). The unexpected financial interruption brought about by COVID-19 isn't just disastrous yet additionally has overflow suggestions since it provoked interest and supply shocks in pretty much every area of human undertaking (El-Erian, 2020)

3.5 Review of other Researches

John Adesuyi and Ibrahim Suleiman (2021) in their research titled ‘Effects of Covid-19 on the Economy of An Oil Dependent Nigeria’ revealed that; Nigeria as a country is over dependant on oil, and needs to reconsider the policies in place to ensure the country has a favourable balance post COVID-19. International and global economies have adopted a series of inward and positive moves to couching the effects of oil price volatility and economic imbalance due to covid19 effects. One thing that has been established is that it’s not possible to underestimate its impact on unemployment, additional job loss, increased poverty, hunger, combined with a major drop in oil prices, Therefore, their study concluded that drastic economic policy steps need to be established and formulated to aid struggling businesses and SME's in this time of difficulties, palliatives, soft social loans should also be made readily available to the most impacted.

John Afaha, Esther Aderinto, Ebenezer Oluwole, Adewale Oyinlola and Yusuf Akintola (2021) in their research titled ‘'Effect of Covid-19 on the Nigerian Oil and Gas Industry and Impact on the Economy' uncovered that; Crude oil costs had decreased to record low of $22 per barrel and this clearly has income affecting consequences for the Nigeria financial framework. Likewise, there is audits of the costs of the premium motor spirit (PMS) or fuel downwards to pad the rampaging effect of the pandemic on individual and business exercises. Even though the government has thought of crisis approaches to decrease the effect of the disease on the economy. In any case, their research review suggested strategies incorporates a thoroughly examined boost bundle, which isn't specific in its applications, could guarantee that the Industry can return much faster than anticipated. Diversification to other areas, for example, farming, strong minerals, manufacturing and administrations areas ought to be additionally heightened and furthermore, the full liberation of the downstream oil and gas area.

Peterson Ozili and Thankom Arun (2020) in their paper titled ‘Spillover of COVID-19: impact on the Global Economy’ analysed the coronavirus outbreak and the spillover to the global economy which triggered the global recession in 2020. They found out strategy creators in numerous nations were feeling the squeeze to answer the Covid pandemic. Therefore, numerous states settled on quick strategy choices that had expansive positive and adverse consequences on their separate economy - numerous nations dove into a downturn. Social separating approaches and lockdown limitations were forced in numerous nations, and there have been contentions that such social strategies can set off a downturn. Their discoveries showed that a 30-day social separating strategy or lockdown limitation harms the economy through a decrease in the degree of general financial exercises and through its adverse consequence on stock costs. Administrators in numerous nations upheld a lengthy social distancing strategy, cursing the outcomes of social separation on the economy. The downturn that followed, which numerous nations experienced, was an impression of the tough decision that policy creators needed to make in picking whether to save the economy prior to saving individuals or to save individuals prior to saving the economy; numerous nations picked the last option. On the brilliant side, the Covid instigated general wellbeing emergency set out a freedom for some state run administrations to make enduring changes in the general wellbeing area. Nations like the UK and Spain fixed their general medical care framework, and fixed different inadequacies in open foundation like the progress to online

schooling, transportation frameworks and the illness recognition frameworks in open emergency clinics. A few state run administrations likewise involved the emergency as a valuable chance to fix the monetary framework and the monetary framework with the arranged government improvement bundle.

4. Practical Part

4.1 Nigerian Oil and gas producing industry in 2020 and 20 years ago

In other to understand the current state of the oil and gas industry, data for petroluem product output was gotten from 2001 till 2020

Table 4 : Petroleum Product Output from 2001-2020

	PETROLEUM PRODUCTS OUTPUT (1000 B/D)				
Year	Gasoline	Kerosene	Distillates	Residuals	Others
2001	54	30	45	53	21
2002	56	29	49	46	8
2003	27	18	33	26	1
2004	21	14	27	22	14
2005	32	23	44	35	44
2006	17	12	18	35	22
2007	3	7	10	14	14
2008	16	14	24	30	16
2009	11	7	11	12	1
2010	18	10	15	18	4
2011	20	11	14	17	5
2012	25	12	17	17	4
2013	30	15	18	20	3
2014	16	9	12	13	2
2015	11	3	4	3	0
2016	14	7	12	6	8
2017	20	10	14	11	4
2018	9	6	7	10	1
2019	2	1	2	2	0.23
2020	0.41	0.29	0.38	0.36	0.22

Source: OPEC Database 2022

Table 4, Expresses the production output of various petroleum product. It is classified into five(5) categories which include; Gasoline, Kerosene, Distillates, Residuals and Others. It can be seen on the table that in 2020, Nigeria was producing less than a 1000barrels per day for all products as against in year 2001 which is 20 years ago where the country was producing 54,000barrels of gasoline per day, 30,000barrels of kerosene per day, 45,000barrels of distillates per day, 53,000barrels of residuals per day and 21,000barrels of other products per day.

Data for local petroleum product demand is shown below from the year 2001 till 2020.

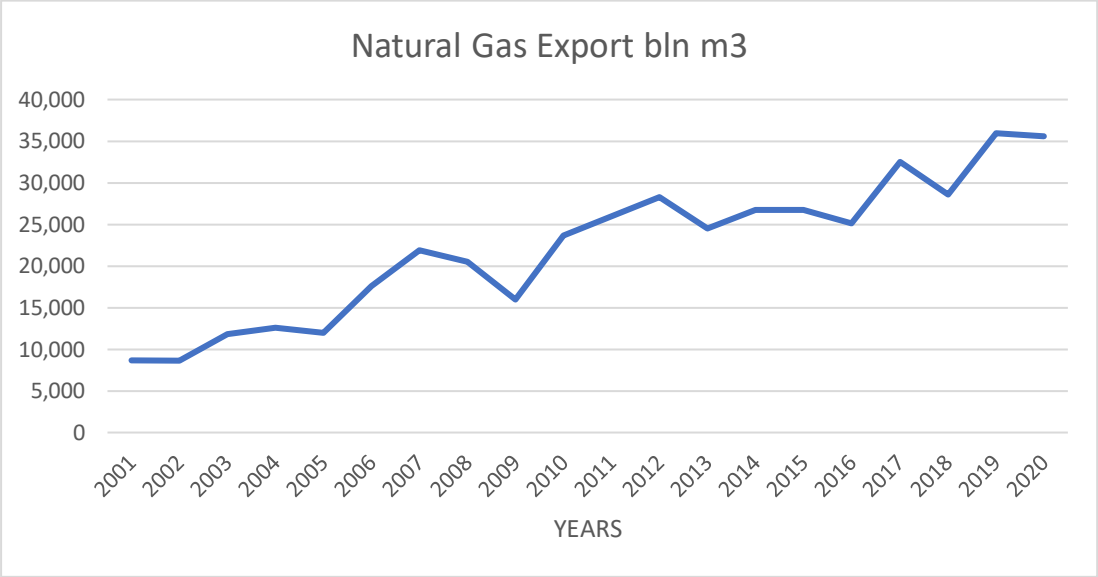
Table 5: Petroleum Product Domestic Demand from 2001-2020

	PETROLEUM PRODUCTS DOMESTIC DEMAND (1000 B/D)				
Year	**Gasoline**	**Kerosene**	**Distillates**	**Residuals**	**Others**
2001	**127.84**	**43.35**	**57.08**	**22.09**	**0.23**
2002	**134.90**	**41.53**	**48.99**	**19.78**	**0.69**
2003	**136.62**	**31.93**	**44.85**	**20.27**	**0.83**
2004	**146.05**	**32.80**	**46.73**	**19.94**	**0.84**
2005	**164.30**	**37.40**	**43.92**	**16.21**	**0.85**
2006	**156.20**	**36.20**	**34.09**	**10.71**	**0.85**
2007	**142.44**	**35.40**	**28.18**	**11.99**	**0.75**
2008	**163.01**	**34.83**	**29.98**	**14.26**	**0.76**
2009	**168.19**	**25.30**	**28.24**	**10.93**	**0.76**
2010	**191.46**	**30.62**	**35.83**	**11.92**	**0.80**
2011	**215.32**	**43.64**	**43.30**	**8.19**	**0.94**
2012	**241.30**	**47.69**	**45.08**	**8.60**	**0.97**
2013	**273.88**	**53.26**	**48.78**	**7.95**	**1.05**
2014	**283.80**	**53.00**	**50.30**	**7.90**	**1.06**
2015	**306.36**	**43.93**	**55.99**	**0.99**	**0.57**
2016	**298.69**	**24.94**	**66.95**	**1.76**	**0.80**
2017	**315.51**	**25.58**	**81.83**	**2.20**	**0.80**
2018	**337.39**	**24.05**	**79.38**	**2.81**	**1.87**
2019	**354.70**	**22.67**	**88.89**	**1.46**	**2.11**
2020	**349.61**	**14.71**	**94.43**	**1.28**	**5.79**

Table 5, Expresses the demand of various petroleum product. Petroleum products are classified into five(5) categories which include; Gasoline, Kerosene, Distillates, Residuals and Others. It can be seen on the table that in 2020, the demand was at 349,610 barrels of gasoline per day, 14,7100barrels of kerosene per day, 94,430barrels of distillates per day, 1,280barrels of residuals per day and 5,790barrels of other products per day as against in year 2001 which is 20 years ago where the petroleum product demand was at 127,840barrels of gasoline per day, 43,350barrels of kerosene per day, 57,080barrels of distillates per day, 22,090barrels of residuals per day and 230barrels of other products per day. The increased demand is believed to be a result of increased population as well as industrialization.

A graph showing the export of natural gas from year 2001 till 2020 by the petroluem industry of Nigeria.

Figure 5: Natural Gas Export from Nigeria 2001-2020



Source: OPEC Database 2022

Nigeria has the largest natural gas deposit in the entire continent of Africa. Figure 5 shows the export of natural gas has been on the increase from year 2001 at 8,000cu m to 35,500 cu m in 2020. Nigeria's natural gas are in high demand all over the world. The major exporting destination of natural gas remain other Africa countries.

4.2 Main importers of Nigerian crude oil and gas

Different export destination is categoried below showing the areas where Nigerian crude oil is been exported.

Table 6 : Nigeria Crude Oil Export Destination

	Nigeria's crude oil exports by destination (1,000 b/d)								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
OECD Americas	453.66	395.00	74.23	85.97	309.61	331.48	171.98	27.52	90.25
OECD Europe	869.04	963.41	962.20	946.86	569.55	692.64	1,055.78	439.30	812.40
OECD Asia Pacific	74.62	48.33	41.81	0.00	0.66	18.12	39.57	237.78	38.48
China	18.77	18.68	40.18	28.93	17.54	15.81	9.24	0.00	80.75
India	329.55	236.46	379.52	421.58	362.11	364.81	327.37	0.00	295.52
Other Asia	191.22	69.53	96.45	113.59	109.06	113.89	11.02	427.17	220.54
Latin America	246.00	263.00	248.39	205.85	81.33	50.05	52.30	252.19	21.48
Middle East	0.00	0.00	0.00	0.00	0.00	2.54	0.00	122.31	9.40
Africa	183.00	197.00	270.61	298.57	252.32	221.76	309.55	260.66	310.46
Russia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Eurasia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	163.69	0.00
Other Europe	2.14	1.59	6.67	12.88	35.79	0.00	2.64	77.61	0.00

Source: OPEC Database

Table 6 shows the OPEC classification of Nigeria's crude oil destination. This classification are; OECD Americas, OECD Europe, OECD Asia pacific, China, India, Other Asia, Latin America, Middle East, Africa, Russia, Other Eurasia, Other Europe.

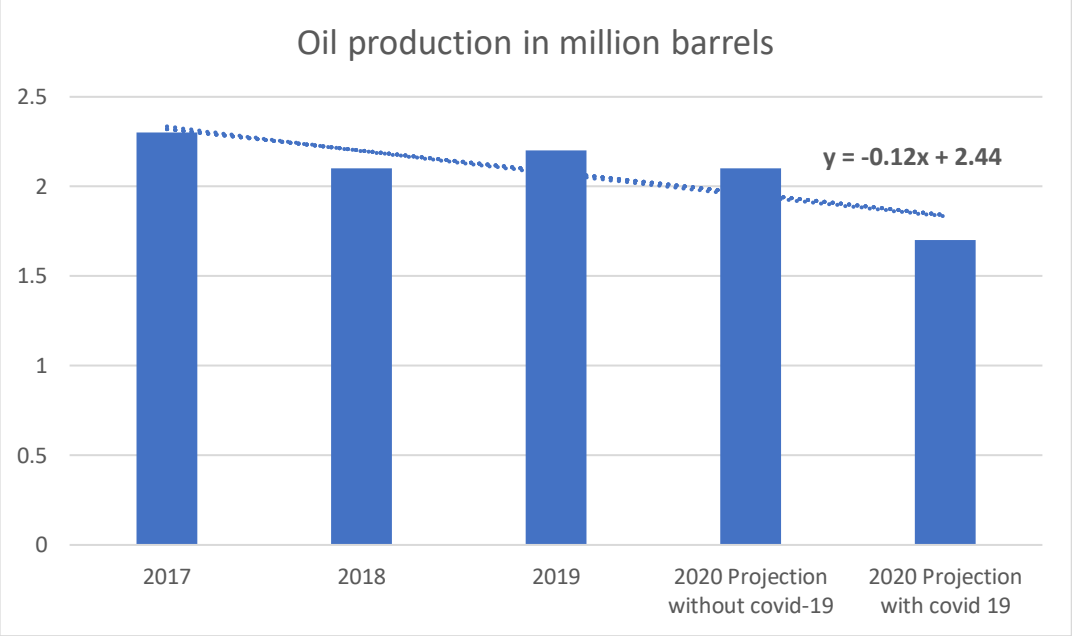
The highest volume goes to OECD Europe, this includes United Kingdom, Netherlands, France, Belgium, Portugal as the major importer of Nigeria's crude oil. Other regions with high volume include India, Latin America, OECD America, and other African countries. There has been a dradual growth in the volume of export to other African countries, from 183,000 barrels per day in 2012 to 310,460 barrels per day in 2020. OECD America which consists of America and Canada, has been the major export destination after OECD Europe but the demand has significantly reduced and not consistent as before.

Lower volumes go to OECD Asia pacific, China, Middle east, Other Eurasia, and Other Europe. Export to Russia only occurs on special diplomatic trade and are not recorded by OPEC.

4.3 The impact of COVID-19 pandemic on oil and gas industry in Nigeria

A linear projection of crude oil production for the year 2020 showing presence and absence of Covid 19

Figure 6 : Projected Oil Production for Year 2020



Source: Author calculation from Statista Data

Figure 6 shows the projected crude oil production for 2020 in million barrels. The projection without covid-19 is at 2.1 million barrels while the projection with covid-19 is at 1.7 million barrels. A significant difference of 400 thousand barrels is due to the covid-19 pandemic situation. For a country like Nigeria where crude oil is the major source of revenue for the nation, this is a huge volume and has affected the national budget significantly.

4.4 Relationships among selected macroeconomic indicators and oil industry in the Republic (via regression analysis)

4.4.1 Economic Theory

For a developing country like Nigeria, petroleum export plays a major role in the economic growth of the country. In other to express the significance of covid-19 in the petroleum industry of Nigeria. A regression analysis showing the dependency of petroleum export on some macroeconomic indicators.

Among the factors which affect the petroleum export (million USD/year), we assumed that the basic determinants are covid cases (thousands), oil price (USD/year), balance of payment (million USD/year), population (Millions) and GDP (million USD/year). All these factors are included in the model below.

4.4.2 Economic Model

$$Y = f(X_2, X_3, X_4, X_5, X_6)$$

In this study, the petroleum export of Nigeria is dependent on the annual value of covid cases, oil price, balance of payment, population and export.

Assumptions

a) As the covid cases increases, the petroleum export will increase. Ceteris paribus
b) As the oil price increases, the petroleum export will increase. Ceteris paribus
c) As the balance of payment increases, the petroleum export will increase. Ceteris paribus
d) As the population increases, the petroleum export will decrease. Ceteris paribus
e) As the GDP increases, the petroleum export will increase. Ceteris paribus

4.4.3 Econometric Model

Identification of variables: $Y = X_1\ X_2\ X_3\ X_4\ X_5\ X_6$

After adding the parameters: $\beta_1 Y_1 = \gamma_1 X_1\ \gamma_2 X_2\ \gamma_3 X_3\ \gamma_4 X_4\ \gamma_5 X_5\ \gamma_6 X_6$

Creation of functional form: $\beta_1 Y_1 = \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \gamma_4 X_4 + \gamma_5 X_5 + \gamma_6 X_6$ (Linear form)

Addition of random parameter: $\beta_1 Y_1 = \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \gamma_4 X_4 + \gamma_5 X_5 + \gamma_6 X_6 + \varepsilon$

Expression of time : $\beta_1 Y_1 t = \gamma_1 X_{1t} + \gamma_2 X_{2t} + \gamma_3 X_{3t} + \gamma_4 X_{4t} + \gamma_5 X_{5t} + \gamma_6 X_6 + \varepsilon_t$

$$\boldsymbol{\beta_{11} Y_{1t} = \gamma_{11} X_{1t} + \gamma_{12} X_{2t} + \gamma_{13} X_{3t} + \gamma_{14} X_{4t} + \gamma_{15} X_{5t} + \gamma_{16} X_{6t} + \varepsilon_{1t}}$$

4.4.4 Declaration of Variables

- Petroleum Export.....……Y_1
- Unit vector…….……...……..X_1
- Covid cases……..……X_2
- Oil Price.……...X_3
- Balance of Payment ……....……X_4
- Population..……...……X_5
- GDP..... ……...……X_6

Y_{1t}: the dependent quantitative variable represents the petroleum export. Unit is Million USD/year rate.

X_{1t}: intercept term

X_{2t}: the independent quantitative variable represents the covid cases. Unit is Thousands

X_{3t}: the independent quantitative variable represents the oil price. Unit is USD/year

X_{4t}: the independent quantitative variable represents the balance of payment. Unit is Million USD/year

X_{5t}: the independent quantitative variable represents the population. Unit is Million/year

X_{6t}: the independent quantitative variable represents the GDP. Unit is Million USD/year

4.4.5 Data Set

Table 7: Data set for One equation model

Years	Petroleum Export (million dollars)	Unit Vector	Covid cases (Thousand)	Oil Price (USD)	BoP (million dollars)	Population (millions)	GDP (million dollars)
2001	17,731	1	0	23.12	2,170	131.7	41,649
2002	16,567	1	0	24.36	-967	134.8	54,471
2003	23,195	1	0	28.1	5,447	138	61,949
2004	33,719	1	0	36.05	15,403	141.3	85,894
2005	47,632	1	0	50.64	37,225	144.7	112,963
2006	54,462	1	0	61.08	36,844	148.3	144,732
2007	50,833	1	0	69.08	27,881	151.9	175,110
2008	73,825	1	0	94.45	29,296	155.7	204,911
2009	42,205	1	0	61.06	14,021	159.7	166,538
2010	67,025	1	0	77.45	13,269	163.7	363,361
2011	88,449	1	0	107.46	10,757	167.9	402,561
2012	95,620	1	0	109.45	17,516	172.2	461,448
2013	90,546	1	0	105.87	19,205	176.6	509,134
2014	75,196	1	0	96.29	907	181.9	561,603
2015	41,168	1	0	49.49	-15,439	187.1	487,093
2016	27,295	1	0	40.76	2,722	192.4	404,649
2017	37,983	1	0	52.43	10,399	197.7	375,745
2018	54,513	1	0	69.78	5,334	203	421,742
2019	45,106	1	0	64.04	-17,016	208.3	406,176
2020	27,730	1	1	41.47	-17,074	213.4	430,197

Source: OPEC Database, 2022.

4.4.6 Correlation Matrix

Correlation coefficients, using the observations 2001 - 2020

5% critical value (two-tailed) = 0.4438 for n = 20

Table 8: correlation matrix

PetroleumExpor	Covidcases	OilPrice	BoPmilliondoll	Populationmill	GDPmilliondoll	
1	-0.2212	0.9825	0.3843	0.1629	0.5539	PetroleumExpor
	1	-0.1826	-0.3985	0.412	0.1844	Covidcases
		1	0.3096	0.2576	0.6069	OilPrice
			1	-0.5465	-0.3911	BoPmilliondoll
				1	0.6337	Populationmill
					1	GDPmilliondoll

Source: Correlation Matrix in Gretl, 2022.

4.4.7 Estimation of Parameter using Ordinary Least Square Model: Software GRETL

Model 1: OLS, using observations 2001-2019 (T = 19)

Dependent variable: Gross Domestic product (GDP)

Figure 7: Ordinary Least Square

```
Model 3: OLS, using observations 2001-2020 (T = 20)
Dependent variable: PetroleumExportmilliondolla

                      coefficient    std. error    t-ratio  p-value
  ---------------------------------------------------------------------
  const               27607.3        11389.0         2.424   0.0295   **
  Covidcases           2427.03        4525.33        0.5363  0.6002
  OilPrice              737.127         63.6849     11.57    1.48e-08 ***
  BoPmilliondollars       0.169868       0.0888957   1.911   0.0767   *
  Populationmillio~    -215.997         78.2607     -2.760   0.0153   **
  GDPmilliondollars       0.0374748      0.0151665   2.471   0.0269   **

Mean dependent var   50539.97   S.D. dependent var   24276.74
Sum squared resid    1.96e+08   S.E. of regression   3738.823
R-squared            0.982523   Adjusted R-squared   0.976281
F(5, 14)             157.4119   P-value(F)           8.66e-12
Log-likelihood      -189.3425   Akaike criterion     390.6851
Schwarz criterion    396.6595   Hannan-Quinn         391.8513
rho                  0.140707   Durbin-Watson        1.717748

Excluding the constant, p-value was highest for variable 5 (Covidcases)
```

Source: OLSM in Gretl, 2022.

Final model:

$$Y_{1t} = 27607.3 + 2427.03X_{2t} + 737.127X_{3t} + 0.1699X_{4t} - 215.997X_{5t} + 0.0375X_{6t} + \mu_{1t}$$

Economic Verification

$$Y_{1t} = 27607.3 + 2427.03X_{2t} + 737.127X_{3t} + 0.1699X_{4t} - 215.997X_{5t} + 0.0375X_{6t} + \mu_1$$

$$Y_{1t} = 27607.3 + 2427.03COV + 737.127OPR + 0.1699BOP - 215.997POP + 0.0375GDP + \mu_1$$

Where:

COV – Covid cases

OPR – Oil Price

BOP – Balance of Payment

POP – Population

GDP – Gross Domestic Product

Intercept term X_1: This is the initial level of petroleum export. If we omit the influence of the other values involved in the equation, the petroleum export was at 27,607million USD. It is significant at both 0.05 and 0.1 level of significance.

Covid cases X_2: Over the analyzed period there was just one year when covid cases were registered, so their influence on export volumes appeared not statistically significant. The estimated parameter is not significant at all level of significance, further calculations need to be done.

Oil Price X_3: If oil price increases by 1 USD in Nigeria over the analysed period, the petroleum export is expected to increase by 737million USD per year, ceteris paribus (that is, we do not expect other changes in other variables included in the model). This certifies the economic theory that increase in oil price will lead to an increase in petroleum export. The estimated parameter is significant at all level of significance (0.01, 0.05, 0.1).

Balance of Payment X_4: If balance of payments increases by 1million USD in Nigeria over the analysed period, the petroleum export is expected to increase by 0.1699million USD per year, ceteris paribus (that is, we do not expect other changes in other variables included in the model). This certifies the economic theory that increase in balance of payment will lead to an increase in petroleum export. The estimated parameter is significant at 0.1 level of significance.

Population X_5: If population increases by 1 million in Nigeria over the analysed period, the petroleum export is expected to decrease by 216million USD per year, ceteris paribus (that is, we do not expect other changes in other variables included in the model). This certifies the

economic theory that increase in population will lead to a decrease in petroleum export because the domestic demand of petroleum will increase. The estimated parameter is significant at 0.05, 0.1 level of significance

Gross Domestic Product X_6: If GDP increases by 1 million USD in Nigeria over the analysed period, the petroleum export is expected to increase by 0.0375million USD per year, ceteris paribus (that is, we do not expect other changes in other variables included in the model). This certifies the economic theory that increase in GDP will lead to an increase in petroleum export. The estimated parameter is significant at 0.05, 0.1 level of significance

Statistical Verification

Number of observations	20
Degrees of freedom	14
Adjusted R-squared	0.976

Hypothesis

H_0: Factors such as covid cases, oil price, balance of payment, population and GDP do not have influence on petroleum export in Nigeria.

$$\gamma i = 0$$

H_1: Factors such as covid cases, oil price, balance of payment, population and GDP have influence on petroleum export in Nigeria.

$$\gamma i \neq 0$$

Statistical significance of parameters

Coefficient of determination R^2 = 0.982523, which means that 98.3% of the total variation in petroleum export can be explained by the linear relationship of the factors involved in the model, that is, covid cases, oil price, balance of payment, population and GDP. The other 1.7% remains unexplained. This leads to the conclusion that the model is statistically significant and therefore suggests that the model is fit.

Table 10: Test Statistic for one equation model

Parameters	γ_1	γ_2	γ_3	γ_4	γ_5	γ_6
t-value	2.424	0.5363	11.57	1.911	-2.760	2.471
t-tab: critical t-value (α = 0.05)	2.145	2.145	2.145	2.145	2.145	2.145
t-value compared to t-tab	2.424> 2.145	0.5363< 2.145	11.57> 2.145	1.911< 2.145	2.760> 2.145	2.471> 2.145
Parameter statistically significant or insignificant	Statistically significant. Reject H_0	Statistically insignificant. Accept H_0	Statistically significant. Reject H_0	Statistically insignificant. Accept H_0	Statistically significant. Reject H_0	Statistically significant. Reject H_0
P value	0.0295	0.6002	<0.0001	0.0767	0.0153	0.0269
P value compared with significance level	The parameter is statistically significant at 10% & 5%	The parameter is not statistically significant at 10%, 5% & 1%.	The parameter is statistically significant at 10%, 5% & 1%.	The parameter is statistically significant at 10%,	The parameter is statistically significant at 10% & 5%	The parameter is statistically significant at 10% & 5%

Source: t- table and Gretl calculation, 2022.

Econometric verification

Testing for Autocorrelation

- **Hypothesis**

H_0: P-value > α absence of Autocorellation

H_1: P-value < α presence of Autocorellation

Figure 8: Breush-Godfrey test for autocorrelation

```
Breusch-Godfrey test for first-order autocorrelation
OLS, using observations 2001-2020 (T = 20)
Dependent variable: uhat

                      coefficient     std. error    t-ratio   p-value
  ------------------------------------------------------------------------
  const                -314.405        11699.5        -0.02687  0.9790
  Covidcases           -788.742         4862.04       -0.1622   0.8736
  OilPrice                2.50092         65.5019      0.03818  0.9701
  BoPmilliondollars      -0.0111731        0.0934702  -0.1195   0.9067
  Populationmillio~       3.33628         80.5287      0.04143  0.9676
  GDPmilliondollars      -0.000870933      0.0156424  -0.05568  0.9564
  uhat_1                  0.159738         0.292172    0.5467   0.5938

  Unadjusted R-squared = 0.022476

Test statistic: LMF = 0.298911,
with p-value = P(F(1,13) > 0.298911) = 0.594

Alternative statistic: TR^2 = 0.449527,
with p-value = P(Chi-square(1) > 0.449527) = 0.503

Ljung-Box Q' = 0.458492,
with p-value = P(Chi-square(1) > 0.458492) = 0.498
```

Source: Autocorrelation test in Gretl, 2022.

From this table, all three p-values of the BG test are greater than 0.05, so we cannot reject H0 which suggests that there is absence of autocorrelation in the model.

Testing for heteroskedasticity

- **General rule**

For p-value < α→ reject H_0

α=0.05

- **Hypothesis**

H_0: presence of homoskedasticity

H_1: presence of heteroskedasticity

Using the White's test for heteroskedasticity:

OLS, using observations 2001-2019 (T = 19)

Dependent variable: uhat^2

Figure 9: White Test for Heteroskedasticity

```
White's test for heteroskedasticity
OLS, using observations 2001-2020 (T = 20)
Dependent variable: uhat^2

                         coefficient       std. error     t-ratio  p-value
  ------------------------------------------------------------------------
  const                   -4.62222e+08      4.59627e+08  -1.006   0.3383
  Covidcases               7.43134e+06      1.70385e+07   0.4361  0.6720
  OilPrice                 1.10109e+06      1.04916e+06   1.049   0.3187
  BoPmilliondollars      102.727          425.871         0.2412  0.8143
  Populationmillio~        5.32739e+06      5.51360e+06   0.9662  0.3567
  GDPmilliondollars     -283.174          224.868        -1.259   0.2365
  sq_OilPrice          -7268.65          7199.93         -1.010   0.3365
  sq_BoPmilliondol~       -0.00715686       0.0121489    -0.5891  0.5689
  sq_Populationmil~   -14366.3          14762.5          -0.9732  0.3534
  sq_GDPmilliondol~        0.000349394       0.000259786   1.345   0.2084

  Unadjusted R-squared = 0.342712

Test statistic: TR^2 = 6.854236,
with p-value = P(Chi-square(9) > 6.854236) = 0.652292
```

Source: Heteroskedasticity Test in Gretl, 2022.

Unadjusted R-squared = 0.342712

Test statistic: TR^2 = 6.854236,

with p-value = P(Chi-square(10) > 6.854236) = **0.652292**

Since our p-value is greater than 0.05, we fail to reject the null hypothesis and conclude that there is no heteroskedasticity in the model.

Test for Normality

- **General rule**

  p-value < α→ reject H_0

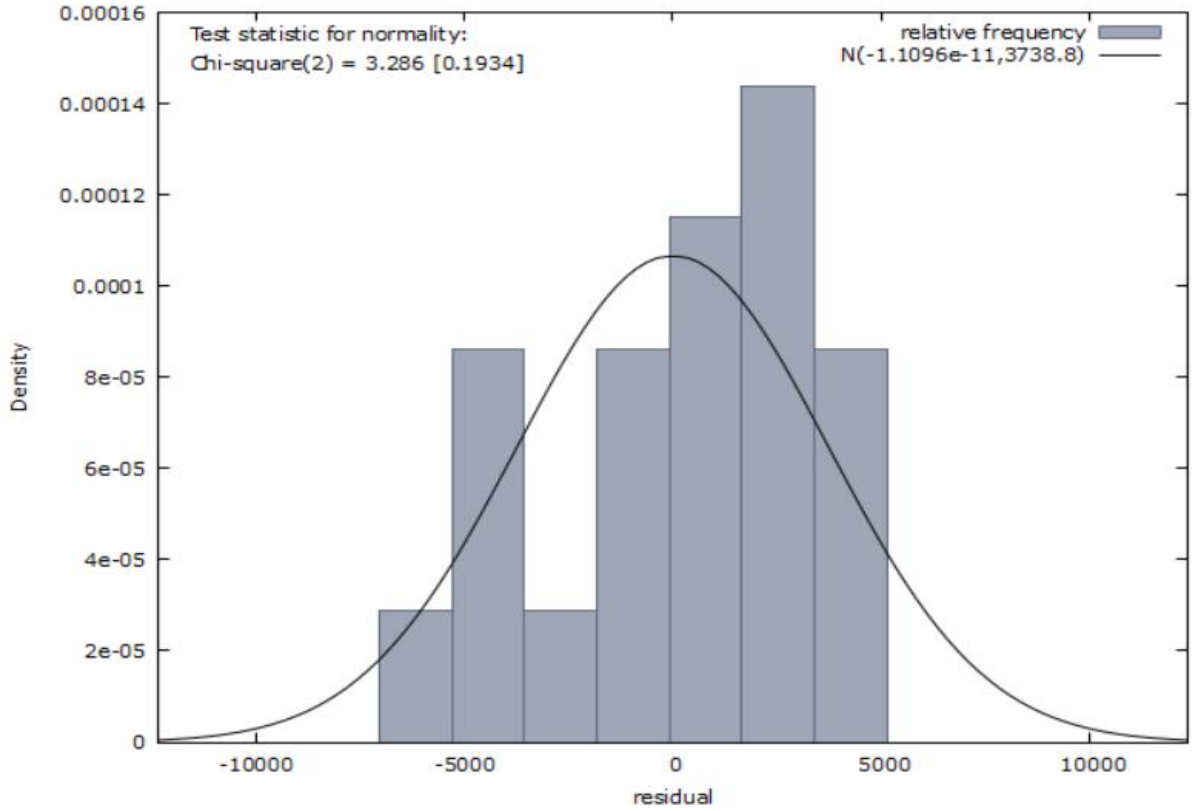
  α=0,05

- **Hypothesis**

  H_0: normal distribution of random variable

  H_1: not normal distribution of random variable

Figure 10: Test for normality of uhat1:



Source: Test for Normality in Gretl, 2022

Number of bins = 7, Mean = -1.10958e-011, SD = 3738.82

Chi-square(2) = 3.286 with p-value 0.19339

Focusing on the result of the Jarque-Bera test, for normality, the test statistic has a p-value of 0.19339 which suggests that we fail to reject the null hypothesis since 0.19339 is greater than α which implies that there is a normal distribution of the residuals (random variable). Other tests for normality also indicates that there is normal distribution of the residuals.

Model Application

Computing the elasticity coefficient for each of the variable for the last observation of 2020 to see which variable(s) affects the petroleum export of Nigeria the most:

$$\mathbf{Y_{1t} = 27607.3 + 2427.03X_{2t} + 737.127X_{3t} + 0.1699X_{4t} - 215.997X_{5t} + 0.0375X_{6t} + \mu_1}$$

$\hat{Y}_{2020}$ = 27607.3 + 2427.03(1) + 737.127(41.47) + 0.1699(-17,074) - 215.997(213.4) + 0.0375(430.197) + μ_{1t}

$\hat{Y}_{2019}$= 14,522.46

$E=\partial y/\partial xi \cdot xi/\hat{y}$

a) E = $\partial y/\partial x_{3,2019} \cdot x_{3,2019}/\hat{y}$

E = 737.127 * (41.47) / 14,522.46

E = 2.105%

This means that 1% of the increase in the oil price leads to 2.105% increase in petroleum export of Nigeria in 2020.

b) E = $\partial y/\partial x_{4,2019} \cdot x_{4,2019}/\hat{y}$

E = 0.1699 * (-17,074) / 14,522.46

E = -0.200%

This means that 1% of the increase in the balance of payment leads to 0.200% decrease in petroleum export of Nigeria in 2020.

c) E = $\partial y/\partial x_{5,2019} \cdot x_{5,2019}/\hat{y}$

E = -215.997 * (213.4) / 14,522.46

E = -3.174%

This means that 1% of the increase in the population leads to 3.174% decrease in petroleum export of Nigeria in 2020.

d) E = $\partial y/\partial x_{5,2019} \cdot x_{5,2019}/\hat{y}$

E = 0.0375 * (430.197) / 14,522.46

E = 0.001%

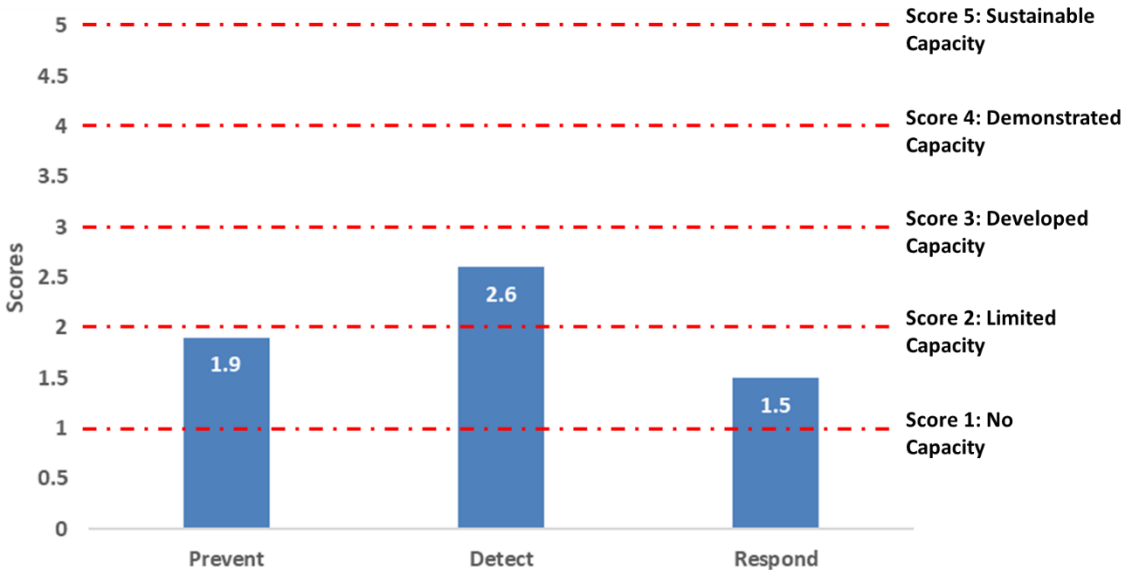
This means that 1% of the increase in GDP leads to 0.001% increase in petroleum export of Nigeria in 2020.

The highest impact observed among the factors affecting petroleum export in Nigeria has to do with oil price as its elasticity coefficient is the highest amongst all factors involved in the model for the period of 2020.

4.5 Government reactions (implemented policies and regulation) were launched to tackle pandemic challenges

Level of Readiness and Prepareness of Nigeria for Covid-19 Pandemic

Figure 11: Nigeria's average score on preparedness to tackle public health risks.

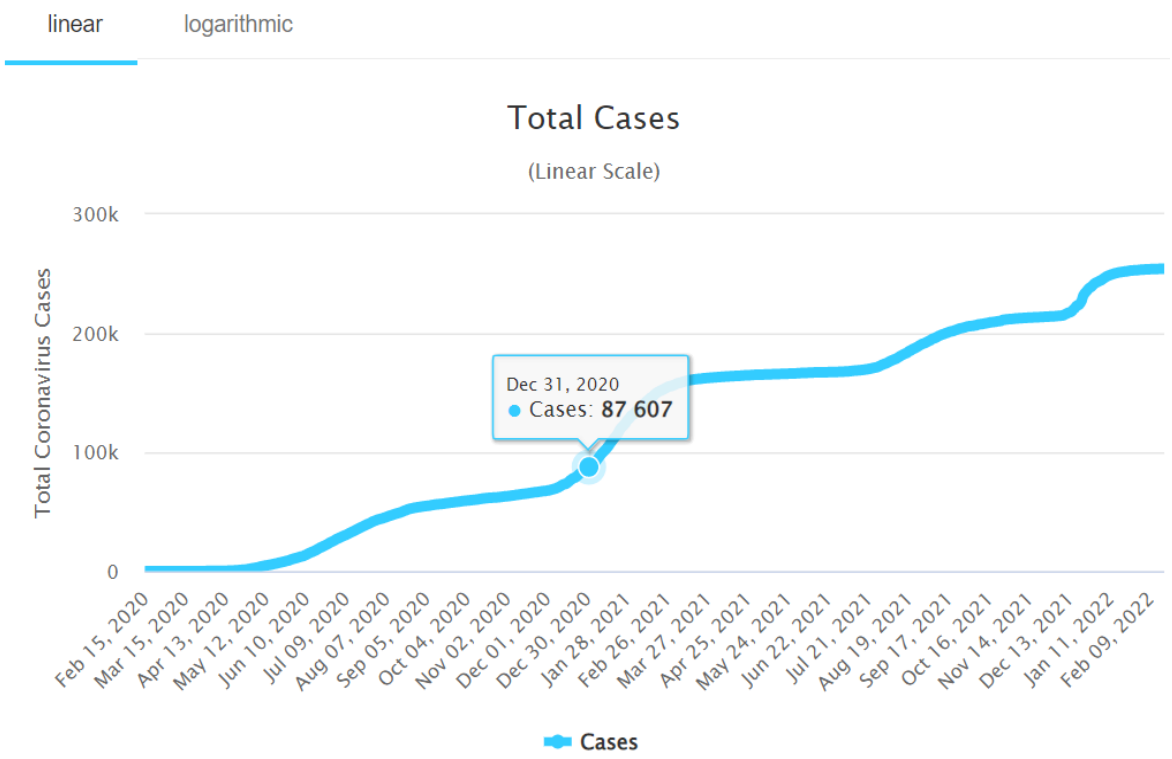


Source: World Health Organization 2017

In figure 10, these scores propose that Nigeria isn't ready to answer the current Covid-19 pandemic. This is generally obvious from the low testing rates for Covid-19 in the country. Nigeria has the ability to test just 5,000 samples every day, and only 50% of these are really regulated every day in view of the deficiency of HR, testing units, and labs, and case definition for testing that focuses on indicative cases and their contacts.

Incidence of Covid 19 in Nigeria

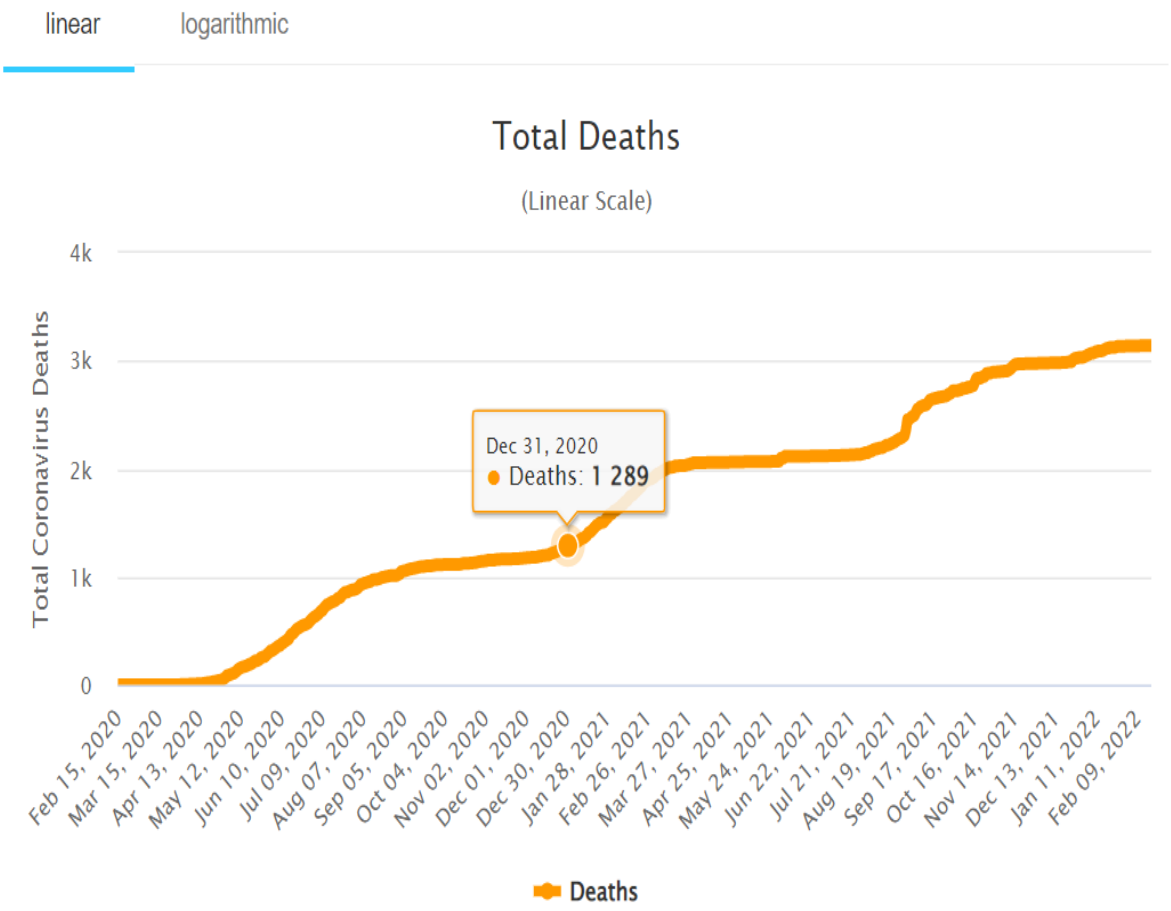
Figure 12. Total Covid-19 cases



Source: Webometer 2022

In figure 11, the total number of cases as at 31st of December 2020 is 87,607

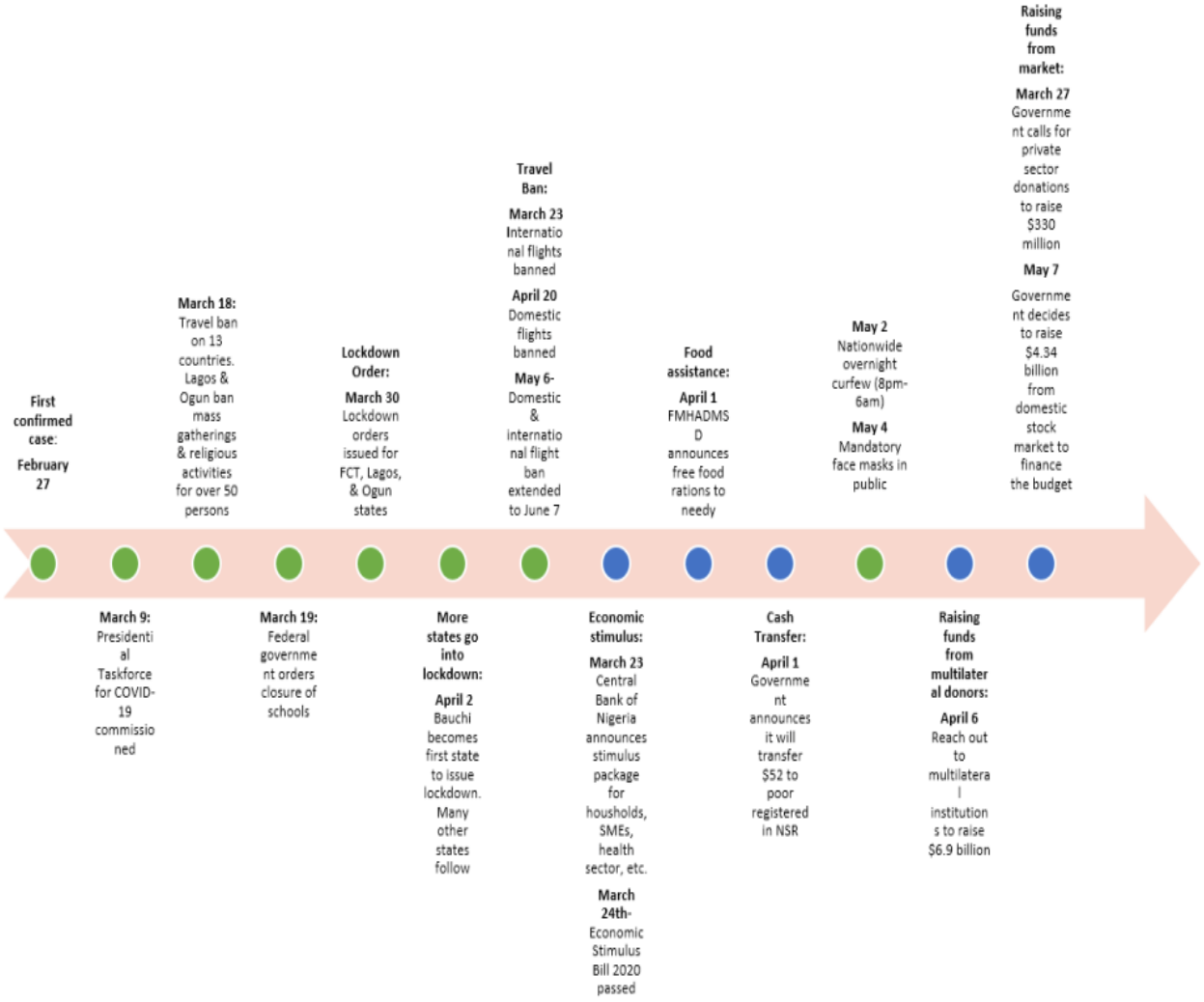
Figure 13: Total Covid-19 death



Source: Webometer 2022

Figure 12 shows the total number of death to be 1,289 as at 31st of December 2020

Figure 14: Timeline of Important policy steps taken by the Nigeria government



Source: Author's Infograph. Data from Punch Newspaper (2020)

Green circle indicates public health policies, Blue circle indicates social and economic policies.

5. Results and Discussion

The production of petroleum products has decreased tremendously in the course of 20years. The poor performance of the petroleum industry is majorly because of the closure of 3 national refineries as well as government corruption and embezzlement over the years.

Covid-19 impact was majorly felt in 2020 with lower petroleum product domestic demand and lower export of crude oil to Nigeria's major buyers.

A regression analysis was done to determine factors which affect the gross domestic product (USD/year), we assumed that the basic determinants are population (Millions), export (million USD/year), balance of payment (million USD/year) as well as oil price (USD/year) and all these factors are included in the model.

It was observed that there is high multicollinearity between oil price and export in the model which could be because of the trend data between these categories of variables with approximately the same level of increase as the year increases. After eliminating the problem of multicollinearity, the regression was run on GRETL given the below model as result.

$$\mathbf{Y_{1t} = 27607.3 + 2427.03X_{2t} + 737.127X_{3t} + 0.1699X_{4t} - 215.997X_{5t} + 0.0375X_{6t} + \mu_1}$$

After economics, statistical and econometric verification has been done. The model was considered fit and can be applied for further analysis.

The major strategic policies and response by the federal government of Nigeria to covid 19 pandemic include:

1. The Economic Stimulus Bill 2020: The House of Representatives members passed the Emergency Economic Stimulus Bill 2020 on March 24 to offer help to organizations and individual residents of Nigeria. The proposed regulation intends to give 50% duty discounts to organizations that are enrolled under the Companies and Allied Matters Act so they can utilize this saving to keep utilizing their present specialists. This bill has helped the Oil and Gas industry to cushing the effects of Covid-19 and helped to retain their staffs. In reality, this bill favoured the bigger companies in the oil and gas industry rather than the smaller companies. The smaller companies still had to let go of quite a number of their staffs.

Additionally, while the bill centers around giving help to formal sector organizations, 65% of Nigeria's all out GDP comes from the non-formal area, which likewise utilizes in excess of 90% of the labor force, and these specialists need backing to make due. Numerous organizations in the casual area are unregistered so it will be hard for them to get these advantages (Brooking Institute, 2021)

Obinna Onwujekwe, 2021 proposed that for the public authority to help, it should utilize little without interest credits or little awards to these undertakings through microfinance offices and other local area based channels.

1. Cash transfers: On April 1, 2020, the public authority declared that it will make moves of 20,000 Naira ($52) to poor and weak families enrolled in the National Social Register (NSR). The NSR has just 2.6 million families (around 11 million individuals) enrolled on its foundation. Tragically, Nigeria doesn't have a powerful public database to executives framework, making electronic installments troublesome. This has brought about many individuals in the NSR not getting the cash guaranteed by the public authority.

2. Central Bank of Nigeria boost bundle. The CBN's boost bundle offers a credit of 3 million Naira to poor families affected by COVID-19. In any case, the advance requires guarantee and isn't without interest. The advances could be made accessible liberated from security to unfortunate families or simply require marked ensures by local area pioneers. The credits ought to be accessible at a low loan cost with long ban and reimbursement period. Also, relatively few poor families and organizations in the informal sector have some familiarity with the accessible financial bundles and strategies executed by the public authority (Brooking Institute, 2021)

3. Food help. After President Buhari forced the lockdown in Lagos, FCT, and Ogun states on April 1, 2020, the Federal Ministry of Humanitarian Affairs Disaster Management and Social Development reported that it will give food apportions to weak families in these states. The drawn out lockdown prompted individuals confronting hunger in numerous areas of the country. The public authority does not have the option to give

food backing to each and every individual who needs it, as the dissemination framework is defaced by debasement and obscure responsibility. As per Siddharth Dixit, 2021 the public authority needs to further develop straightforwardness and responsibility in the food apportion circulation framework. It ought to likewise ensure that middlemen don't have exorbitant control. The public authority could utilize the arrangement of house checking utilized in the polio crusade (in which houses visited by vaccinators are set apart) during food dispersion, i.e., putting an imprint on those houses where food has been disseminated. The Ward Development Committees can likewise be utilized for appropriating the food apportions. The public authority could likewise better use innovation to plug spillages, track apportions, and lessen defilement.

Economic stimulus measures (e.g. loans, moratorium on debt repayments…)

Monetary Policy

On 16 March, the Central Bank of Nigeria declared new measures:

o A 1-year expansion of a ban on head reimbursements for CBN intercession offices;

o The decrease of the financing cost on mediation credits from 9% to 5 percent.

o Strengthening of the Loan to Deposit proportion strategy (for example moved forward requirement of order to stretch out more credit to the private area)

o Creation of NGN50 billion objective credit office for impacted families and little and medium undertakings

o Granting administrative abstinence to banks to rebuild terms of offices in impacted areas

o Improving FX supply to the CBN by coordinating oil organizations and oil adjusting organizations to offer FX to the CBN instead of the Nigerian National Petroleum Corporation

o Additional NGN100 billion mediation store in medical services credits to drug organizations and medical care professionals meaning to grow/fabricate limit

o Identification of few key neighborhood pharmaceutical organizations that is destined to be conceded subsidizing offices to help the acquisition of unrefined components and hardware expected to support nearby medication creation.

· N1 trillion in advances to support nearby assembling and creation companies across basic areas.

· The CBN has embraced a bound together conversion scale framework for Inter-Bank and equal market rates to ease strain on FOREX income as oil costs keeps on plunging.

· CBN takes on the authority pace of NGN360 to a dollar for International Money Transfer Operators rate to banks.

· For on-loaning offices monetary foundations have been coordinated to draw in International improvement partners and arrange concessions to facilitate the torments of the borrowers.

· Arrangement of credit help for the healthcare industry to meet the possible expansion sought after for healthcare administrations and items "by working with acquiring conditions for drug organizations, clinics and experts".

Financial Policy

· The unrefined petroleum benchmark cost was additionally diminished from USD 57 to USD 30.

· The Central Bank promised to siphon NGN 1.1 trillion (USD 3 billion) into basic areas of the economy.

· Beginning of a multi month reimbursement ban for all TraderMoni, MarketMoni and FarmerMoni credits

· Comparable ban to be given to all Federal Government financed advances gave by the Bank of Industry, Bank of Agriculture and the Nigeria Export-Import Bank.

Customs Measures

Commodity of veil

· A few limitations on exportation of masks have been executed.

Different measures

· Specialists are thinking about a wide scope of COVID-19 help measures, including decreases of customs obligation and customs reviews however such measures are not formally reported

· No progressions to Customs necessities as at 31 March 2020.

Installment offices

· Augmentation of recording due date for Value Added Tax (VAT) from the 21st day to the last working day of the month, following the long stretch of allowance.

Different measures and sources

Fiscal Policy

· The Federal Government amends arranged spending in the 2020 financial plan with an increment of about ₦0.23 trillion in use and a 31% diminishing in income.

Suspension of new power taxes:

· On April first, the Nigerian Electricity Regulatory Commission (NERC) suspended the installment of the new power taxes booked to start on 2 April, referring to poor power supply, wide metering hole and the effect of the COVID-19 pandemic. The National Assembly as of late delayed the viable date of the new levy to the primary quarter of 2021.

· On October 11, NERC suspended the Multi Year Tariff Order (MYTO) 2020 for the Electricity Distribution Licensees for a considerable length of time.

NIS installment waiver for guests impacted by movement boycott.

· On 16 April, Nigeria Immigration Service (NIS) reported the award of installment waiver to guests/transients impacted by the movement boycott and the conclusion of global air terminals. Impacted people are supposed to reschedule their flights and travel in somewhere around seven days of the suspension of the limitation.

· Lagos State Government returns yearly land use charges to pre-2018 rates.

Citizens in Nigeria need to consider the effect of the (COVID-19) pandemic on their organizations and specifically the normal expansion owing debtors default rates, retractions of agreements or "flake-outs".

6. Conclusion

The study reported the impact of covid-19 on oil and gas industry in Nigeria, the covid-19 pandemic is a global phenomenon that has impacted the world at large. In Nigeria, the major sectors affected are Agriculture, Housing, Energy, Oil and Gas, Youth & Women Development, Technology, Infrastructure/ Construction, MSMEs, Health, Aviation, Science and Technology, Immigration, Mining, Sanitation and Utility, Security and Digital.

The oil and gas sector is the most affected sector in Nigeria since it serves as the major source of revenue for the country. The oil and gas industry has improved in the year 2020 has compared to 20 years ago in terms of production of crude oil and natural gas. Refining this crude oil into petroleum product has significantly declined and the country now depend on the import of petroleum products.

Nigeria has been hit hard by the pandemic as the international demand for crude oil declined on a large scale due to the immobility of people across the world. Even though the government put in some measures to reduce the effect of the pandemic situation, most of these policies and measures were not effective due to the high inequality and corruption in the nation.

Since the pandemic is still an ongoing phenomenon, it is suggested the the government should put in place, some measures which include.

· Activate assets to animate the economy and asset projects in the Economic Sustainability Plan.

· Financial measures to defend oil incomes

· Monetary measures to assemble and protect non-oil income by augmenting government incomes and streamlining consumptions

· Financial measures to decrease unnecessary spending by smoothing out all administration use and reducing insignificant things

· Support the economy utilizing money related measures.

· Assemble outside financing and look for obligation help.

· Support monetary reasonability of States.

· Secure suitable administrative reason for activities to accomplish monetary supportability.

Although the research identified the situation of the oil and gas industry in Nigeria as well as the impact of covid 19 in the industry for the year 2020, many aspects of the impact in subsector of the oil and gas industry is still not known for the year 2021 and 2022. Therefore, future futher research should extend the scope of this study to cover these unknown aspects and also inspect other sectors in the Nigerian economy.

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Appendix

Figure 1: Map of Nigeria showing the geographical zones

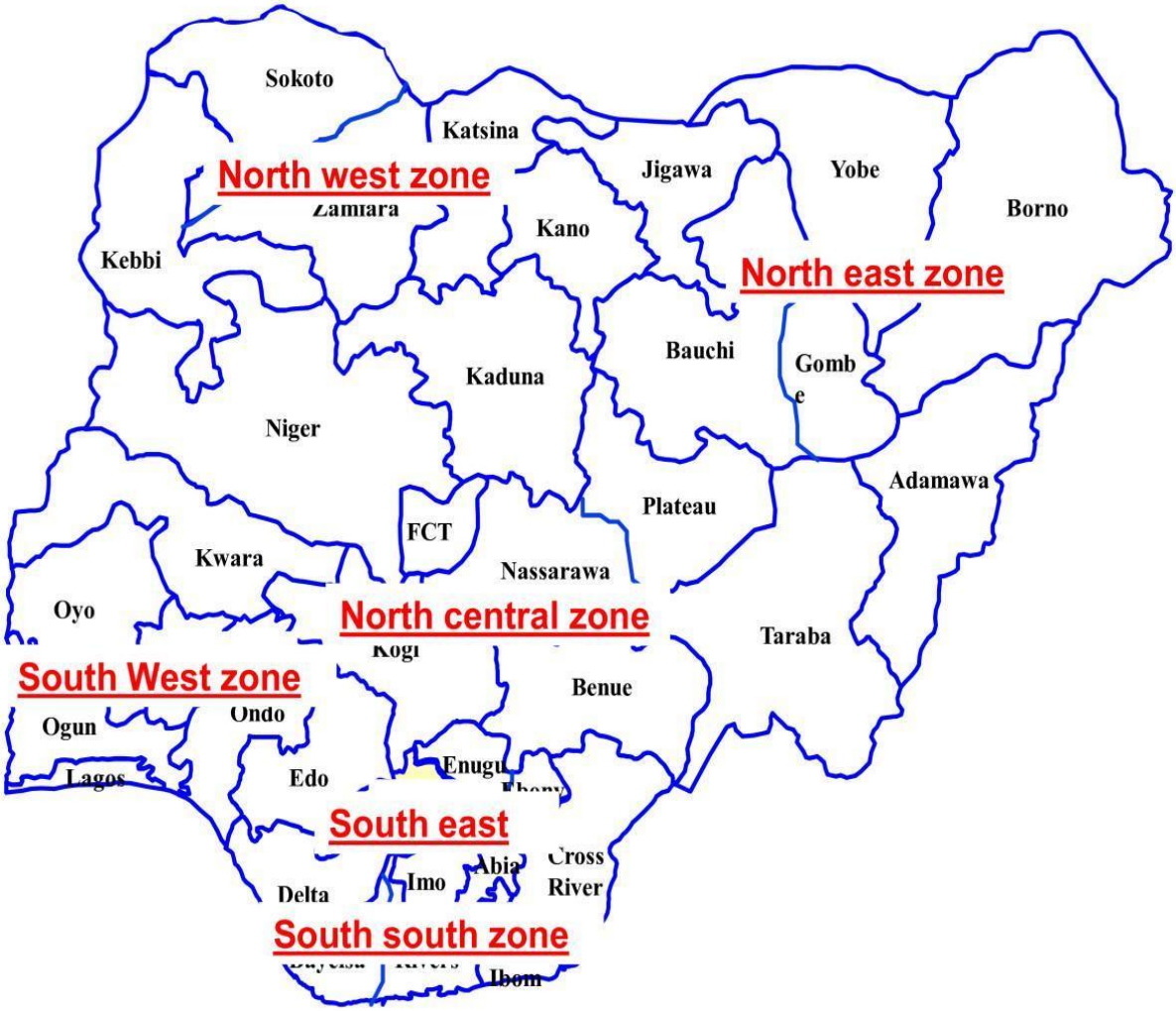

Figure 3 : Locations of Oil and Gas Industry in Nigeria

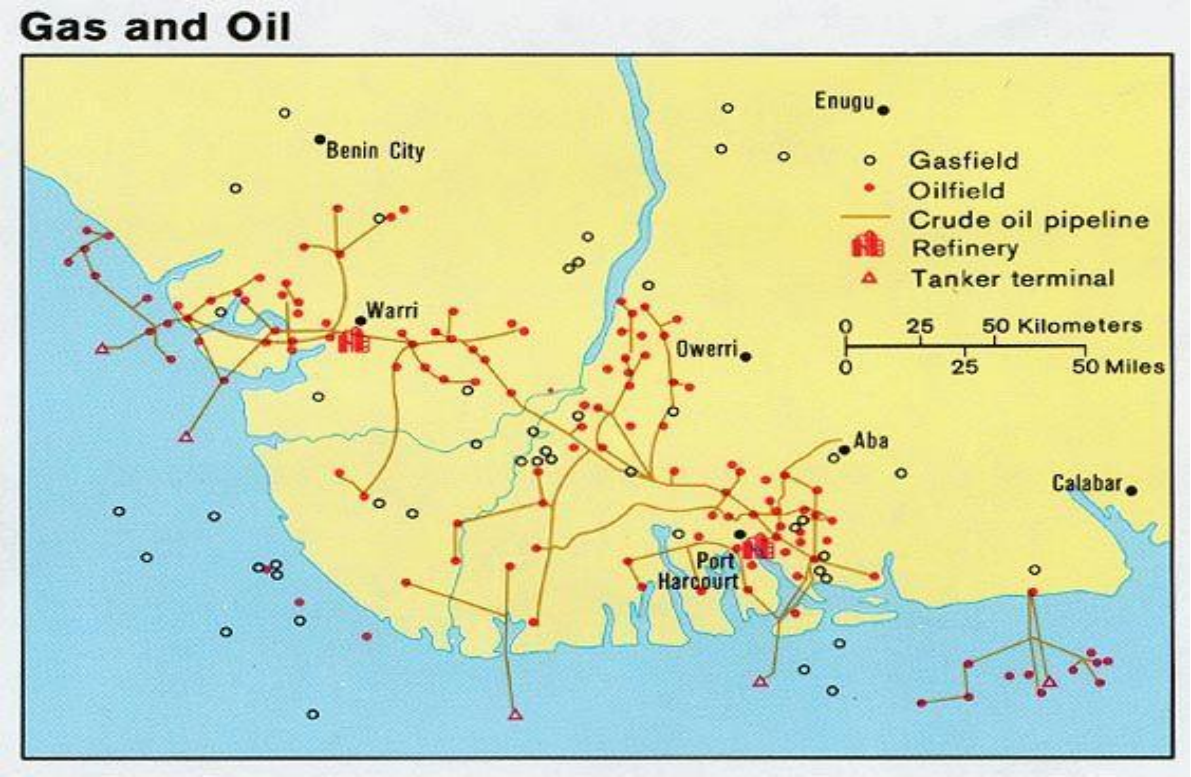

Figure 7: Ordinary Least Square

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Model 3: OLS, using observations 2001-2020 (T = 20)
Dependent variable: PetroleumExportmilliondolla

                      coefficient    std. error    t-ratio  p-value
  ---------------------------------------------------------------------
  const                27607.3        11389.0       2.424   0.0295   **
  Covidcases            2427.03        4525.33      0.5363  0.6002
  OilPrice               737.127         63.6849    11.57    1.48e-08 ***
  BoPmilliondollars        0.169868       0.0888957   1.911   0.0767   *
  Populationmillio~     -215.997         78.2607    -2.760   0.0153   **
  GDPmilliondollars        0.0374748      0.0151665   2.471   0.0269   **

Mean dependent var   50539.97   S.D. dependent var   24276.74
Sum squared resid    1.96e+08   S.E. of regression   3738.823
R-squared            0.982523   Adjusted R-squared   0.976281
F(5, 14)             157.4119   P-value(F)           8.66e-12
Log-likelihood      -189.3425   Akaike criterion     390.6851
Schwarz criterion    396.6595   Hannan-Quinn         391.8513
rho                  0.140707   Durbin-Watson        1.717748

Excluding the constant, p-value was highest for variable 5 (Covidcases)
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Figure 10: Test for normality of uhat1:

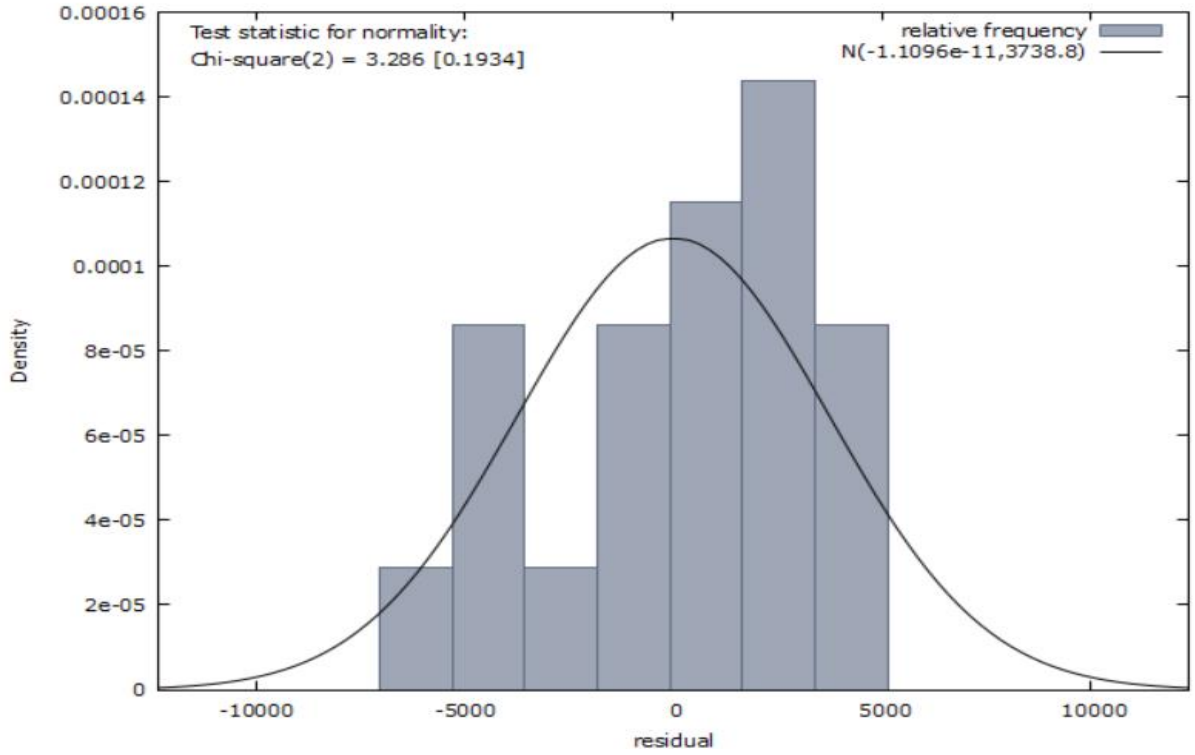

Figure 12. Total Covid-19 cases

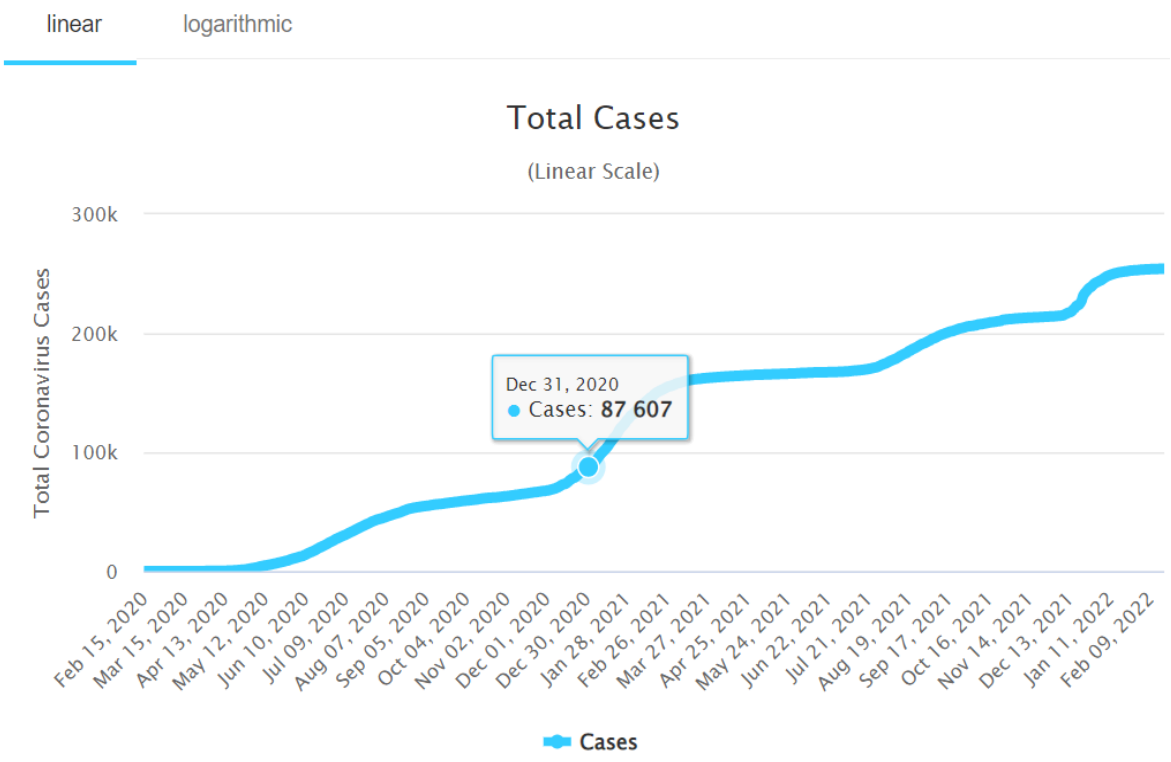

Figure 13: Total Covid-19 death

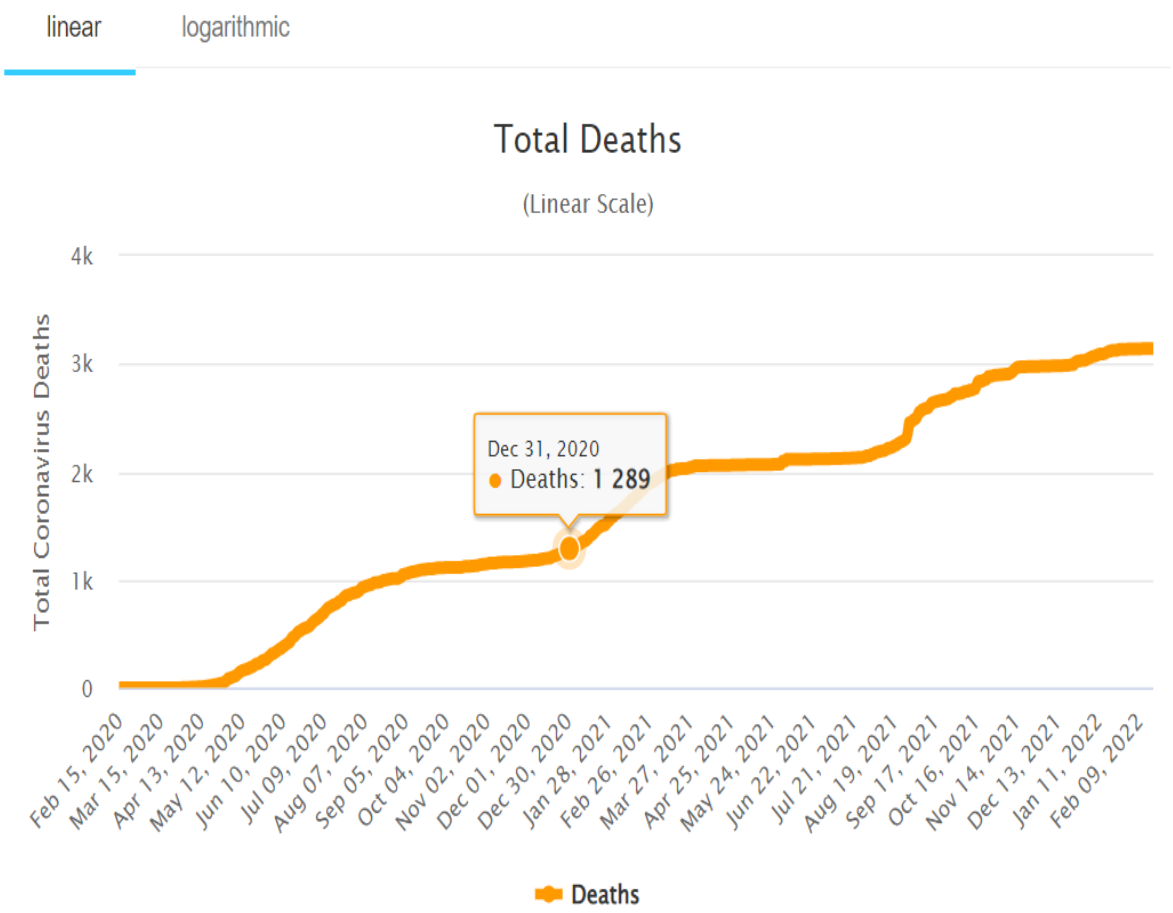

Figure 14: Timeline of Important policy steps taken by the Nigeria government