ASHESI UNIVERSITY

Examining the determinants of contemporary and future demand and supply dynamics of the global oil industry: Implications for Ghana as an oil exporter.

Undergraduate thesis submitted to the Department of Business Administration, Ashesi University in partial fulfilment of the requirement for the award of Bachelor of Science degree in Business Administration

B.Sc Business Administration

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Supervised by : Dr. Emmanuel Stephen Armah

DECLARATION

I hereby declare that this is my original work and that no part of it has been presented for another degree in this university or elsewhere

Candidate's signature ……

Candidate's name : John Ayomah

Date : 25th April, 2022

I hereby declare that the preparation and presentation of the thesis was supervised in accordance with the guidelines on supervision of thesis laid down by Ashesi University

Supervisor's signature ……...

Supervisor's name : Dr. Emmanuel Stephen Armah

Date : 25th April, 2022

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"A tree as great as a man's embrace springs from a small shoot; A terrace nine stories high begins with a pile of earth; A journey of a thousand miles starts under one's feet." - Lao Tzu. This long but completed journey began with a simple step which was the discussion of a potential thesis topic with Dr. Stephen E. Armah.

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Now, my journey is complete, a feat chalked because of all of you.

ABSTRACT

Global Oil industry demand and supply dynamics have historically been and remain a major current concern because of how pertinent and far reaching the global oil industry is for global, national, and local economies. The current problem is that we do not know where oil will trend in the future, because the demand and supply determinants of the industry keeps shifting with global dynamics including pandemics like COVID 19 and for geopolitical reasons. Hence, it is imperative to understand what is happening in the oil industry now, and the industry's outlook.

This study posed a simple question "What are the contemporary and future demand and supply factors of global oil and how should an oil exporting African country like Ghana position itself given it is currently reliant on oil revenue?" Primary data was collected using one-on-one semi-structured interviews with industry experts. Thematic text analysis via a concept mapping approach was also used to analyze data.

The results showed that geopolitics, the push for renewable energy, and energy efficiency methods are factors influencing supply of global oil. Also, robust economies and industries, covid-19, energy generation, and environmental concerns are key determinants of demand of global oil. The outlook of the industry reveals that the oil industry will change going forward, with renewables forming a bigger part of the energy mix. As an implication, Ghana will likely benefit from high cash inflows from oil, and that the global dynamics do not pose a catastrophic threat on the country.

The study recommends that Ghana quickly expedites the exploration and production of the country's oil reserves. Most importantly, the government is advised to start developing and implementing policies that will allow it to diversify away from oil and to invest in and adopt the use of renewables in the long run.

LIST OF ACRONYMS

ABFA – Annual Budget Funding Amount

B/D – Barrels per Day

BRIC – Brazil, Russia, India and China

EIA – Energy Information Administration

BPG – British Petroleum Global

GDP – Gross Domestic Product

GNPC – Ghana National Petroleum Corporation

IMF – International Monetary Fund

ICE – Internal Combustion Engines

OECD – Organization for Economic Cooperation and Development

OPEC – Organization of the Petroleum Exporting Countries

SHS – Senior High School

SMEs – Small and Medium Enterprises

IOCs – International Oil Companies

PRMA – Petroleum Revenue Management Act

AIOC – Anglo-Iranian Oil Company

IFC – International Finance Corporation

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CHAPTER 1: OVERVIEW

1.1. Background

1.1.1. The Global Oil Industry

The global oil industry emerged as a commercial enterprise in Europe and the United States of America (USA) in the 1850s when Benjamin Silliman Jr. was contracted by George Bissell, a New York lawyer, and James Townsend, president of a New Haven bank, and the leaders of an investor group to study the properties of Rock oil as an illuminator (Yergin, 1991). Silliman's positive analysis of the properties of crude ultimately encouraged investment into oil leading to the onset of the petroleum business. John D. Rockefeller, who founded the Standard Oil Company, was the first to invest extensively in the industry. Oil was first struck and tapped at its source near Titusville in August 1859, credited to the professional salt driller William Smith (Yergin, 1991). Oil has many uses and is a vital input in the production of fuel, lubricants, and plastics.

Crude oil is currently a precious commodity on the globe. It is used for energy generation and as a feedstock for transportation fuels in the aviation and shipping industries and in producing petrochemical commodities like: polymers, solvents, and adhesives. As a result, the oil industry has become one of the major branches of the global economy, with fluctuations in benchmark oil prices having a substantial impact on most manufacturing sectors and countries (Statista, 2021).

In the 19th and 20th centuries oil proved to be the most trusted ingredient for generating wealth in the developed world because of the inelastic demand for its use especially as a fuel in transportation and power generation. Majority of the world's wealthiest men during this time were "Oil men" including John Rockefeller, the Rothschilds and Carlos Gulberkian who made their money via oil (Yergin, 1991).

Oil is so important that major wars have been fought over it; among them Saddam Hussein of Iraq's annexation of Kuwait and the consequent invasion of Iraq by the USA on two different occasions respectively named "Operation Desert Storm" and "Operation Iraqi Freedom." In fact, it can be argued that Germany lost WWII because of its struggles to access oil (Yergin, 1991). The Nigerian civil war escalated largely, due to disagreements among the leadership of Eastern, Western and Northern Nigeria regarding equitable distribution of the benefits from oil. Oil, its prices and its use therefore dominate government policy in many different countries that depend on oil revenue for funding social program (Klieman, 2012). Ultimately, these dynamics on the supply and demand side result in changes in the global price of oil. The changes in oil prices not only affect investment decisions into oil and the cost of living in a global scale, but they also actually affect the development ambitions of oil exporters.

In 2020, oil demand and supply were drastically affected by the outbreak of the world-wide pandemic known as Corona Virus (Covid-19) due to lockdown measures adapted all over the world. This decreased demand on one hand via reduced transportation demand and the need for fuel. On the other hand, the demand for oil-generated electricity likely increased because a high number of people stayed longer at home and worked virtually. Reports indicate that global oil supply and demand are gradually returning to pre-Covid levels.

Petroleum and liquid fuels were utilized worldwide at a rate of 98.4 million barrels per day in August 2021, which went up by 5.7 million barrels per day from August 2020 (Energy Information Administration, 2021). Additionally, global petroleum and liquid fuel consumption is predicted to average 97.4 million b/d in 2021, up 5.0 million b/d from 2020, and 101.0 million b/d in 2022, nearly equal to 2019 levels ***(see figure 1)***.

1.1.2. Facts About the Global Oil Industry

The volume of world oil reserves expanded dramatically between 1990 and 2011, rising from little over 1 billion barrels in 1990 to nearly 1.7 billion barrels in 2011 ***(see figure 2 in appendix).*** Global oil reserves have been pretty stable since then, with a small increase in recent years. As the world's oil reserves grew in size, the geographical distribution of proven reserves changed. More than half of the world's proven reserves were in the Middle East in the 1990s and early 2000s. Since 2012, Latin America has made up about a fifth of the total distribution. Meanwhile, the amount of oil reserves held by the Middle East and North America had declined by 2012 and has remained largely steady in recent year (Sönnichsen, 2021).

Over the last three decades, global oil consumption has continuously climbed, reaching 4.01 billion metric tons in 2020 ***(see figure 3 in appendix),*** up from 3.6 billion metric tons at the turn of the century. The only time there was a drop was during the financial crisis of 2008/2009. Crude oil prices have fallen in recent years due to weaker global economic development and decreasing energy consumption. In 2019, the United States and China were the two largest oil consumers but decreased in 2020. Both Europe and North America saw a decrease in their aggregate share of world oil consumption due to increased industrialization and urbanization, increasing population growth, and increasing per capita economic growth. Consumption in other parts of the world, such as Africa, has soared in comparison (Sönnichsen, 2021).

Crude oil prices have been volatile during the last decade. Oil prices are volatile by nature due to their intrinsic inelasticity when it comes to short-term changes in demand and supply. Many commercial events, such as economic expansion in rising countries like China and India, and the introduction of hydraulic fracturing and horizontal drilling in the USA, have considerably contributed to price volatility since

the 2009 financial crisis (Sönnichsen, 2021). The Organization of Petroleum Exporting Countries (OPEC) has set a preliminary annual average oil price of 65.74 dollars per barrel for 2021. This is up from $41.47 in 202, which was just slightly more than the average annual price during the 2016 oil crisis ***(see figure 4)*** (Sönnichsen, 2021).

Over the previous two decades, global renewable energy use has expanded dramatically ***(see figure 5).*** In 2020, consumption reached thirty-two (32) exajoules. Renewable energy consumption remains significantly below that of coal, natural gas, oil, and other energy technologies, despite its rapid rise. The annual growth rate of 9.7% was lower than the 10-year average, but the absolute rise in energy terms was similar to that of 2017, 2018, and 2019, and the biggest for any fuel in 2020 (BP Global, n.d.). In 2020, fourteen (14) countries account for 93.5 percent of global proven oil reserves. The countries on this list cover five continents and have oil reserves ranging from 25.2 billion to 304 billion barrels (Deshmukh, 2021).

Table 1: Proven Oil Reserves by Countries – Top 10 Largest

Rank	Country	Oil Reserves (billion barrels)	Share of Global Reserves
#1	Venezuela	304	17.80%
#2	Saudi Arabia	298	17.20%
#3	Canada	170	9.80%
#4	Iran	156	9.00%
#5	Iraq	145	8.40%
#6	Russia	107	6.20%
#7	Kuwait	102	5.90%
#8	UAE	98	5.60%
#9	United States	69	4.00%
#10	Libya	48	2.80%

(Source: BP Statistical Review of World Energy, 2020)

1.1.3. The Ghanaian Oil Industry

Ghana's oil sector is grouped into upstream and downstream segments. Tema Oil Refinery, the country's only petroleum refinery, is involved in upstream activities

such as crude oil procurement and refining (TOR). As part of their downstream activities, Oil Marketing Companies (OMCs) market and distribute petroleum products. Ghana consumes a significant amount of petroleum products, and the country's substantial crude oil production is entirely exported, accounting for 4.5% of its GDP (Ghana Statistical Services, 2020).

The finding of new exploration fields in Ghana has increased production levels. Ghana's oil production is expected to increase by 2% in 2022, according to Fitch Solutions (Fitch, 2020). Mohammed Amin Adams (Minister of Energy, Ghana) revealed that, crude oil production is expected to exceed half a million barrels per day by 2025 (The News Editor, 2019). By 2023, production will have increased from 196,089 barrels per day to 420,020 barrels per day (The News Editor, 2019). The report reveals a positive outlook for crude oil production in Ghana due to expectations for continued field developments. Comparably, just as we see a global increase in supply levels of crude oil production due to forecasted growth in future demand, we see a similar trend on the local front in Ghana’s oil industry.

1.1.4. Local Content

Developing countries with plenty natural resources are eager to break away from the resource curse (Warner, 2011). The resource curse is a phenomenon found in resource rich African countries who have not benefited enough from these resources despite massive infusions of oil revenue. Governments all around the world have employed various interventions and plans to avoid economic disasters and increase resource benefits in their countries (Esteves et al., 2012; Veloso, 2006; Ado, 2013).

Ghana's Minister of Energy, Hon. Emmanuel Armah-Kofi Buah, presented the 2013 Petroleum Regulations (LI 2204), to the Legislature for approval (Energy Ministry, 2013). A group of government policy specialists devised the framework in

2011, drawing on the lessons of other producing countries (Ministry of Energy, 2011). The regulations were enacted into law in November 2013 and went into effect in February 2014, after a three-month transition period.

As compared to other industries, the oil and gas industry, is a capital-intensive industry, and does not offer many job prospects. As a result, establishing links that allow resource earnings to flow to other sectors is the basis for enacting local content policies (Tordo et al., 2013). The policy is expected to include "the identification of stakeholders and their roles; adequate capacity building and training; indigenization and technology transfer; infrastructure development; the creation of a conducive and thriving environment for optimal local participation; and the integration of the oil and gas sector into the country's long-term development plan" (Ministry of Energy, 2011). The government's principal goal, as in other oil-producing countries, is to utilise natural resources to stimulate industrialization and economic development.

In terms of technology, finances, and human resources, the oil and gas industry still has a small local involvement. As a result of these constraints, foreign participation is required to expand the industry (Ministry of Energy, 2011). Hence, through the implementation of appropriate policies, important measures are being done to systematically empower locals (Ministry of Energy, 2011).

Lastly, in terms of civil society roles, the parliament, the media, and civil society organizations (CSOs) all play important roles in ensuring proper management of natural resources. CSOs have aided in the passage of legislation guaranteeing openness and accountability in Ghana's oil sector management. It accomplished this through promoting the Petroleum Revenue Management Act (PRMA 815) which was signed into law, creating the Public Interest and Accountability Committee (PIAC) and the Heritage Fund. Nonetheless, CSOs face several challenges (Graham, 2013).

1.2. Why Focus on Ghana?

Several countries including Nigeria, Libya and Angola are major exporters and are dependent on oil revenue for economic growth and to finance domestic consumption (Goodrich, 2021). Although Ghana is not a key oil exporter, oil revenue makes up a huge portion of its total export revenue, the country is a relatively small player the oil market compared to Nigeria, Angola, Algeria, and Gabon. Further, Ghana relatively has a more diversed sources of export revenue because it is the top producer of gold, and second largest producer of cocoa, it depends on oil revenue and a lot of the foreign investment into the country are related to the oil industry.

Countries like Ghana that depend on oil revenue are bound to be concerned about the global dynamics of oil supply demand and prices as oil revenue determines to an extent the policies they pursue. In Ghana's case, oil revenue is reported to be the source of financing of the free senior secondary school policy (Armah-Attoh, 2015). Through the 2015 Afro Barometer report on Ghana's oil revenue management, civil society expressed high levels of support for using oil revenues to fund such social projects as free senior high school education.

Ghana is also a key consumer of oil which is a driver of its growing economy both in fuelling transportation and driving energy plants that supply the energy for manufacturing. Oil price increases at the pump also influence inflation domestically and ultimately the exchange rate which determines the cost of importation. It is therefore key that Ghanaian policy makers understand the evolution of the global industry to develop appropriate policies.

Another key reason why it may be interesting to study the consequences of global oil dynamics for Ghana's oil sector is that in a manner similar to other African countries, the "Tesla effect" or the Electric Vehicle (EV) revolution that has made Elon

Musk the richest man in the world is completely absent in Ghana. Specifically, the demand for oil as a fuel for gasoline powered cars has not declined because Ghana has almost zero electric cars. How long can Ghana and similar African countries stay insulated and isolated from the influx of electric cars? The Ghana situation is very different from what is happening in Europe, China, and America where the rise of Tesla, NIO and other electric car models are replacing oil-fuelled cars running on the traditional Internal Combustion Engines (ICE). In fact, since the pro-environmental movement that led to the Paris Accord of 2015, several countries have announced firm deadlines for phasing out the ICE and gasoline powered cars. The potential death of gasoline cars is a major factor that will determine the demand for oil going forward.

1.3. Description of Research Problem

Several scholars including McNeill (2000), Burke and Pomeranz (2009), and Gross (2020) expressly stated the end of the crude oil era during the times of electricity discovery, coal, and natural gas. On the contrary, the oil and the oil industry have thrived till today. In recent publications, researchers such as Reid (2018), Riddle (2012), and IMF (2011) have concluded that the commodity will be in scarce quantities, or entirely not available in some few years to come. This theory and conclusion surfaces from the recent availability of other forms of renewable energies that are being given significant considerations.

There has been an anti-oil movement driven by environmentalists and their profound concerns for the environment. They advocate the abolishment of crude oil production because it is environmentally polluting and harmful to the health of persons. According to Archer (2011), environmentalists believe that global warming is happening and hence, we must act as if it were a reality until scientifically proven wrong. The focus is on crude oil, which is seen as particularly problematic because to

its exclusive usage as a transportation fuel and rapid growth, whilst causing many environmental ills. On the contrary, high-tech solutions are being developed to take over crude oil production so it can be used globally. Today, artificial intelligence is being explored to compensate for inadequate skills in the renewable energy sector to accelerate technological maturity by 2030. This in turn will reduce the cost of oil production and make it cheap and accessible to individuals and firms leading to a cleaner and greener atmosphere with zero carbon emissions (Jackson, 2021).

The discovery and production of crude oil allowed for rapid growth and development of the world via the industrial revolution powered mainly by oil, shaped the world we see today, and saved millions from poverty (Gross, 2020). Recently, new oil reserves are being discovered all over the world (China, Ghana, Namibia, Cote D'Ivoire) to meet the increasing demand for the commodity (Hundermark, 2021). Thus, the economic power of crude oil, its reliability, cheapness, and huge role in the global economy is indicative of the inelastic nature of oil demand in the global market and economies. Despite factors that support the idea that oil could be replaced, other factors buttress the fact that oil will be around a while longer. The uncertainty surrounding the outlook of the global oil industry makes it more imperative for African oil-producing nations that depend on oil revenues for development and social projects to investigate and understand the dynamics of the supply-side and demand-side factors.

For instance, the dynamics in the automobile industry, some of which do not promote the use of oil (e.g., Tesla) is not experienced in African as intensely as it is experienced in the developed nations. On the contrary, Ghana and Rwanda are beginning to produce cars locally. The question we ask is, are they making internal combustion engines (ICE) cars, or are they making electric cars? In Africa, governments of oil-producing nations are making huge investments in the sector with

a focus on achieving maximum returns from the export of the commodity. This is because major social and developmental projects via oil revenues. Ghanaians expressed strong support for sustainable management of their newfound wealth in the 2015 Afro Barometer report, expressing strong support for limiting oil revenue use to a few high impact projects that are in national development plans or have been approved by the legislature, with social services such as education, water, sanitation, electricity, and healthcare taking precedence (Armah-Attoh, 2015).

The government proposed investing GHS 211 million from the Annual Budget Funding Amount (ABFA) in the 2017 budget to start providing "Free SHS" in September 2017. Additional financial support of GHS 188 million would be augmented by ABFA funding to cover the remaining costs connected with the "Free SHS" pledge (Fusheini et al., 2017). Hence, the research problem stems from the fact that we do not know where oil will trend in the future, simply because the demand and supply determinants of the industry keeps changing with shifting global dynamics. Given the massive dependence of economies on oil revenues to fund national budgets for certain social and developmental programs, we must understand what is happening now, and the outlook for the future.

1.4. Motivation

My study of African oil and gas, as well as my summer internship with Hallmark Oil Company Limited, have piqued my attraction to the oil and gas sector. Unlike other scholarly publications that have attempted to explain Africa's resource curse, my research focuses on how global oil industry developments may effect Ghana's nascent oil industry, which now accounts for a portion of the country's annual GDP.

1.5. Research Questions

In light of the problem statement, it is critical to look into specific incidents in the oil business. These questions will clearly throw light on crucial aspects that will define the oil industry's outlook, and will serve as the foundation upon which African oil-producing countries like Ghana may begin to formulate informed sector policies in the future. With this in mind, the research questions for this dissertation are as follows:

1. What are the contemporary and future demand and supply dynamics of the global oil industry?
2. What are the implications for Ghana as they are seen by key experts in the country?
3. What strategies should Ghana formulate based on the interviews with the experts and the review of the literature on the global and Ghanaian case?

In this study, we will examine the contemporary and future demand and supply dynamics for the future of the global oil industry: Implications for Ghana.

1.6. Research Objectives

The research objectives for this dissertation include:

- To investigate the contemporary and future demand and supply dynamics that can impact the global oil industry's future trends.
- Discuss the outlook of the global oil industry.
- To identify and explain the implications of contemporary and future demand and supply dynamics of oil specific to Africa in general and Ghana in particular.
- To recommend strategies to help Ghana's oil industry to survive and thrive.

1.7. Research Relevance

As previously said, governments and policymakers must have a thorough understanding of the future benefits of investments being made by the Ghana

government into the oil sector. Before making investment decisions, multinational firms must have a clear understanding of what future trends in the global oil industry look like and to equally inform their preparations towards any possible terminal year, particularly in terms of the demand and supply. The study's most significant benefit to the Ghanaian practitioners is that findings could be used as a guide for implementing sound investment decisions in the industry, and to also consider possible chances of diversification of the economy. This is why this topic is so important to all of these stakeholders and their decision-making in places where the oil industry which has become a major pillar of the economy is concerned.

1.8. Organization of Study

This research paper will be organised in five main chapters with sub-sections.

Chapter 1: This will constitute the research background, as well as the research topic and objectives. It will examine the problem statement and provide information on the world and Ghanaian oil industries.

Chapter 2: The research will look at existing literature that is relevant to the thesis issue. A critical examination of the literature will be conducted in order to determine what gaps can be filled in this dissertation.

Chapter 3: The research design, research scope, data collecting, and methodology utilized to collect data and answer research questions using data analysis techniques are all explained in this chapter.

Chapter 4: The data discoveries, discussions, and final analysis will be presented. The research questions will be explained in detail and the objectives answered.

Chapter 5: Finally, the study will offer suggestions for how to help Ghana's oil industry survive and prosper. It will highlight the study's weaknesses and reveal future research possibilities.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

The present literature on the research issue is examined in this chapter. It is divided into two sections, the theoretical and empirical reviews respectively. The theoretical frameworks that underpin the research, such as demand theory, supply theory, and demand-supply interaction are discussed first. The literature that has contributed to the advancement of the theories, as well as some of its flaws, are discussed. The second section will go over the existing literature on empirical studies that have been conducted to evaluate the factors that influence global oil supply and demand dynamics.

2.2. Theoretical Review

2.2.1. Demand Theory

Whelan and Msefer (1996) defined demand as the rate at which customers want to buy something in their study of Economic Supply and Demand. According to this economic theory, demand is regulated by two main factors: taste and capacity to obtain the good or product and this applies to demand for oil. A person's taste, or desire for something, determines whether they are ready to pay a specific price for it. The main distinction of oil as a commodity is that it is an input in production and not a finished product that is consumed directly. For example, oil is used in providing electricity service or to provide transportation service. This means oil demand is input or derived demand which means that it depends on the services that oil is used to produce and not directly on the consumer taste for oil.

To be able to purchase anything, even an input factor such as oil, at a specific price, one must have sufficient wealth or income. Both demand parameters are influenced by the market price. ***Figure A on the next page*** shows a simple demand curve illustrating that when a product's market price is high, demand is low.

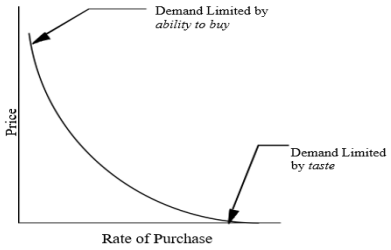


Figure A: Simple Demand Curve (Whelan and Msefer, 1996).

This graph depicts the frequency at which customers would like to purchase a product for a specified price.

Demand is high when the price is low. Consumers will be able to purchase goods at a low cost. When a product's price is exorbitantly high, demand declines since buyers' purchasing capacity is constrained, even if they desire something very much (Whelan and Msefer, 1996). In relation to the global oil sector, it can generally be seen based on historical data that whenever oil quantities are in excess in the global market, the price of the commodity falls, and when the prices go up, the demand level drops. In ***figure B in the next page***, we see how the trend line for United States commercial crude oil inventories and West Texas immediate crude oil prices move in opposite directions. The opposite movement of demand level when price increases or falls projects a pictorial example of how the demand theory works in the oil sector.

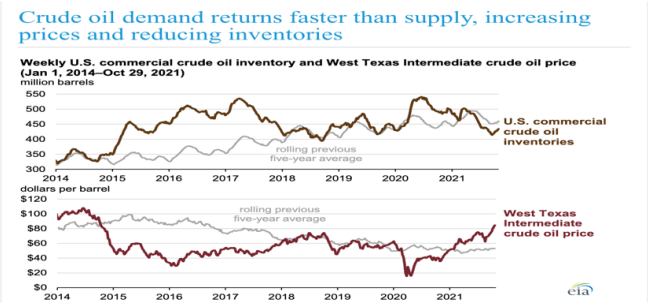


Figure B: Application of demand theory to the global oil sector. (Source: U.S. Energy Information Administration and Bloomberg, 2021)

2.2.2. Supply Theory

Whelan & Msefer (1996) define supply as the seller's willingness and ability to supply items in a similar way. Purchasers will have access to more of the product at a higher price. This is due to the fact that, despite the greater manufacturing costs that may develop as a result of short-term capacity expansion, suppliers will be able to maintain a profit. Manufacturers will boost both supply and pricing when there is a lack of inventory in a genuine market. As a result, manufacturing costs go up due to a short-term increase in supply, resulting in a rise in price. The intended rate of production increases as a result of the price change. A similar outcome emerges when inventory levels are immense. In traditional economic theory, the supply curve was employed to model this complex process. Because each successive unit is regarded to be more difficult or expensive to produce than the one before it, the supply curve in ***Figure C on the next page*** slopes upward, necessitating a higher price to justify its manufacture.

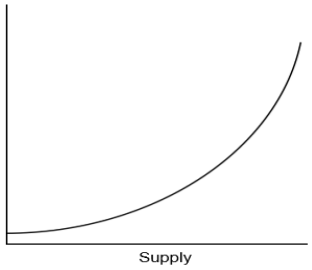


Figure C: Simple Supply Curve (Whelan and Msefer, 1996).

When prices are large, there is more motivation to increase a good's output. A short-term estimate of classical economic theory is depicted in the figure.

2.2.3. Interaction Between Demand and Supply

In his 1691 essay, "*Some Considerations of the Consequences of the Lowering of Interest and the Raising of the Value of Money,"* philosopher John Locke is known for developing one of the first recorded statements of this economic principle (Boyle, 2021). In a discourse concerning interest rates in 17th-century England, Locke

introduced the concept of supply and demand. Many business owners had petitioned the government to reduce the interest rate limit on private lender loans so that people can take out more loans and buy more goods. Because government regulation could have unexpected repercussions, Locke felt that rates should be set by the free market economy. He went on to say that if the loan business was left alone, interest rates would self-adjust. "A commodity's price rises or falls in direct proportion to the number of buyers and sellers." On the other hand, Locke never used the phrase "supply and demand." It was initially published by Sir James Stuart, in 1767.

The first recorded printed use of the words "supply and demand" was in Sir James Steuart's "*Inquiry into the Principles of Political Economy*," (1796). The influence of demand and supply on laborers was his main goal. When supply exceeds demand, prices fall dramatically, limiting merchant earnings, he noticed. When merchants' profits fell, they were unable to pay their employees, resulting in widespread unemployment.

In his 1776 historic economic book, "*The Wealth of Nations*," on the subject of supply and demand, Adam Smith wrote extensively. Smith, known as the "Father of Economics," explained supply and demand as an "invisible hand" that spontaneously rules the economy. According to Smith, the economy's automatic pricing and distribution networks constitute the "invisible hand" of the marketplace. He imagined a society in which bakers and butchers offer goods that people want and need, guaranteeing that supply and demand are balanced and that everyone profits from the economy. Smith's theories, on the other hand, have not been without criticism in the years since they were first published. He failed to include price or a value theory, as well as the entrepreneur's role in bridging inefficiencies and creating new markets.

The study of economics exploded following Smith's book in 1776, and the law of supply and demand was improved. The demand and supply curve from Alfred Marshall's "*Principles of Economics (1890)"* is still used to illustrate market equilibrium. His invention of price elasticity of demand, a concept that studies how price changes affect demand, was one of his most noteworthy contributions to microeconomics. In theory, when a product's price rises, people will buy less of it, but Marshall observed that this is not always the case in practice. Inelastic goods are those that can increase in price without influencing demand. Customers regard inelastic commodities, such as medication or food, to be vital in their everyday lives. According to Marshall, the factors of supply and demand, manufacturing costs, and pricing elasticity all interact. This is a key point in understanding the demand dynamics of oil as oil is known to have inelastic demand because of its importance in energy generation and transportation service.

2.3. Empirical Review

2.3.1. Economic Factors of Oil Demand and Supply

Oteng-Abayie, Ayinbilla, and Eshun (2018) employing a crude oil demand model, the determinants of crude oil consumption in Ghana were explored using the general energy demand model, which is described as a function of crude oil price, per capita income (GDP), and other macroeconomic indicators in their paper titled "*Macroeconomic Determinants of Crude Oil Demand in Ghana."* They used the standard econometric approach by first checking the time series data's stationarity and order of integration before moving on to the cointegration analysis. They discovered that there is a cointegration relationship and thus when crude oil consumption is utilized as the dependent variable, there is a stable long-run equilibrium relationship between the variables. The long-run effects of real GDP per capita, prices, and the exchange rate

on crude oil consumption were all positive and significant, indicating that as national income rises, so does crude oil demand in Ghana. They reported that an increase in crude oil prices has a detrimental impact on the commodity's consumption.

Addo, Bazilian and Oguah (2016) use a qualitative method in their study in which textual analysis were made on several existing documents and cases on policies in their paper "*Ghana: Lessons Learned, New Strategy*." Ghana's subsidy for oil changes, which have been in place since 2001, have not been sustained due to inconsistencies in execution, according to this study. Because of executive intervention in the implementation of a full pass-through of world pricing to domestic oil prices, reforms have frequently been halted. Subsidy schemes, on the other hand, have put the government under a lot of financial hardship. Nonetheless, total petroleum product consumption increased by nearly 42% between 2010 and 2015, with the most substantial increase in 2012, owing to a cyclical spike in infrastructure construction spending, as is customary in election years.

A variety of factors influence global oil demand patterns, according to Allsopp and Fattouh's 2011 paper, "*Oil and International Energy*." Global economic activity, its structure and distribution, global demographic variables, demand-side technologies, oil prices, the relative price of alternative energy, and taxation policies are among these factors. Notwithstanding this diverse set of characteristics, the literature consistently finds that economic activity, whether assessed in terms of GDP or household income, is one of the most important predictors of oil demand. This link, unfortunately, is not linear and varies greatly between countries, depending on economic development, urbanization, and industrial structure. Non-price and non-income factors may also have an impact on oil demand in the longterm. These include regulatory initiatives motivated

by worries about climate change and energy security, as well as technology advancements, particularly in the transportation sector (Allsopp & Fattouh, 2011).

Lin (2008) delved into the age-old problem of estimating oil supply and demand utilizing up-to-date data and simultaneous equation estimate approaches in order to improve on the existing literature on the global oil market. Whereas the monthly supply and demand curves for global demand were consistent with economic theory, non-OPEC demand grew, according to the findings. Furthermore, the amount of oil delivered at any particular time has no relationship with the amount supplied at any other time, implying that oil supply is unlikely to remain constant. According to the research, theory of economics suggests that pricing should have a beneficial impact on demand. This is in direct opposition to demand theory.

In their article "*Exploring the undulating plateau: the future of global oil supply*," Jackson and Smith (2014) argued that whereas oil will continue to play a significant role in the energy equation until 2040, the landscape will change, and other fuels will gain market share, especially when the transition to higher usage of gas energy happens. They discovered that crude oil production capacity will rise from 93 million barrels per day (mbd) to 113 million barrels per day (mbd) by 2030, with no peak forecast at that time. OPEC and non-OPEC output (conventional and unconventional) are predicted to rise significantly until 2030, with part of this supported by gas related liquids.

Furthermore, the study discovered that technical advances and ideas that are now in the experimental stages will have an impact on future crude oil supplies. The study, conversely, indicates that a scenario in which oil supply gradually expands into the future from its current historically high level is unrealistic. Hence, if worldwide demand increases throughout, and the long run stays robust (say, 1% per year), supply will remain constrained indefinitely, and prices will adjust accordingly. Regardless, there is

no scarcity of hydrocarbon resources that can be turned into commercial liquid supply to fulfill expected demand growth over that time period (Jackson and Smith, 2014). Meeting this demand, on the other hand, is going to be difficult. For instance, both conventional and unconventional oil output will need to expand considerably, and significant funding would be required to maintain growth at current levels.

In a joint study, Hosseini, Shakouri, and Peighami (2021) investigated "*A conceptual framework for oil market dynamics"* in order to offer practitioners with a platform on which to undertake various relevant analysis. A quantified system dynamics model was developed to mimic market behavior and forecast expected future developments and variations. According to the findings of the study, both OPEC and non-OPEC producers adopt nearly identical strategies to maximize economic added value from the oil market; that is, a rise in oil prices, in theory, would result in additional oil production in order to profit from the new high prices. Moreover, the article also examines how changes in oil demand affect the number of oil futures traded on financial markets. There will be a shortfall of oil on the market if demand rises, which will encourage oil demand side traders to purchase more futures contracts, resulting in higher futures prices. This raises the spot price and future predictions, driving demand-side consumers to cut their oil consumption by pushing energy intensity management programs, resulting in lower demand in unit economic activity over a period of time. A decline in oil demand, on the other hand, results in a market surplus of oil, which increases demand by lowering prices (Hosseini, Shakouri, & Peighami, 2021).

2.3.2. Geopolitical Factors Underpinning Demand and Supply

Crude oil has become one of the world's most valuable commodities, with international battles over control of oil supplies being researched and debated. The concept of 'oil imperialism,' a new, contemporary sort of imperialism, is frequently

mentioned in these conversations, both within and beyond academic circles (Gemma, 2016). In Imperialism, Lenin proposes the concept of a new stage of capitalism as a response to the theoretical dispute within Marxism that arose with capitalist recovery at the turn of the twentieth century. According to Lenin, the development of monopoly capital at the end of the nineteenth century ended the Great Depression. The current social structure of capitalist stages based on the American monopoly capital school, were influenced by this conception of imperialism (Mcdonough, 1995).

A classic case of oil imperialism is the case of Iran and the British in the 1950s. The August 19, 1953, coup in Iran has become a watershed moment in postwar world history. The administration of Prime Minister Mohammad Mosaddeq, which was ousted in a coup, was the country's last popular, democratically oriented government. The most frequently known narrative of the coup, written by Kermit Roosevelt, the CIA official who led it, is riddled with inaccuracies and omissions. A comprehensive analysis supports the roles performed by the US and Britain in the coup, based on previously leaked diplomatic papers and interviews with most of the main US and British players. Mosaddeq identified himself with two key problems by the late 1940s: a desire to transfer political power from the royal court to the parliament (known as the Majlis) and to enhance Iran's control over its oil company, which was formerly managed by the British-owned Anglo-Iranian Oil Company (AIOC). In the late 1940s, these two issues were becoming increasingly prominent in Iranian politics. By this time, they had become inextricably linked: the British had grown enormously influential in Iran, thanks to their ownership of the oil sector, and they used that power to help the Shah; the Shah, for his part, was largely perceived as a British puppet and had refused to renegotiate or nationalize the AIOC concessions (Gasiorowski, 1987).

To begin with, Stevens (2019) in his research article, *The Geopolitical Implications of Future Oil Demand,* looked at the subject of energy geopolitics and how it has grown into a vast field of study, analysis, and debate. The disagreement occurs because hydrocarbon energy supplies are unevenly distributed between nations due to geography. Some producers have excess capacity, allowing them to export hydrocarbon resources. Some consumers are forced to rely entirely or partially on imports due to a lack of native hydrocarbon resources. The geopolitics of energy is informed by the dynamics of energy commerce, advances in energy markets, and the ability for such markets to be controlled and regulated. These structural imbalances in natural endowments (and hence in supply) are crucial to the geopolitics of energy.

Secondly, (Crouzet, 1999) as cited in (Gemma, 2016) discussed the early twentieth-century British oil concession in Bakhtiaristan, suggesting that oil companies acted as "agents of imperialism." The paper demonstrated how these companies' practices formed an era dominated by capitalism and oil technopolitics, transforming local people into colonial subjects by employing them in the oil labor force. In a similar way, (Crouzet, 1999) as referenced in Gemma (2016) in the early twentieth century, analyzed a British oil concession in Bakhtiaristan, stating that oil companies acted as "agents of imperialism." By employing indigenous people in the oil labor force, these businesses created an era dominated by capitalism and oil technopolitics, changing them from 'threatened' tribes into colonial subjects. Still on the topic of oil imperialism, by assessing Iraq's reaction to the Organization of Petroleum Exporting Countries' (OPEC) oil embargo against Israel and its allies in response to the Yom Kippur War, the article explained how oil-exporting countries have been able to utilize their stockpiles to fight alleged imperialist projects (Bengobeyi, 1999 as cited in Gemma, 2016).

In addition, McFarland (2002) cited in Gemma (2016) investigated Middle Eastern international politics, concentrating on the United States' participation in the Persian Gulf in the 1970s, examining the reasons for and constraints of the US military presence in the region, and emphasizing the reliance on local partners to act as hosts for the American military. Meirding (2002) returning to British oil interests, cast doubt on the generally held assumption that Britain's involvement in the Falkland War was driven by a desire to control the Falkland Islands' oil deposits. The paper both challenged the notion of the conflict as an "oil war" and highlighted the significant influence of "oil imperialism," as a presumed ubiquity, both among contemporary actors and in historical accounts, by elucidating the lack of evidence to support this supposition and emphasizing that, on the contrary, Britain had no interest in this oil.

Moreover, Yergin (1991) in his prize-winning book *"The Prize"* on the subject **"power to the producers"** elaborated the role Enrico Mattei played to change the balance of power in the oil sector from the oil firms to the oil producing nations. Throughout world history, beginning with the finding and drilling of oil in the United States of America, the major oil companies gave us a fair idea of how oil producing companies in the early ages of oil boom and industrialization could set the terms of the oil business. The example of John D. Rockefeller and his Standard oil company tells us how Standard oil singlehandedly controlled oil production and market prices across America and Europe. Similarly, we see the same kind of dominance being maintained by the major oil companies who adopted a strategy that was no different from Rockefeller's integration strategy. Also, the role of Mattei was the most essential component of shifting the balance of power from the majors to the oil producing nations, shattering the 50:50 principles of the major oil companies by introducing the 75:25 principle. As a result of Mattei's steps, other patriots like Juan Pablo Perez

Alfonso soon surfaced, pushing for a united body of oil producing nations which saw the birth of OPEC (Organization of the Petroleum Exporting Countries) in Baghdad in 1960. Today, we can all see the prospering effect of the ability of oil nations to dictate oil prices and supply across the globe.

Since the 17th century, geopolitics in the global oil industry has been prevailing and has been a major factor influencing the supply and demand of the commodity. This notion of geopolitics has often led to oil embargoes, export quotas as in the case of OPEC, price ceilings, conflicts, control of territories or resources often through coups or imperialists projects. Thus, the concept of geopolitics is a powerful determinant of supply and demand dynamics for the future of the global oil industry, and infant oil industries like that of Ghana, is bound to be greatly affected by the power plays and protectionist strategies of superpower oil producing nations (OPEC) against French and Aglo-Saxon oil companies.

For instance, in September 1939, Germany, led by Adolf Hitler invaded Poland, starting World War II. The progress of Germany in World War II was strongly aided by oil (synthetic fuels) which had been in high production, viewed as significant in terms of military needs, and powered 95% of Germany's total aviation gasoline in the War (Yergin, 1991). The Takoradi - Cairo route also known as the West African Re-supply Route was established by Shell and the Royal Airforce in the 1920s. The Route is credited with turning the tide in World War II, since the supplies it delivered allowed Britain's army prevail against Rommel's Afrikakorps in the Spring of 1943. The route played a critical role in the supply of oil to allied forces in WW II by serving as a short route for the supply of oil to North Africa and the Middle East because the Mediterranean supply routes were cut off due to the Fall of France. The route provided access for communication via radio beacons. It served as the operation point for British

and Americans integrated international oil companies, especially Socony-Vacuum who was the key contractor to the military until the end of the war. The route helped the oil company to keep supplying kerosene, oil, and lubricants. The availability of oil to Allied forces in WW II by making use of well-established systems to mainly supply oil which in turn helped the British in their success in the war. (Klieman, n.d.).

Again, crude oil has played the role of coloniazation and the forceful segregation of Nigerians into three distinct peoples living in their own region, creating a federal system that gave each region substantial autonomy over its own affairs during the “Biafra war”. Despite the huge oil and gas revenues coming in since the 1970s, 70 percent of its population currently lives on less than one dollar per day, 43 percent have no access to clean water, and rebel insurgents in the oil-producing Niger delta threaten the stability of the country. Corruption is rampant, and the role of foreign oil companies in the resource curse of Nigeria is evidently established in the article (Klieman, 2012).

Also, in 2014, global oil price slide affected the anticipated revenue from oil exports in African countries because Saudi Arabia refused to help stabilize price by cutting production (Olayele, 2015). This illustrates how geopolitical decisions of major oil countries tend to affect minor oil nations like Ghana, Libya, Ivory Coast, Sudan, Chad, etcetera. OPEC members, on the other hand, have a tremendous motive to keep oil prices very high or low, depending on the situation, to maintain their market share.

2.4. Conclusion

Key Players: The literature review has shown that countries with considerable oil and gas reserves have long been important players in the business. In 1960, five countries created (OPEC) which currently has twelve (12) members who control 80% of proven reserves and a third of global production ***(see Table 1)***. Saudi Aramco, for example, is the world's largest oil business. Other major players include ExxonMobil,

BP, Royal Dutch Shell, ConocoPhillips, Chevron/Texaco, and Total are the six largest supermajors.

Major Consumers: The ***histogram in figure 6*** shows the major consumers of crude oil by country in 1000 barrels per day. With 17.2 million and 14.2 million barrels per day, respectively, the United States and China are the world's largest oil users. In recent years, Europe and North America's share of global oil consumption has dropped, while consumption in Asia Pacific and other countries has climbed.

Major Trends in the Industry: This review has also shown that global energy demand, including oil and gas, is expanding despite price fluctuations. While alternative energy sources are growing more popular, there are strong signs that oil and gas will continue to be used and produced. The Middle East possessed 48 percent of the world's known oil deposits as of 2011. Oil and gas corporations have begun exploring areas previously unexplored due to developments in exploration technology and economic steadiness in Africa.

Despite the reality that economic and geopolitical factors influence oil demand and supply, most of the literature concentrates on economic aspects using quantitative data and complicated quantitative data analysis tools. The literature, on the other hand, focuses on a global perspective of the oil business, with many research publications on major players such as OPEC members, the United States of America, Russia, and China. This study will fill a gap by providing a more concentrated qualitative narrative on the effects of global dynamics on African oil-producing countries, particularly Ghana. It will contribute to the growing body of research about how and where the government should invest in the Ghanaian oil industry to improve its share of earnings from the sector.

CHAPTER 3: METHODOLOGY OVERVIEW

3.1. Introduction

This chapter provides an overview of the Ghanaian oil sectors that informed the data gathering process by identifying key stakeholders and specialists in the field. The chapter discusses the tools and data collection processes that were used to conduct the study. This section defines the types of data that were collected, identifies the data sources, and describes and justifies the data analysis methodologies.

3.2. Research Design

3.2.1. Research Method

A research design is the framework, or blueprint, that directs the research process from the creation of research questions and hypothesis through the presentation of results (Lavrakas, 2008). The research question for this study is to scrutinise the determinants of contemporary and future demand and supply dynamics of the global oil industry and evaluate the implications for Ghana as an oil exporter. As a result, this study is descriptive in nature, with the goal of explaining and evaluating crude oil demand and supply dynamics and the future trends of the global oil industry. A cross-sectional design was chosen to address the topic based on the research type. To detect patterns and themes, a cross-sectional design collects data from diverse sources that represent different sections of a whole (Bryman & Bell, 2007:55). A cross-sectional design was employed because the oil and gas sector is made up of divisions. In-depth one-on-one semi-structured interviews with stakeholders from the three divisions of the oil and gas industry was also used to collect primary data.

3.2.2. Research Scope and Description of Study Area

Structure and Conduit of the Oil Sector: Processes and systems for oil and gas production and distribution are complex, capital-intensive, and require cutting-edge

technology. The oil and gas industry's value chain is divided into three segments. The upstream division is responsible for exploration and production. It comprises companies involved in drilling and extraction of oil. The midstream segment oversees building and managing the infrastructure that connects the resource production to the next section. Processing, pipeline transportation, rail transportation, and shipments are all part of the natural gas midstream industry. The downstream phase is where the resources are refined and distributed to the final consumers.

3.3. Sampling Strategy

Description of the Sample, Sub-samples, and Sub-sample Sizes: Ghana was chosen as the major data collection area. The primary sample included the Ghana National Petroleum Corporation (GNPC), which is responsible for the oil industry. The upstream petroleum industry was the focus of this study because it is the first point of crude oil exploration. The sub-sample comprised a representative of an International Oil Company (IOC), Oil Marketing Companies (OMCs), and some policy experts because the design type is cross-sectional and required a cross-section of players in the sector. Because they play a key role in marketing refined oil products in the industry, local OMCs were chosen, as well as the opinion of a policy experts.

3.4. Data Collection Tools

3.4.1. Research Instrument

A semi-structured interview was utilized as a research tool to acquire primary data. A semi-structured interview follows an interview protocol but is responsive to the responses provided by participants. In other words, it is adaptable, allowing for unanticipated follow-up questions that arise during an interview (Cleave, 2018). During the interviews, this strategy allowed for the introduction and exploration of new concepts. To be able to answer the study topic, different areas of the sample required

different interview instructions. The themes of many of these guides were similar. On average, the interviews will last 30 minutes.

3.4.2. Data Sources:

The data sources were primary and obtained from one-on-one interviews with two individuals from Hallmark Oil Limited, an oil marketing company in Ghana, two representatives from the GNPC, one professor of economics with specialty in the history of oil and gas based at Houston University, one experienced global energy specialist and a former senior employee of General Electric (GE) of the USA, and two representatives from Tullow Oil based in Ghana.

3.4.3. Data Collection Procedure:

Purposive stakeholder sampling (main strategy) and snowballing were used to acquire data for this project. Purposive sampling is a sampling method in which you use your judgment to choose respondents who will best help you answer the research question (Jewell & Hardie, 2009:62). This sampling method is beneficial in data analysis for policy recommendations and assessment study. When locating and contacting members of the research population is difficult, snowball sampling is performed (Jewell & Hardie, 2009:62). Although it was simple to identify individuals of the population, contacting them was challenging, hence, the need to rely on the first few contacts to make recommendations and introductions.

3.5. Data Analysis Techniques

Data analysis is the process of organizing, summarizing, classifying data, and finally identifying and connecting patterns and themes from the data (Patton, 1987) as cited in Kawulich, n.d. Content analysis was utilized to analyse the primary data that was collected. "Systematic study of text documents to detect patterns in text" is what content analysis is (Trochim, 2005). Thematic text analysis was used to analyse the data

for this paper. The data from the field interviews were sorted into distinct themes, with trends discovered and connections to the literature evaluated. Thus, the data analysis technique was appropriate for the research design approach because it allowed us to examine, from a constructionist methodological position, the meanings that people attach to their civic participation, the significance it has in their lives, and their social constructions of it. Also, it enabled us to examine how these constructions might reflect the 'reality' of participants' lived experiences, the material or social contexts in which they live, and which constrain and enable their opportunities for civic participation. It also enabled correct analysis of demand and supply side factors that affected the oil industry's outlook and what implications there are for Ghana.

3.6. Ethical Considerations

A Human Subjects Review application was submitted to the Ashesi Human Subjects Review Board for approval prior to the start of data collection. All human subjects utilized in the study were safe because of this. Before the interview, all participants' permission was obtained. The respondents identified were not linked with the data obtained to safeguard the data's integrity and ensure confidentiality.

3.7. Limitations of the Study

The study's major limitation was that locating and gaining access to the stakeholders involved in the core data gathering procedure was difficult because research participants who agreed to provide data were often busy and not readily reachable on the agreed interview dates.

CHAPTER 4: DATA FINDINGS, DISCUSSION AND ANALYSIS.

4.1. Introduction

This chapter presents the findings from primary data collected from interviews with eight stakeholders in the oil and gas industry in Ghana and the United States of America. The chapter also identifies common themes in data collected and analyzes it by linking it to the literature reviewed. The first part of this chapter assesses the contemporary and future supply and demand dynamics that can impact the global oil industry's future trends. The second section discusses the outlook of the global oil industry. The third section identifies and explains the implications of contemporary and future demand and supply dynamics of oil specific to Africa in general and Ghana in particular. The fourth objective which is to recommend strategies to help Ghana's oil industry to survive and thrive is addressed in Chapter 5.

Participants Demographics: The interview was conducted with eight stakeholders in the industry carefully selected from the target sample mentioned in the methodology. Out of the nine stakeholders, seven were males and one female. The gender imbalance stems from the fact that the industry is one that is dominated by the male gender and because they were more accessible that the female professionals in the industry. 75% of the research participants were from Ghana whilst 25% were from the USA. The ages of all the research participants were 35years and above. Their industry or field experience spanned a period of 15 – 20years for the participants who work in OMCs and IOCs, and an experience of 21years or more for those who work at the GNPC, General Electric and the experts (a lecturer and government official). The interview with each participant lasted 30 – 40 minutes.

4.2. Contemporary and Future Supply and Demand Dynamics That Can Impact The Global Oil Industry's Future Trends.

4.2.1. Factors Affecting the Supply of Global Oil.

Global oil supply is heavily influenced by geopolitics. According to one of the respondents, “The supply of crude oil is mostly determined by the major oil-producing economies, such as the Gulf States, OPEC, Russia, the United States, who control the majority of the supply, and decide whether to decrease output and when to ramp it up.” According to another participant, “when shale oil technology was discovered in the United States, big oil economies like the gulf states quickly realized the potential for the United States to become a powerful player with more leverage because they will be producing more oil, their response was to open up their oil fields to produce more barrels than they did before.” Such a measure leads to excess supply of oil. As a result of the excess supply on the global market, prices fell. As prices fell, investments in new technologies, which are quite expensive to produce shale oil, for example, became uneconomical at the end of the day, because there was less profit to offset investments when shale oil is sold. This aligns with Stevens' (2019) thoughts in his research work, *The Geopolitical Implications of Future Oil Demand*, in which he stressed the significance of geopolitics in energy markets, as well as the possibility of such markets to be controlled and regulated by political and economic entities. Geopolitics is not only important but is also dynamic as the Russian invasion of Kuwait has proven very recently leading to significant rebound of oil prices.

Russia is currently the world's second-largest oil exporter, after Saudi Arabia, and the world's leading natural gas producer. Measures requiring the country to deliver less crude or natural gas would have "significant ramifications" for oil prices and the global economy, according to the report. Many analysts believe prices will continue to

increase sharply due to fears of a significant interruption in global energy supplies (Power, 2022). This is an excellent illustration of how geopolitics affects crude oil supply in the global economy. The requirement to fuel its vast military force (attack planes and helicopters, tanks, armored vehicles, and so on) will result in a supply shortage on the worldwide market. The rippling effect will be a rise in costs, which we are already seeing because of a lack of capacity to fulfill demand, as well as a scarcity for many European countries that rely on Russian exports.

The strategic locations of oil deposits play a significant role in where it is exported (Dike, 2014). As a result, in the global supply of crude oil, the proximity of the extraction site to the reserves is critical. According to one of the participants, “The cost of transporting the commodity to a distant place is higher than the cost of exporting to a nearby one. This is due to the commodity's importance in furthering economic progress by providing as a source of electricity for businesses, particularly in countries still in the industrial period.” The lower the cost of importing the product for non-oil countries, and the lower the mid-stream cost burden on the supplying company, the closer the resource can be acquired. Because of the dependence of countries' economies on crude oil, a country's economy could collapse if it went a week without petroleum goods. The country's human resources will become trapped, unable to get to work, and power generators will be unable to provide power, halting output since companies and offices would be unable to operate, bringing the economy to a halt.

Market-driven climate change mitigation policies include energy efficiency and renewable energy subsidies, but public/government-driven policies such as carbon taxes distort the oil market. Demand for oil reduces over time when energy efficiency programs are implemented, and such demand shocks are relayed to the market. When renewable energy sources are subsidized, the substitution effect kicks in, lowering oil

demand over time. Carbon taxes, likewise, upset the competitive market condition or equilibrium by pushing up crude oil prices, boosting economic activities to find suitable noncarbon/low-carbon oil substitutes over time (Hamilton, 2009). One of the research participants revealed that “The big oil firms have cut their investments in crude oil because of a push to minimize carbon footprints and shift to cleaner renewable energy sources. As a result, the commodity's supply on the worldwide market is reduced.” The reason for this is that when there is a cut back on crude oil exploration and production, you would not get as much supply as you expected or hoped for.

Furthermore, one participant stated that “because much of these exploration and production activities require a lot of capital, oil companies that want to start a project will have to turn to the financial markets for funding or loans. One result of the push for cleaner energy or renewable energy is that huge banks and the International Finance Corporation (IFC), one of the primary loan agencies for international oil projects, are now cutting back on funding or no longer issuing loans to oil firms for fossil fuel projects.” Thus, one element contributing to the drop in supply is the push for renewable energy. Canada joined more than a dozen other countries in pledging to stop financing new oil and gas projects in other countries by the end of 2022, a move that climate activists applauded, claiming that it could divert an estimated US$15 billion in new capital away from the oil sector each year (Friedman, 2021). The expected result of this fund-choking strategy will be a reduction in the industry's capacity to produce and supply at current levels. Hence, other sources of renewable energy will begin to gain a larger share of the global energy mix, while crude oil supply levels continue to decline.

4.2.2. Factors Affecting the Demand of Global Oil.

The manufacturing vibrancy of a country's economy, as well as the economic level of its population, are both important factors in today's global oil demand. This is

in line with Gross's (2020) findings, which highlight how crude oil has proven to be a reliable, efficient, and powerful generator of economic activity and wealth for many countries. The discovery and production of crude oil paved the way for the globe's rapid expansion and development during the industrial revolution, which changed the world we know today and lifted millions out of poverty. Over 80% of the world's economies have residents that earn a low-middle income or less (World bank, 2020). According to the most recent estimates, the world's population is 7.6 billion (and rapidly expanding), with an estimated 1.4 billion cars on the road (putting vehicle saturation at roughly 18%). In the few years since, the number has already topped 1.4 billion. At current growth rates, the total number of vehicles on the road doubling every 20 years, 2.8 billion automobiles are expected by 2036 (Chesterton 2018). As a result, many individuals use gasoline, diesel, lubricants, and other petroleum products to commute. One of the research participants stated that, “A stable economy with a consistent rate of GDP growth, a large amount of disposable income, stable exchange and tax rates, and political stability all contribute to this type of demand.” The argument is that the more stable the global economy, the higher the demand for crude oil, and therefore, the primary driver of demand in the future.

The current demand for hydrocarbon-based fuels like oil is largely driven by energy generation. Crude oil has unquestionably established itself as a key and reliable source of power generation around the world. A participant revealed that, “Ghana's thermal power stations are mostly powered by fossil fuels. As a result, the primary requirement is for electricity generation. Relying on renewable energy is expensive in Africa because the technologies that can make renewable energy more cost-efficient are no readily available in Africa. Similarly, the types of businesses and infrastructure that exist in Africa are primarily reliant on crude oil as a source of energy.” It can be

deduced that, the contemporary worldwide market for hydrocarbons is primarily driven by the human desire for a reliable and inexpensive source of power.

In addition, one important factor that has impacted demand in the last two years is the Covid epidemic, which brought world crude oil demand to a virtual halt, resulting in massive industrial downsizing. According to one respondent, “In 2020, the crude oil forward market turned negative, with crude oil prices falling to less than $20 per barrel.” In their attempt to explain the demand theory in reference to the global oil sector, Whelan and Msefer (1996) back this up. They said that anytime there is an excess of oil on the global market, the price of the commodity decreases, and when the price rises, demand declines. The drop in crude oil prices was solely due to a drop in demand and an excess of the commodity because of the global epidemic. Nonetheless, the business has seen a recent uptick in demand. “This is seen in the rise in crude oil prices, which reached as high as $70 before geopolitical tensions between Russia and Ukraine caused supply disruptions and supply potential” another participant noted. As a result, recent changes in crude oil demand have been contractionary, followed by a rebound as the globe comes to terms with the Covid epidemic and the progressive lifting of both social and economic limitations, resulting in improved demand.

Global environmental concerns is another key demand side-factor. “The tremendous push on the environmental front has the potential to result in two types of changes: energy efficiency reduction and substitution. These changes will have a demand reduction as well as a substitution effect” another participant stated. The major argument for the swap is that the world should abandon fossil fuels such as crude oil in favor of renewable energy. Friedman (2020) agrees with this conclusion, stating in his piece that climate change advocacy groups have emphasized removing government funding and subsidies for oil and gas projects, which they claim has supplied billions

of dollars in capital to the sector and helped prop it up. Similarly, the coalition of 21 countries that pledged alongside Canada to move away from oil, including developing countries like Mali, demonstrates that oil and gas are no longer seen by some as a non-negotiable boon to the economy. There might be a global transfer of nearly $20 billion from fossil fuel projects to clean energy initiatives soon. The impact of such an occurrence could be massive and will choke crude oil's role in the energy mix.

4.3. The Outlook of The Global Oil Industry.

Given that several key countries are pressing for change in the wake of worries about climate change and global warming, the picture for the global oil sector will shift in the next four decades. One of the research participants noted that “The United Kingdom's ambitions, for example, to transition to a carbon-free society by 2050, using mainly electric automobiles, is an agenda that is likely to transform the oil sector over the next three decades.” If this is successful in a major way, gasoline usage for automobiles will decrease. Similarly, the UAE is becoming more vocal about its desire to establish decarbonization firms both at home and abroad (Lin, 2022). “Dubai, an oil-producing city in the UAE, is attempting to diversify its economy away from crude oil. Today, Dubai's officials are aiming to turn the city into a commerce hub where they can source and manufacture many of the big products that China produces for the rest of the globe” another respondent stated. This shows that major petrostates will seek opportunities to diversify their economies and gradually transition away from fossil fuel energy sources in the future.

Furthermore, one respondent stated that “predicting that crude oil will be phased out altogether is a big challenge. As part of the global energy mix, crude oil's importance in the broader energy mix will gradually shrink.” Currently, fossil fuels, such as crude oil, natural gas, and coal, account for 84 percent of worldwide energy

production (BP Statistics, 2021). Crude oil is now widely expected to remain the primary source of energy for the rest of the century. “Other energy sources such as natural gas, solar, and all other types of renewables, on the other hand, will have their share of global energy sources increase ahead of crude oil, according to the global energy industry expert. However, as the commodity becomes more affordable, technology will advance to the point where crude oil handling and its consequences, such as the amount of carbon dioxide emitted by crude oil, will be minimized.

Another respondent stated that “globally, the goal is for the United States, as well as some portions of Europe and Africa, to become more reliant on renewable energy sources than fossil fuels during the next four decades.” This makes it possible for Ghana to invest in renewable energy in the next four decades using earnings from the fossil fuel sector. Furthermore, the Ghanaian economy, like many others in Africa, is still in the developmental stage. Strong economic growth in Africa since 2000 has spurred a significant increase in demand for fossil energy to fuel the expansion of job-creating sectors; hence, a rapid shift to renewables risks disrupting economic progress (African Development Bank Group, 2019). As a result, Ghana still has sectors that need to be powered by crude oil on a large scale. Renewable energy sources are now unable to meet the energy demand levels required by most African countries. Hence, if Ghana abandons fossil fuels, the country's economy may suffer great economic downturns.

Africa is evolving into a civilization in which individuals and firms own an electricity grid to supplement the bigger one when it fails. Because it is not dependable from the start, the transition to alternate energy sources (renewables) is gradual. As a result, the transition from fossil fuels to energy supplies in the foreseeable future is primarily reliant on governments. A participant revealed that, “young people in the United States do not want to work in the old oil and gas industry; instead, they want to

work in renewable energy, which is the way of the future." As a result, the oil firms, and the industry face yet another existential threat.

4.4. Implications For Ghana.

The dynamics of the forces influencing crude oil supply and demand, as caused by major oil states, have an impact on smaller African oil producing nations like Ghana. "The trend in developing countries is for them to mimic the practices of large oil producers" a respondent stated. As a result of the oil price drop in 2015, the government was compelled to significantly reduce the oil earnings projected in the 2015 Budget. Total oil income for fiscal year 2015 fell by a staggering 58 percent, from $1.1 billion to $472.4 million. The drop in oil prices had a negative impact on petroleum tax revenues announced in the 2015 Budget. Domestic-financed capital spending has been reduced by $202.8 million in the revised Budget (Institute of Fiscal Studies, 2015). Considering the Russia and Ukraine geopolitical tensions, Annor (2022) forecasts a significant increase in oil revenue for the governments of Nigeria, Angola, Libya, South Sudan, Gabon, the Congo, and Ghana, as oil prices hit their highest levels since 2008 after the United States banned Russian oil imports. Global geopolitics has an impact in Ghana, such that if the price resulting from geopolitics is unfavorable to projects, companies would be unable to complete cost-intensive projects.

"Smaller oil-producing countries, such as Ghana, gain from increased revenue streams as prices rise" according to one participant. This is backed by Hosseini, Shakouri, and Peighami, who discovered that oil producers use virtually identical techniques to maximize economic added value from the oil market; that is, a rise in oil prices should theoretically result in increased oil production to profit from the new high prices (2021). Ghana is expected to see an unexpected boost in oil revenues, an increase in petroleum taxes, and domestically financed capital investment on social and

developmental projects. Ghana is a net exporter of crude oil and a net importer of petroleum products for the most part. “Ghana will lose petroleum revenues if it reduces crude oil output and exports” another respondent added. This will have an influence on Ghana's economy, but not as much as it will on Nigeria or Angola, which rely heavily on petroleum goods. Thus, the implications of demand and supply dynamics in the global oil sector does not have a dire effect on the country as an oil-producing nation.

According to one participant, “Investors and foreign oil firms have begun to withdraw from Ghana to focus on renewable energy elsewhere. As a result, Ghana will begin to lose a significant amount of technology transfer from overseas corporations. Ghana will be ill-equipped to take over ongoing oil projects due to a lack of technical competencies and skills.” Furthermore, “because these oil and gas projects are capital intensive, one of the ramifications for Ghana is that finding new financial streams to support oil and gas projects will become extremely challenging. Local banks would not be willing to take such a risk” another participant added. On the contrary, the positive side of this assumption is that “as more large players shift to clean energy or renewable energy, only the few countries or players who remain in the fossil fuel business will gain a competitive advantage in terms of profitability” one respondent stated. This is because the transition to renewable energy would still necessitate a significant proportion of crude oil energy. This means that Ghana can keep a vision of a future based on fossil fuels while also benefiting from its economic edge if it fully positions itself to take advantage of the prospective move to renewable energy by big oil states and industries. The exit of major oil nations or firms will cause supply to plummet as there will be few players (suppliers) in the industry trying to meet the demand on a large scale. This will result in massive revenues for countries like Ghana would decide produce oil and meet the global demand.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

This thesis examined the determinants of contemporary and future demand and supply dynamics of the global oil industry: Implications for Ghana as an oil exporter. The problem surfaced from the fact that we do not know where oil will trend in the future because the demand and supply determinants of the industry keeps shifting with global dynamics. The study therefore sought to investigate specific incidents in the oil business by asking the questions; “What are the contemporary and future demand and supply factors of global oil?” “What are the implications for Ghana?” “What strategies should Ghana formulate?” The study is descriptive in nature. 75% of primary data was collected in Ghana and 25% in the USA using one-on-one semi-structured interviews with industry experts. Thematic text analysis via a concept mapping approach was used to analyze the data.

The results showed that geopolitics, the push for renewable energy, and energy efficiency methods are factors influencing supply of global oil. On the demand side, robust economies and industries, covid-19, energy generation, and environmental concerns are key determinants of global oil. The outlook of the industry reveals that the global oil industry will change in the next five decades, with renewables forming a bigger part of the energy mix. Lastly, as an implication, it was found that recent price hikes in the global oil industry will see Ghana benefit from high cash inflows. Also, it was found that the global dynamics do not pose a catastrophic threat on the country as an oil-producing nation.

5.2. Conclusion

The fundamental conclusion drawn from the data and literature is that the global industry dynamics have a negligible impact on Ghana. These global dynamics are

always altering, and they encompass discussions of governmental, environmental, economic, and corporate factors, as well as health-related factors. Nonetheless, it is emphasized that the government and other industry stakeholders must work together to implement the suggested measures listed below to ensure the industry's long-term viability.

5.3. Recommendations

To begin, Ghanaian policymakers must move quickly to expedite the exploration and production of the country's oil reserves. Deleveraging at both the government and bank level has characterized investment in the oil business over the previous decade, making loan capital scarcer and more expensive than it has been as investors choke dollars into the industry (Mitchell et al., 2012). With the expectation of a significant shift away from fossil fuels and toward renewable energy sources over the next four decades, Ghana must guarantee that its natural resources are fully utilized. It is critical that the government reach out to all potential investors in the sector swiftly before they begin to shift away from fossil fuel investments. This can be accomplished by implementing favorable tax and fiscal regimes, to entice investors to come to the country and participate in the sector.

Furthermore, Ghana should wholly or partially nationalize international oil corporations. This method will aid the Ghanaian government and people in gaining more ownership of existing oil exploration assets. Allowing foreign oil firms to continue drilling for oil as long as possible under the joint venture partner is no longer sufficient. Oil production is mostly under foreign control, and the country has reaped little benefit from current government contracts (Hajzler, 2015). Oil companies need more equal cooperation possibilities with the government to lower the cost of equity. Ghana must take advantage of the joint venture agreement to allow it to gradually earn

bigger shares and control over the oil producing firm once it has generated enough cash to cover its establishment and operating costs.

Moreover, Ghanaian policymakers should use some of the oil money to offer incentives for citizens to learn new technologies and build infrastructure that is more suited to the twenty-first century. The government should assist entrepreneurs and businesses by providing subsidies or tax breaks so that they can put their ideas into action. The opportunity to become an entrepreneur in Africa is enormous. As the economy moves, people are looking to move, change, and work with it. As a result, the government should invest in education. People can select what they want to learn and improve as they grow into adults and build their lives and enterprises, but there should also be some strategic investment in sending people abroad to learn about alternate types of energy and paying them to put them into practice on the ground. The world is changing, and we will never be able to rely on oil indefinitely. Hence, we see other countries diversifying and attempting to tap into renewable energy sources, it is critical that Ghana do the same.

5.4. Recommendations for Further Research

Individuals or groups interested in learning more about the topic of Implications of Supply and Demand Dynamics for the Future of the Global Oil Industry could conduct a study estimating crude oil volumes in Ghana over the next two decades using ordinary least squares (OLS) forecasts of industry trends. Furthermore, despite the abundance of literature on the economic and environmental determinants of contemporary and future demand and supply dynamics of the global oil industry, there was little literature on policy and health-related factors as determinants of contemporary and future demand and supply dynamics of the global oil industry during this research. Research in those areas will contribute significantly to literature.

REFERENCES

Ado, R. (2013). Local Content Policy and the WTO Rules of TradeRelated Investment

Measures (TRIMS): The Pros and Cons. International Journal of Business and Management Studies, 137- 146.

Allen, M. (2017). Naturalistic observation. Sage Research Methods. Retrieved September 27, 2021, from https://dx.doi.org/10.4135/9781483381411.n372.

Archer, L. J. (1995). Environmentalists vs oil producers: Clearing Misunderstandings for Constructive Action. Retrieved October 10, 2021, from https://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/03/EV18-EnvironmentalistsvsOilProducersClearingMisunderstandingsforConstructiveAction-LJArcher-1995.pdf.

Armah-Attoh, D. (2015). Ghana's oil revenue management: Convergence of popular opinion, the law, and practice. afrobarometer.org. Retrieved September 27, 2021, from https://afrobarometer.org/publications/pp19-ghanas-oil-revenue-management-convergence-popular-opinion-law-and-practice.

Boye, C. A. (2021). Ghana: Petroleum revenue to hit $1.006 billion next year - PC. allAfrica.com. Retrieved March 8, 2022, from https://allafrica.com/stories/202112220112.html#:~:text=Sekondi%20%E2%80%94%20Ghana%20is%20expected%20to,(PC)%2C%20has%20projected.

Boyle, M. J. (2021). The origins of the law of Supply and Demand. Investopedia. Retrieved December 3, 2021, from https://www.investopedia.com/ask/answers/030415/who-discovered-law-supply-and-demand.asp.

Bryman, A. and Bell, E. (2007). Business research methods. Oxford University Press, USA.

Burke, E., & Pomeranz, K. (2009). “The Big Story: Human History, Energy Regimes and the Environment,” in The Environment and World History. UC Press: Los Angeles.

BP global. (n.d.). Crude oil prices 1861-2020 ($ per barrel). Retrieved September 27, 2021, from https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/oil.html.

Cleave, J. V. (2018). How can we distinguish between structured, semi-structured and unstructured interview? ResearchGate. Retrieved November 18, 2021, from https://www.researchgate.net/post/How-can-we-distinguish-between-Structured-Semi-structured-and-Unstructured-Interview.

Cohn, M. (2021). Human rights attorney sentenced to prison after winning case against Chevron. Truthout. Retrieved October 10, 2021, from

https://truthout.org/articles/human-rights-attorney-sentenced-to-prison-after-winning-case-against-chevron/.

Deshmukh, A. (2021, June 7). Which countries have the world's largest proven oil reserves? Visual Capitalist. Retrieved September 27, 2021, from https://www.visualcapitalist.com/ranking-the-countries-with-the-largest-proven-global-oil-reserves-in-the-world/.

EIA. (2021). U.S. energy Information administration - eia - independent statistics and analysis. Short-Term Energy Outlook - U.S. Energy Information Administration (EIA). Retrieved September 21, 2021, from https://www.eia.gov/outlooks/steo/report/global_oil.php.

Esteves, A. M., Coyne, B., & Moreno, A. (2012). Local Content in the Oil, Gas and Mining

Sectors: Enhancing the Benefits at the SubNational Level. Revenue Watch Institute.

Fitch. (2020). Ghana's oil production to increase 2% in 2021 – Report. Petroleum Commission Ghana. Retrieved September 21, 2021, from https://www.petrocom.gov.gh/ghana-president-akufo-addo-cuts-sod-for-us-25m-gnpcs-operational-headquarters-in-takoradi-3-2-3-2-2/

Fusheini, A., Adam, A., Kuyole, E., Ibrahim-Tanko, R., & Bekoe, S. (2017). Funding Ghana's ‘Free’ Senior High School with Oil Revenue: Sober Reflection Required. Retrieved September 27, 2021, from https://resourcegovernance.org/sites/default/files/documents/funding_ghanas_free_senior_high_school_with_oil_revenue_0.pdf

Gasiorowski, M. J. (1987). The 1953 Coup D’etat in Iran. International Journal of Middle East Studies, 19(3), 261–286. http://www.jstor.org/stable/163655

Gemma, J. (2016). Oil Imperialism? Energy and Political Power from a Global Perspective. https://doi.org/https://www.hsozkult.de/conferencereport/id/tagungsberichte-6911

Ghana Statistical Services. (2020). Rebased 2013-2019 Annual Gross Domestic Product. Ghana Statistical Service (GSS). Retrieved December 3, 2021, from https://statsghana.gov.gh/gssmain/storage/img/marqueeupdater/Annual_2013_2019_GDP.pdf.

Goodrich, G. (2021). Top 10: Africa's leading oil producers in 2021. Energy Capital & Power. Retrieved October 10, 2021, from https://energycapitalpower.com/top-10-africas-leading-oil-producers-in-2021/

Graham, E. (2013). The Contribution of Civil Society in Avoiding Natural Resource Curse in Ghana: The Case of Oil (thesis). ugspace.ug.edu.gh, Accra.

Gross, S. (2020). Why are fossil fuels so hard to quit? Brookings. Retrieved October 10, 2021, from https://www.brookings.edu/essay/why-are-fossil-fuels-so-hard-to-quit/.

Hosseini, S. H., Shakouri, G, H., & Peighami, A. (2016). A conceptual framework for the oil market dynamics: A systems approach. Energy Exploration & Exploitation, 34(2), 171–198. https://www.jstor.org/stable/90007392

Hundermark, C. (2021). Five major oil discoveries in Africa in 2021. Energy Capital & Power. Retrieved October 10, 2021, from https://energycapitalpower.com/five-major-oil-discoveries-in-africa-in-2021/.

Ihua, U. B., Ajayi, C., & Eloji, K. N. (2009). Nigerian Content Policy in the Oil and Gas

Industry: Implications for Small to Medium-Sized Oil Service Companies. In S. Sigué (Ed.), Repositioning African Business and Development for the 21st Century: Proceedings of the 10th Annual Conference - IAABD (pp. 163-170). Kampala: International Academy of African Business and Development.

IMF. (2011). Oil scarcity, growth, and global imbalances. imf.org. Retrieved October 10, 2021, from https://www.imf.org/~/media/Websites/IMF/imported-flagship-issues/external/pubs/ft/weo/2011/01/pdf/_c3pdf.ashx.

International Trade Administration. (n.d.). Ghana - oil and gas. International Trade Administration | Trade.gov. Retrieved September 27, 2021, from https://www.trade.gov/knowledge-product/ghana-oil-and-gas.

Jackson, F. (2021). Top technologies transforming energy in 2021. Forbes. Retrieved October 10, 2021, from https://www.forbes.com/sites/feliciajackson/2021/01/27/top-technologies-transforming-energy-in-2021/?sh=5aef43fe3775.

Jewell, S., & Hardie, M. (2009). How to Write a Research Proposal. Boston: Coventry

University.

Kawulich, B. B. (n.d.). Data Analysis Techniques in Qualitative Research. State University of West Georgia.

Klieman, K. (n.d.). Before the “Curse”: Petroleum, Politics, and International Oil Companies in Africa, 1890-1980s.

Klieman, K. (2012). U.S. Oil Companies, the Nigerian Civil War, and the Origins of Opacity in the Nigerian Oil Industry. The Journal of American History,99(1),155-165. https://doi.org/10.1093/jahist/jas072

Lavrakas, P. J. (2008). Research design. Sage Research Methods. Retrieved September 27, 2021, from https://dx.doi.org/10.4135/9781412963947.n471

Mcdonough, T. (1995). Lenin, Imperialism, and the Stages of Capitalist Development. Science & Society, 59(3), 339–367. http://www.jstor.org/stable/40403507

McNeill, J. (2000). Something New Under the Sun: An Environmental History of the Twentieth Century WorldW.W. Norton.

Ministry of Energy. (2011). Local Content and Local Participation in Petroleum Activities –

Policy Framework. Accra: Ministry of Energy, The Republic of Ghana.

Ministry of Energy. (2013, July 12). Minister Lays Petroleum Regulation in Parliament.

Retrieved December 6, 2013, from http://www.ghana.gov.gh/index.php/2012-02-08-08-32- 47/general-news/1642-minister-lays-petroleum-regulation-inparliament

Olayele, F. B. (2015). The Geopolitics of Oil and Gas. International Association for Energy Economics. Retrieved November 22, 2021, from https://www.iaee.org/documents/2015EnergyForum2qtr.pdf.

Reid, D. (2018). There will be an oil shortage in the 2020s, Goldman Sachs says. CNBC. Retrieved October 10, 2021, from https://www.cnbc.com/2018/11/09/goldman-sachs-there-will-be-an-oil-shortage-in-the-2020s.html.

Riddle, M. (2012). Three essays on oil scarcity, global warming and Energy Prices. Retrieved October 10, 2021, from https://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1597&context=open_access_dissertations

Sönnichsen, N. (2021). Global oil consumption in million metric tons 1970-2020. Statista. Retrieved September 27, 2021, from https://www.statista.com/statistics/265261/global-oil-consumption-in-million-metric-tons/

Sönnichsen, N. (2021). Global oil Reserves volume in billion barrels 2020. Statista. Retrieved September 27, 2021, from https://www.statista.com/statistics/236657/global-crude-oil-reserves-since-1990/

Sönnichsen, N. (2021). OPEC oil price annually 1960-2021. Statista. Retrieved September 27, 2021, from https://www.statista.com/statistics/262858/change-in-opec-crude-oil-prices-since-1960/

Sönnichsen, N. (2021). Statistics and facts about the global oil industry. Statista. https://www.statista.com/topics/1783/global-oil-industry-and-market/#topicHeader__wrapper.

The News Editor. (2019). Ghana's oil Production estimated to go up to 500,000 barrels per day by 2024. Ministry of Finance | Ghana. Retrieved September 22, 2021, from https://www.mofep.gov.gh/press-release/2019-02-14/ghana%27s-oil-production-estimated-to-go-up-to-500%2C000-Barrels-per-day-by-2024.

Tordo, S., Warner, M., Manzano, O. E., & Anouti, Y. (2013). Local Content Policies in the Oil and Gas Sector. Washington, D.C: The World Bank.

Trochim, W. M. (2005). Research Methods: The Concise Knowledge Base. Mason,OH: Thompson.

Veloso, F. M. (2006). Understanding Local Content Decision: Economic Analysis and an Application to the Automotive Industry. Journal of Regional Science, 46(4), 747-772.

Warner, M. (2011). Local Content in Procurement: Creating Local Jobs and Competitive Domestic Industries in Supply Chains. Sheffield: Greenleaf Publishing.

Weitz & Luxenberg. (n.d.). Petroleum spills: Legal help for people affected by oil spills. www.weitzlux.com. Retrieved October 10, 2021, from https://www.weitzlux.com/environmental-pollution/petroleum-spills/.

Yergin, D. (1991). The prize: The epic quest for oil, money and power by Daniel Yergin. Simon & Schuster: New York.

APPENDICES

List of Figures

Figure 1

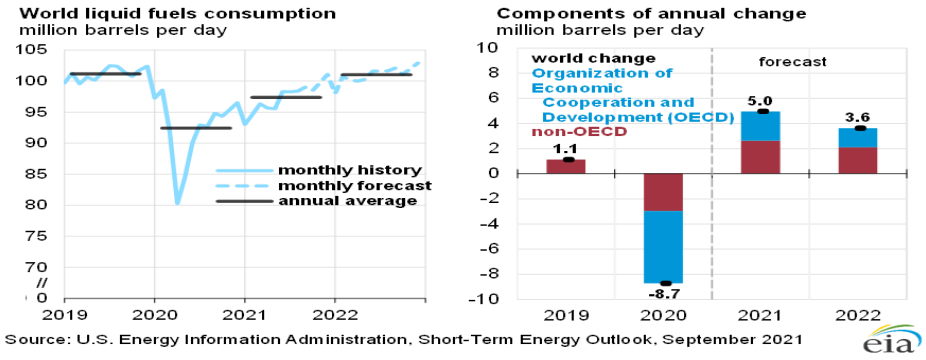
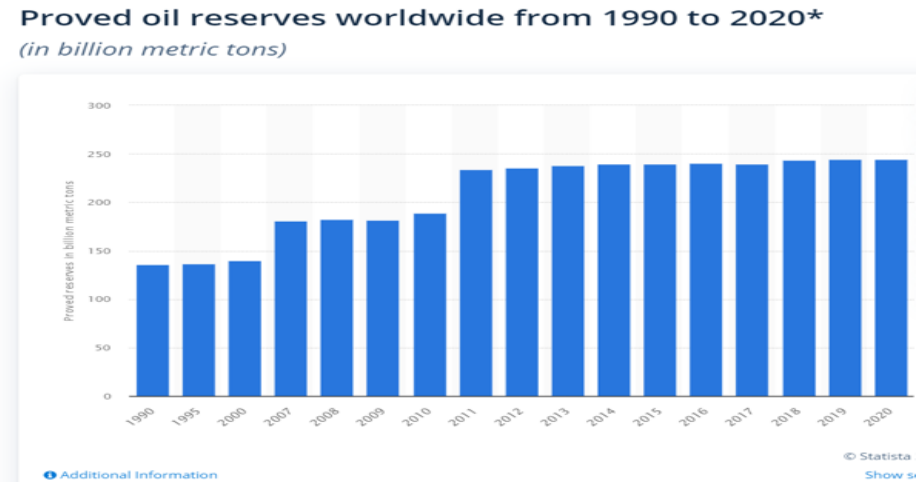
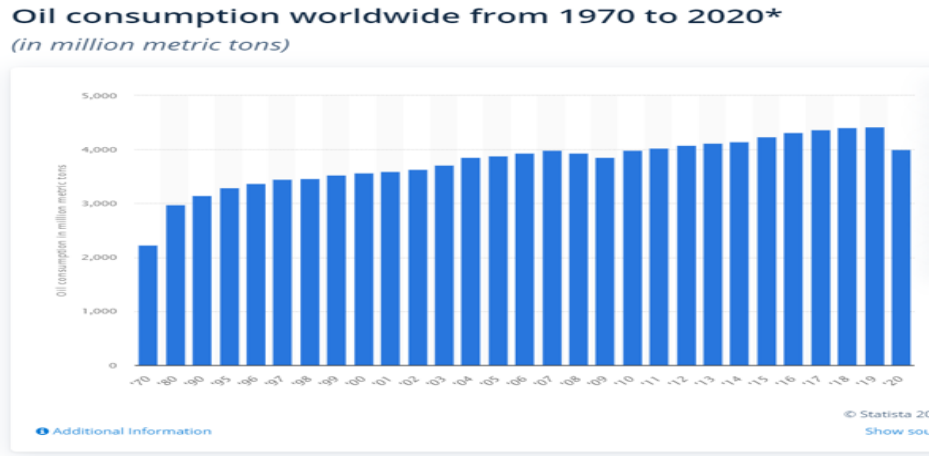


Figure 2: Global Oil Reserves



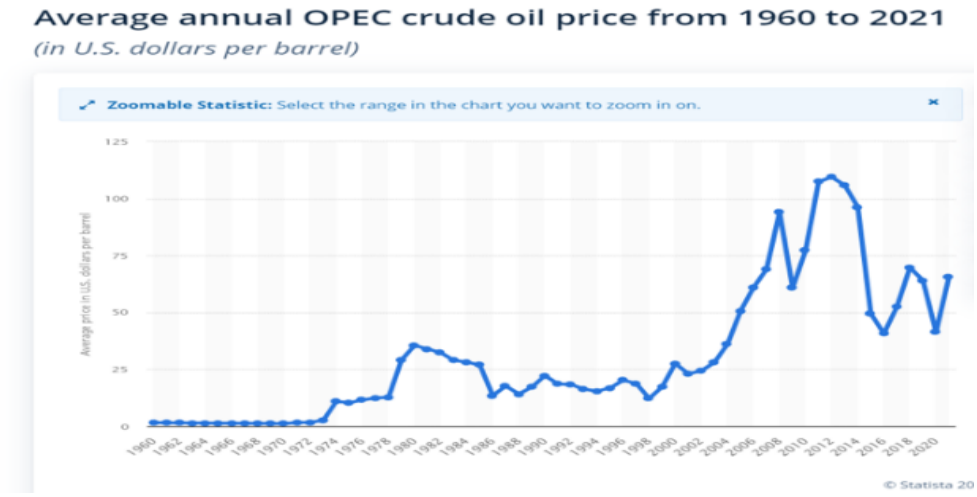
(Source: Statista, 2022)

Figure 3: Crude Oil Consumption



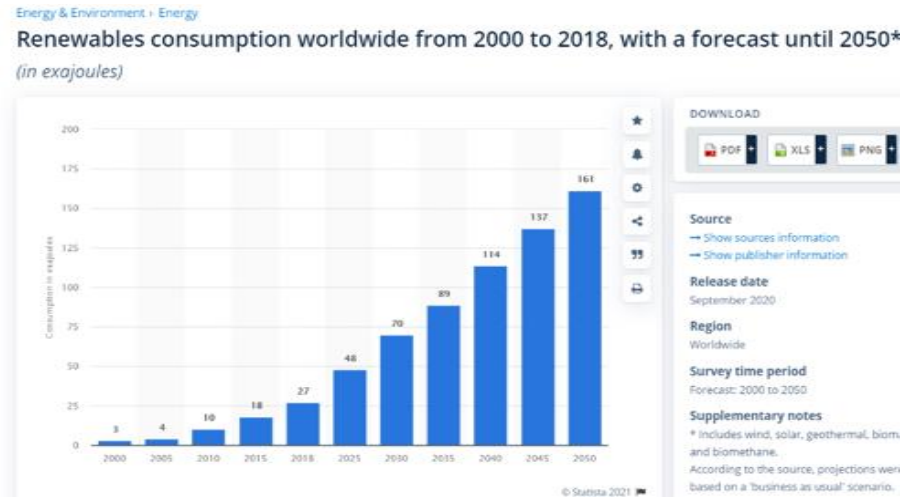
(Source: Statista)

Figure 4: OPEC Crude Oil Prices



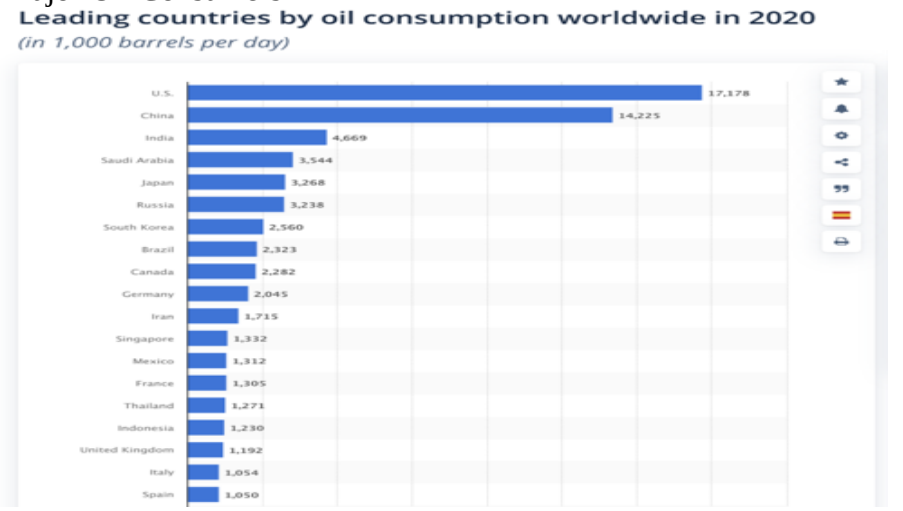
(Source: Statista)

Figure 5: Consumption of Renewables.



(Source: Statista)

Figure 6: Major Oil Consumers



Source: (Statista, 2021)

Interview Questions

UNDERGRADUATE THESIS INTERVIEW GUIDE: " *EXAMINING THE DETERMINANTS OF CONTEMPORARY AND FUTURE DEMAND AND SUPPLY DYNAMICS OF THE GLOBAL OIL INDUSTRY: IMPLICATIONS FOR GHANA AS AN OIL EXPORTER."*

This questionnaire seeks to examine the current and future determinants of the demand and supply of oil in international markets and to explain associated dynamics in the global demand and supply of oil. The study also incorporates a qualitative narrative of the possible effects of global dynamics on African oil-producing countries, particularly Ghana from the perspective industry players. Please be assured that answers provided will be kept in strict confidentiality and thanks for your contribution to the research.

Required background information

A. Sex – Please indicate your gender: Male [] or Female [].
B. Occupation – Please state your occupation or profession
C. Organization – Please provide the name of the institution where you work
D. Position – Please indicate your position in the institution where your work below
E. Experience- Please state how long you have been working in your current capacity

Main Interview Questions

4. What are the current factors affecting *supply* of global oil? – In your answer, please include a discussion of policy related factors, environmental factors, cultural factors, economic and business factors, health related factors etc.
5. What are the current factors affecting *demand* of global oil? - In your answer, please include policy related factors, environmental factors, cultural factors, economic and business factors, health related factors etc.
6. In your opinion will oil be replaced by alternative energy sources as primary fuel in this century. In order words, will the oil industry die out soon. If yes, explain. If no, why?
7. In what ways does geopolitics influence demand and supply of global oil, and how does this impact smaller nations like Ghana?
8. Do you think the global oil industry will change in any significant way in the next decade or two? If yes, in what ways will it change? If no explain why?
9. What are some of the most important changes that have occurred in the global oil industry in the last 50 years?
10. What are the implications of these dynamics for Ghana?

For policy makers

11. Can you identify some of the oil related investments Ghana has made in the last 2 decades? In your opinion, were these oil investments Ghana made profitable?
12. Does it make sense for Ghana to invest heavily in the oil sector in the future?
13. If oil investments make sense, which aspects of the divisions of the oil industry should the government of Ghana invest in?
14. How should Ghanaian policymakers react to changing global and national industry dynamics?
15. What strategies should Ghana formulate to help the oil industry thrive?
16. Given that oil is a non-renewable resource some scholars have argued that Ghana should use the revenues from oil to diversify away from oil into other environmentally sustainable sectors. Do you agree or disagree with this? Explain.