UNIVERSITY OF GHANA

UNIVERSITY OF GHANA BUSINESS SCHOOL

THE UPSTREAM PETROLEUM POLICY FORMULATION IN GHANA: THE RELATIVE WEIGHT BETWEEN SCIENCE AND POLITICS IN SHAPING THE PROCESS

BY

ALBERT FRIMPONG

(10192241)

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF Ph.D. IN PUBLIC ADMINISTRATION DEGREE

NOVEMBER, 2024

DECLARATION

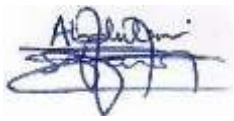
I, Albert Frimpong hereby declare that except for references to other people's works which have been duly acknowledged, this thesis is the result of my independent research conducted at the Department for Public Administration and Health Services Management, University of Ghana, Legon, under the joint supervision of Prof. Kwame Ameyaw Domfeh, Prof. Abdulai Gafaru and Dr. James Mensah. I also declare that as far as I know, this thesis has neither in part or in whole been published nor presented to any other institution for an academic award.

.....
Albert Frimpong
ID No. 10192241

25th November 2024
Date

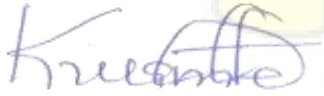
.....
Prof. Kwame Ameyaw Domfeh
Principal Supervisor

25th November 2024
Date



.....
Prof.Abdul-Gafaru Abdulai
Co-Supervisor

25th November 2024
Date



.....
Dr. James Kwame Mensah
Co-Supervisor

25th November 2024
Date

DEDICATION

I lovingly dedicate this work to the cherished memory of my late uncle, P. E. Kyei (Esq), whose wisdom and inspiration continue to guide me. Additionally, I dedicate this to my beloved wife, Ann Afirifa, whose unwavering support has been my anchor throughout this journey. Lastly, I dedicate this to my children, whose presence fills my life with purpose and motivation.

ACKNOWLEDGEMENT

The successful completion of this academic endeavour owes its accomplishment to the dedicated efforts and invaluable contributions of several key individuals. In light of this, I must express my sincere gratitude towards these individuals as I reach this pivotal juncture in my thesis. Foremost, I would like to extend my profound acknowledgement to the MTN Ghana Foundation, whose financial support played an instrumental role in covering my Ph.D. fees. Their generosity has been paramount to the realisation of my academic pursuit. I am equally indebted to my esteemed supervisors: Prof. Kwame Ameyaw Domfeh, Prof. Abdulai Gafaru, and Dr. James Mensah. Their vigilant supervision, constructive commentary, and unwavering encouragement have significantly enriched the quality of this work. I am immensely grateful to Professor Justice N. Bawole of the Department for Public Administration and Health Services Management. His altruistic guidance and sagacious direction have been a compass guiding me throughout my Ph.D. journey. I wish to extend my appreciation to Dr. Kwasi Prempeh Eck, the former director of the Ghana School of Law, as well as Mrs. Helen A. Ziwu, the Solicitor General at the Ministry of Justice, and Anthony. Their diverse forms of support have been invaluable. Moreover, I extend my heartfelt gratitude to Mr. Benson Osei Tutu, Dr. Theophilus Kwabena Abutima, and Mr. Kingsley Baffoe for their unwavering support and assistance. Your contributions have been a constant source of strength and motivation. In conclusion, I humbly acknowledge the collective efforts of these outstanding individuals who have played pivotal roles in my academic journey. Their support, guidance, and contributions have undoubtedly been indispensable to the successful completion of this thesis.

ABSTRACT

The role of policy in public and national administration is of immense significance. Policy formulation is integral to a nation's endeavour to optimize its resources for the welfare of its citizens. Notably, petroleum holds global importance, and policies have been established to regulate its diverse aspects across the value chain—downstream, midstream, and upstream. Empirical studies have explored the multifaceted factors influencing petroleum policy formulation. However, there's a research gap regarding the intricate interplay between science and politics in policy formulation, particularly in Ghana. This study addresses this gap, focusing on the roles of science and politics in Ghana's upstream petroleum sector. The study investigates the nature, driving forces, and implications of the interplay between science and politics in Ghana's policy formulation, emphasizing the upstream petroleum sector. Using qualitative methods, data was collected from 25 experts in policy-making and Ghana's petroleum sector through in-depth interviews and analysis of relevant documents. The study framework drew from the New Institutional Theory, particularly DiMaggio and Powell's isomorphic forces. Findings highlight the essential roles of science and politics in Ghanaian policy-making. The policy landscape is intertwined with politics, yet science serves as a foundation due to its precise problem-solving approach, supplying accurate data for policy decisions. Politics often initiates decisions before involving other stakeholders. Internal and external factors—partisan politics, policy actors' clientelism, re-election efforts aided by rating agencies and Bretton Wood institutions, and foreign relations—shape the interplay between science and politics, influencing policy-making. The interaction between science and politics bears substantial implications for policy outcomes in Ghana. The study concludes that science is critical in the upstream petroleum policy decision-making process, while politics is pivotal in formulating policies for the industry, though hindered by institutional constraints. Existing institutional constraints however complicate these conclusions. The study therefore recommends that the research capacity of the research wings within the ministries, public departments and agencies must be enhanced by the government to ensure rigorous and credible research to complement and advise political decisions in the policy-making process.

Contents

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

Policy frameworks play a fundamental role in public administration and the broader landscape of national governance. They represent critical components of national endeavours aimed at harnessing resources for the collective welfare of global populations (Bardach & Patashnik, 2019; Hill & Varone, 2021). To delve into the subject within the specific context of Ghana, this chapter unfolds by providing a comprehensive background to the oil and gas industry. Emphasis is placed on elucidating the intricate relationships between science and politics in the formulation of policies. The chapter further delineates the general and specific study objectives, followed by the formulation of research questions aligned with the stated study objectives. The subsequent sections address the significance of the study and the disposition of the research and culminate in a conclusion for the chapter.

1.2 Background to the study

Science, rooted in systematic investigation and evidence-based methods, offers unbiased expertise vital in problem-solving across various fields. It not only aids in identifying and resolving issues but also plays a crucial role in shaping policies by providing validated knowledge. In contrast, politics often linked with power dynamics, collective decision-making, and resource allocation, may involve strategies like deception to address societal needs. This study examines how politics intertwines with legitimate governmental authority to influence decision-making processes and the formulation of regulatory policies (Norse & Tschirley, 2000; National Research Council, 2012;

Heywood, 1997). The contribution of science and politics in shaping policy formulation and ensuring development in society is undeniably a complex interrelationship which cannot be underestimated by policy actors (Renn, Baghramian & Capaccioli, 2019; Smith, 2018). The complexities originate from the understanding of the concepts and nature of the application of such concepts in policy formulation from different schools of thought (Johnson & Lee, 2020). For some scholars, science constitutes expert knowledge acquired through systematic inquiry that employs established methods and evidence rules, devoid of biases (Clark, 2015; Brown et al., 2019). It serves as a valuable tool across diverse human endeavours, facilitating the identification and resolution of problems. Additionally, science plays a pivotal role in policy development, offering validated knowledge and guiding the formulation of strategies, policy options, and regulatory standards (Norse & Tschirley, 2000; National Research Council, 2012). In contrast, politics is commonly associated with the exercise of power, authority, collective decision-making, and the allocation of resources. It may involve tactics such as deception and manipulation to address societal needs and desires. Politics, as explored in this study, is intricately tied to the legitimate political authority within government. It encompasses the role, utilization, and impact of this authority in shaping decisions and formulating regulatory policies (Heywood, 1997).

The disparity in the integration of scientific knowledge and political interest or considerations in the formulation of policies represents a complicated and enduring challenge in the governance of various countries across the world. This dissonance carries substantial implications for both the efficacy and equity of the public policy formulation process (Parkhurst, 2017; McLean, 2008). In the current intensely competitive global landscape, finite natural resources such as petroleum are in high demand due to a burgeoning population and the associated increase in both domestic and industrial needs. Petroleum products are renowned globally for their capacity to propel socio-

economic advancement and enhance the economic security of nations fortunate enough to have access to them (Arora & Gupta, 2013; Ngene et al., 2016; Mbaegbu, 2016; Esu, 2017; Asif & Muneer, 2007). Therefore, the significance of petroleum cannot be overstated (Zhai et al., 2021). The petroleum sector has become increasingly indispensable and a linchpin for human existence in recent decades (Asif & Muneer, 2007).

The surging demand for oil and gas by the world's most powerful and populous nations has turned petroleum into a bargaining chip for smaller nations seeking acceptance into international communities and alignment with global superpowers (Arora & Gupta, 2013; Gupta & Arora, 2015). Widely known as the "black diamond," Stebbins (2019) describes it as the lifeblood of many existing economies. With the decline of military capacity as a measure of a nation's power, Arora and Gupta (2013), Gupta and Arora (2015), argue that a nation's strength is now gauged by its crude oil wealth and control, regardless of where the resource is situated globally.

Moreover, the role of the petroleum sector in transportation, agriculture, industry, security, and livelihood empowerment has significantly expanded over the years, particularly in developing countries (Arora & Gupta, 2013; Ngene et al., 2016; Mbaegbu, 2016; Esu, 2017; Asif & Muneer, 2007). However, while some view oil and gas as a boon to the socio-economic fortunes of states, others regard it as a curse due to regulatory and resource management failures witnessed in various countries worldwide (Elwerfelli & Benhin, 2018; Agbaeze & Ukoha, 2018; Esu, 2017).

Petroleum like other precious minerals is processed through three main value chains; thus; upstream, midstream and downstream (Liu Pan, & Li, 2017). Nevertheless, the upstream oil industry which is largely the extractive sector is more central to this study not only because it forms the base stage of the petroleum sector, but also, because the structuring of this segment

immensely influences the political economy of the petroleum industry as well as the institutional frameworks and policy regulations (Manzano & Monaldi, 2010). Although these three segments are independent of each other, is it acknowledged that strong cooperation is always required along the value chain in other to achieve utmost success. Be it as it may, the argument of petroleum being a blessing or a curse could be attributed to the roles played by science, politics and to a larger extent, how these wrought policy developments over the years to achieve desired results.

Science regarding scientific research knowledge generally, produces knowledge for a myriad of purposes including informing policy (Crewe & Young, 2002; Broadbent, 2012). However, as noted by Stone et al. (2001), the relationship between science or research and policy is sometimes fragile and complex if not problematic since research designs are always not relevant to policy and therefore fail to impact policy. Factors including dwindling public research funding and general apathy towards scientific findings in policy formulation are often attributed to this state of affairs (Stone et al., 2001; Silver, 2005; Keate, 2021). Unless demanded by the government, scholars are shifting the focus and objectives of their research projects to align with the demands of funding organisations rather than national policies (Van Dyck, 2002). Politics on the other hand is commonly associated with the exercise of power, and authority, making of collective decisions, allocation of scarce resources and in worse cases, the practice of deception and manipulation within society to meet societal needs and wants (Heywood, 1997). Generally, politics is very well associated with politicians and the control of government machinery. Consequently, individuals or agencies who are external to the confines of state decision-making processes are deemed to be outside the domain of politics and its related activities (Modebadze,2010).

The perceived partisan connotation attributed to public policy formulation and the neglect of scientific knowledge in many developing economies have left academics, think tanks, NGOs and individuals to question the relationship between science and politics in policy formulation. Intellectual interrogation of the relationship between scientific evidence or knowledge and political interest (overt political partisanship) in the formulation of regulatory policies in the petroleum industry forms the basis of this study.

The usage of science and politics and its implications on policy formulation have raised heated debates among academics and other actors in recent years. For Akwei et al., (2020) knowledge of science has been underutilised in policy-making, invariably political ideologies dominate the process. Supporting this assertion, Broadbent (2012) argued that science is not frequently used in public policy formulation but ideologies of politicians embraced scientific knowledge. For others, scientific knowledge exists except that policy actors on the side of governments are just not interested if it will not directly benefit them (Hansohm & Naimhwaka, 2005). Contrary, Akwei et al., (2020) revealed that the non-usage of scientific knowledge and continuous embracement of political ideas is due to the limited scholarly attention research. But the question raised is, does the non-usage of scientific knowledge in policy formulation affect the highly scientific-driven sector like the upstream petroleum sector? Suleman & Zaato (2021) opine that those policies in petroleum sectors have been largely focused on regulatory policies but the usage of scientific knowledge is rarely visible. Rahimi & Noruzi (2011) expressed how regulatory policy frameworks restrict human activities in the oil sector and not how science influences the process.

1.3 Problem statement

Policies are primarily made to achieve specified socio-economic and political agendas. However, the rationale behind policy formulation varies, considering the distinct needs, aspirations, and challenges they aim to tackle (Lowi, 1964; Rahimi & Noruzi, 2011). Recurring and dominant forces influence the formulation of public policies. Consequently, policies may be developed to promote the fair and widespread distribution of resources, regulate human behaviour and dispositions, or facilitate institutional transformation or not (Lowi, 1964; Knill & Tosun, 2008; Howlett, 2011). As asserted by Lowi (1964), the formulation of public policy can lead to either enduring positive outcomes or adverse consequences, contingent upon the factors influencing the formulation process. Presumptively, the upstream petroleum sub-sector is highly scientific and so it's expected of its policy formulation process.

Even though the petroleum industry relies more on scientific knowledge, its policies are presumed to be more politically influenced but there tends to be less scholarly exploration into the interaction between science and politics and the effective and equitable integration of these factors, especially in shaping policy formulation processes in Ghana (Manzano & Monaldi, 2010; Suleman & Zaato, 2021). This phenomenon tends to contribute to policy sustainability and implementation which intends to impact long-term national development. This research gap can be attributed to politicians who frequently cherry-pick scientific findings that align with their political ideologies when crafting regulatory policies (Stone et al., 2001; Walt, 2004; Hansohm & Naimhwaka, 2005; Broadbent, 2012; Suleman & Zaato, 2021).

Previous studies in public policy formulation revealed by Akwei et al., (2020) contend that the relationship between science and politics and its impact on policy decision-making within the

public sector has received limited scholarly attention in Ghana. Similarly, Broadbent (2012) argued that science is not frequently used in public policy formulation but ideologies of politicians and not scientific knowledge a case that is equally shared by Hansohm & Naimhwaka (2005) in most sectors in Ghana. Suleman & Zaato (2021) believes that policies in the petroleum sectors have been largely focused on regulatory policies which are more aligned to the mid and down streams in the value chain. Rahimi and Noruzi (2011) expressed how regulatory policy frameworks restrict human activities in the oil sector and not how science influences the process. This explains why policies that are to ensure that national resources are equitably distributed tend to be poorly formulated and implemented and have fewer reflections of reality when political interest takes precedence in their formulation processes. But is the case in the upstream petroleum sub-sector in Ghana's petroleum sector?

Arguably, other scholars such as (Van Gyampo, 2011; Ainuson, 2015; Mohan et al., 2018; Gatune et al., 2021), have also explored different facets of the oil sector in Ghana but there is a noticeable gap in understanding the relationship between science and politics influence of policy formulation in Ghana's upstream petroleum sector (Akwei et al., 2020; Suleman & Zaato, 2021; Gatune et al., 2021). There is, therefore, less scholarly knowledge to understand the complex conundrum like the relationship between science and politics in the policy formulation process in the upstream petroleum sector of Ghana, the driving forces of the relationship between science and politics and how these forces shape policy-making in the upstream petroleum sector of Ghana and the implications of the relationship between science and politics on upstream petroleum sector policy formulation in Ghana are just based on assumptions and not scientific facts. Against the backdrop of understanding the disequilibria integration of science and politics, this study investigates the

nature, driving forces, and implications of the interplay between science and politics on policy formulation in Ghana, with a specific focus on the upstream petroleum sector.

1.4 Research objectives

1.4.1 General objective

The study sought to generally investigate and understand the nature, driving forces and implications of the relationship between science and politics in the policy formulation process in the upstream petroleum sector of Ghana.

1.4.2 Specific objective (s)

The study specifically sought to focus on;

1. To examine the nature of the relationship between science and politics in the policy formulation process in the upstream petroleum sector of Ghana.
2. To analyse the driving forces of the relationship between science and politics.
3. identify how driving forces shape policy-making in the upstream petroleum sector of Ghana.
4. To examine the implications of the relationship between science and politics on upstream petroleum sector policy formulation in Ghana.

1.5 Research Questions

To achieve the objectives set for the study, the following research questions will guide the study:

1. How is the nature of the relationship between science and politics in the policy-making process in the upstream petroleum sector of Ghana?
2. What are the relevant driving forces of the relationship between science and politics in policy formulation processes in the upstream petroleum sector of Ghana?
3. How do these forces shape policy formulation in Ghana?
4. What are the implications of the nature of the relationship between science and politics on upstream petroleum policy formulation in Ghana?

1.6 Significance of the study

This study was undertaken due to the dearth of research on the nexus between the adoption of science and politics in policy formulation processes in Ghana's upstream petroleum sector. The study will specifically contribute to the body of literature on the nature, driving forces and implication of science-politics nexus in policy petroleum formulation processes in Ghana. Over the years, rich mineral resources have been extracted in countries in Africa without real benefits impacting the lives of the people in the region. Many scholars and organizations attribute the challenges to a lack of policy cohesion and misappropriation of proceeds generated from the sector. Contrary to these assertions, other scholars argue that partisan political leaders do not follow scientific approaches in the formulation and implementation of the policy guidelines governing the mining of mineral resources in Ghana. Since the discovery of oil in Ghana, many such issues

have been raised against political leaders by scholars and stakeholders concerning the relationship between science and politics in policy formulation. Even though some studies have been done in the area, no specific attention has been given to the upstream petroleum sector in Ghana. Studies have paid little or no attention to the implications of the relationship between science and politics on policy formulation in and especially in the upstream petroleum sector (Van Gyampo, 2011; Ainuson, 2015; Mohan et al., 2018; Gatune et al., 2021). This study is therefore expected to fill the literature gap on the nature of the relationship between science and politics in policy formulation in the upstream oil sector in Ghana. This study therefore contributes to the policy-making literature on the nature of science and politics relations in Ghana and implications on policy formulation processes in the upstream petroleum sector as well as petroleum administration in Ghana. The findings will further inform future policies in the upstream oil sector in Ghana.

1.7 Operationalisation of Key Concepts

Since there are contestations and ambiguity in most concepts used in the social sciences, this section provides the "operational definitions" of key concepts as used in this study.

1.7.1 Science

Science is used and understood differently either in its natural or social contexts but in is this study, science is understood as the expert knowledge that is gained through a systematic inquiry within established methods and rules of evidence and inference that is devoid of self-deception and biases (see National Research Council, 2012). Science as expert knowledge applies to almost every aspect of human endeavour (Norse & Tschirley, 2000). As a tool, it is the methodological means of identifying problems and finding solutions to these identified problems (National Research

Council, 2012). Science is also the validated knowledge and experiences that add value and direct policy formulation. Ideally, science mainly contributes to problem identification, strategy formulation, selection of policy options and setting of regulatory standards in the policy formulation process (Norse & Tschirley, 2000).

1.7.2 Politics

Politics is commonly associated with the exercise of power, and authority, making of collective decisions, allocation of scarce resources and in worse cases, the practice of deception and manipulation within society to meet societal needs and wants (Heywood, 1997). Generally, politics is very well associated with politicians and the machinery of government. Politics in this study is therefore understood as the role, use and influence of legitimate political authority government in making decisions and formulation of regulatory policies.

1.7.3 Policy

Policy as defined by Anderson is a specific course of action backed by an actor or set of actors geared towards tackling a particular human concern (Anderson, 1975). Policy, as used in this study, is in line with Millers' definition as a compilation of declarations, laws and other actions to government's aims for a particularly human endeavour within its domain (Miller, 1994). A policy that addresses public concerns must have been formulated through a public institution or governmental framework often facilitated by public organisations aimed at addressing a public good. Such policies are commonly referred to as public policies (Hogwood & Gunn 1984).

1.7.4 Policy Formulation/Development

Policy formulation of development as used in this study denotes the processes and procedure including consultation of stakeholders and decision-making, problem identification and all other related activities adopted in the creation of a policy.

1.7.5 Upstream Petroleum Sector

The upstream petroleum sector is the first of the three stages of the value chain of petroleum production. It focuses on the exploration, development, and production stages of petroleum production.

1.8 Chapter Disposition

The thesis is been organized into seven main chapters with each chapter having some sub-units to be discussed. The first chapter which is the background to the study proceeds with the general introduction to the chapter and then continues with the background and problem statement of the study. Subsequently, the chapter looked at the study objectives, research questions, the significance of the study and operationalisation of key concepts as used in this thesis to give clarity to the subject matter under investigation. The entire research structure is outlined here to describe the sequence of flow of the various chapters accordingly. Finally, the chapter conclusion is presented here to close the discussions under this chapter.

Chapter two is devoted to reviewing relevant literature on various concept relations in the study. Specifically, the chapter also centred on the overview of science and politics relations. Again, the chapter looked at the relevant theories and the conceptual framework adopted for the study. Subsequently, chapter three is dedicated to discussing the methodology adopted for the study. It discusses the philosophical underpinning for the study, sampling techniques used, the sampling size, data collection techniques and tools, data analysis techniques and tools adopted, ethical issues to be considered and finally presents a chapter conclusion.

The findings of the research are divided and discussed under three main chapters. Thus, chapter four is dedicated to discussing the study findings in relation to objective one which focuses on the nature of the relationship between science and politics in policy-making processes in Ghana.

Chapter five of the study examined the findings relating to objective two focused on finding out the driving forces that influence the science and politics relations and policy formulation in Ghana. Chapter six presents the findings on the implications of the relationship between science and politics on upstream petroleum administrative policy formulation in Ghana Finally, chapter seven (7) is dedicated to presenting the summary, conclusion and recommendations for the entire study.

1.9 Conclusion

The Chapter has served as the basis for the successful conduct of this study by presenting the general background of oil policy formulation and key driving forces. The research gap has been justified based on existing literature establishing the need to fill the research gap, add to knowledge and contribute to the debate on petroleum administration and management in Ghana and beyond. The study objectives, guiding research questions, study significance, and chapter disposition have

all been perused. The next chapter examines the existing literature within the context of the focus of the thesis.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature on the extent to which science relates to politics and vice versa, the driving forces of this relationship. In addition, it examines the relations between science and politics on regulatory policy formulation in the upstream petroleum administration. Again, the study utilized two theories namely institutional isomorphism and political economy as an analytical lens to explain the complex relationship between science and politics on one hand and the complex nature of formulating upstream petroleum sector policy governance.

The chapter is divided into three main parts. The first part examines the upstream petroleum sector from a global perspective and the conceptual literature. It starts with a description of the concepts of science and politics as adopted in this study. This is followed by clarifying the relationship between the two dynamics in the study. The chapter also reviewed the literature on the outplay of power between them and how they influence the dynamics (Science and Politics) operation in the formulation of policy instruments and their motivations. Also, to verify the extent to which these two critical dynamics can collaborate and translate into sustainable and transparent enabling policy instruments for petroleum sector governance. It then examines the relations between science and politics, highlighting the types of relations discussed in the literature in addition to classifying the dominant relationship typologies. It also addresses the driver of the relations between science and

politics and concludes with discussions of the implications of relations between them on assessing upstream petrol sector governance.

The second part of the chapter presents a review of the literature on policy implications of petroleum administration governance by unravelling the factors that influence such policy and its impact on the administration of petroleum management from the context of science and politics at the national and international arena. It also highlighted some empirical studies conducted in that field. The final part of the chapter is a theoretical review. This part reviews the institutional theories specifically the isomorphic forces as stipulated by DiMaggio and Powel (1983). These perspectives serve as the lens for understanding the relationship between science and politics. The argument in this context is that the relationship between the two critical areas of interest is driven by other equally essential forces which can be distilled along the lines of isomorphic forces. The other theory which is the political economy addresses the political will and the institutions that control the power relations that influence policies in the administration of commodities such as the upstream petroleum sector.

2.2 Global Perspectives on the Upstream Petroleum Sector and Policy Formulation

Globally, the upstream petroleum sector is characterized by a complex interplay of resource governance, environmental sustainability, and economic policy. Regulatory frameworks in oil-rich countries often aim to balance maximizing resource rents with mitigating environmental and social impacts (Söderholm & Svahn, 2015). International bodies like the Extractive Industries Transparency Initiative (EITI) have sought to enhance transparency and accountability in the sector, influencing policy formulation in both developed and developing nations (Haufler, 2010). Furthermore, resource-rich countries have adopted varying approaches to managing revenues. For

instance, Norway's Petroleum Fund is a model for how policy can ensure intergenerational equity and mitigate resource dependency (Mehlum, Moene, & Torvik, 2006). However, in many contexts, policies are hindered by the resource curse phenomenon, where mismanagement leads to economic stagnation, corruption, and conflict (Ross, 2012).

In Africa, the upstream petroleum sector is often marked by both opportunities and challenges. Many resource-rich countries, such as Nigeria, Angola, and Algeria, have struggled with the resource curse, where weak governance, corruption, and rent-seeking behaviour undermine the benefits of petroleum wealth (Ross, 2012). However, countries like Botswana and Ghana have begun adopting best practices, including transparency and stakeholder participation, in their policy frameworks. African Union initiatives, such as the Africa Mining Vision (AMV), have also sought to harmonize policies across the continent to ensure resource-driven development benefits all citizens (African Union, 2009). The role of multinational oil companies (MNCs) and their influence on domestic policy has been both a point of contention and collaboration, shaping upstream policy in ways that reflect global pressures and local priorities (Obi, 2010).

Ghana's upstream petroleum sector, which gained prominence with the discovery of oil in the Jubilee Field in 2007, has been lauded for its relatively progressive policy framework. The Petroleum Revenue Management Act (PRMA) of 2011 is often cited as a model for transparency in revenue allocation and management (Ministry of Finance, Ghana, 2011). Institutions such as the Public Interest and Accountability Committee (PIAC) have been instrumental in fostering public oversight and transparency in petroleum revenue use (PIAC, 2023). However, challenges remain, including inefficiencies in local content implementation, environmental concerns, and balancing competing interests in resource governance (Suleman & Zaato, 2021). Emerging studies

emphasize the importance of participatory policy formulation processes that include local communities, civil society, and environmental advocates to ensure inclusive and sustainable development (Abudu & Sai, 2020). Ghana's adherence to EITI standards further underscores its commitment to good governance in the petroleum sector (EITI Ghana, 2023). The literature highlights the intricate interplay of global norms, regional challenges, and national contexts in shaping upstream petroleum sector policies, emphasizing the need for continuous refinement in Ghana.

2.3 Conceptual and Theoretical Literature

2.3.1 Understanding the Concept of Science

The era of Enlightenment brought with it the rise of modern sciences and their incorporation into the national development and governance systems (Fischer 2003). The concept of science as a developmental and governance tool is indeed complex even in definition although some scholars define it as a process and a consequence of a careful, disciplined, logical search for knowledge about any or all aspects of the universe, which is realized through the examination of the best available data but subject to correction and improvement upon discoveries (Johnson & Gray, 2010; Aliyu et. al., 2014; Pearce, 2015; Pernecky, 2016). Rakesh (2018) similarly describes science as systematic knowledge based on facts, observations and experimentations. Other scholars also refer to science as the methodical approach to the acquisition of knowledge which aspires to be universal and provides a reliable account based upon the application of rational thought to empirical evidence (Marks, 2009; Argyous, 2012). Rakesh (2018) argues that science could be either abstract, social or possibly natural. Science generates disinterested knowledge that is to a large

extent value free. Hence its contribution to policymaking has a lesser propensity to seek personal interest (National Research Council, 2012). Based on these attributes, science is therefore pertinent in informing national decisions and policy formulation processes on the physical, social, political, economic and environmental interest of a nation. According to the United States National Research Council, expertise or knowledge across all fields of science is relevant to policy decisions. For example, the physical sciences contribute to the formulation of energy policy on renewable efficiencies, the biological sciences influence public health policy on infectious diseases, the engineering sciences inform national defence policy on weapon design, and the social sciences inform economic policy on trends in international trade. However, critical considerations on why and how scientific knowledge is used are exclusively appropriate to the methods and theories of the sciences. Making use of scientific knowledge is a usual human or organisational behaviour. And this behaviour is influenced by science (National Research Council, 2012).

This notwithstanding, scientific research also focuses on understanding the reasons for human behaviour (Baskerville et al., 2018). Thus, science is important because it provides an evidence-based foundation on which to build more effective research to help people understand and engage with the key political and social institutions, thus benefiting individuals and society as a whole. For instance, scientific guidance is very important when addressing emergency threats like epidemics and pandemics, and long-term threats such as food supply, water shortages or climate change (King, 2016). As posited by Haas (2015) research that incorporates the scientific method to include critical components such as asking a question, forming a hypothesis, conducting empirical research, drawing a conclusion, and evaluating the conclusion becomes fundamental in confronting today's problem and helping to solve it. The applicability of science in contemporary research thrives on scientific methods and these include a variety of research approaches, tools,

and techniques, for collecting and analysing qualitative or quantitative data. Lewin (2016) noted that sciences directly involve people and in the research arena, it deals with the behaviour of people in their different roles, such as consumers, competitors, producers, executives, salespersons, leaders, workers, followers, teachers, students, opinion-makers among others with requisite information that can be tailored to solve a present problem. It also transcends systematically due to the approaches used in discovering new facts or verifying old facts, their sequence, inter-relationship, casual explanations and the natural laws which cover them. This assertion according to Mwelwa et al. (2021) has been the basis for diversifying research into different areas with desirable outcomes, especially in social, economic, political and cultural research. The importance that science investigators wield today is immeasurable and enlarging is that there is an increase in social, business and economic problems and the relevance of science research gets enhanced as it provides workable solutions.

Science provided an avenue for delivering unemotional evidence to arbitrate disagreements (Benessia et al., 2016). Thus, science elaborates and elucidates the significance of expertise in any field of study and at the same time, problem-solving is the thrust of most research since it affects the people directly and scientific research offers solutions to such problems and ameliorates the conditions of people at large. Hence, science forms the basis for research on societal behaviour which is studied, analysed and steps needed to modify the same to achieve certain broad goals. All our social problems could be attributed to certain societal behaviours. According to Lewin (2016), the development of policy to deal with social issues is one of the contributions of scientific research in all areas that affect society. He further posited that to deal with these issues appropriately, a layout procedure is needed and must be scientific.

Science contributes to societal development and enhances its outcomes. Scientific research brings out creative and innovative consequences which are empirically justifiable in handling complex challenges. All these add to the progression of society. Many scholars have conceptualized the role of science as a tool for social planning, prediction and control. The reflections of these components in research are an indication that any constructive action needs to be planned, its outcome predicted and deviation of actual from the desirable predicted outcome needs to be controlled. When all these variables guide the research scientifically, then the research can aid in designing appropriate models of social planning, prediction and control. Research emanating from science is generally normative emphasizing what is good for society by stating, what is and what is not good for the economy, for the industry, for the consumers, for the students, for the stock market and the like, thus helping to contribute to social welfare. Scientific research catches the dynamics of social institutions and phenomena which are never static. To keep these changing, science-oriented research is needed and such research helps in dynamically responding to social institutions and phenomena.

2.3.2 Understanding the Concept of Politics

Politics has its roots in citizenship, civics and belonging to the state. The concept of politics often involves the wielding of consensus authority and its application in collective decision-making to ensure the effective allocation of common resources to meet societal needs (Heywood, 1997: Bueno, 2012), however, it is often difficult to separate the exercise of power from partisan politics since the latter is interwoven with clientelism (Mohan et al., 2017). Politics is generally conceived as the science and machinery of governance and the exercise of authority, power, democracy, equality, freedom and justice in a state. Politics is however subjective because its beliefs and

practices vary across space and time (Modebadze,2010; Bueno, 2012). *Politics is also a tool for persuading and influencing the citizens to gain political power and authority in the governance of the state. This* ideology also confers the *sovereign* power for the management of the political, economic, social and administrative affairs in the state which is often associated with party affiliation and setting political agenda (Bueno, 2012).

The contribution of politics to research and national development has been relevant in contemporary times, especially in social and economic sectors (Rose & Johnson,2020). The inclusion of politics in scientific research contributes to how data is approached in the collection, analysis, interpretation, and presentation of numerical data which provides inferences and insights into key political questions. As posited by Grimmer, Roberts, and Stewart (2021), politics in research helps to answer the how and why questions that must be addressed to advance the understanding of political activities and their influence in the society or the organization (Karpf, Kreiss, Nielson, & Powers, 2015). Knowing the significance of politics in scientific research, political clientelism which describes the distribution of selective benefits to individuals or clearly defined groups in exchange for political support (Hopkin, 2006) creates confusion and controversy because of the wide and diverse range of political exchanges which takes place during the process. Clientelism is characterized by a sense of obligation, and often also by an unequal balance of power between those involved (Eisenstadt & Roniger 1984: Piattoni 2004) in this case political authorities and stakeholders on issues that are critical. The political influences in key decisions based on politicians' ideology have in most cases affected research outcomes negatively. Caciagli and Belloni (1981) have posited that the emergence of new clientelism in the form of political behaviour is characterized by patterns of exchange but of a new kind. This new clientelism

incorporates some of the old features with their relationship being instrumental but benefits are largely privatized and excludable. Although clientelism has major implications for party democracy, the only reason for supporting the party is a direct economic exchange that excludes feelings of loyalty or ideological affinity, there is little to anchor the clientele to the party if benefits are not forthcoming.

Clientelism is an essential component of politics through which political parties and their representatives can obtain political support in exchange for selectively allocating benefits through state institutions. When this is introduced in scientific research, it undermines the outcomes generated as suggested by Gherghina and Volintiru (2017). However, mass party clientelism on a large scale is ultimately both inegalitarian and economically unsustainable since political parties do not remain in power forever. The case against clientelism as a form of linkage in party democracy, therefore, remains strong and clientelism is generally an unwelcome phenomenon from the point of view of mainstream democratic practices. Juxtaposing this to the Ghanaian context, the importance of institutions in resource governance fails to see these institutions as embedded in circuits of political power and coalitional competition. And are therefore influenced by the political elites. Ghana's political parties vie for control has intensified since the return to multi-party democracy in 1992 (Agbesi, 2020) and such have influenced many science-oriented programs that are meant to benefit the state but rather end up with individual and fundamentally altered the country's interest-based competitive clientelist political settlement. As such Mohan et al. (2018) argued that the key differences centre on the ideas and political ideology of the leading political parties (NDC and NPP) espouse on issues of this nature for example that of the oil sector. Broadly the NDC coalition has always used the state as a vehicle for driving long-term processes of more inclusive development, which comes with the danger that the centralization of revenues

enables patronage by allowing other recognised state enterprises to venture into such areas. By contrast, the NPP has favoured the market for driving development and so reduced barriers to entry for international capital, which allows the private sector more participation. As such ideas about development rely on these two political parties in the areas of social, economic, and culture among others. It is hard to see uniformity in terms of interest and ideas by these two parties based on the political environment. Thus, by far has a great impact on scientific research as well as the direction since it reflects critical issues in public policy, globalization, terrorism, the environment, civil rights, political development, and foreign policy among others. This means that if scientific research approaches proposed by these main political parties fail to focus on the development of the oil sector and its benefits to the citizens, its relevance will be minimal in general.

The role of politics in research helps one to know one's rights and understand the fundamentals in engaging in political processes, discovering one's own political beliefs, and seeing in much greater detail the benefits and disadvantages of the vast array of political ideologies that are present in contemporary research. Others have also argued that politics' role in research affects the real outcome of research in the sense that their influence creates biases on issues politicians seem to benefit from rather than improving the entire political system for scrutiny (Finnemore & Sikkink, 2001). According to Pierson (2000), research involving state apparatus must have political collaboration or might face strict opposition in their quest to unravel certain notions or perceptions about government and its state machinery. With this in mind, politics can be essential in research, especially on issues that border the state and non-state actors.

2.3.3 Concept of Public Policy

Public policy is a broad and complicated issue that includes a wide range of decisions, actions, and initiatives undertaken by governments and other players. This section of the chapter on the literature addresses some of the important issues on the concept of public policy. A common definition of public policy is the deliberate action of government or other public agencies and departments to address a societal problem, need, or opportunity (OECD, 2011; Hill & Varone, 2021). This concept emphasises the intentional and goal-oriented nature of public policy, as well as the role of government and other public authorities in addressing societal issues. An added, essential concept of public policy is the scope of issues and concerns that public policy addresses. Public policy may include anything from social welfare and healthcare to national security and environmental preservation. According to Bardach and Patashnik (2019), public policy is about making decisions and taking action on matters that affect the public, as opposed to matters that affect only private individuals or groups. Another major issue in public policy literature is the policy-making process. Scholars have recognised many stages in the policy-making process, such as agenda setting, policy development, adoption, implementation, and evaluation (Sabatier & Weible, 2014). However, there is an ongoing debate as to whether these stages are independent and chronological or more adaptable and interrelated. The complexity and ambiguity of many policy topics is one of the obstacles in public policymaking. Policymakers are frequently confronted with insufficient information, competing values and interests, and unpredictable results. As a result, the role of policy analysis and evidence in public policy-making is a hotly contested subject. While evidence-based policymaking is usually considered to be the ideal, there are concerns regarding evidence limits, evidence politics, and the need to reconcile evidence with beliefs and interests (Head, 2020), a common norm in partisan politics and practice. This argument

is in line with Stone Deborah's that public policy is inherently political and that policy decisions are influenced by several factors, such as policymakers' values and interests, the influence of interest groups and other stakeholders, and the larger political and institutional context (Stone, 2012). A related concern in the public policy literature is the importance of evidence-based policy-making. While policymakers often base their decisions on a range of factors, including political considerations and stakeholder input, there is growing recognition of the importance of using rigorous and robust evidence to inform policy decisions (Howlett & Ramesh, 2017). Based on these discourses, it is obvious that the conception of public policy is wide and diversified, reflecting the complexity and diversity in the policy landscape. While many features of public policy are still being debated, scholars continue to investigate significant topics and debates on this subject to better understand the concept of public policy and its formulation processes.

2.4. Typologies of Policy

Public policy has different categorizations. They are often classified based on their characteristics, functions, and goals (Lowi, 1964). Policies can be classified as national, state provincial, or local or municipal, depending on the level of government or the public agency that is primarily responsible for their formulation and implementation (Hill & Varone, 2013). In the same vein, some scholars have also proposed policy typologies based on the level of government that is responsible for developing and implementing policies. For example, the distinction between national, subnational, and supranational policies (Hooghe & Marks, 2003) highlights the different levels of government that are involved in policy-making and implementation, while the distinction between sectoral and cross-sectoral policies (Howlett & Rayner, 2006) distinguishes between policies that are focused on a specific sector, such as extractive or service and those that cut across

multiple sectors. Alternatively, a commonly cited typology of public policy is based on issues or problems that the policy aims to address. Policies can be classified as economic, social, environmental, or political, depending on the type of issue that they are designed to tackle (Birkland, 2015). Policies are also classified based on the modes of formulation or implementation and the instruments that are used in these processes. Thus, policies can be classified as regulatory, redistributive, or allocative, depending on the type of policy instrument that is used to achieve the policy goals (Lasswell, 1956). Distributive policies are geared towards assisting specific groups in the form of subsidies for farmers or grants for universities. Regulatory policies, on the other hand, seek to regulate the behaviour of individuals or organizations, such as environmental regulations or workplace safety standards. Redistributive policies on the other hand involve the transfer of resources from one group to another, such as social welfare programs or progressive tax policies (Lowi, 1964). Policies have also been classified according to phases of policy processes and procedures. In this respect, policy classification can take the form of agenda setting, policy formulation, adoption, implementation, and evaluation, depending on the stage of the policy process that takes centre stage (Hogwood & Gunn, 1984).

Rhodes (1997), also categorised public policy based on the type of governance model that is used to develop and implement the policy. He therefore classified policies as hierarchical, networked, or market-based, depending on the type of governance model that is used to achieve policy goals. Another typology that has been proposed in the public policy literature is the distinction between policy types based on their problem orientation (Birkland, 2014). This typology distinguishes between crisis policies, which are developed in response to sudden and unexpected events, such as natural disasters or terrorist attacks: and routine policies, which are developed to address relatively less imperative but ongoing social, economic, or political challenges, such as poverty or

unemployment; and tectonic policies, which are developed in response to long-term structural changes, such as demographic shifts or technological advances. Public policies have also been distinguished as to whether they are process-based or outcome-based (Sabatier & Mazmanian, 1981). Process-based policies are those that are developed through a participatory and collaborative process that involves a range of stakeholders, while outcome-based policies are those that are developed with a specific outcome in mind, such as reducing crime rates or improving public health. The complexity and variety of the policy environment are reflected in the typologies of public policy that have been put out in the literature. Although there is continuous discussion over the relevance and effectiveness of various typologies, they offer a helpful framework for comprehending and classifying various policy kinds and can aid in policy analysis and decision-making.

2.5 Processes of Public Policy Formulation

Policy formulation involves a set of interrelated phases that govern policy formulation and implementation. Scholars have developed some theories and frameworks to better explain this process. The public policy formulation process is adequately explained using the “policy cycle” framework. The "policy cycle" is typically broken down into four clear stages: problem description and agenda setting, formal decision-making, policy implementation, and assessment. Although the cycle takes an extremely formal view of policy it is also helpful in clarifying the many roles that research may play in policy.

2.5.1 Public Policy Formulation Cycle

The decision to find a solution to the challenges of the growing population requires policies of either distributive, re-distributive, regulatory or constituent as proposed by Lowi (1964). Policies are non-static but dynamic phenomena as Harold Lasswell argued that, every typology of policy to be considered undergoes a series of phases in realizing the goals of the policy (Howlett and Ramesh, 2003). According to Harold Lasswell, the various stages or phases that a policy creation undergoes can be described as a "policy cycle". Similarly, Savard & Banville (2012) also opined that the concept of a policy cycle explains the recurrent pattern of procedures that leads to the creation of policies in an organization. According to Savard & Banville (2012), Harold Lasswell at the initial stages categorized the policy cycle into seven main groups but revealed that only three (3) could stand the test of time in the policy-making process debates. Despite the opposition to Harolds' seven-point cycle proposal, Savard & Banville (2012) citing Howlett and Ramesh (2003) affirmed that policy-making experts have settled on a five-point policy-making stage or cycle. In recent times, researchers subscribed to agenda setting, *policy formulation, public policy decision-making or policy adoption, policy implementation and policy evaluation* as the five key components within the policy cycle processes (Savard & Banville, 2012; Rahimi & Noruzi, 2011; Howlett and Ramesh, 2003).

Figure 2.1: Policy formulation process cycle

Source: Adopted from ThisNation.com

Nevertheless, there are other scholars (Weiss, 1998; Bardach, 2012; John, 2013; Birkland, 2015), who argue that the policy-making cycle must include a termination stage after an evaluation. Once a policy achieves its set goals, a decision would be made by the actors to determine continuity or termination. Arguably, all the sequences along the lines of the policy-making cycle are critical to the better appreciation of the concepts by academics and policymakers. Largely so because, all the stages interact with each other in the value chain to ensure the success of a given policy (Birkland, 2015). The question is usually posed by scholars as to why the a need to separate the various stages in the sequence. Policy-making experts argue that the components differ in their meanings and functions although they interact in the process.

2.5.2. Agenda Setting Stage

Although all the stages are crucial in the policy-making process, scholars argue that agenda-setting is the fundamental basis of all policies. Regarded as the first and foremost stage in the policy cycle, agenda-setting is the stage at which societal problems are identified and considered for certain actions to be taken to remedy the situation by policy actors. Cobb and Elder (1972) describe an

agenda as a general set of political controversies that will be viewed at any point in time as falling within the range of legitimate concerns worthy of the polity's attention. Agenda setting is the process of deciding which concerns to prioritise. Which issues gain attention and which are left out of public debate? At this point, the concerns are believed to have attracted controversial public debates and are perceived to have or are likely to have a greater impact on the lives of people. In such instances, the problem so identified is no longer considered a private affair but a community interest (Garraud, 2004). It is against this that Howlett and Ramesh (2003) argue that, agenda-setting is a socially constructed process which usually attracts the role of the ideologies of the people. Invariably, the nature of the problem so identified actors will determine the type of policy action to be taken by the government or the organization. Thus, the identified problem is what influences or shapes the policy formulation process in the community. For instance, if the majority of the youth in an oil "petroleum" extracting community in Takoradi or Cape Three Point in Dixcov are unemployed and have resulted in social vices and insecurity for businesses, the community members may attempt to find a remedy. Agenda setting is the first instrumental stage in the policy cycle process (Savard & Banville, 2012; Howlett and Ramesh, 2003; Lemieux, 2002). Agenda-setting is the point of collecting quality data about a problem identified to propel a good and purposeful policy formulation.

2.5.3. Policy Formulation Stage

Policy formulation is arguably one of the most essential stages in the policy cycle process because, according to Howlett and Ramesh (2003), once a problem is identified and empirical evidence is gathered to support and convince policymakers and actors, policy formulation becomes inevitable to remedy the situation. Thus, though considered complex, policy formulation is noted to be the

second most important stage in the cycle of policy making (Savard & Banville, 2012). The question then comes as to what can be termed as policy formulation, what stages constitute policy formulation, what are the major policy formulation typologies and why is policy formulation so essential to the concept of policy? Radin (2013) as cited in Andrew & Turnpenny (2015) argues that hitherto, policy formulation was restricted to collecting as much data as was available to assist policy formulators in making a decision. However, in recent times, policy formulation has changed to rather provide a clearer understanding of the problem at stake, how such problems may change over time and the possible alternative solutions to the identified problem.

Howlett and Ramesh (2003) postulated that policy formulation in the policy cycle process is the point where actors discover and evaluate potential policy solutions, consider their benefits and potential drawbacks, and decide which should be adopted and which should be excluded either temporarily or permanently. Other scholars opine that, during policy formulation, varying policy alternatives are raised as potential solutions to the problems identified but it is mostly narrowed down to finding a single decision. Policy formulation generally refers to the processes involved in setting guidelines for working documents for subsequent adoption and implementation. The formulation process is complexly interrelated which begins with identifying the policy issues at stake. Thus, the problem so identified must be spelt out to trigger the effective diagnosis and analysis of the issues to be taken into account by policy actors and major stakeholders. The exact policy objectives are then clearly stated by policy initiators bearing in mind the expectations of the targets of the policy. Another important factor is to identify the applicable policy tools to be employed in the policy formulation, adoption and implementation. Undoubtedly, policies affect a larger spectrum and therefore must involve all major actors who are potential beneficiaries of the effects of the policy being formulated. This therefore calls for the consultation of all

2.5.5. Policy Adoption Stage

This is an important stage in the process where formulated policies will be accepted as a working document for the organization. Institutions responsible for using the policy must show commitment or willingness to enforce the strategies outlined in the policies at this point. Though many scholars regard the adoption stage as a mere formality, studies have shown that several policies formulated never saw the day of implementation because the actors showed no commitment to the policy by adopting same. This becomes a shelved policy and never sees the light of day.

2.5.6. Policy Implementation and Evaluation

Policies so formulated need to be applied or rolled out to ensure that they yield positive results for the organization or institution. The application stage under the policy cycle is referred to as the implementation stage. Subsequently, the policy will be subjected to evaluation to ascertain the success or otherwise of the policy formulated. This is equally factored by policy formulation actors largely because different factors influence the thoughts and decisions of policy formulation, especially those regulatory policies.

2.6. Nature of Science and Politics Nexus in Policy Making

The nature of the science-politics nexus is characterised by conflicts and interdependence across scientific and political decision-making domains. The nature of this relationship has been a topic for many scholarly debates, discussions and investigations (Jasanoff, 2004). These scholarly deliberations of the science-politics nexus reveal a dearth in the partnership and coexistence

between science and politics over the years and scientists are encouraged to get involved in political and societal discussions on very important issues such as ethics, public perception or risk assessment due to the potential mutual impact of working together (Van Dyck, 2002). Ideally, science and politics are intertwined and mutually affect one another. Scientific knowledge provides evidence-based information and expertise to inform policy-making processes. Policymakers on the other hand depend on scientific knowledge to understand the repercussions of policy choices and formulate efficient and informed policies (Cash et al., 2003). The proposed science-politics relations seek science-policy collaboration towards bridging scientific knowledge within policy-making processes. The role of this interface involves interactions between scientists, policymakers, and other stakeholders, facilitating empirically supported communication, translating complex findings into actionable policy options, and incorporating scientific advice into policy decisions (Pielke Jr, 2007).

Nevertheless, the association between science and politics is rarely reciprocated and effortless. The notion of uncertainty also features like science-politics nexus. Uncertainties, constraints, and poorly developed understandings of policy research findings are common characteristics of scientific knowledge. Policymakers therefore have the issue of incorporating scientific uncertainty into decision-making processes while keeping public aspirations for fast and practical policies in mind (Cash et al., 2003). In a similar viewpoint, politics frequently shape the use and understanding of knowledge from science in policymaking. Political concerns, values, and interests further influence the agenda-setting and formulation of policy issues, the allocation of resources for scientific research, and the inclusion of scientific advice into policy choices (Cash et al., 2003; Jasanoff, 2004). The uneasy relationship between science and politics has continued for years (Lambright, 2008). This is manifested in instances where global leaders and their

representatives intensify support for science-related research and development. Whilst Silver (2005) corroborates that there is a complex relationship between science and politics, a recent study by Keate (2021) postulates a clear relationship between science and politics. This is because, science and politics are mutually exclusive and rarely separable since scientific findings have informed policies in several facets of human endeavour (Keate, 2021).

According to Cheng et al. (2003), science is part of the political process where politics is mostly conceptualized as the competition for the allocation of scarce resources which includes petroleum. This assertion backed by Page (2006) revealed how political decisions are influencing scientific research paths either positively or negatively. This is reflected in the statement made by some think tanks on policy reports. As stipulated by Logsdon (2010:223):

> *Then President of America, Kennedy announced that America would place a man on the moon by the end of the 1960s, the politics of the Cold War drove what would become a significant scientific and technological enterprise and became part of the political lexicon.*

Again, some political arguments also perceive science in the form of research to be a promotion of a section of researchers interested in spending government resources on programs that are barely significant to society. These perceptions have deepened the complex nature of the relationship between science and politics. This perception has now been largely overcome by the emergence of scholars and scholarship that has supported the science-related research which includes exploration of oil and its administration which emphasizes petroleum free-market principles in control policies. On the other hand, charges of politicization combined with a disregard for scientific evidence has heightened the tensions between the scientific and political community. General public sentiment on the relevance of the oil sector including petroleum exploration and administration has seen a lot of criticism due to its management and the effect on the industries from the perspective of the Global North countries as a lexicon of policy debates (Taiwo, 2010).

These policy reports cut across many sectors including that of the petroleum sector which serves as the basis for policy formulation and administration of these natural resources which provide opportunities for economic growth and development. Often, however, this prospect is embraced with some scepticism (see Schrank, 2004, Herb, 2005) instead of one leading to the other and vice versa. Countries with substantial incomes from resource exploitation often perform less well than their counterparts with little or no income from natural resources (Weber-Fahr, 2002). A typical example includes developing countries where there is an abundance of resources but policies emanating from the political hierarchy ignore the scientific relevance when it comes to policy formulation. Yet they are encouraged to implement the latter to meet the oil guidelines globally (Oyedepo, 2012). The development trajectories of many resource-rich countries are uneven (Ross, 2012). Countries such as Norway (Thurber et al., 2011), Australia (Ville and Wicken, 2013) and Botswana (Poteete, 2009) have harnessed their resource wealth to boost economic growth and development due to their commitment to marrying science and politics positively through effective policies while others such as Mexico and Venezuela (Lane & Tornell, 1996), Angola (Munslow, 1999) and Nigeria (Sala-I-Martin & Subramanian, 2013) and have not performed well with natural resources, with their economies characterized by corruption, poor economic diversification, environmental degradation, poverty and violent conflict (Karl, 1997, Auty, 2001). This evidence has been confirmed by Simmons and Elkin (2004), it is mostly characterized by the forces controlling the relationship between science and politics and how each component affects the other based on decisions taken by respective countries in addition to the global consensus on natural resources including petroleum administration. However, in redefining the dynamics of this relationship, it has been noticed that the literature in conceptualizing the relationship between science and politics is polarized and has increasingly come under scrutiny for presenting only a

part of the story that suits the political elites (Poteete, 2009; Di John and Putzel, 2009). Within the varied narratives of these critical dynamics (science and politics), what we are yet to better understand are the underlying forces that are influencing each one of them and how they affect the administration of natural resources including petroleum, especially from the perspective of developing countries. Admittedly this quest is not new but its contribution to the changes of resource-led development across different spaces. The ability to marry the two dynamics from the perspective of both global north and south countries to enforce good political policies that commit to delivering development (Poteete, 2009, Khan, 2010). The capacity of institutions to drive resource-led growth lies in the politics that produce them. Bridge and Le Billion (2013) agree that petroleum governance is unavoidably political because the decisions about finding, moving and using oil bring together groups of people with different interests and agendas.

Juxtaposing this with how Leftwich (2004) defines politics as all the processes of conflict, cooperation and negotiation in making decisions about how resources are to be owned, used, produced and distributed, he further argues that a focus on the underlying political forces within which state elites gain commitments to govern natural resources particularly petroleum wealth and development depends on the relationship between science and politics.

Another aspect where science influences politics is the formation of groups that seek funding like the National Science Foundation (NSF), OPEC, and other ad-hoc groups which lobby for increased funding to make independent decisions that shape policies for science without intimidation and suppression from the political terrain. In many areas of national activity, scientists and their advocates have become deeply involved in interest-group politics in the policymaking process and

all of these are part of the political process to persuade policymakers to make the right decisions that affect key sectors including the petroleum sector and its administration. Despite the contestation and the complex nature of this relationship, key actors admit and recognize scientists' role in the political process but have reiterated the factor that scientists must speak with one voice rather than competing among themselves for similar funding from political authorities. This scientific approach is not always political in distorting scientific evidence to serve its political purposes (Koelble, 1995). Other researchers such as Shulman (2007) have taken a position that scientific integrity has been compromised politically, especially in the area of public health and environment where the petroleum sector falls apart. This assertion has been confirmed by the UCS Report (2005) that scientific integrity in policymaking has become politicizing science. The report further stated that this is so because, many times scientific results are distorted if they disagree with administration policy of the energy sector, distorting results of government research by editing out results that disagree with the Administration, as happened with a report on health disparities; removing information from government websites among others. The evidence available empirically attests to the fact that the relationship between science and politics is not unidirectional and therefore factors emanating from these two dynamics outplay each other and must be treated alongside each other to advance the course of science based on political decisions.

2.7. Driving Forces Behind Science and Politics Relation

Over the last decades, there have been several manifestations of the increasing politicization of scientific research programmes (Melin, 1997; Nerdrum & Sarpebakken, 2006). This emerging phenomenon has transformed policy formulation to have both positive and negative consequences

(Frølich, 2006). While the increase in scientific research is well documented, there is less literature that explicitly addresses the driving forces behind the relationship between science and politics. The nexus between the two dynamic areas explains the changes that result in policy formulations which are better understood as consequences of organized political efforts within the area of science and research policy. Literature available in analysing the forces behind science and politics has generated a lot of debate since the relationship is not directional but a causal one as posited by (Tucker et al., 2018). Other scholars have argued that science has the potency to salvage policy from the short-sighted influence of politicians (DeLeon, 1988; Stone, 2001). Politicization of science is high on the research policy agenda in many countries as a result of the relationship that exists between the two variables which is seen by many as a way of improving the quality of research (Gornitzka and Langfeldt, 2008). According to Gornitzka and Stensaker (2004), one of the forces that contribute to a better relationship between science and politics is a unanimous pursuit of good policy and incentives towards scientific research. The acknowledgement and the desire to formulate good policies are important in promoting research cooperation between researchers and political authorities for robust policies that are holistically consulted through the involvement of all actors (Skoie, 1969; Kyvik and Larsen, 1997). The importance of the politicization of scientific research as a result of the relationship between science and politics has been emphasized in numerous research circles as a way of improving the competitiveness and quality of research that leads to better policy formulations.

Another force that drives this nexus is the market incentives with varied opportunities. The variations include exploration fields, legal status, rate of public funding, and other tasks performed in addition. These differences are reflected in the policy targeting these institutions, as well as in

the strategies employed to enhance the science and politics nexus in terms of competition and collaboration. Although a few of these market institutions are still government institutions, most were decoupled from government bodies for expansion and attraction (Skoie, 2005). The market as a force makes governments pursue policies that turn institutes into legally and economically independent bodies with full control of their resources without political intimidation.

In addition, a force worth stating as a driver behind the science and politics nexus is international funding. Funding from abroad is significant, for scientific research which allows actors to express their opinions without hesitation during policy advocacies and policy implementation in that regard (Eurostat, 2007). Statistically, funding has been noted to be one of the key forces that drive science and politics impact on policy formulation and implementation with the increase in international funding constituting 4.1% for research institutes (Hearn, 2010). This trend has been seen to be stable over recent years with the proportion of foreign funding in both areas (science and politics) commitment towards policy making in general. Despite its drive towards positive nexus, its distribution according to Ajide and Raheem (2016) has not been equal among various institutions and institutes. However, the discrepancies in the distribution of the funds are largely individual variations. Some departments or units within sectors can have a very high proportion of foreign funding, while others are under resources. These are a result of political pronunciation on research from those departments. It is therefore worth noting that there cannot be a sharp theoretical distinction between science and politics as long as policy development is concerned since the nexus between the are crucial to an equitable public policy (Jasanoff, 1990).

2.8. Policy Formulation Perspective of Petroleum Administration

As posited by Fullan (2007), policy formulation faces several consequences due to change attempts on the causes and how it influences those causes. It is therefore imperative to point out that policy change starts with formulation across various sectors including the petroleum sector. Maza, Manian & Sabatier (1983) conceptualize formulation as developing a concept which is feasible in arriving at a decision usually incorporated in a statute but which can also take the form of executive orders or court decisions. This definition in turn suggests that there is no full guarantee of success on the ground if policies formulated are not implemented. Notwithstanding the above, Pressman and Wildavasky (1984) opined that the formulation of policies depends on a lot of factors before it can achieve success. These factors depend on the political, economic, and social setting of the country. This is key in developing countries like Ghana where policy formulation depends on political commitment rather than the substance of the policy. According to Payne (2008), many policy formulators and implementors look up to the general solution and do not acknowledge that a particular section of a policy can lead to incoherence in its formulation efforts. Hence, there is no direct approach to achieve formulation of policies in all policy generations including that of the oil sector. Payne (2008) further suggested a successful formulation of policies such as that of the oil sector should incorporate the following as evidence in other policies like the education where coherence, stability, training, and engagement of actors are allowed to interact to produce a substantive impact (Fullan, 2009). This can only be realized as successful formulation when actors (agencies) comply with directives of the statutes in delivering specific indicators that constitute a measure of success (Ingram & Schneider, 1990). In addition, the formulation process is characterized by many factors (McLaughlin, 1987) even if it appears successful. It must frequently

meet certain needs to enhance the change of successful and sustainable formulation though the conditions may vary across systems.

2.9. Politics, Power Relations and Institutional Commitment to Petroleum Administration

The political settlements approach offers a better understanding of the conditions that shape policies to deliver scientifically modified resource development. Current works that have employed the approach in analysing the variations in natural resource administration including that of petroleum evoke sharper insights into how institutions emerge and perform (Mohan & Asante, 2015). The notion that political power lays the ground rules for institutions is central to research on developmental forms the basis of scientific commitment to natural resources including petroleum administration (Orihuela, 2012; Porter & Watts, 2017). This suggests that the exact method for probing for institutional change in petroleum and other minerals administration lies not only in promoting good governance but also in recognizing existing institutional structures together with related policies in translating into better administration modules for natural resources (Bebbington, 2013).

Notwithstanding the assertion that political powers lay the ground rules for policy formulations, this relational perspective is arguably more convincing within the resource administration debate in underlining the major factors behind institutional commitments backed by science than suggested by the political settlements approach. This span from a broader political economy understanding of resource administration such as petroleum and its related products to skewing it towards only a political settlement approach without emphasizing how it helps shape the scientific approach to such administration of resources by designated institutions. Despite the concept of

holding power approach by Khan (2008), the role of actors in institutional change tends to underplay other important dimensions of politics, particularly the role of scientific ideas in shaping the administration of petroleum and other natural resources by institutions. As Routley (2012) argues, understanding the administration of petroleum as a subset of natural resources requires not only an analysis of political interests but key scientific ideational factors that may not necessarily be instrumental (Watts, 2004, 2012). It is therefore critical to expand on the analytical scope of the political settlements framework with scientific ideas that are factual (Brand & Vadrot, 2013).

Deeper insights into the underlying factors behind resource administration reforms must be embedded in a 'scientific institutionalist' theory that accounts for the role of political and science groups in defining the standards by which petroleum and its related products operate within scientific domains backed by policy. Bebbington et al. (2013) outlined that these institutional theories when well managed in resource administration yield better results than just focusing on the political decisions taken on them without proper scientific justification. Such insights have to locate the mediatory role of political ideologies in resource administration, particularly the common tension between science and politics in shaping policies administratively.

2.10. Policy Implication of Petroleum Administration; Perspective of Science and Politics

Relations between science and politics are expected to produce an impact in the administration of petroleum as espoused by Brinkehoff (2002). This can be manifested through policy initiatives designed by a consensus from science and politics output through elite commitment. The existing literature has highlighted the political dominance over science in policy formulation and implementation (Meadowcroft, 1997). This practice has cut across all sectors but has deepened in

the natural resource including the administration of petroleum. This chapter highlights the model of change, its strengths and weaknesses as well as the applicability of policy areas and its implication in the petroleum administration. This is significant according to Batley and Rose (2011), the relations between science and politics have implications for policy formulation and its implementation.

As a matter of urgency, the significance of natural resources including petroleum, especially to developing countries has re-echoed Bennette and Howlett's (1992) assertion that policy change which is an incremental shift in an existing structure or new and innovative policies must lead to a process of improvement of the existing system and assume efficient and equitable responses to the future change (Berman, 1995; 27). This is neglected when policies are designed through the elite commitment in conjunction with the critical dynamics of policy interventions which are science and politics. This has trickled down to the introduction of path dependence by Pierson (2000) who argued that it is generally difficult to change policies because institutions are sticky and actors protect existing models due to the benefits accrued in that regard (Greener, 2002).

The changing implications according to Wilford (1994) and Greener (2002) as a result of reforms should be based on the conjecture of events in that particular sector and how elite commitment towards political actors. Again, Sabatier and Jenkins-Smith (1991) highlighted that a good policy implication is factual when core ideas about causation (either science leading to politics or vice versa) and the value in public policy can meet certain interests and that of science with a relation. They also emphasized that the variety of public and private organizations are part of the policy problems and must be made to understand the implications when reforms are made by allowing them to comprehend the role of policy analysis on petroleum administration. Gornitzka, Kogan, and Amaral (2005) reiterated that the implication of policies that relied on political decisions

without incorporation of science based on evidential factors can affect overall income, and managerial capacity and lead to egalitarian leadership.

These revelations expose the strengths and the weaknesses of the existing policies without reforms and call for the introduction of internal structures that consider top-down or bottom-up approaches to the larger political system. This when done according to Hoppe and Peterse (1993), policy change brings benefits when actors minimize their self-interest and allow transparency for capacity building which in turn lead to the desired change expected in the administration of national commodities including that of petroleum. Another area that draws positive implications on policies is the concept of ideas that are characterized by a set of beliefs with future potential. Other policy change researchers (Capoccia & Kelemen, 2007; Levi, 1997; Shipan & Volden, 2008) have posited some challenges policy reforms bring with deteriorating implications.

One of the difficulties explicated by Sabatier (2005) is that the beliefs of the actors in line with both external and internal factors affect the political system and it further limits most of the reform processes. This happens as a result of high goals conflict and competing belief systems. Another challenge proposed within the policy space by Bennett and Howlett (1992) is that policy learning outcomes such as the organization and program in place as well as existing policies must be differentiated from each other during reforms. When such key information is ignored, its implication on policies becomes negative.

2.10.1 Implication of the Relationship in the Oil Sector

The relationship between science and politics according to Van den Hove, et al, (2002) has brought about some prudent measures to policy formulation and its outcomes in the oil sector. One of these is transparency in the sector. A growing body of literature on transparency in the oil sector recommends that companies publish their revenues is a characteristic of the anti-corruption activism witnessed by companies in the oil sector (Obeng-Odoom, 2014; Öge, 2016). The continuous disclosure of information has made companies and governments accept the Extractive Industries Transparency Initiative (EITI) as a result of the critical assessment of the relationship between science and politics and its effect on policy formulations. This concept also resonates with that of the upstream sector where extraction or production takes place. The upstream sector is the engine of growth for many developing countries with oil resources hence, a scientific approach with political commitment will allow transparency in their operation. The idea of more transparent mechanisms allows citizens to monitor the activities of companies as posited by Pleines and Wöstheinrich (2016). Nonetheless, the expectations raised by the EITI gave the impression that the fight against corruption in the extractive industries depended on its success (Kerr, 2011; Magno & Gatmaytan, 2017).

Research emanating from science with political backing has exposed the strengths and weaknesses of the EITI, but judgements on its successes and failures are often based on different standards. A review of the literature on the EITI by Rustad, Le Billon and Lujala (2017) clarified that the success of the initiative should be evaluated based on a strong relationship between science and politics to distinguish between institutional, operational and developmental which aids in the success of the EITI. This is easily monitored in the oil sector in general more than the upstream sector because

the processes involved at the post-production stage can be tracked as compared to the production stage and that happens most at the upstream level.

Some studies consider increasing public understanding of the extractive in this sense, Ofori and Lujala (2015) showed that a limitation of the EITI lies in an implicit overlapping of the concepts of information disclosure and transparency. Even if countries and companies disclose information, doing so does not mean that the process is transparent. Real transparency takes place only if citizens and civil society can understand the content of the information disclosed.

Similarly, Villar et al., (2017) found that the EITI produced positive effects in reducing corruption in the early stages of its implementation, but only insignificant or small effects in later phases. This is made possible when science and politics initiatives are open to all actors for their input. Other researchers ((Montinola & Jackman, 2002; Kolstad &Wiig, 2009; Sovacool et al., 2016) also advocate for a series of measures apart from revenue disclosure to effectively decrease corruption which include political competition in free elections, strengthening civil society institutions and sufficient education of the electorate. A major weakness of EITI is that the strategy of each country is revealed by different degrees of commitment towards international treaties on transparency, defined as instrumental, tactical or durable. Therefore, it is this commitment, rather than simple adherence to treaties, that leads to decreased levels of corruption (Mouan, 2010; Pleines & Wöstheinrich, 2016)

Another significant implication in the oil sector as a result of the relationship between science and politics is accountability in the oil sector. Transparency is not enough to decrease corruption, but transparency and accountability together may be able to increase considerably the quality of governance of any country (Gaventa & Mcgee, 2013). The conviction that enhanced transparency

may lead to accountability is a myth because, in authoritarian countries, the public exposure of shameless political leaders does not lead to any form of accountability. As opined by Jonathan Fox (2007), transparency, intended as a bottom-up process where citizens monitor the actions of the government, can be either opaque or clear and therefore the relationship between science and politics should be robust to handle it at the initial stage through better policy formulations.

On the other hand, accountability can be either soft or strong. Soft accountability corresponds to a form of answerability (Fox, 2007:665) that is not followed by punishment or political consequences, while strong accountability entails repercussions and all of these affect either the upstream or the oil sector in general. As Christopher Hood (2010) argued, transparency and accountability are often portrayed as Siamese twins, but the reality is that the presence of one is more often accompanied by the absence of the other. He further reiterated that all of these can be exposed if the relationship between science and politics is stringer at the policy formulation stage. Despite the initiatives as a result of scientific and political commitments towards policy formulation, Even today, corruption scandals in the oil sector remain common and not limited to developing countries (Andvig, 1995; Ladd, 2012; Neill & Morris, 2012). Nevertheless, as discussed by Kartick Gupta (2017), corruption does not result from an oil-related mechanism but rather from scarce competition between market actors who are hardly involved in policy-making. Sovacool (2016) through the case of São Tomé e Príncipe, one of the best solutions through which to avoid corruption is to limit the exploitation of the resource over time. Nevertheless, these measures are taken rarely given their relevance for the functioning of world economies, oil remains a strategic resource both at the national and international level. There is also a downplay of science and politics by political actors who have a self-interest in wealth generation at the expense of the

citizenry and hence do little to incorporate science in policy formulation while relying heavily on political commitment.

2.11 The Ghanaian Context

2.11.1 Upstream Petroleum Sector in Ghana

Ghana is endowed with many renewable and non-renewable natural resources. The renewable resources in Ghana include agricultural land, wetlands, forest and forest land, fresh and saltwater fisheries, and surface and underground water resources whilst the non-renewable rescores include mineral ores such as gold, diamonds, bauxites and manganese and petroleum (GHEITI, 2009; Asumadu et al., 2021). Petroleum has been one of the critical natural resources in Ghana since its discovery in 2010. Ghana is one of the new oil and gas-producing nations in Africa. Though, as a small oil and gas-producing country in the Gulf of Guinea, Ghana's petroleum industry has advanced at a steady pace in recent years (Skaten, 2018; Quartey & Abbey, 2018). Petroleum has provided a critical boost to Ghana's economy since 2010. Petroleum is an essential component of Ghana's industrial policy and progression to an upper-middle-income state. This commodity is currently acting as one of the main sources of revenue, jobs and energy security for the country (Abudu & Sai, 2020; ICAI, 2020). Nevertheless, the prospect of Ghana getting the requisite economic and other benefits primarily hinges on the ability of the country to develop comprehensive science-laden regulatory policies that will effectively regulate the petroleum industry.

Ghana's upstream petroleum activities include the exploration, development and production of oil and gas. After several years of exploration, Ghana finally discovered oil and gas in commercial

quantities in 2007 and production subsequently began in 2010 (Abudu & Sai, 2020; ICAI, 2020). Attempts at petroleum exploration in Ghana started seventeenth century but the first ever documented petroleum exploration was undertaken by West Africa Oil and Fuel Company in 1896 in the onshore Tano basin in the Western Region. Further explorations by other companies such as Société Française de Pétrole, African and Eastern Trade Corporation and Gulf Oil Company continued within the same territory from 1905 to 1925. After independence in 1957, Ghana had drilled 21 wildcat wells ready for exploration. The most prominent wildcat among these wells was the offshore well discovered by Signal-Amoco Consortium within the Saltpond Basin, now known as the Saltpond Field, which commenced production in 1978. This well started production in 1978 but was shut down in 1985. Ghana had 54 wildcat wells by the close of 1985 (see Asumadu et al., 2021).

Even though oil and gas production in Ghana started in the Saltpond field in the 1970s and the Tano and Keta Basins in the early 1900s on a small-scale and non-commercial quantity, it was the 2007 discovery in the offshore Jubilee field that put Ghana on the world map as a commercial oil producer in 2010. The volume of oil production increased with the production from the Twenneboa, Enyenra, and Ntomme (TEN) and the Sankofa, Gye, and Nyame fields started in 2016 and 2017 respectively. A development plan for the Greater Jubilee field received government approval in October 2017 to commence drilling the Mahogany and Teak fields (Tullow Oil, 2014; World Bank, 2015; Tullow Oil, 2017; Eni, 2017). Currently, Ghana has four petroleum basins, the Western Basin which comprises the Tano and Cape Three Point blocks is the most active basin. The rest are the Central Basin which holds Saltpond field, Ghana's longstanding oil field, and the Eastern Basin embraces both Accra and Keta blocks, where exploration has been carried out with less commercial result to date. Voltaian Basin covers 40 per cent of Ghana's land area and is the

most promising site for onshore petroleum extraction (Petroleum Commission, 2017). Ghana's oil discovery and production have been a blessing to the country rather than a curse as experienced by some developing countries and this has been attributed to the good national oil governance system (Quartey & Abbey, 2018). In the view of Quartey and Abbey (2018), Ghana's petroleum governance regime was comprehensively reorganized lately to synchronize with global best practices and also promote the government's objective of meeting an adequate and reliable supply of petroleum products and lessening the overt dependency on imported crude oil. With the current additional discoveries of oil fields, the restructuring of the governance regime is more dealing with the existing fiscal and environmental challenges and ensuring local content and local participation in the oil industry.

2.11.2 Upstream Petroleum Policies in Ghana

The government of Ghana first introduced legislative frameworks for regulating the upstream petroleum sector in the 1970s during the earlier oil discoveries even though larger-scale exploration began in the 1980s by enacting three major legal instruments. The Ghana National Petroleum Corporation Act 1983 (PNDCL 64) was principal among the legislations because it was the national legal framework that established the Ghana National Petroleum Corporation (GNPC) which is currently the lead state agency that regulates all state activities in the upstream petroleum sector as well as an oversight supervision over the Petroleum Commission and other state institutions. The Petroleum (Exploration and Production) Law 1984 (PNDCL 84) was also enacted to regulate exploration and production activities and serves as the framework for engagement with international oil companies by the government to undertake petroleum operations. The Petroleum

Income Tax Law 1987 (PNDCL 188) was the last to be passed. This law was to regulate taxation in the upstream petroleum sector. However, PNDCL 84 and PNDCL 188 have been rescinded. The Petroleum Revenue Management Act 2010 (Act 815) was later enacted to regulate and ensure transparency and accountability in the collection, allocation and management of petroleum revenue for the benefit of all citizens of Ghana. Additionally, the Petroleum Local Content and Local Participation Regulations, 2013 (LI2204) which is promoted by the Petroleum Commission ensures the maximization of value-addition and job creation upstream for Ghanaians and to develop local capacity, achieve an appreciable level of local employment and strengthen the capability and international competitiveness of Ghanaian oil firms (Quartey & Abbey, 2018). The Petroleum (Exploration and Production) Act, 2016 (Act 919) is another legislation enacted in Ghana to regulate the exploration, development, and production of petroleum resources in the country. The act provides a legal framework for the petroleum industry, ensuring transparency, accountability, and sustainability in the sector. The Petroleum Act, 2016 (Act 919) in Ghana serves as a comprehensive legal framework to govern the exploration and production of petroleum resources. It aims to promote responsible and sustainable petroleum operations, protect the interests of Ghana and its citizens, and maximize the socio-economic benefits derived from the country's petroleum resources.

Although the Ghana National Petroleum Corporation and the Petroleum Commission are key institutions that regulate the upstream oil industry, the role of the following institutions over the years has been very central in the oil governance regime. The Ministry of Energy collaborates with the Petroleum Commission, to prepare the reference map that designates areas of possible accumulation of petroleum within the boundaries of Ghana. The Finance Ministry superintends over oil revenues and estimations of the target revenue as provided for by law. The Bank of Ghana

is responsible for the management of petroleum in the national account whereas the Ghana Revenue Authority accounts for the petroleum revenues. The Parliament of Ghana ratifies all petroleum agreements initiated by the executive arm of government. Other institutions that play important roles in the upstream oil industry include the Environmental Protection Agency, the State Enterprise Commission, the Public Interest Accountability Committee, the Auditor General and Ghana Gas Company. The 1992 Constitution of Ghana is very important in the regulations of the upstream petroleum industry. The constitution has vested all natural resources on and beneath the earth into the control of the Republic of Ghana through the president in trust for the people of Ghana (1992 Constitution of Ghana). However, the constitutions also ensure that the actions of the president in the management of these natural resources receive parliamentary approval.

Over the years, studies in Ghana's upstream oil sector have focused more on the challenges associated with inadequate regulatory policies and political polarization. Quartey and Abbey (2018) for instance centred on the challenges of the oil governance regime in Ghana by expounding on the poor scope, poor sequencing in the governance framework, poor institutional collaboration, poor compliance to legislative requirements and weak transparency in the formulation of the various regulation policies in this sector. They further argued that political divisiveness and the type of political governance prevailing in Ghana impact the policy regulation in the upstream oil sector. This position is a reiteration of an earlier study by Gyimah-Boadi and Prempeh (2012). Skaten (2018), also revealed political interference in the regulations processes of the upstream petroleum industry. In all these studies, what has not been mentioned is the role of science in the regulations of this very imperative national economic sector. The development of regulatory policy in this sector tends to lack there required inclusive input from all sectors including scientists in Ghana.

2.12 Empirical Review

The nexus between science and politics as well as the impact on policy formulation is not unfamiliar in the policy formulation literature. Several earlier studies focused on the interaction of science and policy of policy formulation in the different facets of human endeavour. A study by Rahimi and Noruzi (2011) provides a descriptive account of how the regulatory institutional policy framework restricts human activities in oil exploration and its administration from the perspective of the local population. Nortse and Tschirley (2000) and Blowers et al. (2007) went on to posit that science and politics influence the formulation of policies that come with remedies for recurring challenges such as environmental issues and also revealed that most research conducted on the upstream petroleum sector sees politics to dominate over science despite the opposite impacting positively on oil findings. The work of Suleman and Zato (2021) also highlighted that the petroleum sector has been driven by regulatory policies with few works on science and politics in addition to its integration. Their study revealed that policy formulation in the petroleum sector has been one-sided where politics influence the regulatory policy formulation processes. The effects on the upstream petroleum sector as explicated by Hansohm and Naimhwaka (2005) and Broadbent (2012) show that politicians embark on ideologies at the expense of scientific findings when formulating. In the case of Nigeria, these key dimensions which are the infusion of science and politics have been left ajar leading to weak policies which seem to favour political interest policies than the scientific justification of the policy for the wellbeing of the local population. According to Van Gyampo (2011), several interventions have been made towards Ghana's upstream oil sector with experts' advice from various stakeholders but are yet to be implemented by governments in the policy governing the sector.

Alternatively, King's (2016) research on science, politics, and policy-making concentrated on suggested ways to get various politicians through governments on board to implement scientific policies refereed to them through available finding outcomes. Similarly, Grimmer et al. (2021) emphasized the significance of politics in research and its benefit in answering the how and the why that surround the exploration administration of the oil sector. Drawing on the conceited value of politics in scientific research works, Hopkin (2006), also focused on political clientelism and its impact on the oil sector which seems to benefit a selected few due to political favours. In the case of Piattoni (2004), he made a geographical categorisation by reiterating that political influence based on specific ideologies tends to affect scientific research outcomes in the upstream oil sector, especially in developing countries. Going a step further, Gherghina and Volintiru (2017) use a more rigorous quantitative method to re-investigate the clientelism effect on the upstream oil sector and its impact on the local population. They found that political dominance and influence undermine gains generated and conspicuous mass party clientelism is unsustainable to the benefits of the oil sector since political parties do not remain in power forever. The study also found that establishing an appropriate nexus between science and politics on oil exploration and its administration can translate into better outcomes. In the same disposition, research on clientelism conducted in Nigeria and Angola by Belloin (1981) using a robust quantitative approach showed that political influence is high in decision-making right from discovery to exploration with little scientific influence despite the call by many experts in the field. In Ghana, Agbesi (2020) alluded that the return to multi-party democracy has given powers to political authorities who have influenced science-oriented research to benefit a group of individuals instead of the state citing cases of the oil sector and its administration as a major one. Further studies by Proteele (2009) and Di John and Putzel (2009) have relied on the mixed method approach to conceptualize the science and

politics nexus in the upstream oil sector and found that the forces characterizing this nexus is as a result of oil-rich countries decisions coupled with the global consensus on natural resources which tend to affect developing-oil producing countries. They additionally attributed the challenges to policies imposed by rich oil nations with different terrains to the smaller oil-producing countries where management of oil resources is difficult due to poor policies and the inability to compete on the world market with raw commodities.

Another study by Jensen and Johnston (2011) posited that petroleum governance in developing countries faces a lot of challenges due to the control of resources by global powers who focus on profitability and environmental degradation and its effect on the local population but to the benefit of the political elites. This emerging trend according to the same studies is that it leads to tension between the local population and the governments of those countries and their partners since the policies formulated fail to address such issues. Bourgouin et al. (2013) also looked at pro-market institutional mechanisms which favour the investors and boost efficiency for the extraction of resources to the detriment of the local population and their immediate environment. Shaxon (2007), for example, explored how oil-rich sub-Saharan African countries negotiate better with international companies in terms of the balance of power and better policies but the outcome shows that the capital injection by the rich-oil companies imposes contractual agreement that favours them. Hickey et al. (2015), also investigated the role of political commitment towards petroleum governance within the oil-rich sub-Saharan African countries and found out that most of the policies were politically influenced and hence are not able to achieve the needed result when implemented. Routley (2012) on the other hand, interrogated already existing policies governing petroleum governance and oil exploration and found out that many of the policies lack the political will for functioning while portions of the policies were not scientifically induced citing examples

using countries such as Angola and Equatorial Guinea. Additionally, Akonnor and Ohemeng's (2020) study on the governance of petroleum in Ghana showed that designated institutions mandated by law to manage the oil sector do not have the free will to operate devoid of political influences and therefore called for robust and enhanced policies to regulate that as a result of their findings.

2.12.1 Ideological Dimension of Politics in Petroleum Governances

There is a need to infuse ideas that are scientific to resonate strongly with the changing global natural resource governance discourse, motivated by debates between state-oriented and neoliberal approaches. In the late 1970s and 1990s, extractive politics shifted globally from resource-nationalist approaches to neoliberal privatization. The criticism against this shift posited that it has led to the control of resources by global powers to offer disappointing outcomes such as low profitability, environmental degradation, and shortage of capital (Jensen and Johnston, 2011; Ross, 2012). Particularly for resource-rich African countries that lack the required financial and technical capabilities to extract their minerals and oil resources, foreign interests push politicians to adopt pro-market institutional mechanisms to boost efficiency in extractive governance (Bourgouin et al., 2013). At the same time, however, the adoption of these liberal policies has not produced concrete reforms that simply placed authority in the hands of foreign investors. Rather, resource-rich African countries have alternated between statist and market-based policies depending on the changing ideologies of ruling coalitions and the existing political realities faced by their national elites within the global resource economy (Singh and Bourgouin, 2013). For example, one major reason for Nigeria's recent (from the early 2000s) left political turn from British neoliberal

petroleum arrangements of 1979 is local politics, shaped by both concerns over neo-colonial exploitation and a revival of the age-old demand by state elites for national control (Andreasson, 2015). State elites employing resource nationalist demands propelled Obasanjo's government to nationalize a significant degree of neoliberal neo-colonial petroleum arrangements, increasing the role of the Nigerian National Petroleum Corporation (NNPC) in oil, as well as deepening the participation of domestic capitalists (Ovadia, 2015). This has remained in place and reinforced by protectionist regulations on exploration and production equities and local participation more broadly, within a wider move by politicians to enhance their legitimacy (Ibid). Nigeria's case closely reflects the conflict between neoliberalism and resource nationalism in various other producing countries where resurgent ambitions to achieve national development catalyze strong elite support for state control (Singh & Bourgouin, 2013). Shaxson's (2007) ideological struggles influence resource governance and see it as a great measure to balance power between oil-rich sub-Saharan African countries and international oil companies. Consequently, ideological dimensions of politics need to be central to exploring how institutional commitments emerge within the scientific struggles to govern natural resources.

According to the institutional approach theory, political institutions like legislatures and legal systems shape how policies are decided upon and how they are implemented. Therefore, any analysis of public policy must focus on these institutions (John, 2013). The strategy further presupposes that state officials are impartial and that their agendas have no bearing on public policy. Additionally, it has been claimed that social groups do not influence policy because decision-makers only adhere to organised processes. It is therefore misleading to assume that social interests and those of state officials have no bearing on public policy. Interest groups can influence

the administration and bureaucracy to address their requirements using their financial resources (Fraussen & Halpin, 2020; Rasmussen & Willems, 2021). The approach also downplays the influence of political settings on institutions. Additionally, it fails to effectively explain changes to policy. A new institutional model arose in response to criticisms made about the initial institutional strategy. This is referred to as new institutionalism, which aimed to alter some of the earlier formed presumptions. This new strategy acknowledges that several elements from the politico-economic environment have an impact on public policy (March & Olsen, 2010; Bodnieks, 2020). Although this new version can be recognised and validated, it failed to fully explain policy changes while underlining the impact of state institutions on public policy.

2.12.2 Interplay of Interest (Politics) and Ideas (Science) in Ghana's Petroleum Governance

Many recent works have employed the political settlement analysis to have a more nuanced view of understanding the power relations and rational actor's behaviour in petroleum administration (Hickey et al., 2015a; Mohan & Asante, 2015; Mohan et al., 2017). In particular, this move involves recognizing the role of ideas as well as interests in shaping the emergence of political commitments within petroleum governance settings. Prime examples come from recent works on the politics of natural resource governance within the Effective States and Inclusive Development Research Centre. These include the work of Hickey et al., (2015a) on the politics of oil deal-making in Ghana and Uganda, where they argue that the different forms of 'embedded autonomy' for the key public agencies responsible for oil negotiations emerged from the dominant interests and ideas that flowed from the respective country-political settlements.

Concerning Ghana, the struggles for oil control before the 2007 discoveries reflected the embedded political ideologies of the two main political parties (that is the NPP and NDC) around the role of the state oil company - Ghana National Oil Corporation (GNPC) in securing deals with international oil companies. The NPP, with its espoused pro-market ideology, favoured a fiscal regime that was more generous to investors and reduced the role of GNPC within the sector. However, the NDC on winning political power and with its espoused resource nationalist character deepened state control with GNPC, helping the corporation to build a high degree of technical competence and restoring its power over oil negotiations. Both political parties enforce their political agenda over ideas that are scientific-related in enhancing the capacity of the state il company. Hickey et al., (2015), argue that Ghana's competitiveness on political settlement underpinned its short time framework with an increased level of political interference in oil contract negotiations. Political interests and politicization of negotiation processes strongly undermined the corporation's scientific capacity to secure high oil deals with IOCs, resulting in relatively weaker oil deals.

The entwining of ideas and interests emanating from both science and politics helps in shaping oil governance as echoed strongly by Mohan et al. (2017) who relate Ghana's investor-friendly oil agreements to the tendencies within its competitive political settlement and the role of transnational capital in brokering oil deals. The NPP's approach to attracting investment into the sector directly reflected its liberal ideology. Labelling itself as the party that discovered oil in 2007 by attracting foreign investments, the NPP described the existing fiscal arrangement (PNDC law 84) to obtain a net oil share of between 65 per cent and 55 per cent as stringent and sought to

reduce this to 45 percent. Mohan et al. (2017) noted that the NPP combined this reduction of the state's fiscal take with the use of upfront companies within its desire to control oil by favouring companies that seem to be sympathizers of NPP such as the EO with oil deals (Gary, 2003). All of these decisions are taken by ignoring the scientific significance of the output from these companies. Furthermore, Hickey et al (2015) and Mohan et al. (2017) noted a different governance style by the NDC, when the party took office in 2008 by reversing the restructuring plans of the NPP a move the NDC's espoused resource nationalist ideology and in the interest of the country. The NDC reverted to the hybrid fiscal system of the 80s, increasing the state's take using political power and promoting a higher degree of national participation with scientific evidence in their outcome. The party doubled the royalty rate from 4 to 10 percent for agreements signed between 2008 and 2014 and increased the state's additional participation interest from an average of 4 per cent to around 13 per cent (Ibid). despite the nationalistic ideas pushed by NDC to salvage the state oil company and allow full participation by the state company, it later circumvented aspects of the local content law to facilitate the participation interest of companies that financed the party's political activities (African Centre for Energy Policy report, 2013).

The findings of both political parties to some extent undermine the possible interaction between ideas (science) and interests (politics) within an integrated political settlements approach and go beyond the institutionalist perspective to investigate how this interplay is shaping oil governance in Ghana. The works of Hickey et al (2015) and Mohan et al. (2017), strongly suggest that what is important in understanding how Ghana's political settlement in shaping oil governance is not whether or not material or ideational dimensions of politics matter more, but how these conditions can help trace the causal mechanisms at play in the emergence of elite commitment. These research

works, along with others such as Poteete (2009) are starting to establish a new research agenda around natural resource governance from a political settlement's perspective. This move is nonetheless challenging, particularly the divergent debates about which of the two variables (interests and ideas) has a stronger causal role in policy processes.

The emerging literature on the relationship between politics and science as posited by Routley (2012) and Hickey (2013) reveals some ways ideas and interests can interact within policy processes. First, a standard political settlements approach denotes a single type of relationship between ideas and interests where the former is seen as helpful to science and forms part of the tactics employed by politicians to sustain the nexus to achieve their interests (Hay, 2010). This revelation confirms Khan (2010: 20) when he argues that;

> *'The ability of political settlements to sustain itself during scientific bargaining depends on its capacity to inflict costs on competing groups, absorb costs and mobilize prevalent ideologies and symbols of legitimacy to consolidate its mobilization and keep its members committed".*

Khan's interpretation is that ideas are essential since they serve as a channel to sustain political settlement and do not possess any independent causal power but rather adhere to the interest generated by the relationship to maintain some informal balance of power (Parks & Cole, 2010). The political settlement's explanation of the interplay between ideas (science) and interests (politics) highlights the conditions that shape one's commitment under extractive settings, particularly the underlying power relations and struggles over resource control and rents. However, Khan (2010) emphasized that ideas are key to interests that minimize the role of ideology in shaping institutional commitments, hence deficient in empirical basis as to how ideas (science) influence institutional change that is independent of interests (politics) (Hall, 2010).

Again, March (1994) examines the interplay between ideas and interests as a subset of the normative institutionalist school where ideas are considered independent of interests and bear an exclusive causal role in policy decisions and enforcement. This assumption relies on the logic of appropriateness embedded in the values, identities, and normative conceptions of actors that often influence their behaviour within the institutional setting. Watts (2004; 2012) shows how these ideational variables trigger new sets of struggles between actors at multiple scales and directly reshape the imaginaries of political and popular groups in the area of development, sovereignty, and national interest. This suggestion provides the basis for moving beyond the instrumental focus of Khan (2010) to explore the role of ideas such as social redistribution, and resource nationalism among others on the paths that institutions take. This theoretical overview of the interplay between ideas and interests helps to deepen insights into the ideational dimensions of politics that underpin institutional change. A major criticism is the ability of this approach to exaggerate the role of normative conditions in policymaking since frequently it tends to undermine the role of interests in shaping the path of petroleum governance take (Abdulai, 2017).

Another school of teaching is constructivism which examines the interplay between ideas and interests (Hay, 2010), through a discursive approach to institutional change and views interests as a subjective idea (Schmidt, 2008). Although proponents of the constructivist school of taught acknowledge the role of interests in driving key actors, they argue that such interests emanate from shared beliefs, values, and ideas that are essential in the policy processes (Schmidt, 2008). This is the epitome of Routley's (2012) argument that interests are subjective hence, what is key is the ideas, the perceptions from the perspective of those actions, and how these were shaped and

reshaped by the actions of the actors in line with their interest. This argument is further demonstrated by Bebbington (2012) in research conducted in South American countries and the findings show that policy decisions to distribute resource rents are not shaped by political interest only but through discursive arrangement around fairness, cost, right, and benefits. Juxtaposing this to Routley (2012), interest does not prevent ideas but rather is mostly perceived, formulated, and produced through discussion within a defined space where actors are involved. The interactions between ideas and interests emanating from the different approaches strongly suggest that what is key now is how these range of approaches can help trace the causal mechanisms at play in the emergence of actors' commitments within the petroleum governance space.

2.12.3 Politics of Petroleum Governance in Ghana

Developing countries' political administration encompasses all sectors of the economy including that of the oil sector (Akonnor & Ohemeng, 2020). This trickle-down to the governance of resources in the oil sector by designated institutions with the involvement of qualified actors. Ghana's CCPS generates incentives and ideas for key actors with experience in the oil sector to use local content development processes to encourage political support in their quest to contribute to the ways to shape policy formulations between political elites and organized groups. Another significant initiative explores how building and maintaining an electoral coalition influence the levels of elite commitment to policy implementation. This helps to ascertain the underlying political factors behind petroleum governance in Ghana, including how the interplay between interests and ideas shapes this. Khan's (2010) approach best fits Ghana oil including that of petroleum governance especially the struggles between politicians and elite groups (e.g. civil society and private sector elites) to develop policies that support greater rent retention. In light of

the above, Gyimah-Boadi and Prempeh (2012) posited that the distribution of power among elite groups determines their ability to withstand conflicts around the rules of the game when it comes to petroleum administration. This shows how coalitions emerge through processes of struggle and bargaining between elite groups, which establish the basis for the types of policies politicians adopt and enforce. Following this, elite commitments are shaped by constantly evolving conditions of interests and ideas (Routley, 2012) and can help in interrogating actual policy processes through a political settlement lens. The key decisions politicians make within their broader relationships with elite groups, particularly the rent retention and accumulation pacts that they can forge and bring some leverage in the governance stage (Bebbington, 2013). Elites group here have been conceptualized by Di John and Putzel (2009) as organized state bureaucrats with the capacity to impose transition costs on institutions, and include those in control of valued assets (e.g. business elites); those with the power of adjudication over the distribution, allocation, and control of resources (e.g. politicians) and those with authority to bargain on behalf of organized social groupings (e.g. civil society organizations, traditional leaders). Brinkerhoff (2000) supports the assertion that negotiations between elite groups help reveal the interests and ideas that underlie political commitments in developing policies and enforcing them. He further conceptualizes political commitment through five main indicators including locus of initiative which focuses on one's ability to initiate policy reforms and it is high when the push for policy change comes from actors espousing that change. Thorp et al. (2012) in that regard place much emphasis on political leadership as a key way of driving change in natural resource settings. Apart from the reforms, he mentioned the degree of analytical rigour and argued that political commitment is high when policy choices are derived through thorough assessments (costs and benefits) of options and anticipated outcomes. studies by Bridge and Le Billon (2013) and Lewis (2009) explain policy success or

failure in natural resource governance including that of petroleum undergoes a series of assessments including cost and benefits undertaken by politicians. A typical example is seen in Indonesia and Nigeria where relative success in oil policy implementation is achieved when political elites heed advice from state technocrats. He however notes the absence of political will to heed technocratic assistance is a key driver to policy failure in the oil and gas industry.

Significantly, the mobilization of stakeholders plays a major role in whether political elites engage with and actively mobilize support from groups such as civil society and the private sector for their (politicians') reform agendas. This is essential when it comes to petroleum governance where politicians incorporate the interests and ideas of powerful elites (business elites) and broadly based social actors (civil society groups) to bolster their legitimacy, which is important for establishing the norms by which elites operate (Poteete, 2009).

Again, the application of credible sanctions explains how politicians provide credible incentives and sanctions to agencies and individuals during policy implementation. This information is central to Ovadia's (2015) argument which says that local content reform in Nigeria and Angola partly entailed politicians restructuring principal-agent relationships through a variety of regulatory mechanisms that provided both incentives and sanctions to ensure policy compliance. The final conceptualization according to Brinkerhoff (2000) is the continuity of effort which talks about the elite support for policy reforms in the area of policy sustainability and implementation. This exposes the level of political commitment in petroleum governance. This in turn pushes the political elites to ensure stability in oil development and governance (Thurber et al., 2011). Brinkerhoff's approach provides an appropriate setting for tracing and understanding how the

interplay between interest and ideas shapes the level of policy choices from the perspective of the elite.

2.12.4 Political Economy in Public Policy Formulation

Generally, in policy-making across all fields, the demand for and use of knowledge are about organizational incentives, professional ideologies, power, and vested interests (Jones et al., 2009; Young & Mendizabal, 2009). Hence, the importance of political economy aids in shaping policy processes and the underlying incentives that promote the demand for and use of knowledge by policy-makers. The political authorities can control structural factors that are beyond the direct control of stakeholders. For instance, the formulation of laws and their implementation to regulate oil exploration and its production. These powers are manifested through institutional variables derived from social norms and practices and, in a wider sense, also comprise how a public sector is organized.

According to Hirschman (1987), political economy is how politics affects the economy and the economic effects on politics but traverse to other areas including science where the so-called political business cycles create ebbs and flows of scientific activities that are essential for the growth of the economy. At the same time, it has been noted by Pierson (2000) that scientific researches also have an immense effect on politics especially in the area of natural resources. Political economists' assertions on science have indicated the rate at which they have uncovered a lot of intricacies that might affect the outcome of science-related research if political scrutiny fails in that regard. Hence political control over public institutions does not undermine their progress

as alluded by many but rather comes in to strengthen the weak methodology usually employed by these institutions.

Apart from political authorities commanding a lot in the affairs of how institutions should be run, when it comes to decisions on policy processes, stakeholders comprising of individuals, as well as organized groups such as political parties or business associations, play an essential role in shaping the policies emanating from the science perspective so it can have the backing of political authorities. Importantly, external stakeholders, such as donors, foreign policy actors, and foreign investors, are also not left out during negotiations over policies, rules for foreign investment, and foreign trade among others. As a result of political engagement, knowledge or discourse on policy formulation allows mainstream analyses on the issue at hand, its causes, and consequences on the local and national levels. This is particularly evident in oil exploration, where governments engage in negotiations with foreign partners to secure deals that align with the country's best interests. This assertion is supported by Edelman (2009) who outlined that the central. policy discourse, ideologies, and narratives, the relative integration of different perspectives and sources of knowledge, and the types of information available all interact at various decision-making levels with different actors whose perspective differs. This counter-argument is likely to delay policy processes but also leads to an effective and efficient policy formulation with varied options.

Political commitment espoused in scientific research has been made easier in places where the democratic system of government is central. This form of government transcends to policy formulation and implementations where varied opinions are considered. Tebele (2016) also noted that in the era of democratic dispensation, countries practising such a system allow due process politically when it comes to policy formulation and implementation. Over the past 50 years,

Campbell (2018), explained that political economy has become increasingly prominent in both economics and science and has identified the relevant groups and their interests, and how political institutions affect their impact on policy. These groups include petroleum companies, and manufacturing enterprises among others. The political economist goes beyond the economic effect on politics to that of science by assessing how science affects politics. They do so by engaging the macro and microeconomic trends to understand the chances of policy generation in that regard. At the macro and micro economic level, the economic characteristics of these firms or industries which include that of the petroleum companies can have an impact on the nature and direction of their activities as a result of political commitment.

Again, the application of politics to science in the field of natural resources allows politicians to have analogous thoughts towards firms in the form of voting and or government monopoly rights. Scholars such as Matland (1995) and Pressman and Wildavsky (1984), have conceptualized science-politics interaction as an essential relation that can help in designing policies that do not have only the political commitment to dictate the pace but in collaboration with other scientific approaches for a robust policy to meet the modern challenges of the oil sector and petroleum administration in general. The impression generated from this relation is that political economy affects both scientific scholars and policymakers in analysing how societies work and those trying to change the narrative in that regard.

Others have also contested the role of political commitment in a peak-oil study where many of these organizations do not take into account institutional and political dimensions of resource exploitation like the role of markets and the potential impact of oil prices on consumer behaviour

or the impact of national interests of oil-exporting countries. This according to Campbell and Laherre´re (1998) is that the predictions based upon an assumption of unrestrained exploitation of a natural resource are the cause when natural consequences occur beyond human control. He further reiterated that oil exploitation will have a lot of challenges if it is unimpeded by political and economic factors if they ignore scientific measures to curb its exploitation. There is a conjecture that if science and political relations constraints are not addressed, it will affect oil production and it will translate to high oil prices and shortage on the world market, and the resultant effect will be political and economic (Engdahl, 1993; Klare, 2004). This assertion implies that the future oil supplies will increasingly depend on the politically unstable Middle East with the bulk of it expected to come from OPEC countries (IEA, 2008). The consequences of this aspect of political insecurity have been explored by Klare (2004) who emphasized that if stringent policies are not politically and scientifically made in the best interest of oil-producing countries through better administration, sustainability of the commodity will be difficult.

According to the study by Guriev et al. (2008), the propensity to nationalize oil assets has been closely linked to the rising price of oil which political authorities have less control over due to international pricing and this has been seen by multinational companies such as Exxon Mobil, Royal Dutch Shell, and BP among others. The full control overexploitation of remaining reserves has made oil-exporting countries use it in advancing their political agendas on the international level for both economic and foreign policy goals. They may use resource nationalism to try to unsettle the system of international relations as posited by Stanislaw (2008). Political economy as a model in oil administration including that of petroleum requires the effort of both actors that is

political and stakeholders to channel out policies that focus on the benefits of the resources for sustained economic growth.

2.13. Theoretical Perspective: New Institutional Theory (NIT)

Numerous theories have been employed in analysing the relations of two interdependent variables' impact on decision-making processes on social and economic imperatives. According to Oliver and Ebers (1998), different theories have been developed in establishing a relationship between certain elements, and these include network, institutional, political power, strategy exchange, transaction cost, decision-making, population ecology, law, and industrial marketing. The most prevalent of these theories include resource dependency, network, and institutional theories. However, to effectively theorise and explain the nature, driving forces and implications of science and politics relations on policy formulation, the New Institutional Theory, also known as Neo-Institutionalism has also been identified as a central theory for explaining the structure and operations of policy actors from macro-organizations (Suddaby 2010). The new institutional theory embedded within the mechanism of isomorphism is best suited for this study because it deals with how institutions employ science and politics as a lens in establishing the relation for better policy implementations and running institutions administratively in addition to the other equally essential forces that are driven from different sources as stipulated by DiMaggio and Powell (1983).

2.13.1 The New Institutional Theory [NIT]

Despite the unpopularity of the institutional theory in its application than resource dependency, network, and political power theories (Oliver and Ebers 1998), institutional theory has been applied to understanding organizational behaviour in terms of decision-making and change processes (Kondra and Hinings 1998). Thus, the relevance of new institutional theory to policy formulation emanates from its emphasis on the role of institutions in determining decision-making processes and their outcomes. In the view of Barley and Tolbert (1997), institutions serve as bases for explaining how formal and informal rules, norms, and organizational structures shape policy formulation and implementation. Institutions also encompass the common rules and relationships that define the categories of social actors: their related activities and relationships. The institutional theory further highlights how organizations retain stability and maintain social order by establishing an authoritative guideline for social behaviour processes which includes schemas, rules, norms, and routines (Hall & Taylor, 1996; March & Olsen, 1989; Scott, 2005). Thus, organisations will be inward if they exhibit this trait. This theory primarily elucidates that organizations have to adjust to the institutional norms and beliefs of another origination with similar environmental conditions. Juxtaposing this with the ecology of organizations where conformity to existing rules and regulations gets the organisation more attracted to others in the form of support and where the desire for legitimacy is central or the ultimate goal in the organizational process (DiMaggio and Powell 1983). This process makes organizations become more and more like others in the organizational field, a phenomenon referred to as isomorphism by DiMaggio and Powell (1983). This implies that institutions can adopt an inward-looking, non-consultative administrative approach in their policy decision-making as they seek to conform to the norms of another institution. Neo-institutionalism emanating from institutional theory has political influence where public sector agencies are drivers and triggers of institutionalization

(Frumkin and Galaskiewicz, 2004). According to Scott (1995), institutions have three main influences on policy formulation: cognitive, normative, and regulatory. The cognitive effect refers to the common views, attitudes, and knowledge that affect policy actors' understanding of the situation at hand and the available policy options. The normative effect relates to the social norms, cultural values, and standards that govern policy actors' behaviour and determine their policy choices. The regulatory effect pertains to the formal rules, regulations, and procedures that govern policy processes and decision-making. The study adopted the new institutional theory as a lens to explain the nature, driving forces and implications of science-politics relations because of the context within which institutions influence policy formulation and because policy formulation is a core mandate of institutions. Thus, institutional behaviour plays a crucial role in shaping policy choices and decisions under the influence of the following forces:

2.13.1.2` Isomorphic Pressures: The New Institutional Theory emphasises the idea of isomorphism. This framework maintains that organisations and policymakers have the proclivity to adapt to existing institutional norms and practises (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). Isomorphic forces can lead to policy convergence, in which policies from various organisations or jurisdictions become similar as a result of demands for legitimacy or a desire to emulate successful practices (Hall, 1993; Hood, 1998). This occurrence will impact how science or politics informs policy formulation. The different three forms in which isomorphism manifests and shapes institutional behaviour and practice as suggested by DiMaggio and Powell (1983) are: Coercive, Mimetic and Normative.

2.13.1.3 Coercive Isomorphism

Generally, organizations in their quest to receive attention and legitimacy in addition to maintaining relations with other organizations are subjected to both formal and informal obligatory pressures in the form of laws and policies that generate responsibility for a certain behaviour, and failure to conform attracts sanctions (Scott, 2011). These pressures denote coercive isomorphism, which is demonstrated differently and could be intentional. These may also include the use of force, persuasion, or mere invitations to belong to a group. DiMaggio and Powell (1983) and Mizruchi and Fein (1999) allude that coercive isomorphism is driven by numerous factors and one of such factors is the influence of a paternal organization on which an organization depends for resources. This form of isomorphic pressure is consistent with the tenets of the Resource Dependency Theory (Mizruchi and Fein 1999) that posit that in the bid to maintain the continuous flow of organizational resources, organizations may get glued to other organizations considered more resourceful.

Again, a key factor that drives coercive isomorphism is the cultural setting of the organization at hand and the forces within an organization's cultural setting can exert pressure on it to respond in the affirmative to such pressures if it must be considered a team player and if it must assume legitimacy. Caemmerer and Marck (2009) report that public sector agency that relates and interacts with private sector organizations were pressured to conform to the standards and practices of these private sector organizations. They also report that due to the resource link between the public organizations in their study and the government, these organizations had to respond to changing policies and pressures to improve public services as well as the public opinion that provided a measure of the quality of the services they provide. Within these settings, organizations are seen

in a state of ambiguity. They become uncertain about how to deal with rising expectations and contradicting demands of their stakeholders (Caemmerer and Marck 2009).

It has been highlighted extensively in the literature according to Phillip et al., (2000) that coercive isomorphism seems more prominent when one actor controls more critical resources or exercises formal authority as in the case of the relationship between the central government that controls national resources and the actors in that particular sector that receives funding allocations among other things. Coercive isomorphism has wide-ranging applicability and explains the behaviour of both private and public organizations including administrative procedures.

2.13.1.4 Mimetic Isomorphism

Mimetic isomorphism often expresses the social reality through shared values and concepts between organisations. As organizations relate to others in a field, they are not only influenced by power and resources, they occasionally face uncertainties that are resolved by looking up to the best practices as the surest way to minimize these uncertainties (DiMaggio and Powell 1983; Radaelli 2000). Mimetic isomorphism then steps in when organizations imitate the performance, structures, and practices of other organizations in an attempt to improve their performance or resolve their uncertainties (DiMaggio and Powell 1983; Caemmerer and Marck 2009). These organizations do so by impersonating their networked peers, bigger and more successful organizations based on the authority of legitimacy (Barreto and Baden-Fuller 2006). These legitimacy-based groups are the authoritative ones that proffer help to other organizations that find themselves in difficulties beyond their control and decide to mimic to attain legitimacy (Barreto and Baden-Fuller 2006). However, these legitimacy providers, identified to include regulatory and public endorsements with the media serve as the avenue for the public's endorsement. Caemmerer

and Marck (2009) have argued that an initial submission to coercive isomorphism leads to mimetic isomorphism. That is, the response to coercive isomorphic pressures results in ambiguous and uncertain outcomes which then stimulate mimicry of behaviours across sectors both public and private. The implication has been that in an attempt to respond to coercive isomorphic pressures, institutions get uncertain about which strategic choices to make, thereby warranting mimicry which consequently results in strategic blunders.

Barreto and Baden-Fuller (2006) noted that many organizations have rejected their own rules and regulations and time-tested practices in improving their organization in search of legitimacy-based groupings endorsement which mostly allows them to be pressured by impersonating others.

2.13.1.5 Normative Isomorphism

Organizations or institutions are not key to only institutional reactions and interrelationships but include professionals whose activities such as the reinforcement of professional norms, principles, and practices contribute to the success of the organization. Since normative isomorphism is grounded on the ideals of behaviour, social values and professional standards in institutions (Scott, 2011), the extent to which institutional dynamism plays out is also influenced by professionalization within the institutional field. Professionals defining the conditions and methods of their work, draw their membership to both coercive and mimetic isomorphism (DiMaggio & Powell 1983; Mizruchi & Fein 1999). The influence of entrenched common norms, values, and beliefs within a specific institutional context. Organizations kow-tow to these norms to gain validity and acceptance (DiMaggio & Powell, 1983). within the framework of policy development, normative isomorphism can be evident when organizations align their policy

proposals, strategies, and discourse with the dominant norms and values in the policy area. By sustaining prevailing norms and values that align with the interests of powerful actors, normative isomorphism can perpetuate existing power systems. Power dynamics, on the other hand, can affect normative isomorphism by determining which norms are regarded as valid and accepted in the policy-making arena. Understanding the interaction between normative isomorphism and power relations is critical for understanding the dynamics that influence policy formulation processes, detecting possible biases, and advocating for more inclusive and equitable policy-making.

2.13.2. Institutional Constraints: Neo-institutionalism recognizes that policy formulation processes can be constrained by existing institutional arrangements. It emphasises that existing institutional arrangements, such as legislative frameworks, bureaucratic structures, power dynamics, and cultural norms may constrain policy formulation (March & Olsen, 1998; Scott, 2014). These institutional restrictions affect the wide range of accessible policy alternatives and influence the feasibility and acceptability of various policy approaches. Policy-making institutions, according to the New Institutional Theory, have both formal rules, such as laws and regulations, and informal rules, norms, and values that govern policymakers' conduct and determine their choices (Hall & Taylor, 1996; March & Olsen, 1989). These institutions offer a framework for policy actors to function and interact, affecting their behaviours in generating policy results (DiMaggio & Powell, 1983; Scott, 2014).

2.13.3. Policy Diffusion: The theory additionally makes provision for policy diffusion, which is the dissemination of policies across multiple settings or jurisdictions. It implies that policymakers

are affected by policies implemented in other areas or nations, motivated by a desire to emulate successful practices, obtain credibility, or respond to international pressures (Béland & Cox, 2011; Shipan & Volden, 2008). Policy dissemination happens through the exchange of ideas, models, and practices among policymakers and organisations (Dolowitz & Marsh, 2000; Stone, 2001).

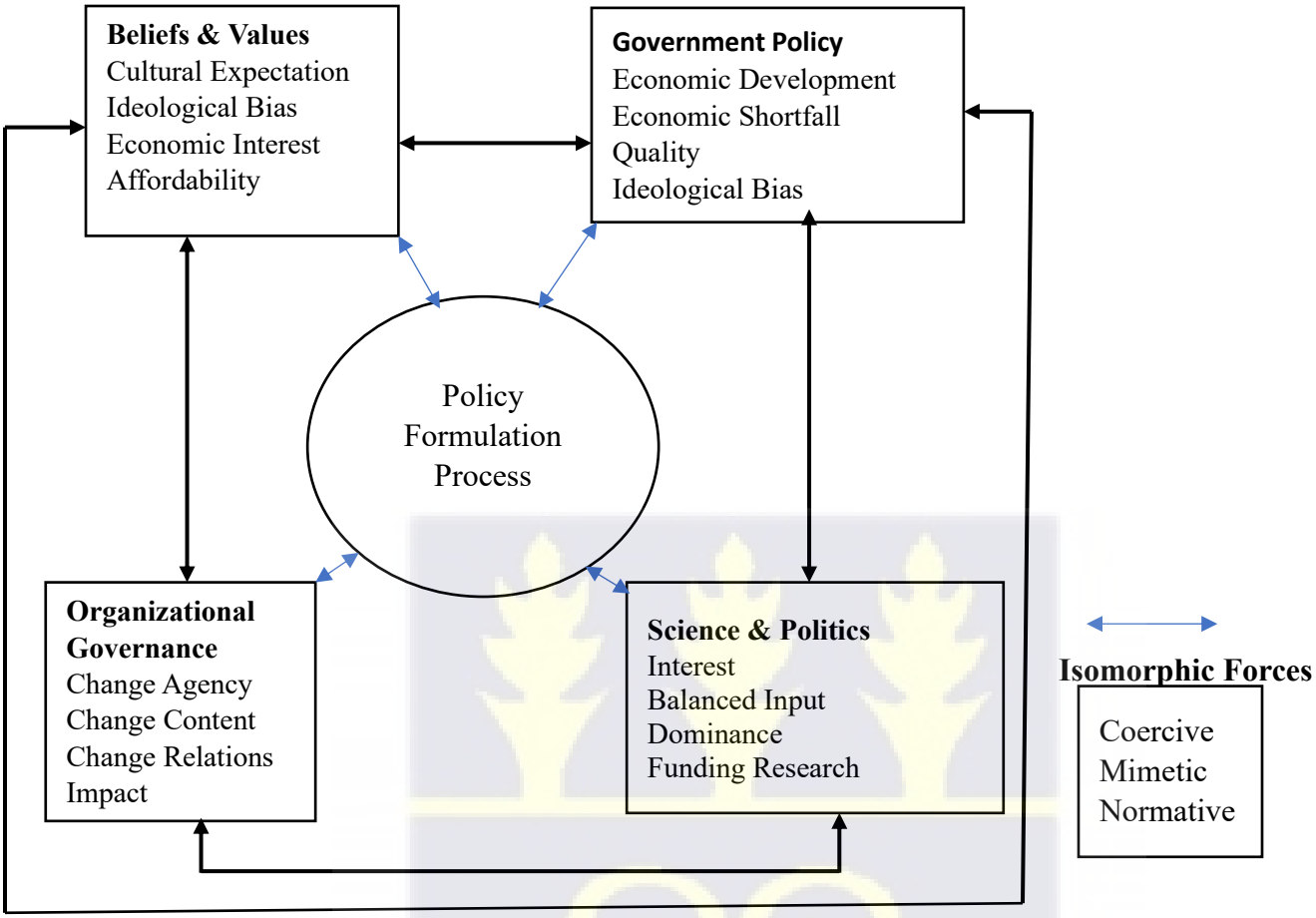
2.13.4. Policy Entrepreneurship: New Institutional Theory recognizes the role of policy entrepreneurs in shaping policy decisions. The significance of policy entrepreneurs in influencing policy formulation processes and challenging current institutional arrangements is key to the all-inclusive policy formulation process (Kingdon, 1984.Zahariadis, 2007; Mintrom & Norman, 2009). Policy entrepreneurs can be individual policy actors, groups or organisations who can present new policy ideas, lobby for policy change, and traverse institutional impediments to impact policy results. Policy entrepreneurship is essential for institutional transformation and policy innovation (Kingdon, 1984; Mintrom & Norman, 2009).

2.14. Conceptual Framework

This section presents the conceptual framework for the study. It explains how institutional structures, behaviours, norms, values, beliefs and aspirations could impact the nature of science and politics relations and how this relation could have implications on policy formulation in the petroleum sector of Ghana. The preceding discussions have demonstrated the extent to which the new institutional theory embedded in isomorphism supports the role of the structural arrangement of institutions and organisations in influencing policy-making decisions as well as how scientific and political inputs are incorporated in policy-making. It is also important to encapsulate the major

ideas from the literature review and theoretical discussions into a conceptual framework to guide the research process. The study examines the extent to which the interplay between scientific findings and politics impacts the formulation of public policy in the upstream oil sector as well as their driving forces and implications on policy formulation in the upstream petroleum sector in Ghana. The issues of interest in this study which are science, politics and their relationship to public policy formulation are fundamentally social practices that are entrenched within a larger social institutional system (DiMaggio & Powell,1983; Sabatier, 2007; Scott, 2014). To unpack this conundrum for a better understanding of the relationship between science and politics on policy formulation processes requires a conceptual framework to elucidate the interlinkages of the important factors and driving forces in explaining policy formulation and administration processes in the upstream petroleum sector of Ghana. The intricacies of the ideas discussed in this section and diagrammatically encapsulated in Figure 2.2.

Figure2.2 Conceptual framework of institutional isomorphism



Adapted from DiMaggio and Powell (1983) and Li (2017)

The perception of institutional isomorphism often clears up why organizations functioning within an identical ecological set are more predisposed to have the same structures and practices notwithstanding the previous conditions that would have driven them toward differentiation (Hallonsten & Hugander, 2014). From an institutional theory perspective, Scott (2014) notes the influence of driving forces in institutions how they shape organizations and the interactions between institutions and individuals within organizations. This notion is rooted in Weber's 1946;

and 1952 statements of rationalization of bureaucratization in the concept of capitalism, dubbed the iron cage (Jennings, & Greenwood, 2003). This idea was further elaborated on by DiMaggio and Powell (1983) as moving beyond the marketplace to include the activities, beliefs, norms, practices, expectations and interests of central government and professionals. DiMaggio and Powell (1983) formulated the model for explaining the three types of mutually engaged mechanisms in which isomorphic change transpires: coercive, mimetic, and normative. In this study, the coercive isomorphism occurs when formal or informal (government policy decisions, organisational governance, beliefs and practices) pressures drive organizations in the petroleum sector of Ghana to assume certain pre-existing institutionalised rules, norms, and practices that are deemed legitimate by the central government or other internal and external powerful and influential players in formulating upstream oil policies. Memetic isomorphism focuses on the balancing act and behaviour of institutions towards change in times of uncertainty. Normative pressure also speaks to the rational compliance by new professionals to the norm system shaped by training and practice. According to DiMaggio and Powell (1983), the fundamental driver of isomorphism pressure is legitimacy seeking rather than the efficiency or performance of institutions (Andrews et al., 2006; Brewer & Selden, 2000).

As illustrated in this discussion, the conceptual framework has broad applications in public policy formulation processes, seeking legitimacy and the likelihood of this pattern being replicated in the Upstream Petroleum Sector where science and politics are key in public policy formulation. This model is therefore appropriate to provide an insight into the relationship between science and politics in petroleum exploration and extraction with a specific focus on the upstream sector of the

value chain in Ghana. The conceptual framework displays the interplay of forces within this framework.

2.14.1. Establishing Science, Politics and Policy Relationship

It is evident from the literature on public formulation science and politics are the key factors that influence public policy-making decisions. However, there are disequilibrium patterns in the amount of input that science and politics make in public policy formulation. So, there are varied implications if the factors that influence policy decisions are skewed towards science dominance or political dominance. The implication could also vary when there is equity in the use of science and politics. However, the implications of science-politics relations on policy could be mediated by factors such as Government Policies, Timing, resource availability, Political Ideology, beliefs and values of the ruling party, Organisational structure and culture of the policy formulation body, personal interest and obligations of pollical actors, interest of scientist/experts in contributing to policy. It is worth noting that all public policy-making institutions in Ghana are legal establishments. They are bound by law to operate within the confines of the legal instruments that established them. These institutions must always seek to legitimise all policies that are formulated. All these factors are also driven by the three isomorphic forces.

2.15. Conclusion of Chapter

The Chapter reviewed relevant literature on the core content of the study by discussing the conceptual, empirical and theoretical literature for insightful understanding of the science-politics relations on public policy formulation. The two key concepts that are integral to this study were

discussed first. The chapter then discussed the intersectional issues between science and politics and revealed that both concepts mutually influence each other but politics has a greater impact on the activities of science. It also conceptualised public policy, its typologies and policy-making processes. Literature on the driving forces behind science and politics relations was also reviewed. This was followed by discussions on the political economy in public policy formulation, policy formulation perspectives of petroleum administration, politics, power relation and institutional commitment to petroleum administration, ideological dimension of politics in petroleum governances, policy implication of petroleum administration; perspective of science and politics their implications in the petroleum sector were also discussed extensively. The chapter also paid keen attention to the literature on the Ghanaian context. It focused on the upstream petroleum sector in Ghana, the upstream petroleum policies in Ghana, the politics of petroleum governance in Ghana and the interplay of interest and ideas in Ghana's petroleum governance. The chapter also reviewed empirical literature on the phenomenon under study. The empirical literature review centred on the ideological dimension of politics in petroleum governance, the interplay of Interest (Politics) and Ideas (Science) in petroleum governance in Ghana, politics of petroleum governance in Ghana, political economy in policy formulation and its related processes. The latter part of the chapter centred on the theoretical perspectives of the study to analyse the science and politics relationship through the lens of the new institutional theory and isomorphism. A conceptual framework was also adapted from the literature and the theories to better contextualize how science and politics interact to impact policy regulation in Ghana.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The scientific search for knowledge requires a systematic laid-down plan referred to in academic cycles as the research methodology. The framework serves as the pathway for approaching the research in achieving the study objectives or adequately answering the research questions. The chapter therefore is devoted to outlining the entire research methodology and design to be adopted to aid in attaining the objectives set for this study. In chronological order of presentation, the chapter will proceed by discussing the philosophical positions in social science research and eventually discuss interpretivism as the settled philosophical underpinning for this study. Subsequently, the exact research method considered and its research design adopted will be equally discussed. The target population in the selected institutions slated for the study will be looked at in this section. The chapter will also discuss the sample size, outline the sampling techniques, describe the research instruments, and data collection and finally discuss the tool that was used for the analysis of the data collected.

3.2 Philosophical Foundations of the Study

The philosophical approach to the search for knowledge and wisdom about the facts of reality regarding the environment and its interaction with humans has attracted varying degrees of intellectual debates across the globe in centuries past. Beyond metaphysics, different philosophical thinking concerning the appropriate method for searching for true scientific knowledge emerged in the field of research in the 1800s. Positivism and interpretivism which are linked to the

quantitative and qualitative epistemological philosophies respectively emerged as the two main opposing schools of thought as the best means of searching for true knowledge although this has been disputed in recent times by other academics.

The quantitative research approach which originates from the positivist philosophy of science according to Kaboub (2008) as cited in Aliyu et. al. (2014) can be traced back to Auguste Comte (1798- 1857) and the Vienna Circle group of philosophers. According to Aliyu et. al. (2014), positivism is a research strategy and approach that is rooted in the ontological principle and doctrine that, truth and reality are free and independent of the viewer and observer but Mack (2010) claims it is an epistemological doctrine that argues that true knowledge is only about hard facts which can be obtained through sensation and observations. Thus, from the positivist perspective, knowledge is acquired through observation and experimentation by making use of large data sets, quantitative measurement and statistical methods of analysis (Antwi & Hamza, 2015; Krauss, 2005).

To a large extent, Ormston et al. (2014) refer to the concept of quantitative method as the adoption of the natural science experiment as the sole model for scientific research or phenomena which is studied in a systematic way that controls the variables that influence the phenomena. Quantitative is therefore viewed as a research approach or strategy that is concerned with the use of numerical methods in the collection, and analysis of data from the field of research (Yilmaz, 2013). In most cases, it involves a deductive approach which is related to theory and research in which the emphasis is placed on the testing of theories and their credibility into the problem under research. According to Teye (2012), quantitative research entails quantifiable data which is used by many

social science researchers due to its ability to allow for generalisation and prediction. Yilmaz (2013) argues that the phenomena must be analysed utilizing mathematically based methods.

The positivist school of thought has been criticized for not having the ability to explain behaviours and perceptions of social phenomena (Brannen, 1992 cited in Teye, 2012). The rigidity of the approach in terms of churning out statistics is what makes Moghaddam et al., (2008) argue that measurements in quantitative research tend to detach findings from real-world contexts. Emotions and feelings are difficult to express in the quantitative paradigm debate despite its acclaimed scientific background. This is because raw numeric data do not speak for themselves and as such do not make meaning unless explanations are provided by the researcher. Grace & Mikal (2019) argue that in a highly contextual phenomenon, quantitative analyses do not explicitly model relevant aspects of the local context and as such can be misleading in terms of study findings.

It is in line with these perceived weaknesses that Albert Einstein conceived the humanistic paradigm which is also referred to as the interpretivism approach in research. According to proponents, interpretivism gives credence to human beings, human meaning, and human actions with a strong ethical framework that both respects human beings and seeks to improve the state of humankind in a global context. This paradigm was considered an opposition to the positivism and the quantitative paradigm despite both being scientific, interpretivism is subjective and believes all human behaviour cannot be reduced to numbers but needs some relevant explanations to make meaning (Babbie, 2011; Teye, 2012; Bryman, 2016).

Invariably, the research findings of any academic are influenced by the individual's philosophical lineage of either positivism or interpretivism. Given that, this study adopts the interpretivism philosophical paradigm as the basis to unravel the facts related to the set objectives of the study-

exploring and understanding the nature, driving forces and implications of science policy relationships on the policy formulation process in Ghana's upstream petroleum sector. The interpretivism paradigm is chosen over the many philosophical paradigms for this study due to the inherent strengths and fit for the study objectives (Babbie, 2011; Teye, 2012; Bryman, 2016). This paradigm has phenomenology and existentialism as its two major theoretical prepositions. While phenomenology is concerned about the exploration of perspectives and experiences of phenomena and the meanings one attributes to such phenomena, existentialism adds that people are free agents who have control over their choices and actions and as such, society should not restrict an individual's life. The humanistic philosophy has the qualitative method, ethnography, idiographic, and participant observation as key research approaches (Babbie, 2011). The qualitative approach which is the most popular approach is in opposition to the positivist quantitative method in researching social phenomena. Arguably, policy formulation especially regulatory policies human human-centred so the influences of the researchers and the participants cannot be underestimated in the processes (Teye, 2012). The use of numeric figures which is more toward quantitative positivism will inevitably not be enough for appropriate policy generalizations (Grace & Mikal, 2019) but the expressions of emotions by study participants and stakeholders in the sector will inform the quality of data for policy formulation and policy pathway (Johnson & Turner, 2001).

Even though the findings of the research are not pre-determined, the researcher's influence is considered crucial to the outcomes of the findings thereof. The adoption of the qualitative approach therefore is deemed fit because, the views of experts through key informant interviews, major agencies and stakeholder engagements of institutions related to upstream oil production and regulatory policy formulation in Ghana will enhance the study outcomes (Johnson & Turner, 2001;

Teye, 2012). The philosophical underpinning for this study is therefore interpretivism and its key approach "qualitative design" employed as the main research design (Creswell, 2013).

3.3 Research Design

The coherent set of rules and regulations which guide the conduct of any scientific research and prescribe the basic mode of presentations is described as a methodology (Kitchin and Tate, 2000). According to Weber (2004), the quality of one's research findings depends on the adoption of the right research design. Admittedly, there are different methodological approaches and designs in the field of social science which are linked to the various philosophical positions of interpretivism.

Research design is regarded as a strategic framework for action, that serves as a bridge between research questions and the execution and implementation of the research strategy (Durrheim, 2004). Arguably, the qualitative approach is complex and multifaceted in the area of definition and usage. This is largely so because qualitative research is based on the epistemological assumption that social phenomena are so complex and interwoven that they cannot be reduced to isolated variables and so it is inappropriate to use the term variable when defining qualitative. As cited by Yilmaz (2013), Strauss and Corbin (1998) believe the qualitative method is a research approach that produces findings which are not arrived at by statistical procedures or other means of quantification.

Other scholars alternatively argue that it is the research technique or strategy that emphasizes the use of words or narratives rather than quantifying in the collection and analysis of data. It is said that this approach is inductivist as well as interpretivist (Babbie 2001; Bryman, 2016) and it

emphasizes behaviour, motivation and meanings of issues under research. In most cases, the approach requires the use of structured instruments like interviews, focus group discussions and participant observations. However, for this study, which is a qualitative study, only key informant interviews will be considered in collecting all the data required to answer the research questions. A qualitative approach is embraced by many researchers due to the inherent strengths of the dichotomous strategy. Minichiello et al. (1995), contend that this approach is flexible and less expensive to run as compared to quantitative design. Similarly, others argue that qualitative research design makes room for a detailed collection of information from participants based on their experiences, perceptions, emotions, beliefs and behaviours for deeper reviews and understanding of the phenomenon under study (Bryman, 2016; Teye 2012).

Qualitative methods are also more flexible and reflective than quantitative methods and make room for research without necessarily getting underpinning theory (Minichiello, et al, 1995). According to Quinn (1980), the strategy allows important dimensions to emerge from the analysis of the cases under study without supposing in advance but may be relevant to the research information. A qualitative study is apt for this study because a study on policy formulation and petroleum where people with special expertise are required to participate, a qualitative study gives the flexibility to purposively select willing and more qualified participants whose responses will adequately answer the research questions of the study.

3.4 Fieldwork Processes

The fieldwork took place in Accra, the national capital of Ghana between June 2022 and October 2022. Accra was chosen because all the qualified and willing participants for this study are located in Accra. Before the commencement of the fieldwork, ethical clearance and fieldwork approval were sought from the University of Ghana's Ethics Committee for Humanities (ECH). The strategy employed in completing the fieldwork included applying for clearance from the Ghana Ministry of Energy and Petroleum (MoEP) which will allow me to conduct interviews with the agencies under the ministry. Again, I obtained an introductory letter from the Department for Public Administration and Health Services Management, University of Ghana Business School which introduced me as a student of the department to potential participants. The participants were pre-informed of the interview. Those who agreed to be part of the study mutually agreed with me and field assistants. We then scheduled a date, time and venue for the interview.

3.5 Sampling Method

The data collection for this study was conducted largely using two non-probability sampling methods. There were purposive sampling methods and snowballing sampling methods. As indicated by Campbell et al. (2020) and Klar and Leeper (2019) purposive sampling consists of participants who have information on a subject matter that is significant to them. Specifically, the study adopted these two sampling techniques where the sampling process is based on the individual's expertise and experience of the phenomenon under investigation (Campbell et al., 2020; Klar & Leeper, 2019; Abrams 2010). Thus, individuals with expertise in policy formulation processes in Ghana's upstream petroleum sector were purposively selected for this study. The snowball sampling on the other hand was adopted to complement the purposive sampling since

the participants with the target characteristics of the study are not easily accessible (Naderifar et al., 2017). The difficulty of reaching experts in policy and petroleum in study in Ghana to willingly participate in this study therefore warranted the adoption of the snowball sampling method.

The sampling of the participants from government, private, international and civil society organizations was based on the virtue of their experience in the issues relating to the relationship between science and politics and regulatory policy formulation processes which is the bane of investigation in this study. As a qualitative work, this study's sampling regime did not seek to meet representativeness (Abrams, 2010) but will be in the position to provide diverse insights and therefore participants were purposively selected because they occupy certain privileged positions which were relevant to the study. As a result, judgment about who will be positioned to provide the needed information was made before the start of the fieldwork.

3.6 Sampling of Organizations

The study employed a purposive sampling technique to select and generate a list of organisations from which officials were selected to be part of the study. These organizations were selected for their work in the area of natural resources exploration and policy formulation and implementation. Their work falls under the broad area of policy formulation and the petroleum sector in Ghana where the study is investigating. The organizations were categorized according to their areas of expertise. Since this study is about science and politics nexus on police formulations, it was appropriate to select these organizations. In Ghana, policy and its related issues have become exigent in recent times (Ireri et al.,2019) hence the need to select organizations that can help unravel science and political implications on policy formulations is of paramount importance.

Table 3.1 presents the planned sample distribution of the organization before fieldwork commenced.

Table 3.1 Sample Distribution of Organizations and Interviewees

Name of organization	Description	Interviewees sample
Ministry of Energy and Petroleum	Public Regulation Agency	2
Bulk oil and transportation limited	Public Regulation Agency	1
Tullow Oil, Plc-Ghana	Oil Exploration Company	1
Centre for Social Policy Studies, University of Ghana	Academic Institution	1
African Centre for Economic Transformation (ACET)-Ghana	Civil Society Organisation	2
Ghana Petroleum Authority	Public Regulation Agency	1
Ghana National Petroleum Corporation (GNPC)	Public Regulation Agency	1
Ghana National Gas Company	Public Regulation Agency	1
Ghana Oil Company (GOIL)	Public Oil Company	1
International Energy Agency-Ghana	Civil Society Organisation	1
Institute of Economic Affairs (IEA)	Civil Society Organisation	1
Ghana Energy Commission	Public Regulation Agency	1
Institute of Energy Securities-Ghana	Civil Society Organisation	1
African Centre for Energy Policy (ACEPA)	Civil Society Organisation	1
Institute for Fiscal Studies (IFS)	Civil Society Organisation	1
IMANI-Ghana	Civil Society Organisation	2
The Environment and Natural Resource Research Initiative (ENRRI. EfD-Ghana)	Civil Society Organisation	1
Public Interest Accountability Commission (PIAC)	Civil Society Organisation	1
Faculty of Law, University of Ghana	Academic Institution	1
Department of Public Administration	Academic Institution	1
Kosmos Energy	Oil Exploration Company	1
Aker Energy	Oil Exploration Company	1
Exxon Mobile	Oil Exploration Company	1
Total		**26**

Source: Author's construct, 2022

3.7 Sampling of Research Participants

Before the fieldwork, a sampling regime was constructed. However, in the course of the actual data collection, I had challenges in reaching out and interviewing willing participants for the study.

In all, 25 participants were granted interviews. The data collection process was terminated after interviewing the twenty-fifth participant because the process got to a point where I was continuously encountering repetition of information usually referred to in qualitative research as the saturation point. It is worth stating that the organization selected were the best ones to provide in-depth information on the role of science and politics in policy petroleum administration and policy formulation. Table 3.2 gives details of the organisations where individuals or experts who finally participated in the study were sampled for the study.

Table 3.2 Actual Interviews with Participants

Participating Organisations	**Description**	**Number**
Ministry of Energy	Public Institution	2
Tullow Oil, Plc-Ghana		1
Centre for Migration Studies, University of Ghana	Academic Institution	1
Centre for Social Policy Studies, University of Ghana	Academic Institution	1
Department of Political Science, University of Ghana	Academic Institution	1
Faculty of Law, University of Ghana	Academic Institution	1
Department of Geography, University of Ghana	Academic Institution	1
Department of Public Administration, University of Ghana Business School	Academic Institution	1
Ghana Petroleum Authority	Public Institution	1
Ghana National Petroleum Corporation (GNPC)	Public Institution	3
Petroleum Commission, Ghana	Public Institution	2
Ghana National Gas Company	Public Institution	1
Natural Resources Governance Institute	Civil Society Organisation	1
Parliament of Ghana	Public Institution	2
ENI Ghana	Oil Exploration Company	1
Ghana Energy Commission	Public Institution	1
African Centre for Energy Policy (ACEPA)	Civil Society Organisation	1
President J. A. Kufour	Former President	1
Public Interest Accountability Committee (PIAC)	Civil Society Organisation	2
Kasa Initiative Platform	Civil Society Organisation	1
Total		**25**

Source: Authors construct, 2022

3.8 Data collection method

There are several data collection methods but for this study, the research employed face-to-face semi-structured in-depth interviews with few informal discussions with the sampled experts whose expertise is important to the study. Arrangements were made with participants formally through phone calls and emails and the date, time, and location for the interviews were agreed upon and booked.

3.8.1 In-depth Interview

Interviews are regarded as a key component of qualitative research (Myers & Newman, 2007) and so this study relied on qualitative data collection approaches. Although there are variants of interviews this study employed largely semi-structured in-depth interviews. Despite the availability of a set of interview questions, these only acted as a guide and each interview took a different trend and style (Myers & Newman 2007) based on the experience and knowledge of each participant on the phenomenon being investigated. The interviews were conducted one-on-one at an open venue agreed upon by the participants. The key informants were 25 with the majority having vast knowledge of various upstream petroleum production value chains in Ghana and beyond. These experts have years of working experience with the organizations and have adequate information concerning upstream petroleum policy regulation formulation in Ghana and beyond. The interviews were recorded digitally with prior information and consent of the participants.

3.9 Data analysis technique

Data analysis for this study was categorized into three parts. The first part took place during the fieldwork. Tape-recorded interviews were played numerous times after each day of fieldwork and

before the next day's fieldwork began. Tracy (2013) advised researchers to read and listen to the data repeatedly to get immersed in the data. This strategy was useful in three ways. First, it helps to address the loopholes in earlier interviews by ensuring that questions that could have been asked as follow-up are asked in subsequent interviews; second, it will provide the opportunity for immediate follow-ups and make it possible for clarification to be sought; and finally, it provides an opportunity for identifying key themes very early in the interviewing process to help focus future interviews and assist in the eventual themes that will be adopted in the analysis of the data. The themes established in the literature were useful in guiding the development of similar or alternative themes. In effect, data analysis was done in line with the objectives and the research questions.

3.9.1 Interview Transcription

The second part of the analysis was the transcription of the recorded interviews into text. More essentially, an element of quality in qualitative research requires rigour and trustworthiness in the data analysis process. This can be achieved through transparency in the research process. Interview transcripts form a crucial part of qualitative research (Witcher 2010) and must be done naturally where there is a verbatim reproduction of the interview with every utterance included. Stutters, pauses, mannerisms, and other nonverbal cues should be captured and this is consistent with Oliver et al. (2005) assertion on interview guides and their transcriptions. To ensure the integrity of the data collected, interviews were recorded into computer-compatible formats with the permission of participants as noted under ethical considerations, the files were kept and resorted to whenever the need arose. The transcription was done following the question-and-answer format.

3.9.2 Thematic Analysis Approach

The third stage of the data analysis was to code the transcripts in three major codes according to three key themes. As posited by Braun and Clarke (2006), thematic analysis is the process of identifying themes within the qualitative data and there are many ways of approaching this type of analysis (Javadi et al., 2017). The reason for choosing this approach of analysis helped in identifying the themes and in this case, the interview questions were used as the themes as posited by Clarke and Braun (2013). The study in adopting this approach further incorporated the latent theme type where it looked beyond what has been provided by the participants examined the ideas and assumptions, and conceptualized them in shaping the content of the information. Again, Braun and Clarke's (2006) framework was adopted as shown below.

Table 3.3: Six-Phase Framework for Thematic Analysis

Steps	Outcomes
1	Familiarity with data
2	Generation of initial codes
3	Search for themes
4	Review of themes
5	Define themes
6	Write-up

Adopted: Braun & Clarke (2006) six-phase framework for thematic analysis

As shown in the framework, the transcripts were read overly for familiarity and they helped in getting an early impression about the data on each organization interviewed. In generating the codes, the research questions were relied on and helped in coding each segment of the data relevant to the research such as the relationships between the two

phenomena, the formulation approach, the challenges, contribution of stakeholders among others. Concerning these themes, most of the codes fitted into the themes since the codes generated were on science and political implications, and challenges among others, and are descriptive. The next stage which is step 4 is about the review of themes identified in step 3. These were modified and developed into preliminary themes and each data associated with each theme was cut and pasted under it as suggested by Bree and Gallagher (2018). In step 5, the themes generated will be refined and they will be used for the write-up in step 6. This form of analysis approach was crucial for the study because it aided in getting the right information for the writing of the report.

3.10 Ethical Consideration

Ethical issues are crucial in the general acceptability of modern scientific research and so all stages of the research followed the ethical principles acceptable in social science research. First and foremost, academic research at the University of Ghana is controlled by an Ethics Committee for Humanities that sets out the ethical standards for every research. Ethical clearance was therefore sought and permission was obtained from the University of Ghana Ethics Committee for Humanities before the commencement of the fieldwork.

To ensure that qualitative research meets quality standards, several elements including a) worthy topic, b) rich rigour, c) sincerity, d) credibility, e) resonance, f) significant contribution, g) ethics, and h) meaningful coherence (Tracy 2010) were also considered.

Similarly, for confidentiality and anonymity, the actual names of participants in this study were substituted with pseudonyms. This was ensured through the adoption of relevant

pseudonyms for all respondents. Data collected will also be protected from external parties and stored in private and protected storage devices until the data is completely discarded after data analysis.

Again, official permission and clearance letters were issued to all agencies and organizations identified for participation in the study. These letters clearly outlined the purpose of the study and sought their formal consent before any involvement. A consent form was handed over to organizational representatives to sign to confirm their consent when they agreed to participate before the commencement of any formal interview. In line with individual rights of informed consent, the permission and informed consent of all participants were individually sought and obtained as well. Institutions and representatives of organizations were not coerced to be part of the study but were informed of all their rights and were provided with the right to withdraw at any point without giving any reasons if they wished to.

Further, there were no secret recordings of interviews in the course of the study. But for the purposes of transcription and accessing quality data, interviews were recorded and transcribed, participants were duly informed and their permission was sought before the recording. However, recordings will not be entertained if the participants decline. This study was conducted according to all the research protocols and all appropriate ethical considerations for PhD dissertations at the University of Ghana and as advocated by Tracy (2010) in qualitative research.

3.11 Researcher's Positionality

The researcher's positionality refers to his/her traits that tend to influence the research outcome. Such traits may include, the researcher's religious background, political affiliations, philosophy and ideology, socio-economic class and many others have the potential to influence participants' presentation of their realities in policy formulation. I acknowledge that my background as a trained and practising lawyer researching regulatory policy formulation which is legally related could impact participants and outcome of the study. However, to ensure the credibility and validity of data collection,I remained neutral and where possible employed the services of research assistants who conducted the interviews for future transcription.

3.12 Reliability and Validity of Research

Verification in research refers to the procedures utilized throughout the research process to contribute gradually to assuring reliability and validity, and hence the rigour of a study. These processes are woven into every step of the investigation to build a robust study (Creswell, 1997; Kvale, 1989) by detecting and fixing flaws before they are integrated into the evolving model and undermine the analysis (Creswell, 1997; Kvale, 1989). Thus, reliability and validity are important indicators for measuring the rigour of research instruments. There are various methods by which the reliability and validity of research instruments can be established and these are based on the research strategy employed in a study relative to reliability and validity, Yin (2012) notes the methodological procedures should be documented consistently, supported by the construction of thorough study protocols and a database so that others can follow comparable techniques. For instance, to

ensure reliability in qualitative data, themes that were established during analysis were carefully specified so that their meanings were consistent regardless of the number of analysts (Miles, 2017). Another strategy that the study employed was to ensure the reliability of qualitative data to allow a more knowledgeable coder to analyse all data after a coding scheme has been established (Campbell et al., 2015). To ensure the reliability and validity of this research the researcher spent a significant amount of time on the research, developed a deeper understanding of the study, piloted the interview guide, and gathered data from multiple sources-in-depth interviews and from relevant official documents. A good rapport was built between the researcher and the study participants which was key in avoiding the risk of misrepresentation of the data. The researcher also embarked on member checking where he shared the findings and interpretations of the data with participants and sought their feedback to ensure that the analysis aligned with the experiences and perspectives they shared. As a practising lawyer who is familiar with issues of policy in Ghana, the researcher kept reflecting on his own biases and preconceptions throughout the research process. He also kept a research journal to document his thoughts and feelings, which can help improve transparency and his self-awareness of the research process. All necessary scientific research ethical considerations were adhered to by the research to strengthen the overall quality and trustworthiness of your study.

3.13 Chapter Conclusion

In line with this study, the chapter presented a methodology outlining semi-structured interviews and documentary reviews as the key methods that will be adopted for data

collection. This chapter will be useful in providing both a philosophical and methodological basis for the research. This is in line with the qualitative research evaluation criteria suggesting that the choice of appropriate methodology is important to ensuring research quality and robustness.

CHAPTER FOUR

The Nature of the Science-Politics Relations in the Policy-Making Process in Ghana

4.1 Introduction

This chapter examines the role of science and politics in policy formulation in Ghana. The core focus of this chapter is to examine how science and politics have over the years influenced policy-making in general in Ghana. For a heightened understanding of the issues of policy formulation before delving deeply into broad public policy issues and then public policies in the petroleum sector of Ghana, the chapter started by exploring the views of experts on the public policy environment, policy formulation bodies, and the roles of science and politics in policy-making.

4.2 Policy Formulation Environment in Ghana

Many factors are identified to either facilitate or hamper policy development in every field of management. The processes and nature of how policies are formulated coupled with actions of key actors are critical to the development agenda of governments as well as the national interest of every country and Ghana is no exception. The broad literature however suggests that policymaking in critical sectors of the Ghanaian economy is highly influenced by elitist interest rather than national interest (Gyimah-Boadi & Prempeh, 2012, Abdulai, 2017). These conclusions are based on outcomes of previous events of competing elitist interests and their implications on the development prospects of Ghana (Oduro et al., 2014). This section aims to use the knowledge and

opinions expressed by the participants to elucidate the general understanding of the policy-making ambience and reveal the issues that influence how contributions are made in policy-making processes in Ghana. The major aim of this study is to find out the role of science and politics in this phenomenon. The findings show that the participants were divided on whether the policy public environment is influenced by science or politics. A section of the participants who were proponents of the view that the Ghanaian policy environment is more welcoming to the contribution of science to policy formulation saw science as not only scientific data from research but the application of technical expertise that gives direction to policy from the initiation of intent through to drafting, the implementation and appraisal stages. A public sector worker and an expert working in the technical field of the Ghana petroleum industry expressed the view that:

> *"The public policy environment is more of science. The very nature of our operations informs how you will operate. An example is the Makondo disaster in Mexico where there was a huge oil spillage and it brought the operations of that field to a halt. It was a failure of policy, a failure of the systems and procedures that were supposed to implement those policies. One of the things they also saw was poor communication. Internal politics will bring your policy to failure" (Public Official 7).*

His view is a strong demonstration of a non-ideal policy environment where the poor consideration of science in policy formulation leads to failure in policy implementation. The proposed ideal environment could better predict possible outcomes and challenges at the initial stages of the process as well as unravel ways of averting potential policy failures. All these attributes of science make expert input imperative to policy development. Aside from the views expressed above, another perspective from a participant in the petroleum extraction sector described the Ghanaian

policy environment as positive. His optimism was born out of the fact that the government shows concern and accommodates the views of industry. He intimated that:

> *If you ask me, I will say the policy environment is largely positive. Largely positive in the sense that even though the government develops its policies, it gives ears to an industry where there are some challenges. The legislation is drawn from policies. The government is very accommodating of industry views when some scientific data arises. Whatever concerns the industry raises, the government has been very accommodating. For me, I think it is positive. If we can also do pre-engagements and not wait until things go sour, I think we can minimize some of these challenges. Other than that, I think I'm very optimistic (Oil Com Official 1).*

The expressed view shows a positive policy environment where expert views are solicited in policy formulation. However, the expertise of people from the industry is only solicited when there is a dead-end in the process. Thus, in spite of the professed use of science in the policy-making environment, industry players are not invited into the policy formulation process at the initial stage. Industry or scientific contribution is only recognized when challenges are identified in the course of the implementation process and their opinions may be sought only if they could ameliorate the process. This probably depicts the real state of the Ghanaian policy environment where anecdotal and scholarly perspectives indicate that the role of science in policy formulation has been inadequately exploited.

An astute Ghanaian politician, a law-maker and a member of the current Ghanaian Parliament sadly admitted the need to employ science in policy making but bemoaned the reality of the underutilization of scientific knowledge in the policy formulation environment:

> *"The policy environment is good but some of the policies are gathering cobwebs because they are political considerations. You cannot assent to a policy without scientific data. Science informs what to do but I've been told that it is not working off late, I think we need to look at it again. How can science be made to toe the line of politics? Science at the sufferance of politics. Scientific orientation can suffer because of the way politics is being done. Vice versa" (Hon MP 1).*

Aside from a validation of the existence of idling stated policies in a poor policy environment, this claim postulates a confirmation of this view even among law-makers that in the policy environment in Ghana, science should be a critical ingredient in policy-making but has been relegated for the promotion of other competing ingredients. This most patronized factor tends to be politics. The views expressed by most of the participants were also that policy is driven by politics with less consideration given to science. Rather, political ideology influences the policy direction. These were captured as;

> *"The policy environment in Ghana is partisan to the point that science doesn't matter again. It is partisan to the point that science has to be political. What I'm trying to say is that whatever you say, they will view it from a political angle. It is fact if it agrees with their political ideology but fiction if it doesn't. And that is where the issue is" (Academic 1).*

This point supports the speculation on the dominant political interest in the Ghanaian policy-making environment which culminates in the relegation of science to the confines of the policy-making processes whilst making efforts at drawing scientists into the political folk in their bit to influence scientific outcomes. Thus, only scientific results that align with the political interest are

considered or accepted. The academic further added: *"If you look at the policy space and politics in Ghana, you will realize that politics seems to have an overwhelming influence on the policy, so we always create room for the political elite to manipulate or manage the policy in their interest" (Academic 1).*

The dominant influence of political players in the policy-making environment is neither ground-breaking practice nor peculiar to Ghana. Over the years, scholars including Shulman (2007) and Tebele (2016), a group of scientists like the Union of Concerned Scientists (UCS) have taken a position which suggests that scientific integrity has been compromised politically, scientific integrity in policymaking has become politicizing science (Union of Concerned Scientist, 2005). This study corroborates the Union of Concerned Scientist Report which further explained that many times scientific results are discredited if they conflict with the official position of administrative policy of the sector, distorting government research by editing out results that disagree with the scientific data and removing information from government websites, among others. As noted in Chapter Two, empirical evidence available attests to the fact that the relationship between science and politics is not unidirectional and therefore factors emanating from the practice of politics and scientific investigation outplay each other and must be treated in conjunction with each other to advance the course of scientific contribution to significant political decisions that are of national interest.

In an attempt to throw more light on the Ghanaian policy environment coupled with the inadequate incorporation of science in the policy development process, another academic and a policy expert laid the cause of this on the reliance of existing policies to make new policies. Although existing

policies can serve as a reference point for the development of new policies, the challenge in our case is the less consideration for our domestic differences. A participant explained that:

> *Most of our policies aren't domestically determined. Usually, we take what has been done by other countries and try to do the same in our environment but it's not derived from domestic factors that are relevant to our economy. We take it from somewhere backed by other factors. The fact that it is backed by science does not mean that it is science when you consider it our domestic affairs" (Academic 3).*

The neglect or the adoption of undomesticated interest which could be aptly generated from scientific facts into the policy formulation process is explained by some factors. However, the majority were unanimous on press for time and external influence. The various views on timing are summarised as follows:

> *"This is probably the case because the length of time available for policymakers to go through the policy-making process is limited. So, if you want a policy to originate from the people or scientific data, this may be time constraining, so, they may consider science in some sectors but not all the sectors. Science will be blocked in other sectors. (Academic 3).*

As noted in Chapter Two, policy formulation processes are not devoid of external interest and influences of donors, foreign policy actors, and foreign investors. Policies that attract the interest of these organisations which are outside of government machinery and decision making will seek to achieve their interest by contributing in diverse ways including logistical, financial and expertise through their input (Edelman, 2009) without recourse to data that is locally relevant. This literature is confirmed by a policy expert in the public sector:

> *Well, I will not say that is the actual case. When you take the sponsor and develop parties, yes, they make a lot of demands and also sponsor the operation of some of these policies and therefore the implementers of the policy also put certain things there to meet up just as to satisfy the sponsors (Public Official 5).*

The findings on the preceded discussion on the Ghanaian policy formulation environment divulge the fact that science has a lesser influence on policy making process because of the greater influence of political interest and the poor synchronization of the content and objectives of Ghanaian policy to domestic reality.

4.3. Policy Formulating Bodies in Ghana

Ghana's constitution has incorporated the Executive and the Legislature as the two significant institutions primarily responsible for developing and approving public policies in Ghana. The Judiciary also undertakes some public policy-making tasks, but it is not a primary organ in the policy-making process because it is only called upon when there is a need to settle constitutional disputes regarding public policy and its design (Constitution of Ghana, 1992; NDPC, 2020). Policy-making is an important function of government because it allows the organs of government to deal with major issues that impact individuals in society. Institutions that assist the government in its policy-making role include Ministries, Departments, and Agencies (MDAs) whose policy formulation mandate is critical to accomplishing overall national development goals and resolving recognized matters of national concern (NDPC, 2020). Based on this background, the study sought to engage the study participants on their perspectives on the bodies that formulate public policies in Ghana. From the interviews, the majority of the participants corroborated that Government ministries form the major policy-formulating body for policies in the country. In their view, every

ministry drives the formulation of policies that are specific to their sector of operation with the support of their departments. The agencies of the ministries however support the implementation of these policies. The majority of the participants mentioned that policies are initiated by appropriate ministries but government departments and agencies can sometimes be tasked by their respective ministries to make inputs when formulating policies. One of the participants from academia who made specific reference to policies in the energy sector stated this: *"I know of the Energy Commission, National Petroleum Authority, Ghana National Petroleum Cooperation providing support to or play a major role in terms of energy policy related making which is the responsibility of the Ministry of Energy and the Ministry of Science and Environment" (Academic 3).* This point was further clarified by another participant from the oil industry that commissions in Ghana, however, do not have policy-making responsibilities:

> *The commission is not a policy formulation institution. The Ministry of Energy within the framework of the public sector is responsible for policy formulation. We as a commission recommend policy to the minister. So, he or she actually decides what thought to take from the policy (Public Official 3).*

However, a participant from Ghana's energy sector gave a list of bodies including stakeholders that constitute the team that formulates the energy policy. This suggests that all sectors of the Ghanaian economy that are relevant to a specific policy are consulted to make contributions to policy formulation in Ghana:

> *In doing that, the practice constitutes a stakeholder team consisting of relevant institutions at the Ministry of Energy. For example, in energy policy, we have almost all the sectors in the economy not only petroleum. We have the Petroleum Commission, MPA, VRA, Energy Commission, Quick Power, ECG, and almost all sectors in the economy. When you talk*

about the gas policy, we have the Petroleum Commission, Energy Commission, and GMPC among others (Public Official 5).

Although the government is the primary initiator and formulator of public policies, the actual work also involves the service of different experts from both the public and private sectors. This view which encapsulates that of several participants was expressed as;

"The policy is being drafted by the policy drafters based on the issues on the ground. Sometimes we use technocrats to draft. But there is a disconnect between the policy formulators and key stakeholders because ideally for a setup which is drafting a policy, it is expected that when you draft a policy, you have a 360° kind of stakeholders. The academia, scientists, industry, and economists among others. Policies are not like regulations that can easily be changed" (Oil Com Official 1).

The findings suggest that even though technocrats, scientists or people with the expertise and relevant technical know-how are invited to the initiation and drafting stages of policy formulation, the composition of the team is not as all-encompassing as expected since certain key stakeholders such as those from academia, natural and social sciences, industry who can make a cogent contribution to the success of the policy are excluded. This indicates that the policy formulation environment in Ghana is marked by a significant lack of scientific input in policy-making processes.

The findings also reveal that although every ministry in Ghana has a Research Statistics and Information Management Directorate (RSIMD) or a semblance of such departments, research institutions and agencies are less unutilized in the public policy formulation processes. A participant from academia firmed this finding by stating that:

> *"In Ghana, the regulations and policies are done by sector ministries. They have a research department just that they are not active. They do not work until there is an issue and for most of the policy, these departments are just not active in formulating policies. There has to be evidence. You need to get information. But the data is not available because the departments are not resourceful" (Academic 4).*

A member of parliament who forms part of the chain of policy formulation process confirmed the role of parliament is not to formulate policies, what parliament does in relation to policy development is shaping the policy for acceptance by the executive, that is the ministries.

> *"No, we do not do policies, we do proffer views and ideas. We leave the policy consideration to the minister. When the minister brings an issue before us, we implement it in the aspect of practicality and intellect. If he wants to adopt, that is fair but we don't force policies on the minister. That is for the government to do (Hon MP 1).*

The statement from the member of parliament resonates with a report by the National Development and Planning Commission (NDPC) that parliament performs an important role in evaluating government policies, programmes and projects which is part of its oversight responsibilities on the executives rather than policy initiation (NDPC, 2020).

4.4 Policy Formulation Processes in Ghana

This section focuses on the processes involved in policy development in Ghana. Globally, policy development has been the point where actors discover and evaluate potential solutions to policy or developmental gaps while considering the benefits and potential drawbacks, and deciding which measures should be adopted and which should be excluded either temporarily or permanently (Howlett & Ramesh, 2003). Hence, the public policy formulation process begins with the

recognition of an issue, a gap that demands public policy attention. Public policy scholars refer to this stage as "the agenda-setting stage". The stage where the problem that needs policy attention is identified and a team of experts is assembled to consider the required action based on the prevalent national ideology or the interest of the dominant social group in the country (Howlett & Ramesh, 2003; Garraud, 2004). In Ghana, the determination of policy issues opens the way for policy intent, which could be conveyed through the 1992 Constitution, the government's manifesto, the President's Coordinated Programme of Economic and Social Development Policies, the National Development Policy Framework, or regional and global commitments. At this point, either the President or the MDA initiates public policy (NDPC, 2020). Concerning the process of formulating policies in Ghana, several participants indicated that the process involves stakeholder consultation championed by the sector minister in question. A participant who is currently a member of parliament and a former minister intimated that: *I think the minister is to bring the stakeholders on board who will inform him on how to best situate the scenario in the Ghanaian situation (Hon MP 1).* This statement was firmed up by another participant from the Ghana petroleum industry: "*Government invites input, we help contribute but policy formulation is purely the government's business. There is a situation whereby there is stakeholder consultation so the government will inform you to make contributions but it is not a regular thing" (Oil Com Official 1).* These are corroborated by the work of Howlett and Ramesh (2003) as stated in Chapter Two that agenda-setting is a socially constructed process which usually attracts the role of the ideologies of the people, policy-makers, stakeholders, experts from the industry to gather empirical evidence to support and the existence of the problem and the possible solution. It is at this stage also the roles of sector ministers (politics) and expert knowledge (science) require judicious collaboration in the policy formulation process. The data also revealed that although policy formulation is a

political initiative, scientific research is an integral part of the process in identifying possible bottlenecks and generating a procedure to guide the entire process as well as make expert inputs. This idea was captured as follows:

> *Before the policy formulation is done, we do research, a scan has to be done, of the key challenges that we can identify that are important to the state. The key challenge, like the policy I am trying to recommend to the minister, the minister has to formulate. Like the issue of digitization, the key challenge is how the policy will provide guidelines for that activity to be done. We do the research, we identify it, we look at the issue and make a proposal to the minister. We first scan the sector to identify key problems. After that, we come to the office and talk to industries civil society organizations, and others who are in the sector. After that, we draw up proposals and through the lines of the CEOs, the proposals are accepted and forwarded to the minister. Over there, the ministry takes it into the formulation process of stakeholder engagements and what have you (Public Official 3).*

Thus, after the agenda setting, experts from the scientific community and other stakeholders make further proposals to the minister for the policy formulation process to continue. This implies that the role of science and politics is always critical in the agenda-setting process. Another aspect of the agenda setting in the policy development process as indicated by some of the participants is validation of the problems identified. This task is carried out by stakeholders who validate, confirm and prioritise identified issues from the research outcomes. This was highlighted as follows;

> *"...the formulation process you may have intentions but that intention doesn't make it a policy. You have it, you put it, you formulate it, go through it and people may talk against it giving arguments, opposing it and giving reasons why they don't like it so before it comes*

back you will make some changes in it and sometimes even where it becomes a law it's a policy that for this given discipline or this is the policy in this area and that's how as a government or institution intends to do and probably sometimes backed by law but of course not everywhere it needs to go through everything but ones you get to that time the guidelines and everything will be there and it becomes a policy that you've to follow to achieve your goals" (Academic 3).

Thus, the process also avails itself for public scrutiny of government intentions. This exercise may also engender suggestions on the relevance or otherwise of the policy and the problem that it is to mitigate. The findings in this study also disclosed that not all identified problems require policy intervention since policies are developed to mitigate challenges that go beyond the internal capacity and interest of the respective ministries. Policy formulation may therefore not be needed if the identified challenge can easily be solved. A participant from the public sector stated this in this manner:

When there are gaps, sometimes you may not necessarily have to use policy. Depending upon the quantum of the gap and whether you need management intervention to close that gap. If you need management intervention, then you must develop a policy. If it is within my power, I do not need to develop any policy. Policy decisions come in when the problem or gap is cut across other sectors in the company (Public Official 6).

The dominant theme in this section is that stakeholder consultations including the seeking of scientific knowledge are key in policy formulation in Ghana. This claim is however contrary to the NDPC Report (2020), that many public policy documents have been completed without extensive stakeholder consultations. The claim by the NDPC is substantiated by the study participants from academia who indicated that although there are some sort of consultations at

some point in the process, however, the expert views gathered do not form part of the final policy document. Probably most of the consultations are more politically oriented than scientific. This raises issues of disequilibrium in the role of science and politics in policy formulation in Ghana which is at the centre of this study.

4.5. The Role of Science and Politics in Policy Formulation

This section of the study analyses the role of science and politics in policy formulation in Ghana. As noted in the first chapter, science is operationalised as the outcome of scientific research or experiments and the application of expert knowledge to inform decision-making. Politics on the other hand is used in the study to denote the use of government machinery to exercise power in decision-making, allocation of resources as well as the ability to influence the decisions of others. The two variables have a greater inclination to influence not only decision-making but also the development of critical national or public policy (Wynne & Lynch, 2015; Keate, 2021). Science is considered a constituent of the political process because it informs how politics and political power are exercised in the distribution of scarce societal resources to meet scientifically identified needs (Cheng, Kruger & Daniels, 2003). Political systems have also played important roles in supporting the production of scientific research (Keate, 2021). Previous studies have also analysed the extent to which the findings of scientific research influence political decisions and how political decisions influence the funding of scientific research (Silver, 2005; Keate, 2021). Based on these arguments, it is not a novelty that science and politics work hand-in-hand however, over the years, the role of science in public policy formulation is changing (Silver, 2005). This trend emanates from some factors including dwindling and conditional funding for scientific research. This practice has therefore culminated in some researchers shifting their focus and the objectives of their research

projects to align with the demands of funding organisations (Van Dyck, 2002). A contrary developmental discourse and schools of thought also have it that notwithstanding these happenings, science and politics are mutually exclusive and rarely separable, particularly in terms of public policy formulation processes (Keate, 2021). As a result, most governments in developed countries prefer to consult experts when developing policies (King, 2016). It is against this framework that this study sought the opinions of participants on the role of science and politics in policy formulation process in Ghana. The section first analysed the role of science in policy formulation and then moved to the roles of politics in policy formulation. In the analysis of science as an influential variable in policy formulation, the themes that emerged included; science serving as a basis for the policy formulation process, science providing evidence of issues on the ground as well as science complementing the politics in policy making.

4.5.1 Science Precedes the Policy Development Process

The majority of participants recognized science as a fundamental cornerstone of policy formulation, emphasizing its role as the foundational factor in the policy development process. The participants emphasized that science precedes the policy development process;

> *"Science is at the beginning of the policy-making process. The process is circular. Science starts the process; the needs are determined when science comes in. Science should be at the beginning, quite frankly science should be the hydrating factor, there should be a constant interaction between science and policy formulation. They both have different motives quite frankly; the life cycle of science may be much longer than that of politics. I believe the policy has a shorter requirement. Science takes time. Politics may not be able*

to wait for science but science provides data and it is fundamental and provides the basis for policy-making" (Public Official 4).

Aside from the acknowledgement of the fact that science makes available the required data to commence with the agenda-setting part of the policy formulation process, the participants also did not only indicate that science should inform the inception of the policy-making process but it informs the policy-maker to have a first-hand grasp of the enormity of the policy issues, the required resources and the procedure for developing policies. In their view, a great quantum of information needed to inform the whole content of a policy is gathered through a scientific research exercise which ideally and in reality, should precede the policy formulation process. One of the participants indicated that:

I think science comes in from the onset, when you are doing research, you talk about data collection, you talk about statistics so that is where the science comes in. Without science, we cannot analyse or identify the tools. Science is key. Science informs policy. Science helps us to understand and appreciate the gravity of the issue (Public Official 3).

The participants were in unison about their opinions on the role of science as the basis for policy formulation. They were also of the view that science has to always provide policy direction to policy-makers. This is what one of them had to say:

"So, if there is evidence that a given cause of action could make you achieve a given goal or solve a problem, science provides that direction. Consistently, science has provided or given a way to go about problem-solving. The policymakers should always take the way of science because if there's a linkage and the cause of action, science sets that path to achieve the goal of that action" Academic 3).

The consistency of science in providing policy direction throughout the policy formulation process is born out of the fact that science has always filled all policy loopholes and corrected ambiguities in the final policy document. Thus, science does not only commence the policy formulation process and guide policy-makers in the development of the policy but it also authenticates the policy by ensuring that all policy loose ends are tightened. This finding is consistent with the United States of America's National Research Council (2012), that science contributes to policy in two ways, firstly by accurately contributing to the understanding of social conditions and how humans react to social conditions including assessing the causes and consequences of human behaviour. Secondly, scientific methods are useful in policy formulation because of their methodical nature.

4.5.2 Science Provides Data as Evidence in Policy Formulation Process

The commitment to the ideals of Evidence-Based Policy rests on the fundamental idea that policy decisions ought to be grounded in available evidence and guided by rational analysis. This is attributed to the belief that policies informed by systematic evidence tend to yield superior outcomes. The 2020 NDPC Report on Guideline for Public Policy Formulation in Ghana bemoaned the lack of evidence and data on which decisions on policy directions are underpinned. The finding of this however divulges that one other role of science in the policy formulation process as indicated is that science provides data which is used as evidence for the formulation of policies. It was deduced from the findings that the absence of science in the policy-making process will render the final policy empty and irrelevant to meeting the actual needs of society since it will lack historical backing. Policies without scientific evidence will rather only achieve partisan political interest. A participant indicated this:

> *Well, if you develop a policy without science, there will be a hollow policy because your policy needs to have historical data and you must prove that the policy needs will be well addressed. You make this happen because the politicians have made promises to the people. So, let's do a policy but the foundation here is science (Oil Com Official 1).*

A section of the participants was also of the view that science provides the evidence that gives the assurance that a policy will achieve its intent when formulated. They believed that since policy has a linkage with national development, it is through the evidence of scientific data that a policy can confidently demonstrate that a policy will contribute to the development of a nation. One of them has this to say:

> *"For science, science participates in the sense that people need evidence. People need evidence to arrive at a decision. That policy is good and will yield positive results so that is where science comes in. To be able to show evidence and to prove and establish a relationship between policy and development. That is where science comes in. "(CSO Official 1).*

According to the 2020 report on Guidelines for Public Policy Formulation in Ghana by NPDC (2020), in every policy formulation process, adequate qualitative and quantitative data is required not solely for analysing the policy issues but also to provide evidence to understand the policy background after all strategic assessments are completed. One of the participants noted that the importance of data is validating policy by indicating that: *"The fishing commission should be able to know the number of catch and use data to support whether there is adverse impact or not and whether there is the need for a policy intervention to what directions" (CSO Official 1).*

Data from science and the appropriate data are central to formulating a policy that aims at achieving the right results. From the viewpoint of participants, notwithstanding the role of data, the wrong data could be catastrophic to policy documents. According to a participant from a policy formulation agency, relying on assumptions without data backing will lead to the failure of policies. This is what he said:

> *"Well, science is necessary because if you don't have the right data, you could end up with the wrong policy. You have the data but do not have the right data that will back the strategy or the approach, which is likely not to work. Assumptions are what drive policy-making, you are likely to come out with a wrong point. A lot of policies are based on consistent scientific assessment of what the resources are. So, science is very fundamental". (Public Official 3).*

This narration is supported by another participant who indicated that decision-making and policy-making in this dispensation have become more scientific because of the availability of data. Therefore, data is needed at every stage of the process to authenticate the issues that require policy intervention. Scientific data therefore serve as a test for the need for a policy intervention. This data can be achieved after scientific analysis of the pressing concerns such as human behaviour and needs with past and present occurrences.

> *"I think we are in a data-driven era, and that particularly makes every decision a scientific decision... Now there is a lot of data, whatever you want to do, you need data. For policy-making in a data age, every policy must be backed by statistics, models, theory, evidence or events over time. For policy to stand the test of time, and because policy deals with human behaviour, you need a particular sector that the policy affects, you need to analyse events over time to be able to draft a policy that will respond appropriately to historical*

scenarios or behaviours or patterns over time. The decision or policy-making stage is more scientific now because of the effect of data, and the existence of data analysis to software." (CSO Official 1).

Although all the afore submissions by the participants in this study are of the strong view that scientific data is necessary for providing evidence to support policy, there was also a general agreement on the existence of apathy on the part of policy-makers towards the use of data in policy formulation. One of such narratives is that: …… *is one area where we deliberately ignore science. We don't make use of the data even though it is available for use. We ignore scientific processes on how people's lives are affected". (CSO Official 1).*

Generally, to make well-informed policy decisions and assess their potential impact, it is imperative to gather scientific evidence to comprehend the evolving policy landscape. This evidence is critical to estimating the expected consequences of policy changes, helps in making choices between various policy options and analysing their effects. Furthermore, scientific evidence enables policymakers to establish clear connections between our strategic goals, planned outcomes, and policy objectives. By demonstrating the logical and evidence-based links between our current actions and the desired outcomes (Howard, et al., 2021).

4.5.3 Science Complement Politics

While evidence plays a crucial role in policymaking, it's essential to recognize that numerous factors influence the policymaking process at each stage of the policy cycle. Apart from science preceding policy formulation and also serving as evidence for policy formulation, the study also

found that science also complements politics in the policy formulation process. In many circumstances, science and politics complement each other however, politics works within the larger ambience of science, thus, all political activities are procedural which is a core attribute of science. This was explained by a participant as;

> *First of all put the science down, all the work we do is science. Even how politics works is also science. Without the application of scientific methods and theories, no political activity will succeed because politics is more or less about how things work. They follow a certain process which is scientific" (Public Official 7).*

Science provides political actors with an analytical lens to understand human behaviour, needs and how to intervene in terms of policy direction and decision (National Research Council, 2012). These findings align with the OECD (2011) assertion that policy must be guided by solid scientific research and analysis to achieve the intended results. Even though effective policy formulation requires the input of science as much as politics, the literature suggests that politics has a greater influence on the public policy-making process compared to science. As such, not many scientists are interested in political and societal deliberations on matters of public good (Van Dyck, 2002). Those in favour of political dominance argue that in democratic systems, science is only one of the multiple options as a source of knowledge for public policy considerations (Silver, 2005). Blowers et al. (2007) intimated that even though scientific research identifies problems and delineates solutions, science alone is weak in implementing problem-solving measures through public policy. The application of scientific propositions to policy-making is wrought by politically related factors such as resources, choices, democratic decision-making, conflicts, ideologies, values, justice and priorities. Policy making is therefore politically weighted as noted in Jones et

al. (2009), that policy is a plan of action grounded on certain principles and decided on by a group of individuals with vested authority to administer, manage and control access to resources.

4.5.4 Politics and Policy Formulation in Ghana

The public policy-making process at every stage is not only wrought by rationality and scientific data but the interplay of political power, cultural values and competing interests (MacLennan, 1980). Politics plays a critical role in driving public policy formulation processes. As Cohen et al. (2013) argue, political actors and institutions shape the agenda-setting, policy formulation, adoption, and implementation processes. In other words, policy decisions are not neutral or objective but are subject to the influence of political actors and processes. The study therefore examined the role of politics in the policy formulation process of Ghana. Varied responses came from the participants. These views embrace narratives that politics drive policy decision-making and also drive the policy formulation process.

4.5.4.1 Politics Drives Decision-making in Policy Formulation Process

Policy-making is the government's core responsibility. The previous discussion revealed that political actors were the dominant drivers of the policy-making process because all public policies in Ghana are initiated by the various sector ministers who are political appointees of the government. Politics was therefore found to be synonymous with decision-making in the policy formulation process. Thus, public policymaking is inherently a political process. The majority of participants believe that the policy-making process is inherently a political action, typically initiated by political institutions and led by political authorities. Therefore, politics is the first step

in the policy formulation process. The following narrative further illustrates the views of the participants; *"...politics is all about decision-making and it is the same in policy making. Once you decide to do one thing and not the other, is politics for me" (Academic 1).* Politics is about the power to make choices on issues. This choice is only exercised by those endowed with political power in the performance of their political duties. Technical experts even working as senior officials in the ministries lack the jurisdiction to exercise political power. As a result, they may only play advisory roles but do not exercise power in the policy decision-making process. A lawmaker indicated that: *"…… technocrats do not drive the government policies. They only advise the government. For example, the Chief Director's view is not binding on the minister because the minister has to take the ultimate responsibility" (Hon MP 1).* Consequently, the ultimate power to drive policy decision-making lies with the political actors since they have the constitutional mandate to perform this responsibility. However, the execution of this mandate is influenced by certain factors as noted by a participant from a civil society organisation:

> *"Politics basically has to do with the right to govern, so the policy maker in most instances is a politician and a politician will usually be influenced by his political ambitions or political sector in taking decisions and how that decision will affect or serve the majority of the people. So, politics or governance is one of the key determinants of a good policy. Politics ensures that systems are put in place within those premises to have the checks and balances of things to ensure transparency and to ensure the majority of things are done well" (CSO Official 1).*

This view shows that decision-making is influenced by the interest of the politician even though the ultimate aim is to serve the public interest.

Although the majority of participants clearly stated that politics play a role in the policy formulation and decision-making process, some participants cautioned that politics becomes problematic when it is partisan. Policy decisions may then be made based on the politician's and the party's interests rather than the concerns of the general public. This was explained as;

"Partisan politics is where we take an entrenchment position based on a particular identity and that is perhaps making the policy space weak in Ghana and perhaps distinguishing Ghana from any other places". (Academic 1). This notion implies that policy decision influenced by partisan interest affects the policy-making process and the actual intent of the actual policy. The concern about partisanship was reinforced by an academic that:

> *"That is a different thing. The partisan becomes where the issue is. And that is the distinction between Western and African countries. Because in our case, it is the partisan that has overwhelmingly taken over everything we do. The USA is the most divided place in the world but at times, they have policies that are decided on a partisan basis." (Academic 1).*

Politics plays a critical role in shaping the decision-making process in the public policy formulation process. Political factors such as partisanship, political ideology, and interest groups influence each stage of the policy formulation process. As such, policymakers need to consider political factors when formulating and implementing public policy.

4.5.6. Politics Drives Policy Formulation Processes

Public policy-makers in the political arena often choose issues based on their political goals, values, and vested interests. However, these decisions are not made in isolation but rather are

influenced by a range of factors, including public opinion, media attention, interest groups, and electoral considerations (Kingdon, 2003). Thus, politics drives policy formulation in several ways, including shaping the policy agenda, influencing policy formulation, and determining policy implementation processes. The findings of this study therefore confirmed that policy formulation is driven by politics and its antecedents. Public policy formulation bodies are led by politicians who direct policy formulation processes through resource allocation. These were mentioned by participants;

> *"Political leaders will be the implementers of the policy. Almost all policy involves the allocation of resources and somebody should determine where we should put those resources how to allocate those resources and who should benefit from those resources so politics will determine each of these things. For policies to meet the interest of those in charge, they should be in line with what politicians want. Politicians will ensure that policies are formulated to meet their interest" (Academic 3).*

This shows that the interests of the political actors are very paramount in the determination of how policies should be formulated and even how they should be implemented. Another participant indicated that;

> *"Politics is also key, especially in the area of policy formulation and ensuring that the various industries play their roles and are mandated to work according to the policy recommendation. The political powers of the ruling government become the guidelines for activities that take place in the oil and gas sector. I believe it is key." (Public Official 3).*

These narratives demonstrate that politics drives public policy formulation processes through various mechanisms, including stakeholder engagements, and agenda-setting. This posture neglects the ideal situation where policy-makers need to balance the role of science and politics in

a context where policy development ensures that policy decisions are evidence-based, transparent, and accountable.

4.6 Chapter Conclusion

The chapter set out to analyse the nature of science-politics relations on policy formulation. The discussions on the policy environment, policy-making bodies and policy-making processes in Ghana show that the Ghanaian policy environment though employing the use of science in the policy decision-making process, is highly political. This is because, based on the provisions of the 1992 Constitution, public policy-making is a political responsibility. Other stakeholders are consulted when their expertise is required. This notion therefore permeates and informs public policy-making processes in most sectors in Ghana. The analysis on the role of science and politics on policy formulation concluded that, when it comes to the role of science on policy formulation, science serves as the foundation of the policy-making process because, with its methodological nature towards problem-solving, science also provides accurate data for analysing issues in the policy decision-making process. Science further complements political decisions towards the formulation of policies. Regarding the role of politics in policy-making processes, it was observed that politics initiates almost all policy-making decisions before inviting the input of other stakeholders. Politicians also regulate all the policy-making processes since they are the originators of the policy ideas.

CHAPTER FIVE

FORCES DRIVING SCIENCE-POLITICS RELATIONS IN PUBLIC POLICY FORMULATION IN GHANA

5.1 Introduction

This chapter discusses the key driving forces of science-politics relations and how these relations influence public policy formulation in Ghana. It centres on the relationship between science and politics which subsequently impacts the production and usage of scientific knowledge and political ideologies in the formulation of public policies in Ghana. The chapter also presents results and discussion on the forces that underpin policy formulation in Ghana's upstream petroleum. The uneasy and complex relationship between scientists and politicians has thrived over the years (Silver, 2005; Lambright, 2008; Keate, 2021) of which Ghana has enjoyed and endured a fair share of the ramifications of this nexus (Van Gyampo, 2011; Ainuson, 2015; Mohan et al., 2018; Gatune et al., 2021). These studies demonstrate the continuous intensification and influence of this nexus on garnering expertise, arriving at consensus as well as dealing with power relations in resource allocation to impact public policy formulation processes in the upstream petroleum sector. Even though science and politics are said to be mutually exclusive, the key actors, their interests, core mandate, values, culture and the environment of operation are crucial in driving the policy formulation process. It is therefore important for this study to provide a clear understanding of the forces that drive the relationship between science and politics in Ghana which is an important motivation of this study. The chapter is organised under two broad policy drivers, thus; internal and external sources. Partisan politics, clientelism, traditional and cultural values, belief systems and many others were identified under the internal drivers whereas donor support, scientific

expertise, re-election and international endorsement among others surfaced under the external factors.

5.2 Internal Drivers of Ghana's Upstream Petroleum Policy Formulation

This section discusses the first part of the chapter. It focuses on the internal driving forces of science-politics relations on policy-making processes. These forces include partisan politics, clientelism, traditional and cultural values, and belief systems.

5.2.1 Partisan Politics

Just as Rose and Johnson (2020) and Bueno (2012) contended, politics is an inevitable concomitant of the growth and national development of organized nations. In the socio-economic fibre of societies, the contribution of politics to research and national development in contemporary times cannot be underestimated (Rose & Johnson, 2020). Politics over the years has proven to wield authority in decision-making, policy formulation and in shaping the effective allocation of common resources aimed at meeting the socio-economic and political needs of the society (Heywood, 1997: Bueno, 2012). It is often difficult to separate the exercise of politics from policy-making and development. However, it becomes arguably effective when policy formulation is dictated by partisanship and clientelism (Mohan et al., 2017). This notion was aptly captured by an academic and a public policy expert in this research, thus:

> *Partisan interest affects policy formulation all over the world but it is more serious in Africa and more serious in Ghana. The difference is that in the developed worlds, the technocrats have some power that we do not have here. You may be fired. The technocrats*

may advise the politicians on what to do but it will not be done if it is not in their interest ***(****Academic 4****).***

In most developing nations in the Global South like Ghana where arguably, natural resources abound, partisanship has surpassed policy thinking and as a result, the realistic outcomes have become a mirage. Instead of politics shaping policy, partisanship is seen as overriding the supreme interest of the totality of the population in the upstream petroleum sector policy formulation in Ghana in this study. Thus, the interest of political parties and their ideologies in formulation was more evident in the narrative compared to other drivers. Partisan politics, in other words, both covert and overt partisanship was found to be one of the key driving forces influencing policies in Ghana's petroleum sector. This is related to government policies directed toward influencing the decisions of the electorates to win political power. Different levels of participants affirmed this; partisanship is more powerful in Ghana's oil policy formulation than anything else. One of the participants explained:

"*Yes, politics to me is partisan politics. Of course, parties give birth to policy so the opposition of parties has become the opposition to politics. The parties don't want to be voted out; the parties want to do things that will cause the electorate to retain them in re-election. A case which should not be but, it has been the norm that people who conduct research end up speaking for political parties or the government even though the government should have its people speak for them. So, politics has every role to play in the formulation of policies*" *(CSO Official 2).*

Thus, the concern here is not about politics in its normative understanding of driving policy formulation but the bane is on the vested partisan interest to the detriment of national interest. In the same vein, another participant indicated that;

> *"Yes. There are situations where politics will drive or influence a policy. Let me put it this way, once people are in government or power more especially, in our sectors here, one hidden objective of every government is to win an election so in situations where the government wants to achieve certain objectives, to help him sustain or win power, politics will be prioritized compared to science." (Public Official 6)*

The influence of partisanship in the policy thinking of governments is not entirely a new phenomenon in the history of Ghana's development. Largely because Ghana has been on the natural resource map of the world for ages with different political leaders with diverse ideological approaches to policy. From Agriculture to manufacturing, the interest of political parties in power has been on the radial but this study found that the practice has become more profound since the discovery of oil in Ghana. According to participants and industry players captured in this study, the upstream petroleum sector has become the most caged and partisan sector in Ghana's economic policy fields in recent times. This was evident in the narratives of experts who argued that the potential influence of the ruling political party's interests on decisions regarding the oil business has resulted in policy volatility in the oil industry in Ghana. One expert expressed…

> *"Oh yes, perhaps upstream petroleum is the most political sector in policy formulation in Ghana than any other sector of our economy. For example, Kufour was in power when we discovered oil and gas. When Mills came, they accused Kufuor's government of being generous to multinational companies so we renegotiated the contract, when Mahama came even though it was the same political party, the players changed". (Academic 3).*

Undeniably, successive governments of Ghana have been known to alter the policies of their predecessors regardless of how successful the policies may be, simply because politics is seen to be subjective and varies across space and time (Modebadze, 2010; Bueno, 2012). To some extent,

because policies were initiated by a different party based on different ideologies, it is certainly seen as not fit for purpose. The beneficiary actors of policy outcomes are mostly considered as opposition to the political ideologies of the incumbent and as a result may require possibly actors who ascribe to common ideologies. This is what some experts of policy formulation in this study opine as supporting the breed of the politicization of the industry. Some interviewees expressed different opinions to confirm this assertion. For instance, a seasoned lecturer from the University of Ghana opined that;

> *"Sometimes they know a policy is even good but once one political party is the one that introduced it, the other doesn't want to accept it because the other party will claim it's the originator of it. So even though in their mind when they sit down individually, they think this policy is good and evidence back it but once somebody starts it, they may not agree to it. For instance, I was telling a colleague that since independence the best infrastructure that we have put across is the national identification card system and the person told me that when a different party comes into power, they may ignore it. The only reason is that somebody started it so whether it's good and evidence backs it but they wouldn't follow that path because someone started it (Academic 1).*

Another participant indicated that the ruling government wield more powers than the opposition in terms of policy decisions. Although the opposition may have better alternative ideas, they are not actively involved in influencing the policies of institutions.

A participant asserted that:

> *"No, from my experience what I have seen in the process is from the point of view of the ruling government. Apart from parliament where you see the impact of the opposition party, beyond parliament, we do not see the opposition parties actively influencing the policy*

outcomes. For example, when there was a need for amendment of the local content law when we saw a clear partisan display at parliament. Beyond that, we don't see any opposition party showing interest in any policy of the institutions". (Public Official 6).

Some participants mentioned that manifestoes from the ruling party can occasionally have an impact on policy when discussing how politics affects them. Political parties strictly focus on implementing policies captured in the manifesto. The manifestoes of political parties seeking political power may seem a reflection of the wishes of the general public but mostly hidden are their belief, ideologies, values and party interests. A participant revealed this to corroborate this assertion; *"I think at the official level, the interest of political leaders is to see that the policies are in line with the party's manifesto because they made a promise to the people that they are going to carry out some actions so it needs to be in line (Public Official 1).* However, the interests of political party loyalists may sometimes differ from individuals' interests. This is in line with the "Individual Interests Approach" assumption which contends that decision-makers frequently develop policies after carefully weighing their options. Thus, the reasoning of policymakers and their capacity to select the optimum course of action is dependent on the collaboration between societal actors and decision-makers which can foster trust in the government and eventually result in the development of policies (Putnam,1993). John (1998) in the rational choice models offered a dynamic connection between the micro and the macro levels since they are based on human decisions made within the context of institutions. The study found that the interest of individuals in government plays a significant role in determining the nature of petroleum policies formulated. Quartey and Abbey (2018) confirmed this when their study on upstream petroleum policies attracted political (government) interference. An official at the Petroleum Commission of Ghana also argued that:

> *"Then again from my experience, they also have individual interests and therefore some companies need to be protected so when you are coming out with a policy or guidelines, they should not go against such companies. For example, when I was at BOST, they came out with a strategy that we would stop the transportation of petroleum products, but when it was sent to the Ministry of Energy, the then minister asked us to revise it with the reason that we should not create just one medium for petroleum products. There are instances when you see that the policy, we take is just to protect political interests and companies (Public Official 2).*

The statement by this official further confirms the argument of the individual interest model in policy making process held by Putnam (1993) and John (1998). Nonetheless, the individual interest in the petroleum policies met the procedural requirements of state institutions. Invariably, even though the individual interest was seen as a driver, it is subtle to the institutional procedures. Thus, the interest of the individuals still passed through the institutional process for authentication thereby legalising the political illegality.

Further, partisanship was seen to drive the procurement process of upstream petroleum policy-making. Undoubtedly, procurement is an inseparable part of policy formulation and the study found that politics had an impact on the industry's procurement procedures, even though they may be more complicated than those used by the Ministries. In the case of Ghana, it was observed that the GNPC which is arguably an independent institution established by an Act of Parliament (Act 1983, PNDCL 64) to manage the petroleum sector with its policies is technically not independent as observed since it works under the Ministry of Energy. Invariably, even if the GNPC was apolitical, the supervisory Ministry responsible for their policies is not and as a result, some of its

genuine policies are influenced by the interest of the political ministries. In this study, some participants argued that, in some instances, policies that could be formulated without external consultants are handed over to consultants who subtly push the interest of their employers in the policies which are not allowed to be altered. A participant from GNPC maintained that;

> *"The procurement process is more political because you can't compare a GNPC operation with a ministry operation. A ministry operation is not into oil and gas and therefore if you are doing this, there are technical issues where you need to do an evaluation and it is time-bound until you do that. Someone will ask why won't you go and rectify data, it also comes with politics. The intentions are meant to be good but for people like GNPC, it is wearying our values" (Public Official 4).*

According to study participants, these results are a reflection of Ghana's oil control struggle before the 2007 discoveries. The political beliefs of the two major political parties in Ghana (the NPP and NDC) were ingrained in this. The NPP supported a fiscal framework that was more accommodating to investors and limited the role of GNPC within the industry due to its stated pro-market ideology. However, the NDC increased state control over GNPC after gaining political power and promoted resource nationalism, enabling the company to develop a high level of technical expertise and regain control over oil negotiations Both political parties prioritise their political agendas over ideas that are scientific-related in enhancing the capacity of the state oil company. According to Hickey et al. (2015), Ghana's short timeline and increased level of political interference in oil contract negotiations were supported by the country's competitiveness in terms of political settlement. The corporation's technical ability to negotiate lucrative oil deals with IOCs was severely hampered by political interests and the politicisation of the negotiating process, which led to relatively weaker oil deals.

The findings are also consistent with the work of Suleman and Zato (2021) who indicated in their study that policy formulation in the petroleum sector has been one-sided where politics influence the public policy formulation processes. Again, Hansohm and Naimhwaka (2005) and Broadbent (2012) asserted that in the upstream petroleum sector, politicians embark on ideologies at the expense of scientific findings during the formulation stage. Van Gyampo (2011) further reiterated that several interventions have been made towards Ghana's upstream oil sector with experts' advice from various stakeholders but are yet to be implemented by governments in the policy governing the sector.

5.2.2 Clientelism

Besides partisanship, clientelism is another identified force that drives policy-making in Ghana. Clientelism is an added crucial aspect of politics that allows political parties and their representatives to win support in exchange for selectively allocating benefits through state institutions (Hopkin, 2006). Gherghina and Volintiru (2017) contend that the introduction of clientelism in scientific research undermines the facts of the outcome generated. The arguments about who finances the political activities of political parties in the wake of campaigns compromise the political actors even before they secure political power. Politicians thus become the clients of their financiers and actors and so winning political power is only to do the bid of their leaders. These financiers are also shaping the activities of researchers and the direction and interest of their research to impact the sort of scientific knowledge which informs policy formulation (Stone et. Al., 2001; Van Gyampo, 2011; Mohan et al., 2018; Gatune et al., 2021).

Similarly, individuals and organizations who render certain services to states are expected to be paid off using favourable policies and, in such situations, policies be they petroleum sector or not are tilted to favour the sponsors. In such instances, policy formulation becomes the avenue for doing the bid of the political clients upon assuming office. In this study, clientelism was found to influence the policy formulation process in the oil and gas industry. This is done in the form of offering personal favours like jobs, welfare help, tax exemptions, and award of contracts in exchange for backing a specific policy. A participant revealed that:

> *"I agree with you because the time decisions are made and the agreement that is reached between the state and the multinational, and those things it's possible that it was influenced by bribery, which future in how people from a political party could be helped, so politics could always be there. It could be ignored as well." (Academic 4).*

Similarly, some participants indicated that state monies are used to rip the personal interest of clients who have been assigned to perform their obligations in the country. According to these participants, a state official who secured investors for the state at the time of oil discovery in Ghana had to be paid off even though he used state resources while in office. This was revealed by a participant who was asked whether clientelism was evident in the policy-making process in the upstream petroleum sector. He had this to say;

> *"100% Yes. For instance, do you know that after the discovery of oil, an ambassador to the US got some 3.5% share of proceeds from the jubilee fields as sweat equity? Meanwhile, you were an ambassador and that was part of your obligations. So, in this instance, they used state properties to rip personal interest" (CSO Official 3).*

According to the PIAC official, sweat equity was introduced because, at the time of oil discovery, the commercial quantities were not strong enough to attract investors to the sector by the government. Individual lobbyists who succeeded in securing firms to risk investing in the extraction became clients to the state with their personal conditions. Coincidentally, state officials became the people who managed to secure the investors and as a result, their individual interest was captured in the policy drafting.

The findings corroborate Hopkin's (2006) work on political clientelism and its impact on the oil sector which found that political clientelism seems to benefit a selected few due to political favours. Similarly, in Gherghina and Volintiru's (2017) evaluation of how clientelism influences upstream oil business and its effects on the local community, it was observed that individual interest and political domination controlled policy formulation in that regard. However, Gherghina and Volintiru (2017) argued that the clientelism influences diminish advantages made and that conspicuous mass party clientelism is unsustainable to the oil sector's gains in so far as political parties do not remain in power indefinitely.

5.2.3 Changing Cultural Dynamics and Beliefs System

Ghana like many other African countries is uniquely identified by the culture and traditional belief system of its people (Diawuo & Issifu, 2015). The dominance of the cultural heritage penetrates all sectors of Ghana's economic growth and developmental drive (Chamlee-Wright, 2002). Embedded in the unique Ghanaian culture are the rich values of honesty, loyalty, respect for traditions, hard work and many others. On the contrary alien to the Ghanaian cultural values is the assimilated culture of disloyalty, dishonesty, disrespect for traditions and selfishness. This

borrowed alien culture has promoted a high level of corruption and disregard for rules and regulations which has penetrated the policy-making process of Ghana's upstream petroleum sector.

During the study, it was discovered that one of the key factors impacting policy formulation in the oil sector was shifting cultural dynamics. Due to modernization, cultural values that were once revered and upheld by society that would have safeguarded the institutional approach to policy making over the individualism approach are no longer given much weight as society advances. As people acquire more unacceptable values, positive values find their way out of Ghana's upstream petroleum pathways. A study participant expressed his opinion by saying:

> *"I think as I said earlier on, the traditional culture drives the policy-making process which sometimes becomes a barrier. Sometimes the way we see things is not the best. I can't recall exactly any impact on a section of the local content policy which makes a typical reference to culture. It is all about what people elsewhere outside Ghana have done. We work with other belief systems other than ours" (Public Official 2).*

Similarly, another participant argued that the lack of respect for integrity as a cultural value of Ghanaians has affected the quality of policy-making in all sectors but more especially in the upstream petroleum sub-sector. The participant complained that;

> *"If our changing culture doesn't value integrity to manipulate my results, then my results will become like what science is saying, and that influences the policy. But if you're in an environment where integrity is valued then you're likely to make fewer decisions. When I read about history it looks like formally, we had a lot of people with integrity but looks like this has been eroding so, if that is the case, it won't be difficult for academics and researchers because we are part of the general people if we don't value integrity, you don't*

> *value honesty then it is easy for us to be manipulated. Same thing with politicians if they don't have all these values, it is easy to do things at their convenience and not in the supreme interest of the nation" (Academic 3).*

Adding to the concern for eroding Ghanaian cultural values, and dishonest manipulation of scientific data which adversely impact the veracity of the data that is supposed to inform national policy, a participant noted that:

> *It's not a problem, it is how you may give in to what the data is saying but once you can manipulate the data so that you get what the politician wants that's what makes the problem. But here the integrity and the cultural issues are the problems not necessarily politicians contracting (Academic 3).*

Moreover, certain communities' belief systems, which are ingrained in tradition and religion, function as roadblocks to the effective design of policies in the oil sector. Due to superstitious beliefs about certain elements in the environment, some practices might hinder development. A former Minister of Energy and Power and also a legislator described how culture constrains and influence policy in the sector;

"A lot of the cultural values and the mindset of the people delay and influence the content of oil and gas policies. When you talk about culture, you talk about religion. Someone will say you want to do a hydropower dam but it should not affect the Volta River because the Volta River is a god. The culture of the people can be a problem sometimes". (Hon., MP 2).

Given that, the framing of petroleum policies also takes into consideration the culture and the religious beliefs of the people. Such belief systems influence the cost of designing policies because

more consultancies would be required at the local level to ensure that traditional overblocs are overcome.

5.2.4 Personal Interests and Incentives

Personal interests and incentives play significant roles in shaping the direction of policies. This is particularly relevant in the case of Ghana, where the policymaking process is often characterized by competing interests and a lack of transparency (Adjei, 2019). Despite the existence of national institutions, rational choice decision-making in the individual interest approach in policy-making remains significant in petroleum policies in Ghana. This is however expected because the oil and gas policies are formulated by human beings who have consigned interests to achieve as opined by John (1998). However, it is usually expected that state interest and professionalism will override individual interest in areas regarding upstream petroleum policies. Nonetheless, the personal interest of policy actors may be fuzzy since it could be sometimes positive and vice versa.

In this study, one of the variables that was observed to affect how policies are formulated in the oil and gas industry was the personal interest of actors. Some of these actors were regarded as frontiers of international organizations and financial schemes linked to local political parties. Policymakers could influence people with money or their powers to mobilize support for policies that serve personal interests. A participant indicated this;

> *"... there are instances where people who have to sign contracts on our behalf have personal secret interests. So that provides a cover for people seeking a personal interest in what should be a national assignment. Such personal and bifocal interest also drives politics and the policies we formulate in the sector. We personalise groups of people who*

stand to benefit from some policy, they try to be the ones who will push it" (Public Official 6).

In exchange, one thing that cannot be separated from the policy-making process in the "black diamond" industry is money and politics. Money drives politics in Ghana and many African countries rich in oil and gas. As politicians desire to hold onto power and authority, the argument of twisting the hands of policy-makers is inevitable especially so in the interest of sponsors of individual activities. For instance, environmental policies relating to upstream oil drilling could be circumvented to favour a firm because the actors are financiers to the party. An upstream petroleum policy actor revealed that:

"Politicians are influenced by two things that are money and ***numbers****. So, if you are a group that has money, you can influence politics and policy. If you don't have the money and can mobilize the numbers to show that you're a force to reckon with because you have the potential votes, those numbers can turn into politicians listening to you to influence their decisions" (CSO Official 2).*

Some participants further emphasized that decisions in the petroleum sector are mostly incentivized. People are provided with incentives to influence policy decisions. It was further indicated that even in situations where scientific data is required, policymakers only focus on those that are favourable to their plans. This was espoused by a study participant;

"There is a lot of politics in governance. It looks like every decision or almost all decisions are taken based on incentives. This is happening because people want to privatize resources and benefits. Political interest becomes the laid down procedure for policy formulation in this country. Public institutions are more interested in using scientific data

that favours them and ensuring that regulation is passed without considering the negative implications the policy would have on the totality of the country. From my industry observations, you will see that there is a lot more politics happening than science" (CSO Official 4).

The opinions of participants also suggested that Ghana's oil and gas industry is a high-incentive sector and so the interest of individuals is generally high.

"This is solely or purely interest and incentives. Politicians have the power to make decisions anytime they want and they can always decide to rely on science when they want assurance. Political power mostly is stronger than science. It is always a matter of what incentives the politician thinks he can get from the policy. Away, from the petroleum sector, policy-makers have put forward thoughts of what their incentives are and what investment they can create for themselves. So, in the spirit where the transparency of the true intent of policymaking, you will always see that there is a stronger interest in incentives that may not be informed by data or science but rather by personal or political power" (CSO Official 4).

In these narratives, there are clear demonstrations that personal interests and incentives drive policy formulation. Policy-makers are incentivized to take certain positions on policy issues to advance their interests or those of their political party. Policy-makers need to be aware of these factors and strive to balance personal interests and incentives with the broader public interest to ensure that policies are effective, equitable, and transparent.

5.3 External Forces

One of the elements influencing policy decisions in the oil sector was also discovered to be external factors. The external dynamics discovered in this study were however multifaceted and complicated. One of these identified drivers was the influence of donor organisations and multinational firms in the upstream petroleum policy formulation. Obviously, in an open system economy like that of Ghana where the government has signed onto varying trade agreements, the influence of donors is inevitable. Ghana's oil and gas resources became open to international investment from external firms which made them stakeholders in Ghana's policy formulation in the sector. Participants stated that these businesses present to the table distinct interests based on their country of origin and their personal company policy which tends to influence policy formulation in the oil and gas sector. A participant confirmed that:

> *"Certainly, International Oil Companies by their behaviour do influence politics to influence policies. This is because when they have the financial muscle, they can determine how your policy should be. Certain external forces cause science and politics to relate the way they do. The issue of aid is one major external force. This tells you that no matter your policy framework, without the finances, you will be handicapped (CSO Official 3).*

Similarly, it was discovered that foreign and diplomatic country relations with Ghana have been an anchor for policy making in the petroleum sub-sector as well. As donor countries provide grants and invest resources into the communities, such countries are considered partners of development and as a result, they are consulted to make inputs into policies. It is equally argued that such countries serve as the destination market for the products. Invariably, host countries tend to be vulnerable anytime firms threaten to fold up or withdraw the financial assistance they provide to

nations when laws are considered unfavourable to them. To ensure keeping good diplomatic ties with other countries, the template of foreign nations is borrowed as the basis for policies enacted in the sub-sector. A CSO participant in the project reacted by saying:

> *"There is little the government could do for policy's sake; how do you expect countries to donate the taxpayers' money of their countries and to fold their arms to make detrimental policies? They need to protect their indigenous companies working in the sector in Ghana. Why do you think the embassies and consular missions are here in Ghana? Differently, they have a say in what policy you make, this is an open secret in this industry" (CSO Official 2)*

An economic policy advisor similarly remarked that:

> *"My brother relax! The truth is that the hands of our governments are tied and the people will control our petroleum sector policies for a very long time. Why because these countries are not Father Christmas to be giving you grants from the taxes meant for the wellbeing of their people for free, certainly it is an investment they make and expect profits which can only be draw-back through policies" (CSO Official 4)*

Beyond the external influences of firms and countries, another issue that strongly surfaced in these externalities as a driving force in policy-making was the security of re-election endorsement of governments by external countries and institutions. In sub-Sahara Africa, the endorsement of Western institutions and other developed countries in the election of governments in many infant democracies such as Ghana is critical. The financial support during elections from allied countries serves as an open buy-out cross in the petroleum policy-making process in Ghana. A sitting

member of Ghana's legislature and former minister of the energy sector argued in conformity to this assertion that:

> *"Apart from the money, expertise, political will, and consistency. But I am of the view that money plays a major role. The quest for re-election is a cost that every incumbent government thinks about. The cost of winning power can override scientific dictation sometimes. External forces cannot change science. But there may be a scientific method we can never apply because we do not have the money and so we may have to rely on external sources" (Hon MP 2).*

A former Minister of state equally supported the discussion but considered it from the state budgetary angle. Just like him, many other study participants opined that the financing of the country's budget by external donors compromises Ghana's position on making petroleum policies in the extraction sub-sector. The argument of over-dependency on foreign support is an inseparable indelible mark on Ghana's privacy and relation to upstream petroleum policies. The participant said:

> *"The budget of Ghana which is always laid by the government through the finance minister is mostly reliant on external and donor support. So, what better laws or policies do you expect to be laid on the floor of parliament for consideration? The truth is that it may look pretty good on the surface but inherent in it is the unseen external hands that drive the direction of policies, we can't run away from that fact" (Hon MP 1).*

Further to these drivers, others said that international oil firms use lobbying tactics to sway decisions about the energy sector. The energy sector is not only controlled by the state alone but by other CSOs who have a stake. These CSOs according to the study, seek to mostly influence the

local content aspect of the petroleum policy mix and therefore use lobbying to influence government agencies in the sector in the spirit of institutional corporatism theory. A civil servant working in one of the astute ministries summarised this by this statement:

> *"The other consideration I will say is the agitation or lobby by our regulations. The companies that we regulate, are the IOCs. They do that through three ways, one is direct to the commission, for example, insurance policy, decommission policy unitization policy they have an issue. They come in directly to present their views on the intended policy. They also have the trade association which is their mouthpiece. They sometimes do it through diplomatic channels to lobby for them. The second is using their trading association. Thirdly is using their diplomatic channels" (Public Official 7).*

Consistent with Bourgouin et al. (2013), pro-market institutional mechanisms favour the investors and boost efficiency for the extraction of resources to the detriment of the local population and their immediate environment. Similarly, Shaxon (2007), for example, explored how oil-rich sub-Saharan African countries negotiate better with international companies in terms of the balance of power and better policies but the outcome shows that the capital injection by the rich oil companies imposes contractual agreement that favours them. Also, an investigation on the role of political commitment towards petroleum governance within the oil-rich sub-Saharan African countries by Hickey et al. (2015), found that most of the policies were politically influenced and hence are not able to achieve the needed result when implemented.

5.4 Scientific Data as a Driving Force in Upstream Petroleum Policy

Scientific data is seen as one other force that drives policy formulation in all parts of the world. Policy of any kind for that matter is motivated by either quantitative or qualitative data obtained either through structured research means or observable procedures. Data obtained from previous experiences or production outcomes are sometimes considered scientific by industry players. However, it is not all circumstances that scientific data has driven policy formulation in the oil extraction industry due to the complexities associated with it. On the back of whether scientific data served as a driving force in Ghana's upstream petroleum policy formulation, the study participants presented divergent observations and views based on their experiences in the industry leading to two different schools of thought.

A section of the participants argued strongly about how consistent scientific data has driven petroleum policy formulation in the country over the years. For these proponents, the petroleum sub-sector in all stages is guided science. According to participants from Ghana National Petroleum Cooperation (GNPC), science is the main driving force in policy formulation in their sector without which there is nothing possible or achievable. A representative stated that:

> "*As for our industry, without science, you cannot survive! our policies are driven mainly by scientific data because the sector itself is purely science. I tell you, if you overlook science in our industry, you will fail measurably in every policy you implement. Because of the seriousness we attached to science influencing our policies, we have a strongly established research department that investigates different aspects of our field" (Public Official 7).*

Similarly, officials at the ministry responsible for energy and petroleum policies affirmed that all state policies regarding upstream petroleum policies are driven by scientific research. There are existing research units within the various ministries that investigate matters of concern before decisions are captured into policy. For these participants, the formulation of upstream petroleum policy goes through processes, procedures or methods which are considered scientific. According to a participant:

> *"We just don't get up and say we are formulating policies to cover upstream petroleum policy in Ghana, there are rigorous processes and methods that the intended plan of action would have to pass the test before it can be considered as policy. Even the tools that are used for the preparation of the policies are scientific. Besides All these processes are models that are internationally recognized as scientific and so if someone says we don't employ scientific approaches, I don't understand the person" (Public Official 1).*

Another official from GNPC contended:

> *"Science is the bedrock of all our policies, the problem we have is that, when a CSO proposes something and it is not considered, they think because theirs were not chosen then we did not use science. But one thing they forget is that, there are always so many models on the table to sample from and so it is not always the case we would have to select what they think is right, but let me assure you that, science drives everything we do here" (Public Official 1)*

On the contrary, many from the CSO space in Ghana do not have any confidence in the science driving policy formulation in Ghana. According to some study participants, science is absent from petroleum policy formulation. A renowned energy policy advocate argued that: *"In policy*

formulation in Ghana, science is generally absent in the process. Resources invested are not based on scientific data. There is a total disconnect between scientific data and the kind of policies that are formulated in the various sectors of the economy" (CSO Official 2).

The same participant recounted the days of gold mining and policies that were ascribed to it and further argued science does not influence the upstream policy sector. He said this; *"Even policies regarding gold mining which has been with Ghana over centuries are not based on scientific knowledge, no cost-benefit analysis is conducted or drives the policy formulation processes" (CSO Official 2)*. CSO participants admitted that there are different scientific models for formulating policies around the world based on science, typical example in Ghana is Integrated Sustainable Development and Equal Opportunities for All, developed by the Institute for Sustainable Development and Environmental Communication (ISODEC). The ISODEC Model or Framework on policy formulation seeks to foster sustainable development and equal opportunities for every individual, irrespective of their background or socio-economic status in policy formulation. This model thus, does not only emphasise long-term development plans and the protection of the environment but an equal contribution of opinions and expertise of all relevant stakeholders. ISODEC recommends that the key tenants of the Integrated Sustainable Development and Equal Opportunities for All Framework, Sustainable Development, Equal Opportunities and Environmental Protection should inform all policies formulations process in Ghana. Nonetheless, these policy thinkers opine that the models are not just used in the formulation of petroleum policies in Ghana. One stated that:

> *"Look! The ISODEC model is a good fit for analysis, for instance, measuring the benefits of taking subsidies. However, the models are not considered by policy formulators, rather,*

> *sectional interest, group interest, the interest of political financiers, voices (those who can mobilize large numbers are those who are considered or listened to) and not knowledge and ideas based on scientific research. This is Ghana for you!" (CSO Official 2).*

In the view of this participant, science has no place in the policy formulation process especially in the upstream petroleum sector. However, the same participants acknowledged that science is critical in policy formulation because of the distributive effects. He rhetorically questioned the proceeds Ghana has made from the upstream petroleum sector since its discovery and production.

> "*Look 10 years of oil production in Ghana, only 18% of profit has been achieved so far. Why because the required returns due the country are not achieved due to (elite capture) or clientelism. The whole policy formulation space is based on the excessive discretion of policy-makers. Explanations given by ministers for the policies formulated are based on pure discretion and not science" (CSO Official 2).*

From the statement of the PIAC official, ministries and agencies mandated by the constitution of Ghana to promulgate policies for the management of the petroleum sector perform their role based on discretion. Thus, the power of discretion given to the ministries is considered supreme and mostly determines the nature of policies formulated. According to the participants, the country has not benefited much from the petroleum sector since its operations due to the use of discretionary policies by state institutions.

Despite the counter-views on the science driving policy formulation, there were other revelations CSOs and participants from academia raised who believed in the fusion of both science and politics. For this section of people, science drives policy formulation except that not as much as politics will do. Invariably, politics dominates science in the policy-making process in the upstream

petroleum sector. For instance, according to a respondent who happens to be a renowned professor of economics and policy in Ghana:

> *"In the context of developing economies like Ghana, Politics is about 80% of the policy formulation process. Science is strategically sidelined by the political actors obviously for the interest of the politicians. Both are supposed to relate but, because of profiteering by political actors, science is sidelined" (Academic 2).*

Similarly, a representative of a CSO involved in climate change-related policies also believes politics drives policies in Ghana more than science and rated politics over 80%. According to him:

> *"Science acceptance in policy formulation is not always the case. Politics plays over 80% of state policy interventions. Most policies are politically motivated, look my brother don't worry yourself, even if you have a very good idea that will help Ghana, the ministers and agencies will not even mind" (CSO Official 6).*

Other study participants disputed the science as a basis of policy formulation argument and questioned the credibility of the scientific data that are used. For this group of participants, the source of the scientific data considered is mostly sponsored and skewed towards the interest of politics rather than science. The upstream petroleum policy environment was seen not to be different in terms of this formal practice. The study found that policy in the upstream petroleum sector in Ghana is mostly informed and initiated by scientific data generated by government agencies or institutions and industry stakeholders. Unfortunately, for some, science may drive the initial drafting of policies but the final document will be thwarted to favour the intended beneficiaries.

It was revealed that most policy actors in the petroleum sector adopt portions that coincide with their interests and ensure they go through the formalities of institutional protocols. In the eyes of the general public, the positive side of scientific data is defended on public platforms for the acceptability of the people. For instance, a petroleum policy initiated will go through parliamentary approval and receive Executive ascent but may not yield the intended results due to the inner interest of the policy initiators and biased availability of the scientific data.

The research observed from the narratives of the two opposing sides that, the argument of science is appreciated differently. In one end, science is conceptualized by state institutions as the formalities and procedures upstream petroleum policies must pass through before its acceptability. This finding arguably satisfies the argument of John's (2013) institutional approach about the legal processes that must endorse policies before implementation. Equally, the proponents who believe science influences policy also confirm the assertions of Fraussen & Halpin (2020) and Rasmussen & Willems (2021) that, interest groups can influence the administration and bureaucratic processes to address their requirements using their financial resources. That is why a participant expressed that; *"There is no space for science at all, the outcome of the science is mostly predetermined because finance is regarded as a latent factor in the process" (Academic 4)*. The position of this thesis is that science plays a role in driving policies at the initiation stages except that, the dominance of politics cannot be overruled which makes the scientific drive insignificant. For the CSOs, the policies in the upstream petroleum sector are largely a "cage system". The process is not opened and it is always kept closed in an open "secret manner". A representative of the Kassa Platform contended that:

> "*Look, the truth is that, if the policies are for other areas or sectors with less financial outcomes, that one science can drive the policy formulation but for the petroleum sector forget, the ministers and ministries don't want you to even come closer, it is a caged system, if you are not for them you can't contribute, forget!"* (CSO Official 6).

Again, this thesis deduces that the scientific data is mostly driven by political technocrats which makes the scientific data used by actors in policy formulation questionable from the point view of some observers. The study observed that the outcomes of the policy formulated become the benchmark of judgement for many stakeholders. Failed policies receive stakeholder criticism of having not been influenced by science and vice-versa.

5.5 Chapter Conclusion

In this chapter, the focus was to identify the driving forces of the relationship between science and politics and how these forces shape policy-making in the upstream petroleum sector in Ghana. The narratives reveal that the forces are broad and so were classified into internal and external factors. Partisan politics, clientelism of policy actors, changing cultural dynamics and belief systems of the state, personal interest and incentives of actors were classified under internal factors that drive science and politics in the policy formulation process in the upstream petroleum sector in Ghana. On the other hand, the security of re-election of political parties in power through the endorsement of rating agencies and the Bretton Wood institutions, foreign and diplomatic country relations as well as donor country influences of multinational firms and pro-market mechanism of external investors were revealed as the external drivers of science and politics in the policy formulation process. The discussion of the drivers of the policy formulation reflects the interplay of the

multiplicity of government, cultural and socio-economic variables as displayed in the isomorphism theoretical conceptualisation adopted for this study.

CHAPTER SIX

Implications of the Relationship Between Science and Politics on Policy Formulation in the Upstream Petroleum Sector in Ghana

6.1 Introduction

This chapter discusses the implications of the relationship between science and politics on policy formulation in the upstream petroleum sector in Ghana. The discussion is staggered into three main broad headings thus, implications of science, implications of politics and the implications of the interplay of science and politics on policy formulation in the upstream petroleum sector. The major highlights which are based on the study findings focused on policy coherence, inclusivity of stakeholders in the formulation process in the upstream petroleum sector, Sentimentality of policies and policy sustainability. Followed by the distinct and combined roles of politics and science in policy formulation in the upstream petroleum sector as well as the implications of their relationship on policy formulation in the upstream petroleum industry. It further presents proposed ways to resolve the negative implications of the relationship between science and politics on upstream petroleum in Ghana.

6.2 Implication of Science on Policy Formulation in the Upstream Petroleum Sector of Ghana

This sub-section discusses the findings concerning what happens when science dominates the policy formulation process in the upstream petroleum sector. The discussion leveraged the views of our study participants concerning the science implications. The main issues here were policy

coherence, inclusivity (thus widening the engagement and consultation process), sentimental (thus politically motivated policies), sentimental policies, sustainability of the policy and policy security and diversification. The discussions flow in this order:

6.2.1 Policy Coherence

Resource curse or blessing to countries has been a long-standing debate among academics, global institutions and policy think tanks over the years. The fuzzy effects of resource extraction on host communities' socio-economic drive have been attributed to varying structures, prominent among them is the policy quality or policy consistency or inconsistency (Sabatier and Jenkins-Smith, 1991). It has been argued that the existence of natural resources such as oil and gas and the desire to extract them to benefit the people require regulations (Lowi, 1964). The study established that the upstream petroleum sector in Ghana is guided by several regulatory policies at different levels. As to whether the policies are consistent with existing laws and follow best international practices of policy formulation is something unclear. The study found that policy coherence in the upstream petroleum sector is influenced by science and politics. It was observed that the upstream petroleum sector is under the supervision of different ministries and statutory institutions like the Ministry of Energy, GNPC, Petroleum Commission and CSOs who relate to the formulation of policies. Invariably, the success or failure of the formulation of policies to regulate the sector is dependent on how science and politics are used. The study found that most of these institutions have different legal mandates so, the role of science in ensuring positive policy uniformity and to reduce or avoid policy conflict in the application of the scientific ideologies was paramount. Study participants believe that the application of science has promoted the quality of policies Ghana has for the sector.

For instance, the regulatory policies indicated by study participants as governing the upstream petroleum sector in Ghana including the GNPC Law 64 which birthed the Ghana National Petroleum Corporation, the Petroleum Management Act, 2011 (Act 815), Petroleum Exploratory Act, 2016 (Act 919) among others are regarded as fantastic policies birthed by scientific knowledge and processes. An MP and former minister of state explained:

> *"Everything that is done at the sector is guided by regulations that is science. When you go into petroleum, we are talking about the PNDC law 64 which gave birth to the establishment of the GNPC. The Petroleum Management Act 815, revenue laws, and others" (Hon. MP1).*

For this participant, the laws were made by political actors in collaboration with technocrats who brought their scientific knowledge to bear during the formulation process. According to the participants, it was out of the systematic processes that the laws were made and through that the GNPC which is in charge of exploring oil in Ghana was established. Invariably, the existence of oil drilling in Ghana can therefore be attributed to the acceptance of scientific knowledge in the decision-making process. Adding to this conversation, another lawmaker in Ghana's parliament who is a participant in this study revealed that;

> "*The upstream petroleum sector has to do with the production and exploration of the resources which is scientific. So, the regulations first of all start from the resources, the constitution, and some acts and regulations that we have. We have the Petroleum Exploration Act, Act 19 which is used to regulate. We have the Petroleum Revenue Act used to regulate revenues generated from the upstream petroleum sector. We have the Petroleum Commission which is mandated to regulate the upstream petroleum sector and also the*

Ministry of Energy Policy, the Constitution, and laws. These are the regulations used to manage upstream petroleum" (Hon. MP2).

For this MP, though the agencies of state perform different functions at different stages in the petroleum management sector, the acceptance of science enables all to make policies that are coherent due to the adoption of scientific frameworks or models. Ideally, scientific frameworks and models are adopted to influence the nature of policies the state enjoys from the sector. GNPC as an entity, according to participants, was established under regulations mandated to regulate petroleum exploration under the Petroleum Exploration Act,2016 Act 919. Under the act, the exploration of petroleum fields in Ghana today is regarded as the responsibility of GNPC and the right to outsource the activity to external organizations is the outcome of scientific knowledge. Similarly, the which determines the nature of policies formulated to influence how revenues emanating from the sector will be managed are equally the outcome of scientific knowledge. The study found that revenues expected or generated from the upstream petroleum activities of firms to the state are negotiated under the regulatory terms of the state by the Petroleum Commission using scientific metrics. The architect of all these policies is the ability to accept science as the brain source of the ideas that determine the kind of laws and policies that will be formulated and for that matter in securing the coherent quality of policies the country has.

6.2.2 Inclusivity and Stakeholder Engagements in Policy Formulation in the Upstream Petroleum Sector of Ghana

Science is a systematic process and likewise, policies that undergo processes are deemed scientific. Policy formulation is regarded as a critical dimension of the success or failure of policies implemented and as a result, undergoes scientific processes that are unique to the country, the sector and the type of policies in connection with it (Savard and Banville, 2012; Howlett and Ramesh, 2003). Though policy formulation is an inevitable component of the policy life cycle there are stages and stakeholders involved in the policy process (Howlett and Ramesh, 2003). At all stages, problem identifiers, host community leaders, traditional and religious leaders, academics and thinktanks, lawmakers, petroleum investors, NGOs and many other state and non-state organizations who are affected in one way or the other in the chain are considered legal stakeholders of the policy formulation process. The views of such stakeholders are crucial to the acceptance of the final policy and therefore their exclusion from the process breeds resistance which scientific models seek to avoid.

This study focused on the policy formulation stage of the policy-making cycle to explain how policies are formulated concerning the upstream petroleum policy sector to bring about a better understanding on how the key stakeholders are included in the process. For Lowi (1964), in a critical area like resource extraction where the environment relates to the population, policies are undoubtedly inevitable. Different participants narrated how the process is carried out in the context of upstream petroleum policy formulation in Ghana and how science is applied. Study participants largely accepted that the majority of national policies are initiated by the government through the sector ministries, thus, referring to the politics associated with the process. Consequently, for

participants, policy formulation begins from the executive arm of government. An academic explained that;

> "I *think until recently when the private members' bill was passed, many legislations came from the executive which meant that you as an individual or a member of parliament could not originate legislation. This means that it is only the executive that comes with legislation and a proposal that goes through a process for approval. That seems to be policy formulation in Ghana and the public space" (Academic 1).*

A participant from a state agency responsible for Petroleum Policies in Ghana also confirmed that;

"From the national level, policies in the petroleum sector are developed by government through the Ministry of Energy. We have different players so, we have the policy being done by the ministry, then the regulator who implements the laws rather than the policies because the policies must be guiding but if it breaches the law at any point in time then the regulator is more likely to look at what the law says and what a particular government is saying even though in as much as the policy is to shape the law, they go hand in hand" (Public Official 1).

Unvaryingly, the formulator is not necessarily the regulator but both are expected to operate together to ensure effective delivery. The chronological processes the upstream petroleum policies go through thus promote transparency and reduce the sabotage of persons who are not involved. According to a participant even though the government led by the executive arm mostly spearheads the policy formulation process, consultations are done with major stakeholders just to obtain legal acceptance. Thus, the ideas proposed by the executive arm of government suggest the kind of policy to be formulated. However, the government leads the process also according to an identified problem it wishes to resolve.

"Yes, so we in the Petroleum Commission scan the environment, do our research and identify the key issues we think policies can develop to solve the situation and then forward it to the minister in charge. My department comes out with policy recommendations, the requisite research proposal to the chief executive and we discuss the policy if we think that it can be implemented then we forward it to the minister" (Public Official 3).

Nonetheless, some of the participants argued that the proposed ideas presented are sometimes modified to meet legal standards following the interaction with key stakeholders in the industry. For instance, a member from the Petroleum Commission recounted that; *"Well, the fact of the matter is, when we send policy to the ministry, other information we thought are not critical issues can be suggested after further engagement with key stakeholders in the sector. To bring everybody on board, we are forced to modify" (Public Official 3).* In most cases, the experts who are supposed to provide scientific knowledge do not have equal power relative to the politicians to force their ideas into the policy document. One of them indicated that;

"Yes, that is correct. Also, the policy objectives at the broader level are outlined by the board or the direction from the Ministry of Energy. The broader directives came from the minister, as to governments expectations that we need to achieve and we have no option than to prepare the policy in line with the broader directives from the minister" (Public official 6).

Contrary to the arguments of most participants about the executive initiating the formulation process, some participants acknowledged the introduction of the private members bill which

allows the individual citizen to equally initiate the process of policies. The indication is that policy in the upstream petroleum sector is sometimes initiated by technocrats or individuals or CSOs. For instance, a participant argued that; "I *think until recently when the private members' bill was passed, many legislations came from the executive which meant that you as an individual or a member of parliament you could not originate legislation" (Academic 1).* Though this statement affirms the narrative that, hitherto, policy formulation was restricted to the executive head only, however, the process is changing regarding who proposes the idea of policy formulation to kick-start and who is included. In recent times, citizens also reserve the right to initiate the formulation of certain regulations that may be considered as a policy due to the appreciation of scientific models or theories. But the final decision rests with the government or its agencies who are the political figures.

In a different twist confirming the individual initiations, a technocrat at the Petroleum Commission recounted that some of such policies are organized internally. The participant stressed that;

> *"It is done internally. At the Petroleum Commission, for instance, those involved in the policy department are more technocrats. Resource persons are picked from the key department and they bring the inputs for developing the documents and the drafting is done by the police department" (Public Official 6).*

Despite all the arguments raised by study participants, some participants were more specific in narrating the processes based on their professional experiences in the industry. A renowned scholar of policy formulation argued that the policy formulation at the upstream petroleum sector of Ghana flows in the manner discussed as follows due to the influence of science. He enumerated the following steps:

- *Policy formulation begins with the identification of the societal problem that requires attention and redress.*
- *Once the problem is identified, you proceed to the definition stage. At this stage, the problem is clearly defined (explained) to the understanding of the masses or all the actors involved in the processes.*
- *The third stage is the data collection stage which is considered the pure scientific stage. At this stage, the data collected serves as evidence of the identified problem. Collected data is analysed to formulate alternatives and options by actors.*
- *Policy options are discussed and the second-best options may be given consideration.*
- *The fifth stage is considered policy testing. Under this section, the policy is subjected to hacking and policy criticism. Major stakeholders are allowed to critique the policy and accept new inclusions. Academics are allowed to compare models of international standards and make critical recommendations.*

I think these should be the processes of policy formulation except that they are usually not followed especially in developing economies like ours. In most cases, academic reviews on policy intentions are absent. Government imperatives are regarded as supreme reality in the process. People wanting to be part of the process is largely the least considered or absent" ***(Academic 4).***

A participant from another CSO identified in this study as CSO 6 also outlined the formulation process as the procedures adopted by policy actors in formulating upstream petroleum policies in Ghana. According to him, the processes include; *Policy formulation begins with a recommendation from a stakeholder to a Sector Ministry or departmental head based on an identified concern or problem in society under the control of the said ministry. The recommendation then moves to the consideration stage at the ministry level".* At this point, CSO 6 believes that the said ministry

peruses the recommendation by the stakeholder to ascertain whether or not it falls within their space and if the issue is new and worth considering. Subsequently, the idea proceeds to the formulation stage. At this point, CSO 6 argues that the ministry responsible sometimes engages the services of consultants to draft the ideas. He added that:

> *"The process then engages a broader stakeholder consultation where the organizations that recommended or identified the idea are brought on board. This also includes other CSOs and sometimes broader deliberation on the issue at hand with the citizenry. It then moves to the reformulation stage where the outcome of the discussions with stakeholders will enable the ministry to revise the content for the acceptance of all".*

All these processes are in synch with the processes discussed in Chapter 2 of the study. Thus, CSO 6 believes that the place of science is at the consultation stage of the process of policy formulation where some academics are made consultants to bring their scientific views to bear. He recounted how the Ghana National Climate Change Policy was drafted by a professor from of University of Ghana who designed it based on a scientific model. CSO 6 further believes that upstream petroleum policy formulation in Ghana undergoes the same process except that, the processes may be dominated by politics.

Besides the academics and the CSO's view on how upstream petroleum policies are formulated, participants from GNPC equally revealed how policy-making revolves in the upstream petroleum sub-sector. According to him, policy-making in the upstream petroleum sector in Ghana goes through the following steps:

- *An idea or problem is identified by the head of the cooperation or the sector minister and then passed onto the head of operations for review.*
- *The operations unit presents the idea to the research unit of the cooperation. At this stage, the research unit understudies the problem by perusing the existing literature on the subject matter. A draft is prepared based on the review outcome and then models are recommended for debriefing.*
- *After this, it moves into the formulation stage where the ideas generated are designed in line with best international models and practices. The draft document is internally discussed and corrected.*
- *The draft document is forwarded to the Ministry of Energy and Petroleum for their input and inclusion.*
- *The revised document is then subjected to public opinion. This is where CSOs' academics, other consultants and industry players are invited for discussion on the subject matter. The document is therefore presented for critique to enhance the quality and acceptability of all.*
- *Legal approval stage. At this stage, the document will be presented to the office of the Attorney General for legal advice and to ensure legal cohesion. Where required, the document is forwarded to the parliamentary sub-committee on Energy and petroleum for their perusal and endorsement.*
- *Finally, the policy will receive executive endorsement and then move in the implementation stage of the cycle (Public Official 7).*

The processes which were not different from what authorities at the Ministry of Energy shared also revealed that participants who are also stakeholders in the oil and gas industry are consulted which

highlights the stages argued by Howlett and Ramesh (2003). The finding also agrees with Savard & Banville's (2012) argument that policy formulation is a complex process. The complexity hidden in the processes that are involved in the formulation makes it difficult to envisage the use of science also affirms the conceptual thinking in the New Institutional Theory and Isomorphism about how state and non-state institutions based on culture, beliefs and values, economic desires seek legitimacy by ensuring that policies go through the right processes by involving all stakeholders. For some actors, these processes and the consultations followed are what make the process scientific. For instance, a former President of the Republic of Ghana who was also a study participant argued that;

> *"The ministries are composed of politicians and technocrats. Technocrats mean scientists. So, the policy is not formulated independently but receives the advice of both technical and political actors of the ministry. So, the policies are formed by scientists, and administrators before that, they advise the minister who is the political instrument and will then take it to the cabinet to be deliberated on" (Former President).*

Inferring from the former Presidents' statement, the process of policy formulation is largely scientific and that ensures the inclusivity of all stakeholders affected by the policy. Nonetheless, other participants subtly disagree with the former President arguing that; *"... sometimes political issues come in. A clear example is the unitization policy we are preparing. We have the political, we have issues with EIN which is in court. When formulating such policies, we are very mindful not to put anything in the policy that will jeopardize Ghana's case" (Public Official 6).* The revelations from the narratives affirm the argument of academics 4 and 5 respectively about stated policy and actual policy; or symbolic policy and substantive policy. Thus, what may exist on paper

might not necessarily be what will be implemented. These findings are consistent with Skaten (2018) who found evidence of political meddling in the upstream petroleum industry's policy procedures and also confirms the isomorphism theory of seeking legitimacy.

6.2.3 Sentimental Policies in the Upstream Petroleum Sector in Ghana

In the 21st century, the world has been proven to be science, technology and data-driven without which one's development pace could be slowed. In the developed world where oil and gas have become the anchor of development, policies governing the management of oil extraction have been the adoption and development of homegrown models (Gornitzka, Kogan, & Amaral, 2005). Several developing countries especially countries in Africa that are suffering from overall income and poor managerial capacity from oil and gas extraction are believed to be led by egalitarian leadership or politically dominated in policies (Gornitzka, Kogan, & Amaral, 2005). This is because, DeLeon, 1988 and Stone (2001) argue science has the potency of salvaging policy from the short-sighted influence of politicians. For scientific frameworks, the metrics for measuring the realistic nature of policies to be formulated are devoid of political lenses and so the quality of policy is assured even though it could also fail. A public official explained this further by stating:

> *"The science comes in by informing us, as to what is achievable and what is not under a policy to be formulated. For instance, if we are developing a decommissioning policy, our engineers here are the important tool to use in the sense that we look at what we will do to decommission the fields, which requires informed engineering knowledge as to what can be done. That is an aspect where science also comes in"* ***(Public Official 6).***

This is not to say the presence of science does not make room for developing policies that are driven by political or party manifesto interests. Such policies are deemed non-sentimental and it is easier to work with compared with policies laden with political sentiments. The same participant explained how science takes into consideration the environment, the values, and the culture of society in proposing workable policy solutions. He explained by saying:

> *"Remember that the sector is highly technology driven and if preparing a policy, one thing you must bear in mind is that, the policy must work, it must bring benefit to the people and therefore the scientific knowledge should be the basis and guide to your policy formulation. Science will help you determine whether what you are proposing is achievable or not and whether it can be implemented at a reasonable cost or not. The science part, for instance, the environmental science, whatever you are proposing we have the environmental scientists here in the department. They have to also tell us what we intend to do, and the environmental effects that will come, the safety precautions specialist also tells us about the safety of the workers and equipment. Science comes in for you to know the impact of the policy you are developing on people, the environment or how workable that policy is (Public Official 6).*

Science is subjected to analysis to assess the validity and workability of policy recommendations before consideration and approvable are given. This reduces the tendency to formulate dead-on arrival policies in the upstream petroleum sector. The findings establish the relationship between science and belief systems as enshrined in the isomorphism theory and institutional theory adopted in the conceptual framework of this study.

6.2.4. Sustainability of Policies in the Upstream Petroleum Sector in Ghana

In modern academic and policy discourse, the key concept that comes out in almost all conversations is "sustainability". Sustainability is about how to provide for the current and conserve for the future generation. Sustainability serves as a benchmark and therefore informs the policy direction of many petroleum economies in the world today. To sustain the environment and the economies of the world, science has been suggested as an inevitable component of the drive. In an attempt to appreciate this, the study sought to find out from study participants the implications science has on policy and it was revealed that scientific knowledge drives sustainable policies in the upstream petroleum sector. Considering that oil and gas have a life span, issues of managing the oil for future generations is expected to inform policies formulated in the sector. A participant argued that "*if a policy has a scientific base, the outcome is objectively determined and likely to bring the intended outcome" (Oil Com Official 1).* On the contrary, many participants believe the influence of politics over science does not assure sustainable development policies in the upstream petroleum sector in Ghana. These were expressed as:

> *"This is the problem; we do not have a long-term plan that drives the company in a particular direction. When you take Nigeria for instance, they had a long-term plan on how to exploit their resources so irrespective of the person that comes into power, the plan still holds. We do not have a long-term plan so we are being directed by manifestos. Depending on which political party is in power, the industry is driven by that political party's ideology and manifestos. So eventually what happens is that there are too many amendments to policies which don't promote sustainability"* (Oil Com Official 1).

The participants' viewpoint also reveals the introduction of sentimental manifesto policies rather than scientific sustainable policies. Thus sentimental manifesto policies will not last for a lifetime time but it is considered dead on the arrival of a new government. Similarly, a participant said;

> *"GNPC is at the core of the science because, every policy developed, GNPC being government institutions in the upstream petroleum sector is being involved. Whatever GNPC will say, science supports it, but for the politicians, it's what brings money, and what benefits the people which are usually on a short-term basis. For example, a policy was passed that said that Ghana would achieve local content within ten years". Clearly, it was political bias. That is a policy without science because that was not achievable in ten years" (Oil Com Official 1).*

This demonstrates the sentimental nature of policies that relegate science and focus on meeting political desires even though science warns against such a decision because of poor feasibility. Similarly, a participant indicated that;

> *"I think ideally, they are supposed to collaborate but it is not always the case. Having worked in the policy environment for some time, I would be naive to say that politics and science always work together to affect policy. This is because we have policies that are formulated without the backing of data or scientific evidence! How do you expect such policies to be sustainable?" (CSO Official 1).*

CSO Official 1 implies that science promotes the formulation of sustainable policies in the upstream petroleum sector even though he doubts the effective utilisation of scientific knowledge in the policy. Nevertheless, there is a belief among participants that, politics direct the nature of

the utilisation of science in policy formulation. A participant from the CSO bloc argued this view in this way;

> *"Yes, political decisions will influence the way we use science in developing policies and strategies. We do not take science as a whole. In using scientific knowledge in developing policies, we make sure that the political aspirations are taken into consideration to ensure that science is not implemented in a way to causes problems at the political level" (CSO Official 2).*

As noted earlier, the participants who are experts in the area of study have unambiguously demonstrated that the potential implications are that, it is important to combine science and politics to come out with a workable policy in the petroleum sector. When there is too much political input in policy, the outcome will be policies that are not workable. Thus, they may not achieve the intended outcome to benefit the people. Also, a change of political party or minister means there might be a change of policy. In the same way, if the policy has a scientific base, the outcome is objectively determined and likely to bring the intended outcome. If the policy is scientifically based, it is possible that the policy will not be implemented because there is no political consideration. The implications corroborate Campbell and Laherre´ (1998) assertion that oil exploitation will have a lot of challenges if it is impeded by political and economic factors, by ignoring scientific measures to curb its exploitation. To them, it is estimated that if science and political relations constraints are not addressed, it will affect oil production and will translate to high oil prices and shortages on the world market, and the resultant effect will be political and economic and not sustainable (Engdahl, 1993; Klare, 2004). In line with this, Klare (2004) emphasized that if stringent policies are not politically and scientifically made in the best interest

of oil-producing countries through better management, the sustainability of the commodity will be difficult. Gornitzka, Kogan, and Amaral (2005) reiterated that the implication of policies that relied on political decisions without incorporation of science based on evidential factors can affect overall income, and managerial capacity and lead to egalitarian leadership.

6.2.5 Energy Security and Diversification Policies in the Upstream Petroleum Policies in Ghana.

Policies about energy security and diversification are guided by scientific understanding regarding petroleum reserves, production capacity, and future estimates. Governments can make informed choices about local production, import tactics, and long-term energy planning by understanding the availability and accessibility of petroleum resources. Policies supporting the diversification of the energy mix to lessen dependency on petroleum might be influenced by scientific research on alternate energy sources and technologies.

> *"You cannot overlook science in your policy drafting in the upstream petroleum sector and expect to sustain your development plans. You need to understand that, the resource is exhaustible and obviously will not last so science will inform you the years that the resource will last and that will help you formulate policies that will cater for the gap that will be created when the resource is no more" (CSO Official 2).*

Diversification of upstream petroleum proceeds, according to this CSO official 2, is critical to sustain development economies like Ghana because petroleum resources will be exhausted. Besides, the product presents environmental consequences and science will have to reveal the indicators and suggest the pathways to which policy must look at post-extraction. Thus, if the long-

term effects on the environment will tend to affect the quality of lives of the population, then diversification which comes out as a result of scientific knowledge is arguably inevitable. Academic 6 also argued in details while saying that:

> *"First of all, you need data. For instance, what are the hydrocarbons, what are the proven research, what can we extract, what is the world market price and how much can you generate? For instance, Nigeria does about two billion barrels a day. In Ghana, we generate two hundred a day. In terms of revenues, it is a bit small. And also, where the oil is even located, it is offshore, deep-water? If it is deep water, it is more expensive to extract. Your capability of carrying a particular interest will determine how higher the cost will be less available in spending the budget itself in terms of infrastructure. These are some of the ways science influences policy formulation" (Academic 6).*

Science in this discourse takes into consideration the economic dimension and the environmental future of upstream extraction to dictate the focus of policy formulation. These findings are in tandem with the theory of isomorphism as discussed under the conceptual framework.

6.3 Implications of Politics on the Policy Formulation in the Upstream Petroleum Sector

Similarly, under this subsection, the discussion focuses on the findings concerning what happens when politics dominate the policy formulation process in the upstream petroleum sector. The discussion equally leveraged the views of study participants concerning the scientific implications in the area of policy coherence, inclusivity (thus widening the engagement and consultation

process), sentimental (thus politically motivated policies), sustainability of the policy and policy security and diversification. The discussions flow in this order:

6.3.1 Policy Coherence

The argument of politics dominating always presents doubts about the efficiency of policies to be formulated to govern the sector. Over the years, egalitarian leaders have made policy decisions that followed less or no logical reasoning. Unlike science, the dominance of politics tends to skip scientific processes, institutions and stakeholders in the policy formulation process. The consequences have always been detrimental in the long run even though most of such policies are seen to be very flamboyant. CSO official 2 opined that;

> *"Politics breeds self or group interest leading to corruption. So, in the policy formulation process, political leaders can skip institutions or agencies that are supposed to serve as a check on them to do the proper thing. In such cases, my brother! You cannot be sure of a coherent or consistent policy. There will be some errors somewhere and you see that the policy is conflicting with existing laws. This is where investors take advantage of the loopholes to steal from the country" (CSO Official 2).*

A participant supporting the argument of CSO Official 2 also argued that the executive arm of government through its ministries and agencies sometimes takes policy decisions by skipping parliament which is required by law to serve as a check on its activities. In such instances, the argument of the policy actors following the scientific frameworks shreds in secrecy. This is what he said:

> *"Ah! In this country, institutions of state like GNPC, TOR, and Energy and Finance ministries have one's taken serious policy decisions which needed parliamentary approval but failed to do that which landed us in trouble. Today we don't even know how heritage fund proceeds from upstream petroleum is managed" (CSO Official 1).*

Most policies that are influenced directly by politics mostly go against the dictates of the law. For instance, an official disclosed how a policy was influenced by politics and the laws caught up with it.

> *"We are owned by political organizations, so there are some decisions that, there are conflicts sometimes but, in the end, we dialogue, and in the end, we follow the orders of your owner. So sometimes politics influence decisions. But also, it doesn't take long, you will face the reality. Sometimes just a year. For example, AKEI made news. AKEI is developing a pecan field, an oil field discovered. There were certain things they wanted and by the law at that time, it couldn't take effect, it was renegotiated to enable them to have an economic window to develop the field. The minister renegotiated the PA which was his mandate that what AKEI requested for that time was against the law. Science is science, it was against the law not science" (Public Official 5).*

Securing a coherent policy under the influence of politics is always difficult. On the contrary, some participants believe that political dominance also promotes the development of coherent policies. For these participants, science in policy formulation is initiated by political actors and so therefore using the frameworks developed by political actors, coherent policies are achieved. It is argued that political actors are responsible for cracking the whip and so their actions serve as a check on these science advocates. A participant cited the Public Accounts Committee and the various

parliamentary sub-committees that serve as a check on the nature of policies that are formulated by the stakeholders to ensure that they are indeed, consistent with the law and it serve the needs of the society. **Public Official 6** argues that science may lead policy formulation but the definition of the outcome of the policy will be determined by politics. He said;

> *"From my point of view, science leads the policy process in terms of how the policy outcome will be attained because in many cases the political process comes at the beginning and this is what we want to achieve. But in terms of how the policy will be achieved is mainly influenced by science. The politics may lead by defining the policy outcome but science will come in with the inputs" (Public Official 6).*

From the narratives, it can be affirmed that politics may be seen as an affront to coherent policies but in certain circumstances, politics becomes the beacon of coherent policy due to the various checks and balances that are associated with it.

6.3.2 Sentimental Petroleum Policies in the Upstream Petroleum Sector

The world is arguably a political space controlled by political actors wearing different hats in the performance of their duties. Designing policies in such a space is not only complex in formulation but attracts a lot of consequences in the processes due to political intuition (Fullan, 2007). In a political economy where scarce resources exist; politics of ideas and incentives shape the nature of policies to be formulated by the political actors (Jones et al., 2009; Young & Mendizabal, 2009). This is largely because the political actors control the structures that determine the policy formulation process. In the case of Ghana, all natural resources are vested in the hands of the government and are managed in trust on behalf of the people. The organs of government co-

manage the resources in trust under the principle of checks and balances, a key feature of modern democracy. Nonetheless, majority control of natural resources is vested in the executive led by the President. The laws of Ghana allow the executive to establish agencies and ministries to directly manage a particular sector or area of the political economy that is of great interest to the government of the day. Invariably, the executive who is the political head of the political party in power is charged with the responsibility to initiate and design policies for the development of the economy. In a multi-party democratic system like that of Ghana, political ideologies, campaign promises of government and individual interest coupled with the desire to be re-elected shape the nature of policies in Ghana which leads to science exclusion in their policies. The evidence of political implications is "sentimental policy formulation". Sentimental policies were revealed in this work as formulating policies based on feelings and self-interest rather than what science says.

The majority of study participants from state institutions, academia, and CSOs' acknowledged that, policy formulation in all sectors especially the oil and gas industry is dominated by politics leading to the formulation of more sentimental policies. What is common are rather sentimental or manifesto promises. Several participants indicated that policies laced with partisan political orientation cannot be dissociated from sentimental policies in the upstream petroleum sector. Public official 6 therefore indicated that there are instances where the policies would have to be designed by the manifesto of the political party in power**.** This is what he said;

> *"Somehow in a very subjective way, I must say the political consideration also comes in. Also, in political cases maybe, for instance, we have the NPP manifesto, as a guide. All the policies we are drafting have the manifesto as a guide to make sure that whatever we are*

doing is in line with the promises of government in power to the electorates" (Public Official 6).

The Public Official 6 further expressed how government institutions are coerced into formulating sentimental policies rather than adopting a balanced or entirely science-laden approach. He said;

"*The Petroleum Commission is a government institution. We work for the government. Whatever policy we prepare, we do that on behalf of the Ministry of Energy or government and therefore our policy formulation process will aim at achieving the political objectives of the government in power. You cannot do any policy which will not further the aspirations of the government in power. We do not depend on the government always for our policies but some of the subjective decisions are certainly from the government and they ensure we adhere to it strictly. All policies prepared are guided by the manifesto of the government in power, that is the truth!" (Public Official 6).*

From the narratives of the participants, the study observes that political objectives which are hidden in the political ideologies of the party in power become the benchmark for framing public policies in the oil and gas sector in Ghana. It further discloses how the political party manifesto is used as a reference point for designing public sector policies in an attempt to seek legitimacy. Affirming this assertion, a participant compared how two sample policies were drafted based on the manifesto of a party and the other devoid of political sentiments. One of the participants stated:

"What you can identify from a document being political is in terms of directives from the sector minister or the manifesto of the political party. To the extent that policy-makers reference political party manifesto. Like the assimilated oil and gas capacity building program policy which was an extraction policy for the government, when compared to

local content policy or insurance policy, you will see clearly that the Accelerated Oil and Gas Capacity Building (AOGCP) policy is very political. When you look at the insurance policy or decommission policy, they are not political but rather strategic and scientific if you like." (Public Official 3).

The former President under whose political tenure oil and gas were discovered in Ghana believes the same that, politics regulates the system and the policies. Thus, to harness the natural resources to benefit the growing population, policies will be needed to regulate the activities. However, for him, natural resources present both positive and negative repercussions on the environment and so the regulations are keen. The regulations needed are postulated by the political heads and the government and so politics is inseparable from policy formulation. He argued that:

"With politics, we talk about regulations. Politics regulates the system. With politics, ownership is established. Crude oil was found in the territory of Ghana so technically it belongs to Ghana. And Ghana is governed through politics… In that sector, it is the Ghana Petroleum Commission (GNPC) which engages the scientists to do these kinds of studies to see how to explore the resource. The government will invest to that extent. The resource was found in the land of Ghana and I am the government. If it belongs to Ghana, then it belongs to the government of Ghana. Who will even regulate it if it is solely driven by science and technology and there are no funds to exploit it? (Former President).

According to the former President, the existence of the resource does not necessarily benefit the people. It requires governments to sink capital into the extraction process so that the resource can be harnessed to bless the people. Besides, investors will need to be managed to ensure compliance with the dictates of best environmental practices in the extraction which requires political

decisions. The sentimental policies were also sometimes driven by time and percentage in terms of economics according to some participants. Citing a particular policy to buttress the discussion, Public Official 3 revealed that;

> *"An example is, in 2010 when we were formulating the upstream petroleum policy, the issue of the percentages was reviewed, when the ICC came into the business, we thought they should come in 2020 or 2030, but when we went to the minister to do the presentation, they said it should ta effect immediately, so, we had to modify it" (Public Official 3).*

The former president contended that science does not work on itself, it requires some political will by political actors to shape the policies designed for it. He recounted that; *"Science is good, but without politics, science will not be seen because science does not work in isolation, policies will not be designed to extract the mineral which is mostly sponsored by the state, especially in a capital-intensive sector like oil and gas" (Former President).* This therefore implies and supports the ideal argument for the adoption of equilibria utilisation of science and politics in policy formulation in Ghana's upstream petroleum sector.

6. 3.4 Inclusivity in Policy Formulation

Based on the foregoing discussions, public policy formulation is a multi-sectorial activity requiring the engagement of experts from sectors with varied expertise. There is a high tendency or a looming catastrophe when policy decision-making processes are unilateral. Besides, the argument of some participants of the study reveals that politics is basically about the people and their welfare. Politics is limited to performing the role of science or other non-political sectors. To ensure

effective inclusiveness during the process of policy formulation, the people at the local level are consulted to make inputs to shape the outcome of policy. One of the participants clearly articulated the view that:

> "*For instance, even though Ghana's oil is located offshore, communities that made their livelihood from fishing in the deep seas were considered as the host because their activities were going to be interrupted by the extraction activities. In the policy discourse, the people had to be consulted to be part of the decision-making. For some participants, that process is largely political and cannot exempted in the policy formulation process"* (Public Official 3).

In a similar twist, Public Official 2 explained the existence of intra-political consultations in policy decision-making to the extent that even opposition political parties are equally involved during the formulation of policy in certain areas of interest to the nation all in the spirit of inclusiveness. He explained that:

> *"... normally one of the things you do in policy formulation is to make sure that all stakeholders participate or accept the policy. Because of this, you want to make sure that at every stage of dispensation or different political party. As a proper policy developer, you want to make sure you carry the opposition along, once you carry them along, their inputs are factored into the policy and once that happens, it becomes a policy for all"* ***(Public Official 2).***

These findings, however, are inconsistent with Quartey and Abbey (2018) who focused on the challenges of the oil governance regime in Ghana. They found that regulatory frameworks in Ghana are bedevilled with inadequate scope, inadequate sequencing, inadequate institutional

collaboration, inadequate adherence to legal requirements, and inadequate transparency in the development of the various regulation policies in this industry. Additionally, they found that political polarisation and the style of political governance practised in Ghana have an impact on the regulation of upstream oil industry policies. This position was reiterated by Gyimah-Boadi and Prempeh (2012).

Other policy experts mentioned that consultation from stakeholders including opposition political parties form part of the political process in the formulation of frameworks in the upstream petroleum sector. The inputs from sub-committees in parliament and political parties that have no representatives in parliament are taken into consideration. These views were expressed as;

> *"Politics is believed to be always around. The fact that you are sitting without consulting other people and acting on their behalf in terms of formulating policies in itself is politics. Politics is when various interests, especially those with a stake in formulating these policies are also brought to the table. But one cardinal feature of politics is consultation and consensus building. Well, you may satisfy science in that scientists find the requirements from the consensus and factor them into the policy"* ***(Academic 6)***.

This narration gives the impression that the ideal political decision towards policy-making is consultative. Thus, a decision cannot be political when it is unilateral. Another participant and a lawmaker espoused that:

> *"Politics first of all has to do with society. You will recall that even in the Western Region, some of them were not happy enough. Even those who sit on the committee were insisting that even though you are extracting oil from the sea, the whole country must benefit. Even if the issue of cooperation, some of us try so hard that, it should be pushed to the benefit of*

the whole country. Depending on the numbers on the committee, when they present the annual budget for approval it influences all that" (Hon. MP 2).

These assertions are in line with Poteete (2009), who indicated that a significant factor in determining whether political elites actively interact with and mobilise support from groups like civil society and the commercial sector for their policy reform agendas is stakeholder engagement. In terms of petroleum governance, this is crucial because it helps politicians establish the standards by which powerful elites (such as business elites) and broadly based social actors (such as civil society groups) conduct themselves. These interest groups are noted to be able to influence the administration and bureaucracy to address their requirements using their financial resources (Fraussen & Halpin, 2020; Rasmussen & Willems, 2021).

6.3.5 Sustainability in Policy Formulation at the Upstream Petroleum Sector in Ghana

Sustainable policies are long-term planned and mostly believed to be influenced by science and not politics. In recent times, the policies of states are considered short-lived because of the over-domination of politics in the policy process. In the current democratic systems where policies are formulated within a political year, a policy life span is determined by the number of years that government will be in power. Invariably, it is believed that the change of government leads to the change of policies and therefore there is no assurance that a policy once formulated under a regime will stand the test of time even if it was designed under the influence of science.

"*Oh! As for this country, once you make policies under a political regime, another person will come and say that I am not interested in that and will discontinue the policy due to ideological differences and so this affects long-term planning" (CSO Official 1).*

Another participant reiterated that:

> *"Sloganeering policies are sponsored by political party manifesto and so a party that wins power also brings different policies that affect continuity. For instance, when NDC was in power several petroleum policies were changed and when NPP also came to power, they have also changed several policies" (Public Official 1).*

Thus, politically dominated public policies are less likely to be sustainable since the foundation of the decisions that led to their formulation are not driven by lasting issues of national interest. Short-term egocentric decisions are unfavourable for public policy formulation processes.

6.4 Implications of the Interplay of Science and Politics in the Formulation of Public Policies in Upstream Petroleum in Ghana

When science and politics are integrated into policymaking, the outcome will depend on several variables, including the political and scientific context, the quality of scientific evidence, the political environment, the policy environment and the processes of institutional decision-making. The implications of the interplay of science and politics were also explored in the formulation of policies in the upstream petroleum sector in Ghana. In a perfect institutional context or society, science and politics are inextricably linked and influence one another. Scientific knowledge should provide evidence-based information and expertise to help policymakers make better decisions. Policy-makers, on the other hand, depend on scientific information to comprehend the consequences of policy choices and to develop effective and well-informed policies (Cash et al., 2003). The discussion in this section also focused on the views of study participants concerning the implications of the interplay of science and politics in the area of balancing interest and value,

collaboration and coherent policy formulation and sustainability of the policy and policy security and diversification.

6. 4.1 Balancing Interests and Values in Policy Formulation

A balanced decision-making is achieved when all important stakeholders are involved in policy making. The participants were unanimous and in support of the ideal situation that science and politics go hand in hand in the policy formulation process in the upstream petroleum sector in Ghana. their numerous views were captured by one of the academics and they remarked that;

> *"Science and politics must not be separated if you want a meaningful policy to be formulated. So, one has to decide, in deciding you have to be guided by hard facts and hard facts in itself has to be scientific. So, in my view, the two must go hand in hand. The idea of deciding is political. If you want to abstain from politics then you can't decide. One cardinal feature of politics is to decide. Acting on behalf of other people is political. But in making that decision, that decision must be informed by science. The two must go hand in hand"* (Academic 6).

This means that for quality policy decisions to be made in the upstream petroleum sector in Ghana, ***Academic 6*** believes that science and politics must not in any way conflict but rather work together to have a balanced policy where all scientific and political issues in the policy document are incorporated. Political policy decisions must be guided by scientific outcomes to engender trust in the capability of the policy. For him, the decisions to be made by political actors must be informed by scientific data. On the other hand, science cannot also make decisions without considering politics and therefore anytime the two are separated, policy coherence is distorted. Another

participant however believes that politics is the pacesetter as it motivates scientific explorations. According to a participant from an oil company;

> *"Politics will entice you to use science to explore the opportunity. So, they intermix. Without politics, you can't get to use science. And without science, you can't be successful. I think science will take the greater part because, with other countries, it leads the way. But in Ghana, I think politics should leave the way"* (Oil Com Official 2).

By incorporating scientific knowledge with political decisions, policymakers can find a balance between technical competence and the democratic process, ensuring that policies reflect a diverse variety of opinions. Thus, to achieve a comprehensive petroleum policy in Ghana, politics must show a way to incentivise exploration decisions.

6.4.2 Collaboration and Coherent Policy Formulation

Policymakers can make informed judgements based on scientific facts and expert opinion when science and politics are successfully integrated into the policy-making process. This approach prioritises objective analysis, rigorous research, and empirical facts, resulting in policy based on a thorough grasp of the issues at hand. This process leads to policy coherence. For instance, the former president in a statement argued that Ghana's discovery of oil offshore was commissioned by the government herein known as the "political actor" which enables "scientific institutions" backed by the law and financed with state resources to use technology (science) to search for the crude oil. The former president revealed that:

> "*…it took the politician to formulate first; the law to establish the GNPC and two; resourced it with state-of-the-art equipment which empowered them to start scientific research. After years of research, the political financed the scientists and mandated them*

to conduct the exploration based on the scientific data and that is why Ghana was able to identify that crude oil was within our space in commercial quantities, so I must say it was the blend of science and politics" (Former President).

To maximise profit from coherent and consistent policies, the two must be well managed to reduce antagonism. The former president remarked; *"Ideally you want to manage the two efficiently, you cannot do without science, technology, and economics"* (Former President).

Corroborating this, the argument is established that, scientific institutions do not work in isolation. They work within the remits of the laws of the state whose management has been entrusted in the hands of the government. Ineffective laws made by politicians have the potential to make scientific institutions ineffective in their operations and achieving the set objectives. Public official 1 confirmed this assertion by remarking that;

"As far as I'm concerned, GNPC is a very science and technology-based institution considering the kind of work we do, that the core thing is oil exploration and production, developing and production and disposal, these are all capital-intensive science-based activities that you cannot do otherwise. In terms of the actual drilling exploring the oil is purely science. However, the decision making as whether to go into oil exploration and what time to do so is all politics" ***(Public Official 1).***

Further, the argument is equally made about how science identifies petroleum resources but the decision as to who obtains the permits and legal requirements to extract and manage the resources rest in the hands of the political actor. Public official 1 argued that;

*"The decision making for instance as to who gets to do it for us, which company gets the contract to do the drilling is political. But as for how it is drilled, this is science. but who gets to do the drilling that is the procurement process and what time, how much should be spent might not necessarily be science but might be influenced by politics" (**Public Official 1).***

Science and politics have their unique roles that are critical in policy-making decisions in the petroleum sector that cannot be glossed over.

6.4.3 Sentimental Petroleum Policies in the Upstream Petroleum Sector

In developing countries like Ghana where public policies determine which political party will be elected and maintained in power to manage the extractive industry sector, formulation of sentimental policies which are often not rooted in science is inevitable. However, the interplay of science and politics in the policy formulation metrics is believed to reduce sentiments and promote a balance in the policy formulation process. The study found out that even in situations where sentimental manifesto promises are considered in the policy formulation process, it still contains mitigated scientific knowledge. In the drafting of a political party manifesto, scientific research sometimes informs the manifesto promises presented to the electorates. Thus, policies that are formulated based on the manifesto of the political party in power are believed to reduce strictly partisan political and ideological dominance. These perspectives were further explained by a public official that:

> *"In modern democracies, manifesto promises are not based on hearsay but rich in scientific findings except that such research may have been commissioned by the political party itself. But when the manifestos are based on rigorous scientific findings, they will have a great*

impact on public policy even though they emanate from a political ideology. Science can easily take out self-centredness that is embedded in political manifestos that could have influenced the policy (Hon. MP 1).

This implies that policies that are motivated by the interests, values, beliefs and ideology of partisan politics will be sustainable even when a new party takes the realm of governance when they are informed by objective scientific knowledge. Going forward, the sustainability of the policies is sometimes questioned, but participants contend that, the interplay of science and politics sometimes ensures the promotion of sustainability through the policy formulation checks and balances. Recommended policies are scrutinized by the general public through public opinion approaches which draw both scientific, political and cultural checks to reality. Public official 2 remarked that;

"Public policies relating to the upstream petroleum sector are not just made, the general public is involved sometimes. Recommended policies are sometimes subjected to public scrutiny through the organization of public forums and media sessions. The public is made up of scientists and politicians and their views serve as a check on the outcome of the policy decision" (Public Official 2).

The use of public scrutiny strategies by people with different expertise in the public policy formulation process also means the widening of the scope and content of policy directions and decisions. This means people from varying academic, cultural, political and economic backgrounds are going to be included. Thus, the process promotes the adoption of inclusive policies where a plethora of ideas are combined to ensure workable policies are achieved.

In recent times, numerous researchers have applied the political settlement analysis to have a more nuanced view of understanding the power relations and rational actors' behaviour in petroleum administration (Hickey et al., 2015; Mohan & Asante, 2015; Mohan et al., 2017). In particular, this involves recognising the role of science as well as politics in shaping the emergence of political commitments within petroleum governance settings. According to Mohan et al. (2017), the intertwining of ideas and interests from science and politics aids in the shaping of oil governance. The findings demonstrate Ghana's investor-friendly oil agreements that have been achieved in recent times. The research by Hickey et al. (2015) and Mohan et al. (2017) strongly suggests that the key to understanding how Ghana's political system has shaped oil governance is not whether or not material or ideational aspects of politics matter more, but rather how these factors can be used to identify the causal processes that led to the emergence of actors' commitments within the petroleum governance space. The narrative thus relates with the expressions of the interactions between science and politics as displayed in the isomorphism arguments and also affirms Nortse and Tschirley's (2000) and Blowers et al. (2007) findings of science and politics effects on policy formulation. Whether science or politics, legitimacy seeking is crucial to the nature of policy outcomes.

6.5 Resolving the Negative Implications of the Relationship between Science and Politics on Upstream Petroleum in Ghana

The implications of the various variables in this study present some negative effects and as a result, the study sought to find out how such implications can be resolved. Various participants suggested

ways which include collaborations between policymakers and think tanks to shape policy formulation. These were expressed as:

> *"Yes, they need to collaborate to shape policy formulation. I can say I've experienced that before. Over here when you say scientific data or the best way of doing things it has been said by industry people. Sometimes we advise the politicians and they take. When you are doing a project, for instance, you are doing a high capital cost project, normally what you will do is that the politician wants to have the project done, once the project is done, the politician is looking at the economic benefits of the project. But you as institutions want to see if this project is viable. You are looking at whether the project will affect people, and the socioeconomic aspects of it while the politician is looking at the profit aspect of it. We are government bodies or entities so we must use data all the time as well as try to marry data and politics to make sure we get the best outcome or results"* ***(Public Official 2).***

Others opined that the development of formidable state structures that are checked by effective media systems will promote the reduction of the negative implications. Again, the argument of adopting dialogues in the formulation process is also recommended by participants as a remedy to the unfavourable implications of the antagonism between science and politics. A participant said;

*"They can be resolved in two ways; one is we need to continue to talk (engage or advise) politicians not to discard science when it is not in their favour. They should learn to accept science as a reality. Scientists need to be trained better. We need civil society groups as well. The policymaker should work with the media. When the media is very good, it will expose loopholes" (**Academic 5).***

The suggestions are consistent with Skoie (1969) and Kyvik and Larsen, (1997) who acknowledge that to formulate good and robust policies it is important to promote cooperation between

researchers and political authorities that is holistically consulted through the involvement of all actors. Other studies have also argued that science has the potential to salvage policy from the short-sighted influence of politicians (DeLeon, 1988; Stone, 2001). According to Gornitzka and Stensaker (2004), one of the forces that contribute to a better relationship between science and politics is a unanimous pursuit of good policy and incentives toward scientific research.

The isomorphism theory which served as the basis for the conceptual framework designed for this study has been largely affirmed as most of the policy formulation processes and outcomes were evidence of the interactions between science and politics. Even though legitimacy-seeking was eminent in the political influences, science was not left out in the process. As alluded to by many of the study participants, the argument of "*who leads who*" becomes complex to unravel. However, it is settled that science is considered very useful in the policy formulation drive except that, its aims are not achievable without politics and so the effective interplay of the two is considered the best option for upstream petroleum policy formulation in Ghana.

It is critical to recognise that the connection between science and politics is multifaceted, with no one-size-fits-all solution. The ideal outcome is a collaborative and constructive relationship between science and politics, in which scientific evidence is considered alongside societal values, ethical considerations, and political feasibility to inform policies that are effective, equitable, and address population needs.

6.6 Chapter Conclusion

This chapter was dedicated to presenting the findings on the implications of the relationship between science and politics in upstream petroleum policies in Ghana. The findings revealed that both science and politics indeed have implications on the nature of policy and outcome in the upstream petroleum policy process. Interaction with participants revealed that science and politics acting separately leads to policy coherence, and stakeholder engagements promote the inclusivity of policies, control sentimental or manifesto policies, and promote sustainability of policies and/or policy security and diversification. Contrary to scientific implications, the dominance of politics in policy formulation does not guarantee coherency, sustainability policy security or inclusivity due to the partisan and personal interest instead of the collective interest of the state. In all these, the effective interplay of science and politics is regarded as the best option as it promotes a balance in the quality of the policies being formulated. However, the interplays are not without negative implications and it is suggested that to resolve the barriers, effective collaboration between science and politics must be encouraged and deliberately implemented. Equally, it is suggested that training and equipping scientists and politicians to embrace science without antagonism is key. The realisation of this according to participants was to ensure the development and equipping of the media as a force of checks on science and politics.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter is dedicated to presenting three main issues, the study summary, conclusions and recommendations. The summary seeks to cover the main focus of the study, the methodology adopted, the conceptual and theoretical highlights and the major findings. This is followed by the conclusions drawn from the findings about existing literature and the study objectives. Finally, based on the findings and juxtaposing them to the objectives, recommendations are made. In the same vein, the limitations observed from the study and areas of possible future research are recommended.

7.2 Summary of the study

Public policy formulation is a complex system of varying variables that interact at various stages. The study sought to generally investigate and understand the nature and implications of the relationship between science and politics in the petroleum exploration and extraction sector with focus on the upstream sector of the petroleum value chain in Ghana but with specific focus on three main areas: the nature of the relationship between science and politics in the policy formulation process in Ghana the driving forces of the relationship between science and politics and how these forces shape policy making and the implications of the relationship between science and politics on upstream petroleum policy formulation in Ghana.

The study adopted the qualitative research design and conducted qualitative interviews with over 25 participants from academia, industry, CSOs, and state and non-state actors related to upstream petroleum extraction and management in Ghana. The specific findings of the study are examined below.

7.3 Findings

The study shows that participants were divided on whether the policy public environment is influenced by science or politics. On the key actors of policy formulation, it was revealed that Government ministries form the major policy-formulating body for policies in the country. It was further observed that those ministries drive the formulation of polices that are specific to their sector of operation with the support of their departments and agencies. Indeed, policies are initiated by appropriate ministries, government departments and agencies compared to individuals or CSOs.

On the role of science and politics in public policy formulation, it was revealed that science precedes politics and serves as the foundation of the policy-making process because of its methodological nature towards problem-solving and that it provides accurate data for analysing the issues in the policy decision-making process. Regarding the role of politics in policy-making processes, it was observed that politics initiates almost all policy-making decisions before inviting the input of other stakeholders. Politics also regulates all the policy-making processes since politicians usually initiate policy ideas.

Driving forces of the relationship between science and politics and how these forces shape policy-making in Ghana: In line with the second objective of the study, the study sought to find out the forces that drive science and politics as main variables in the public policy formulation process in the upstream petroleum sector in Ghana. The findings reveal that the forces are broadly classified into internal and external factors. Partisan politics, clientelism of policy actors, changing cultural dynamics and belief systems of the state, personal interest and incentives are deemed the main internal factors that drive science and politics in the policy formulation process in the upstream petroleum sector in Ghana. On the other hand, the externalities such as the security of re-election through the endorsement of rating agencies and Bretton Wood institutions, foreign and diplomatic relations as well as donor country influences of multinational firms and pro-market mechanism of external investors were revealed as the external drivers of science and politics in the policy formulation process.

The implications of the relationship between science and politics on upstream petroleum policy formulation in Ghana. The study revealed that both science and politics have implications on the outcome of the nature of policy in the upstream petroleum policy. It was further observed that science and politics acting separately affect policy coherence, stakeholder engagements or inclusivity of policies, sentimental or manifesto policies, sustainability of policies and/or policy security and diversification. While science implications assure the positive dimensions of the key findings in policy formulation upstream, the dominance of politics on the contrary does not guarantee coherency, sustainability policy security or inclusivity. However, the study revealed that the effective interplay of science and politics promotes a balance in the quality of the policies being formulated. Again, the interplays are not without negative implications and it was observed that to

resolve the barriers, effective collaboration between science and politics must be encouraged. It was proposed that training and equipping of scientists and politicians to embrace science without antagonisms. Most of the findings are consistent with arguments established by the isomorphism and institutional theory.

7. 4 Conclusions

The policy-making institutions in Ghana are public institutions and they have the power to initiate and give final approval to policies. The use of science or politics in informing policy is at the discretion of these institutions and they exercise it based on the interest of government, time and resources available. This practice means there is less reliance on science in policy making process as a result of interest and political constraints.

Science is critical and imperative to the policy decision-making process in the upstream petroleum sector of Ghana. Without science, making policies in the petroleum sector would definitely not only be difficult but would not stand the test of time. Nonetheless, politics rather plays a pivotal role in the process of the formulation of the policies that govern the petroleum industry in Ghana.

The public policy space in Ghana is very complicated but very formalised and legitimised just as elucidated in the New institutional theory (NIT) which is embedded in the Isomorphism arguments. It is obvious that science precedes politics in the policy thinking processes. The processes followed are however systematic despite challenges of political interference due to the nature of executive control over the governance structure of Ghana. The constraints identified are in line with the institutional constraint's arguments espoused in the isomorphism discussed under the conceptual framework in this study.

In most cases, public policies are still initiated by the executive organ through sector ministries and associated agencies and departments. Major stakeholders like CSOs, academia and investors are not left out in the decision-making process which promotes policy convergence promulgated by Hall (1993) and Hood (1998) as a medium of seeking legitimacy as postulated in the Isomorphism debate. Irrespective of the over-politicisation of the policy entrepreneurship influences, political ideologies and values of the party in power, the formalised structures are exhausted which promotes policy credibility.

The arguments of partisanship, clientelism, and personal interest remain active ingredients in the policy formulation discourse. It is against this background that, the study agrees to the assertion of stated policies and actual policy issues raised by study participants affirming the Dimaggio and Powell (1983) three drivers of pressures in policy formulation as realistic. Ghana has beautiful policies formulated because the policy-making process embraces the cultural setting pressures revealed in Caemmerer and Mack (2009).

Foreign interference through the use of sponsored research and investor influences remains a significant contributor to the upstream petroleum policies of the state. The negative implications of the dominance of science or politics in policy formulation are eminent however, the adoption of the interplay of the two concepts promotes policy diffusion as enshrined in the isomorphism theory.

7.5 Recommendations

The study admits science and politics are inseparable in the public policy formulation process in Ghana. However, since institutional and structural constraints are inevitable in the public policy formulation process, the study recommends the following as possible alternatives to solving the dilemmas observed:

First, the research capacity of the research wings within the ministries must be enhanced by the government to ensure rigorous and credible research to complement and advise political decisions in the policy-making process. This can be done through effectively resourcing relevant institutions with scientific equipment and building the capacity of the actor. This will help achieve policy diffusion and harness the benefits of effective policies in the petroleum sector.

Secondly, the development of homegrown policy models should be encouraged as it will help address the issues of the sector more effectively rather than adopting foreign scientific models which are effective in different geographic spaces. This will help reduce policy formulation conflicts that exist in the system.

The development of all-inclusive policies to withstand the shocks of unstable political changes should be considered. Policies of the state should not be abandoned after the exit of one political party in government. Such inconsistencies promote sentimental policies as observed in the study.

Addressing institutional constraints that hinder effective integration of science into policy-making processes is critical. Streamlining procedures and reducing partisan influences could improve the sustainability and inclusivity of policies, particularly in sectors like upstream petroleum.

Promote transparency and accountability through the active involvement of non-partisan oversight bodies like Public Interest and Accountability Committees (PIAC).

The government and its policy-making actors must interact with the scientific community so as to share ideas in finding a solution to the challenges that confront the blending of science and politics in the policy formulation processes in Ghana. This will help build confidence and trust in the policy-making process of the state and reduce partisanship traits in the system. This is expected to boost investor confidence in the sector.

7.6 Recommendation for Future Research

This study was conducted with the primary focus on science and politics relationship in the upstream petroleum policy formulation space in Ghana using the qualitative approach. The study acknowledges that policy formulation is just one out of the many stages of the policy cycle. Thus, other stages such as agenda setting, policy implementation, and policy evaluation among others remain uncovered. The policy implementation and evaluation stages can equally be researched to establish the linkages between the various stages in the cycle and the role of science and politics.

Again, similar studies may be conducted in the same sector using either a quantitative approach or mixed-method design as this study only relied on the qualitative approach. The findings of such approaches can present a different interesting perspective that will inform policy direction in Ghana.

Finally, the study suggests that future research should delve into the interplay of science and politics in the other streams of the petroleum industry. Thus, the interplay of science and politics

in policy formulation processes in the downstream and mid-streams will be worth considering in the future.

7.7 Contribution to Knowledge

The petroleum sector has received varying degrees of intellectual research and knowledge in Ghana and beyond. However, the search for an understanding of science and the role of politics in the public policy formulation process with a specific focus on the upstream petroleum sector in Ghana had received less attention and therefore the findings from this study are undoubtedly a contribution to knowledge. This study is, therefore, one of the few studies that clearly articulate (1) the nature of relations between science and politics in petroleum upstream policy formulation in Ghana, (2) the driving forces and how such forces influence the science-politics relations in petroleum upstream policy formulation in Ghana; and (3) the implications of these relations for petroleum upstream policy formulation in Ghana. Natural resources are bound in Africa and we understand the political economy drivers in the decision-making and policy formulation discourses. This study has thrown significant light on and provided fresh insights into the balance between political considerations of electoral fortunes and how even critical matters such as science get played. This study therefore extends our understanding and can become the basis of fresh analyses into natural resources governance from not only a political economy lens but also a "scientific" perspective.

As observed from the study findings, the issue of clientelism, and partisan political interest of the governing party in power influence significantly the policy formulation discourse in the upstream petroleum sector in Ghana. More so it can be deduced that Ghana as a nation has no established

petroleum policy model but borrows from other international best practices which might not fit the Ghanaian context all the time. These things are perceived as open secrets in the public policy formulation in Ghana but the affirmation of the perceptions by research makes the views gathered no more perceptions but undoubtedly scientific. This study therefore provides a significant contribution to the stock of scholarly knowledge and enhances the debate for future discussions.

Significantly, the study contributes to the age-old politics-administration and arts-science debates by public administration scholars by using the upstream petroleum sector in Ghana as a case study. This will expand the spectrum of discussion in the sector, identify the gaps and provide durable solutions to future policies in Ghana. Undoubtedly, there is a gap in appreciating what constitutes the science that policy must adopt. Is it the process of the policy going through stages or it is the use of scientific data that determines whether or not a policy is scientific or political? This study provides direction where academics could expand the debate further and therefore defuse the ambiguity of deciding what science or politics may be and their place in policy formulation especially so in the petroleum sector in Ghana.

REFERENCES

Abdulai, A. G. (2017). Competitive clientelism and the political economy of mining in Ghana.

Abudu, H., & Sai, R. (2020). Examining prospects and challenges of Ghana's petroleum industry: A systematic review. *Energy Reports*, *6*, 841-858.

Abrams, L. S. (2010). Sampling 'hard to reach' populations in qualitative research: The case of incarcerated youth. *Qualitative social work*, *9*(4), 536-550.

Abudu, H., & Sai, R. (2020). Examining prospects and challenges of Ghana's petroleum industry: A systematic review. *Energy Reports*, *6*, 841-858.

African Union. (2009). *Africa Mining Vision*. Addis Ababa, Ethiopia.

Agbaeze, E. K., & Ukoha, K. (2018). Oil a blessing or a curse: The Nigerian experience. *European Journal of Social Sciences*, *56*(3), 262-270.

Agbesi, S. (2020, September). Political parties and Internet voting system adoption in Ghana. In *International Conference on Electronic Government and the Information Systems Perspective* (pp. 174-186). Springer, Cham.

Ainuson, K. (2015). Overview of the Institutional Framework for the Management of Oil and Gas Industry in Ghana. *U. Ghana LJ*, *28*, 103.

Ajide, K. B., & Raheem, I. D. (2016). Institutions-FDI nexus in ECOWAS countries. *Journal of African Business*, *17*(3), 319-341.

Akonnor, A., & Ohemeng, F. L. K. (2020). Towards a more accountable resource governance in developing countries: The case of Ghana's oil and gas sector. *The Extractive Industries and Society*, *7*(3), 812-819.

Akwei, C., Damoah, I. S., & Amankwah-Amoah, J. (2020). The Effects of Politics on the Implementation of Government Programs/Projects: Insights from a Developing Economy. *Politics & Policy*, *48*(6), 1161-1201.

Aliyu, A. A., Bello, M. U., Kasim, R., & Martin, D. (2014). Positivist and non-positivist paradigm in social science research: Conflicting paradigms or perfect partners. *J. Mgmt. & Sustainability*, *4*, 79.

Amin-Adam, M. (2015). Licensing Compliance in Ghana's Upstream Petroleum Sector. *Accra, Ghana: African Center for Energy Policy*.

Anderson, J. (1997). Response to Theodore J. Lowi's" comments on Anderson,'Governmental Suasion: Adding to the Lowi policy thypoloy"'(Policy Studies Journal, 25 (2), 283-285). *Policy Studies Journal*, *25*(4), 557.

Andreasson, U., Perret-Liaudet, A., van Waalwijk van Doorn, L. J., Blennow, K., Chiasserini, D., Engelborghs, S., ... & Teunissen, C. E. (2015). A practical guide to immunoassay method validation. *Frontiers in neurology*, *6*, 179.

Andrews, R., Boyne, G. A., & Walker, R. M. (2006). Strategy, structure and process in the public sector: A test of the Miles and Snow model. Public Administration, 87, 732–749. doi:10.1111/j.1467-9299.2009. 01760.x

Andvig, J. C. (1995). Corruption in the North Sea oil industry: Issues and assessments. *Crime, Law and Social Change*, *23*(4), 289-313.

Antwi, S. K., & Hamza, K. (2015). Qualitative and quantitative research paradigms in business research: A philosophical reflection. *European journal of business and management*, *7*(3), 217-225.

Arora, S., & Gupta, A. (2013). Control Oil-Rule the World! *Available at SSRN 2200815*.

Asante, K., Abdulai, A.-G. and Mohan, G. (2021) The 'new' institutional politics of Ghana's hydrocarbon governance. ESID Working Paper No. 169. Manchester, UK: The University of Manchester. Available at www.effective-states.org.

Asif, M., & Muneer, T. (2007). Energy supply, its demand and security issues for developed and emerging economies. *Renewable and sustainable energy reviews*, *11*(7), 1388-1413.

Asumadu, G., Ofori, D., Agyei, J., & Bawa, A. Y. (2021). Ghana's Oil Discovery and Natural Resource Curse Nexus. Modern Economy, 12, 1959-1971. https://doi.org/10.4236/me.2021.1212103

Auty, R. M. (2001). The political economy of resource-driven growth. *European economic review*, *45*(4-6), 839-846.

Auty, R. M. (1993). *Sustaining Development in Mineral Economies: The Resource Curse Thesis*. Routledge.

Babbie, E. R. (2011). *Introduction to social research*. Wadsworth Cengage learning.

Bardach, E. (2012). A practical guide for policy analysis: The eightfold path to more effective problem-solving (4th ed.). CQ Press.

Bardach, E., & Patashnik, E. M. (2019). *A practical guide for policy analysis: The eightfold path to more effective problem solving*. CQ press.

Barley, S. R., & Tolbert, P. S. (1997). Institutionalization and structuration: Studying the links between action and institution. *Organization studies*, *18*(1), 93-117.

Barreto, I., & Baden-Fuller, C. (2006). To conform or to perform? Mimetic behaviour, legitimacy-based groups and performance consequences. *Journal of management studies*, *43*(7), 1559-1581.

Batley, R., & Rose, P. (2011). Analysing collaboration between non-governmental service providers and governments. *Public administration and development*, *31*(4), 230-239.

Bebbington, P. E., McBride, O., Steel, C., Kuipers, E., Radovanoviĉ, M., Brugha, T., ... & Freeman, D. (2013). The structure of paranoia in the general population. *The British Journal of Psychiatry*, *202*(6), 419-427.

Béland, D., & Cox, R. H. (2011). Ideas and politics in social science research. Oxford Research Encyclopedia of Politics.

Berman, D. S., (1995). Incremental value of in policy formulation and implementation. *Journal of the American College of Cardiology*, *26*(3), 639-647.

Birkland, T. A. (2015). An introduction to the policy process: Theories, concepts, and models of public policy making. Routledge.

Blowers, A., Boersema, J., & Martin, A. (2007). Science and politics–relating the 'can'and 'should of sustainable development.

Brand, U., & Vadrot, A. (2013). Epistemic selectivities and the valorisation of nature: The cases of the Nagoya protocol and the intergovernmental science-policy platform for biodiversity and ecosystem services (IPBES). *Law Env't & Dev. J.*, *9*, 202.

Brannen, M. Y. (1992). Bwana Mickey": Constructing cultural consumption at Tokyo Disneyland. *Remade in Japan*, 216-234.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Brewer, G. A., & Selden, S. C. (2000). Why elephants gallop: Assessing and predicting organizational performance in federal agencies. *Journal of public administration research and theory*, *10*(4), 685-712.

Bridge W., and Le Billion J. (2013). *Oil governance in Ghana: exploring the politics of elite commitment to local participation*. The University of Manchester (United Kingdom).

Brinkerhoff, D. (2000). Promoting the sustainability of development institutions: A framework for strategy. *World Development,* 20(3)**,** 369-383.

Brinkerhoff, J. M. & Brinkerhoff, D. W. (2002). Government–nonprofit relations in comparative perspective: evolution, themes and new directions. *Public Administration and Development,* 22(1)**,** 3-18.

Brinkerhoff, J. M. (2003). Donor-funded government—NGO partnership for public service improvement: Cases from India and Pakistan. *Voluntas: International Journal of Voluntary and Nonprofit Organizations,* 14(1)**,** 105-122.
British Ecological Society (2017): Policy Guide

Broadbent, E. (2012). Politics of research-based evidence in African policy debates. *London: Overseas Development Institute*.

Brown, R., Davis, S., & Miller, J. (2019). *Expert Knowledge and Its Role in Evidence-Based Policy Making*. Policy Studies Review, 30(1), 76-92.

Bryman, A. (2016). *Social research methods*. Oxford university press. http://hdl.handle.net/123456789/3771. 978–0–19–958805–3

Bueno, C., F. (2012). The Fundamental Principles and Concepts of Politics. Political Science: The Modern View of Government, State and Politics (pp.44-51). CreateSpace Independent Publishing Platform, ISBN: ISBN-10: 1479178128 ISBN-13: 978-1479178124

Caemmerer, B., & Marck, M. (2009). The impact of isomorphic pressures on the development of organisational service orientation in public services. In *Australian and New Zealand Marketing Academy*.

Campbell, J. L. (2018). 7. Institutional Analysis and the Role of Ideas in Political Economy. *The rise of neoliberalism and institutional analysis*, 159-190.

Campbell, N. R., Lackland, D. T., Niebylski, M. L., & Nilsson, P. M. (2015). Is reducing dietary sodium controversial? Is it the conduct of studies with flawed research methods that is controversial? A perspective from the World Hypertension League Executive Committee. *The Journal of Clinical Hypertension*, *17*(2), 85.

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., ... & Walker, K. (2020). Purposive sampling: complex or simple? Research case examples. *Journal of research in Nursing*, *25*(8), 652-661.

Campbell-Verduyn, M. (2019). Understanding technological change in global finance through infrastructures: Introduction to Review of International Political Economy Special Issue 'The Changing Technological Infrastructures of Global Finance'. *Review of international political economy*, *26*(5), 773-789.

Capoccia, G., & Kelemen, R. D. (2007). The study of critical junctures: Theory, narrative, and counterfactuals in historical institutionalism. *World politics*, *59*(3), 341-369.

Cheng, A. S., Kruger, L. E., & Daniels, S. E. (2003). " Place" as an integrating concept in natural resource politics: Propositions for a social science research Agenda. *Society &Natural Resources*, *16*(2), 87-104.

Clark, P. (2015). *Defining Science in Policy Making: An Analysis*. Scientific Studies Journal, 8(4), 511-529.

Cobb, Roger and Charles D. Elder (1972) Participation in American Politics: The Dynamics of Agenda Building, Boston, Allyn and Bacon

Creswell, J. W. (2013). Steps in conducting a scholarly mixed methods study.

Creswell, J. W., & Miller, G. A. (1997). Research Methodologies and the Doctoral Process. *New directions for higher education*, *99*, 33-46.

Crewe, E., & Young, M. J. (2002). Bridging research and policy: context, evidence and links. Working Paper 173. London: ODI.

Dah, F. K., & Sulemana, M. (2010). The contribution of oil to the economic development of Ghana: The role of foreign direct investments (FDI) and government policies.

Di John, J., & Putzel, J. (2009). Political settlements. Issues paper, Governance and Social Development Resources Centre. *International Development Department, University of Birmingham*.

DiMaggio, P. J. & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review,* 48(2)**,** 147-160.

Dolowitz, D. P., & Marsh, D. (2000). Learning from abroad: The role of policy transfer in contemporary policy-making. Governance, 13(1), 5-24.

Durrheim, K., & Tredoux, C. (2004). *Numbers, hypotheses & conclusions: A course in statistics for the social sciences*. Juta and Company Ltd.

Edelman, R. (2009). Effects of politics of policy formulation and implementation. *The Journal of Physical Chemistry C*, *113*(41), 17761-17767.

Elwerfelli, A., & Benhin, J. K. A. (2018). Oil a blessing or curse: A comparative assessment of Nigeria, Norway and the United Arab Emirates.

Engdahl, O. (1993). Oil pricing mechanism and method for determining the size of a sector 103(1), 26-29.

Eni (2017), 'Eni starts production from the OCTP Integrated Oil&Gas Development Project, in Ghana's offshore, ahead of schedule and with a record time-to-market', 20 May: https://www.eni.com/en_IT/media/2017/05/eni-starts-production-from-theoctp-integrated-oilgas-development-project-in-ghanas-offshore-ahead-of-schedule-and-with-a-record-time-to-market (accessed 19 December 2017).

Esu, G. E. (2017). Assessing the resource curse question: A Case of crude oil production in Nigeria. *Journal of Economic Research*, *22*(2), 153-213.

Eurostat, W. (2007). *Gross domestic expenditure on R&D (GERD) by source of funds – abroad*. Available at <http://epp.eurostat.ec.europa.eu/portal/>.

Fischer, F. (2003). *Reframing public policy: Discursive politics and deliberative practices*. Oxford University Press.

Fox, J. (2007). The uncertain relationship between transparency and accountability. *Development in practice*, *17*(4-5), 663-671.

Frumkin, P., & Galaskiewicz, J. (2004). Institutional isomorphism and public sector organizations. *Journal of public administration research and theory*, *14*(3), 283-307.

Fullan, M. (2007). *Leading in a culture of change*. John Wiley & Sons.

Gallagher, L. M., Lagman, R., & Rybicki, L. (2018). Outcomes of music therapy interventions on symptom management in palliative medicine patients. *American Journal of Hospice and Palliative Medicine®*, *35*(2), 250-257.

Gary, I., & Karl, T. L. (2003). *Bottom of the barrel: Africa's oil boom and the poor*. Catholic Relief Services.

Gatune, J., Commodore, R., Darko, R., Atengble, K.O., Harris, D., Osei, D.R., Oteng-Abayie, F.E., Shah, N., Bainson, A.K., Fenny, A., Osei, C., and Rosengren, A. (2021) The role of evidence in policymaking in Ghana: a political economy analysis, SEDI: Oxford.

Gaventa, J., & McGee, R. (2013). The impact of transparency and accountability initiatives. *Development Policy Review*, *31*, s3-s28.

Ghana National Petroleum Corporation, (2008). Status Report Jubilee Field. GNPC, Accra Ghana, Available athttps://www.bing.com/search?q=ghana+national+petroleum+corporation

Gherghina, S., & Volintiru, C. (2017). A new model of clientelism: political parties, public resources, and private contributors. *European political science review*, *9*(1), 115-137.

GHEITI. (2023). *Ghana 2023 EITI Work Plan*. Ghana Extractive Industries Transparency Initiative. Available at EITI website.

Gordon, U. E. E. P. J. (2014). *Oil and Gas Law: Current Practice and Emerging Trends*. Edinburgh University Press.

Gornitzka, Å., & Langfeldt, L. (2008). The internationalisation of national knowledge policies. In *Borderless knowledge* (pp. 141-169). Springer, Dordrecht.

Gornitzka, A., Kogan, M., & Amaral, A. (2005). Reform and change in higher education. *Analysing Policy Implementation. Netherlands: Springer*.

Grace, K., & Mikal, J. (2019). Incorporating qualitative methodologies and fieldwork into large scale, quantitative analyses of climate health in low-income countries. *The Lancet Planetary Health*, *3*(12), e496-e498.

Greener, R. H. (2002). *Four African Development Plans: Ghana, Kenya, Nigeria and Tanzania*: Cambridge Univ Press

Grimm, S., Gensch, M. M., Hauf, J., Prenzel, J., Rehani, N., Senz, S., & Vogel, O. (2018). *The interface between research and policy-making in South Africa: exploring the institutional framework and practice of an uneasy relationship* (No. 19/2018). Discussion Paper.

Gupta, A., & Arora, S. (2015). Control the Oil, Rule the World: The Energy Games Nations Play. *IUP Journal of International Relations*, *9*(1).

Guriev S. Rutland, P. Ballock P. & Smith-Corock H. (2008). Putin's economic record: Is the oil boom sustainable? *Europe-Asia Studies*, *60*(6), 1051-1072.

Gyimah-Boadi, E., & Prempeh, H. K. (2012). Oil, politics, and Ghana's democracy. *Journal of democracy*, *23*(3), 94-108.

Hall, B. (2010). The financing of R&D and innovation. In *Handbook of the Economics of Innovation* (Vol. 1, pp. 609-639). North-Holland.

Hall, P. A. (1993). Policy paradigms, social learning, and the state: The case of economic policymaking in Britain. Comparative Politics, 25(3), 275-296.

Hall, P. A., & Taylor, R. C. R. (1996). Political science and the three new institutionalisms. Political Studies, 44(5), 936-957.

Hallonsten, O., & Hugander, O. (2014). Supporting "future research leaders" in Sweden: Institutional isomorphism and inadvertent funding agglomeration. Research Evaluation, 23, 249–260. doi:10.1093/reseval/rvu009

Hansohm, D., & Naimhwaka, E. (2005). Policy Research Networks and Policy Making in Africa'. Working Paper 100. Windhoek: NEPRU.

Hay, J. (2010). Too good to fail: Managing financial crisis through the moral economy of realty TV. *Journal of Communication Inquiry*, *34*(4), 382-402.

Head, B. (2020). Evidence-based policy: Principles, promises and pitfalls. Policy Design and Practice, 3(2), 136-150.

Hearn, J. (2010). Foreign aid, democratisation and civil society in Africa: a study of South Africa, Ghana and Uganda.

Herb, M. (2005). No representation without taxation? Rents, development, and democracy. *Comparative Politics*, 297-316.

Heywood, A. (1997). Politics, *Macmillan Press LTD*, London

Hickey, E. W. (2015). *Petroleum capacity Building network*. Cengage Learning.

Hickey, S. (2019). The politics of state capacity and development in Africa: Reframing and researching 'pockets of effectiveness'.

Hill, M., & Varone, F. (2016). *The public policy processes*. Taylor & Francis.

Hill, M., & Varone, F. (2021). *The public policy processes*. Routledge.

Hirschman, A. O. (1987). The political economy of Latin American development: seven exercises in retrospection. *Latin American research review*, *22*(3), 7-36.

Hogwood, B. W., & Gunn, L. A. (1984). Policy analysis for the real world. Oxford University Press.
Hood, C. (1998). The art of the state: Culture, rhetoric, and public management. Oxford University Press.
Hood, C. (2010). *The blame game*. Princeton University Press. https://doi.org/10.1515/9781400836819

Hooghe, L., & Marks, G. (2003). Unravelling the central state, but how? Types of multi-level governance. American political science review, 97(2), 233-243.
Hopkin, J. (2006, August). Conceptualizing political clientelism: Political exchange and democratic theory. In *APSA annual meeting, Philadelphia* (Vol. 31, pp. 46-18).

Hoppe, R. (1999). Policy analysis, science and politics: from 'speaking truth to power to 'making sense together'. *Science and Public Policy*, *26*(3), 201-210.

Howlett, M. and M. Ramesh (2003). Studying Public Policy: Policy Cycles and Policy Subsystems, Toronto, Oxford University Press.

Howlett, M., & Ramesh, M. (2017). Studying public policy: Policy cycles and policy subsystems. Oxford University Press.

Howlett, M., & Rayner, J. (2006). The politics of pleasure? Integrating public health and tourism goals in the policy and planning process. Journal of travel research, 44(3), 311-321.

Haufler, V. (2010). Disclosure as governance: The Extractive Industries Transparency Initiative resource management in the developing world. *Global Environmental Politics, 10*(3), 53-73.

ICAI (Institute of Chartered Accountants of India) (2020, February 12). Literature Review: The Changing Nature of UK Aid in Ghana. https://icai.independent.gov.uk/html-version/ghana-3/

Ireri, D., Belal, E., Okinda, C., Makange, N., & Ji, C. (2019). A computer vision system for defect discrimination and grading in tomatoes using machine learning and image processing. *Artificial Intelligence in Agriculture*, *2*, 28-37.

Jenkins-Smith, H. C., & Sabatier, P. A. (1994). Evaluating the advocacy coalition framework. *Journal of public policy*, *14*(2), 175-203.

Jennings, P. D., & Greenwood, R. (2003). 6bConstructing the iron cage: Institutional theory and enactment'. *Debating organization: point-counterpoint in organization studies*, *195*.

Jensen, M. P., Turner, J. A., & Romano, J. M. (2001). Changes in beliefs, catastrophizing, and coping are associated with improvement in multidisciplinary pain treatment. *Journal of consulting and clinical psychology*, *69*(4), 655.

Jensen, N. M., & Johnston, N. P. (2011). Political risk, reputation, and the resource curse. *Comparative Political Studies*, *44*(6), 662-688.

John, P. (2013). Policy feedback and policy success. Oxford Research Encyclopedia of Communication.

Johnson, M., & Lee, K. (2020). *Policy Paradigms: Understanding the Complexities*. Political Science Review, 15(2), 212-230.

Jones, S., Holmes, F. A., O'Shaughnessy, J., Blum, J. L., Vukelja, S. J., McIntyre, K. J., ... & Savin, M. A. (2009). Policy-making processes and Implementatio. *Journal of Clinical Oncology*, *27*(8), 1177-1183.

Jordan, Andrew J. (Ed.); Turnpenny, John R. (Ed.) (2015): The Tools of Policy Formulation: Actors, Capacities, Venues and Effects, New Horizons in Public Policy Series, ISBN 978-1-78347-704-3, Edward Elgar Publishing, Cheltenham, http://dx.doi.org/10.4337/9781783477043

Kaboub, F. (2008). Positivist paradigm. *Encyclopaedia of counselling*, *2*(2), 343.

Karl, T. L. (1997). *The paradox of plenty*. University of California Press.

Karl, T. L. (2007). Oil-led development: social, political, and economic consequences. *Encyclopedia of energy*, *4*(8), 661-672.

Keate N. (2021). What is the relationship between science and politics? Warwick University. Science & Tech, science policy.

Kerr, S., (2011). Extractive sector: review of concepts, policies, tools, and critical issues. *Ocean & coastal management*, *54*(11), 807-820.

Khan, M. (2010). Political settlements and the governance of growth-enhancing institutions.

King, A. (2016). Science, politics and policymaking: Even though expert knowledge has become indispensible for policymaking, providing scientific advice to governments is not always easy. *EMBO reports*, *17*(11), 1510-1512.

Kingdon, J. W. (1984). Agendas, alternatives, and public policies. Little, Brown and Company.
Klar, S., & Leeper, T. J. (2019). Identities and intersectionality: a case for Purposive sampling in Survey-Experimental research. *Experimental methods in survey research: Techniques that combine random sampling with random assignment*, 419-433.

Klare, J. P., (2004). The price equalization modules, the case of West Africa 564(3), 219-224.

Knill, C., & Tosun, J. (2008). Policy making.

Koelble, T. A. (1995). The new institutionalism in political science and sociology. *Comparative Politics* Vol. 27, No. 2 (Jan., 1995), pp. 231-243 (13 pages)

Kolstad P,. &Wiig, K.(2009A). Democracy and Corruption Causality in Indonesia. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, *3*(3), 2241-2254.

Kondra, A. Z., & Hinings, C. R. (1998). Organizational diversity and change in institutional theory. *Organization studies*, *19*(5), 743-767.

Kvale, S. E. (1989). *Issues of validity in qualitative research*. Studentlitteratur.

Kyvik, S., & Larsen, I. M. (1997). The exchange of knowledge: A small country in the international research community. *Science Communication*, *18*(3), 238-264.

Ladd, H. F. (2012). Education and poverty: Confronting the evidence. *Journal of Policy Analysis and Management*, *31*(2), 203-227.

Lambright, W. H. (2008). Government and science: A troubled, critical relationship and what can be done about it. *Public Administration Review*, *68*(1), 5-18.

Lane, P. R., & Tornell, A. (1996). Power, growth, and the voracity effect. *Journal of economic growth*, *1*(2), 213-241.

Lasswell, H. D. (1956). *The decision process: Seven categories of functional analysis*. Bureau of Governmental Research, College of Business and Public Administration, University of Maryland.
Leftwich, A. (2007). The political approach to institutional formation, maintenance and change: a literature review essay. *Governance and Social Development Research Centre*.

Levi, M. (1997). *Consent, dissent, and patriotism*. Cambridge University Press.

Lewis, J. (2009). Redefining qualitative methods: Believability in the fifth moment. *International Journal of Qualitative Methods*, *8*(2), 1-14.

Liu, X. P., Jin, Z. J., Bai, G. P., Guan, M., Liu, J., Pan, Q. H., ... & Xing, Y. J. (2017). Formation and distribution characteristics of Proterozoic–Lower Paleozoic marine giant oil and gas fields worldwide. *Petroleum Science*, *14*, 237-260.

Logsdon, J. M. (2010). John F. Kennedy and the Race to the Moon. In *John F. Kennedy and the Race to the Moon* (pp. 223-244). Palgrave Macmillan, New York.

Lowi, T. J. (1964). American business, public policy, case-studies, and political theory. World Politics, 16(4), 677-715.
Mack, L. (2010). The philosophical underpinnings of educational research. Polyglossia Volume 19, October 2010.

Manzano, O., & Monaldi, F. (2010). 12 The Political Economy of Oil Contract Renegotiation in Venezuela. *The natural resources trap: Private investment without public commitment*, *409*.

March, J. G., & Olsen, J. P. (1984). The new institutionalism: Organizational factors in political life. American Political Science Review, 78(3), 734-749.
March, J. G., & Olsen, J. P. (1989). Rediscovering institutions: The organizational basis of politics. Free Press.
March, J. G., & Olsen, J. P. (1998). The institutional dynamics of international political orders. International Organization, 52(4), 943-969.

Matland, R. E. (1995). Synthesizing the implementation literature: The ambiguity-conflict model of policy implementation. *Journal of public administration research and theory*, *5*(2), 145-174.

Mbaegbu, D. (2016). An industrialization strategy for economic diversification and sustainable development of Nigeria. *International Journal of Advanced Studies in Business Strategies and Management*, *4*(2), 25-38.

McLaughlin, M. W. (1987). Learning from experience: Lessons from policy implementation. *Educational evaluation and policy analysis*, *9*(2), 171-178.

McLean, I. (2008). Science and Public Policy: The Virtuous Corruption of Virtual Environmental Science by Aynsley Kellow

Meadowcroft, J. (1997). Planning for sustainable development: Insights from the literature of political science. *European Journal of Political Research*, *31*(4), 427-454.

Mehlum, H., Moene, K., & Torvik, R. (2008). Institutions and the resource curse. *R. Congleton, A. Hillman, & K. Andreas (Eds)*, *40*, 245-264.

Melin, L. (1997). Engaging practitioners in qualitative family business research: an engaged scholarship approach. In *Handbook of Qualitative Research Methods for Family Business*. Edward Elgar Publishing.

Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. American Journal of Sociology, 83(2), 340-363.

Miles, D. A. (2017, August). A taxonomy of research gaps: Identifying and defining the seven research gaps. In *Doctoral student workshop: finding research gaps-research methods and strategies, Dallas, Texas* (pp. 1-15).

Miller, J. D. B. (1962). the nature of politics, Gerald Duckworth & Co. *Ltd, London*.

Minichiello, V., Aroni, R., Timewell, E., & Alexander, L. (1995). Analysing the data and writing it up. *In Depth Interviewing: Principles, Techniques and Analysis*, 247-81.

Ministry of Finance, Ghana. (2011). *Petroleum Revenue Management Act*. Accra, Ghana.

Mintrom, M., & Norman, P. (2009). Policy entrepreneurship and policy change. Policy Studies Journal, 37(4), 649-667.

Mizruchi, M. S., & Fein, L. C. (1999). The social construction of organizational knowledge: A study of the uses of coercive, mimetic, and normative isomorphism. *Administrative Science Quarterly*, *44*(4), 653-683.

Modebadze, V. (2010). The term politics reconsidered in the light of recent theoretical developments, *IBSU Scientific Journa*l (IBSUSJ), ISSN 1512-3731, International Black Sea University, Tbilisi, Vol. 4, Iss. 1, pp. 39-44

Moghaddam, F. M., Harré, R., & Lee, N. (2008). Positioning and conflict: An introduction. In *Global conflict resolution through positioning analysis* (pp. 3-20). New York, NY: Springer New York.

Mohan, G., & Asante, K. (2015). Transnational capital and the political settlement of Ghana's oil economy.

Mohan, G., Asante, K. P., & Abdulai, A. G. (2018). Party politics and the political economy of Ghana's oil. *New political economy*, *23*(3), 274-289.

Montinola, G. R., & Jackman, R. W. (2002). Sources of corruption: A cross-country study. *British journal of political science*, *32*(1), 147-170.

Mouan, L. C. (2010). Exploring the potential benefits of asian participation in the extractive industries transparency initiative: The case of china. *Business Strategy and the Environment*, *19*(6), 367-376.

Munslow, B. (1999). Angola: the politics of unsustainable development. *Third World Quarterly*, *20*(3), 551-568.

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and organization*, *17*(1), 2-26.

Naderifar, M., Goli, H., & Ghaljaie, F. (2017). Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in development of medical education*, *14*(3).

National Research Council. (2012). Using Science as Evidence in Public Policy. Committee on the Use of Social Science Knowledge in Public Policy, K. Prewitt, T.A. Schwandt, and M.L. Straf, Editors. Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Neill, K. A., & Morris, J. C. (2012). A tangled web of principals and agents: Examining the deepwater horizon oil spill through a principal–agent lens. *Politics & Policy*, *40*(4), 629-656.

Nerdrum, L., & Sarpebakken, B. (2006). Mobility of foreign researchers in Norway. *Science and Public Policy*, *33*(3), 217-229.

Ngene, S., Tota-Maharaj, K., Eke, P., & Hills, C. (2016). Environmental and economic impacts of crude oil and natural gas production in developing countries. *International Journal of Economy, Energy and Environment*, *1*(3), 64-73.

Norse, D., & Tschirley, J. B. (2000). Links between science and policy-making. *Agriculture, ecosystems & environment*, *82*(1-3), 15-26.

Obeng-Odoom, F. (2014). *Oiling the Urban Economy: land, labour, capital, and the state in Sekondi-Takoradi, Ghana*. Routledge.

Obi, C. (2010). "Oil Extraction, Dispossession, and Conflict in Nigeria's Oil Delta." *Canadian Journal of Development Studies*.

Oduro, F., Mohammed, A., & Ashon, M. (2014). A dynamic mapping of the political settlement in Ghana.

OECD. Publishing. (2011). *Regulatory policy and governance: Supporting economic growth and serving the public interest*. OECD Publishing.

Ofori, J. J. Y., & Lujala, P. (2015). Illusionary transparency? Oil revenues, information disclosure, and transparency. *Society & Natural Resources*, *28*(11), 1187-1202.

Öge, K. (2016). Which transparency matters? Compliance with anti-corruption efforts in extractive industries. *Resources Policy*, *49*, 41-50.

Oliver, A. L., & Ebers, M. (1998). Networking network studies: an analysis of conceptual configurations in the study of inter-organizational relationships. *Organization Studies*, *19*(4), 549-583.

Ormston, R., Spencer, L., Barnard, M., & Snape, D. (2014). The foundations of qualitative research. *Qualitative research practice: A guide for social science students and researchers*, *2*(7), 52-55.

Ovadia, M., Kalok, D., Tamir, I., Mitra, S., Sacépé, B., & Shahar, D. (2015). Evidence for a finite-temperature insulator. *Scientific reports*, *5*(1), 1-6.

Oyedepo, S. O. (2012). Energy and sustainable development in Nigeria: the way forward. *Energy, Sustainability and Society*, *2*(1), 1-17.

Page, S. E. (2006). Path dependence. *Quarterly Journal of Political Science*, *1*(1), 87-115.

Parkhurst, J. (2017). *The politics of evidence: from evidence-based policy to the good governance of evidence* (p. 182). Taylor & Francis.

Parks, T., & Cole, W. (2010). Political settlements: Implications for international development policy and practice. *Occasional paper*, *2*.

Payne, A. F., (2008). Managing the co-creation of value. *Journal of the academy of marketing science*, *36*(1), 83-96.

Petroleum Commission (2017), 'Sedimentary basins':http://www.petrocom.gov.gh/sedimentary-basins.html (accessed 29 October 2017).

Petroleum Commission, Ghana (n.d.). Petroleum Exploration History. **http://www.petrocom.gov.gh/exploration-history/**

Pierson, P. (2000). Increasing returns, path dependence, and the study of politics. *American political science review*, *94*(2), 251-267.

Pierson, P. (2000). The limits of design: Explaining institutional origins and change. *Governance*, *13*(4), 475-499.

Pleines, H., & Wöstheinrich, R. (2016). The international–domestic nexus in anti-corruption policy making: The case of Caspian oil and gas states. *Europe-Asia Studies*, *68*(2), 291-311.

Pollard, A. & Court, J. (2005) 'How Civil Society Organisations Use Evidence to Influence Policy Processes: A Literature Review'. Working Paper 249. London: ODI.

Porter, D., & Watts, M. (2017). Righting the resource curse: Institutional politics and state capabilities in Edo State, Nigeria. *The Journal of Development Studies*, *53*(2), 249-263.

Poteete, A. R. (2009). Is development path dependent or political? A reinterpretation of mineral-dependent development in Botswana. *The Journal of Development Studies*, *45*(4), 544-571.

Pressman, J. L., & Wildavsky, A. (1984). *Implementation: How great expectations in Washington are dashed in Oakland; Or, why it's amazing that federal programs work at all, this being a saga of the Economic Development Administration as told by two sympathetic observers who seek to build morals on a foundation* (Vol. 708). Univ of California Press.

Putnam, R. (1993). The prosperous community: Social capital and public life. *The American*, *4*.

Rahimi, G. R., & Noruzi, M. R. (2011). A brief look at policy, typology of policy, and its related affairs. *International Journal of Business and Social Science*, *2*(11).

Renn, O., Baghramian, M., & Capaccioli, M. (2019). *Making sense of science for policy under conditions of complexity and uncertainty*. SAPEA.

Rhodes, R. A. W. (1997). Understanding governance: Policy networks, governance, reflexivity and accountability. Open University Press.

Routley, L. (2012). Developmental states: a review of the literature.

Ross, M. L. (2012). *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*. Princeton University Press.

Rustad, S. A., Le Billon, P., & Lujala, P. (2017). Has the Extractive Industries Transparency Initiative been a success? Identifying and evaluating EITI goals. *Resources Policy*, *51*, 151-162.

Sabatier, P. A. (2007). Theories of the policy process. Westview Press.

Sabatier, P. A., & Mazmanian, D. A. (1981). The implementation of public policy: A framework of analysis. Policy Studies Journal, 9(4), 538-560.

Sabatier, P. A., & Weible, C. M. (Eds.). (2014). *Theories of the policy process*. Westview Press.

Sabatier, P. A., (2005). *Swimming upstream: Collaborative approaches to oil management*. MIT Press.

Sachs, J. D., & Warner, A. M. (2001). "The Curse of Natural Resources." *European Economic Review*.

Sala-i-Martin, X., & Subramanian, A. (2013). Addressing the natural resource curse: An illustration from Nigeria. *Journal of African Economies*, *22*(4), 570-615.

Savard, J.-F. with the collaboration of R. Banville (2012). "Policy Cycles," in L. Côté and J.-F. Savard (eds.), Encyclopedic Dictionary of Public Administration, [online], www.dictionnaire.enap.ca

Schmidt, V. A. (2008). Discursive institutionalism: The explanatory power of ideas and discourse. *Annu. Rev. Polit. Sci.*, *11*, 303-326.

Schneider, A., & Ingram, H. (1990). Behavioural Assumptions of policy tools. *The journal of politics*, *52*(2), 510-529.

Schrank, A. (2004). Ready-to-wear development? Foreign investment, technology transfer, and learning by watching in the apparel trade. *Social forces*, *83*(1), 123-156

Scott, W. R. (2001). Institutions and organizations: Ideas and interests. Sage Publications.
Scott, W. R. (2005). Institutional theory: Contributing to a theoretical research program. *Great minds in management: The process of theory development*, *37*(2), 460-484.

Scott, W. R. (2011). Institutions and Organizations, Thousand Oakes, California: Sage

Scott, W. R. (2014). Institutions and organizations: Ideas, interests, and identities. Sage Publications.
Shaxson, L., (2013). Knowledge, policy and power in international development: A practical framework for improving policy. *London: ODI*.

Shipan, C. R., & Volden, C. (2008). The mechanisms of policy diffusion. *American journal of political science*, *52*(4), 840-857.

Shulman, S. (2007). *Undermining science*. University of California Press.

Silver, H. J. (2005). Science and politics: The uneasy relationship. *Open Spaces Quarterly*, *8*(1).

Simmons, B. A., & Elkins, Z. (2004). The globalization of liberalization: Policy diffusion in the international political economy. *American political science review*, *98*(1), 171-189.

Singh, J. N., & Bourgouin, F. (2013). Introduction: Resource governance at a time of plenty. In *Resource governance and developmental states in the global south* (pp. 1-18). Palgrave Macmillan, London.

Skaten, M. (2018). Ghana's oil industry: steady growth in a challenging environment. Oxford Institute for Energy Studies. OIES PAPER: WPM 77 DOI: https://doi.org/10.26889/9781784671044

Skoie, H. (1969). The problems of a small scientific community: the Norwegian case. *Minerva*, 399-425.

Skoie, H. (2005). *Norsk forskningspolitikk i etterkrigstiden*. Cappelen akademisk.

Smith, A. (2018). *The Role of Science and Politics in Policy Formulation*. Journal of Public Policy, 25(3), 421-438.

Söderholm, P., & Svahn, N. (2015). Mining, regional development and benefit-sharing in developed countries. *Resources Policy, 45*, 78-91.

Stanislaw, J. A. (2008). Power Play—Resource nationalism, the global scramble for energy, and the need for mutual interdependence. *Deloitte Center for Energy Solutions*, 9.

Stebbins, S. (2019). *15 countries that control the world's oil. 24/7 Wall St*. Retrieved November 09, 2019, from http://247wallst.com/special-report/2019/05/20/15-countries-that-control-the-worlds-oil-2/.

Stone, D. (2001). Learning lessons and transferring policy across time, space, and disciplines. Politics, 21(1), 51-59.

Stone, D. A. (2012). Policy paradox: The art of political decision making (A. Javsicas, Ed.). *W. W. Norton & Company*.

Stone, D., Maxwell, S., & Keating, M. (2001). Bridging research and policy: an international workshop funded by the UK Department for International Development. Warwick University.

Strauss, A., & Corbin, J. (1998). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. Sage Publications, Inc.

Suddaby, R. (Ed.). (2010). Editor's comments: Construct clarity in theories of management and organization. *Academy of management review*, *35*(3), 346-357.

Suleman, S., & Zaato, J. J. (2021). Local content implementation and development in Ghana's upstream oil and gas sector for sustainable development: Contemporary issues on policy management. *Discover Sustainability*, *2*, 1-15.

Taiwo, A. S. (2010). The influence of work environment on workers productivity: A case of selected oil and gas industry in Lagos, Nigeria. *African journal of business management*, *4*(3), 299-307.

Tebele, M. M. (2016). *Problems and challenges related to public policy implementation within the South African democratic dispensation: a theoretical exploration* (Doctoral dissertation, North-West University (South Africa), Potchefstroom Campus).

Teye, J. K. (2012). Benefits, challenges, and dynamism of positionalities associated with mixed methods research in developing countries: Evidence from Ghana. *Journal of Mixed Methods Research*, *6*(4), 379-391.

Teye, J. K., & Torvikey, D. (2018). The political economy of agricultural commercialisation in Ghana: A review. PRA Working Paper 15, Future Agricultures Consortium.

The 1992 Constitution of Ghana. Article 257(6) of the 1992 Constitution.

Thurber, M. C., Hults, D. R., & Heller, P. R. (2011). Exporting the "Norwegian Model": The effect of administrative design on oil sector performance. *Energy Policy*, *39*(9), 5366-5378.

Tracy, S. J. (2013). Qualitative research methods. Blackwell Publishing.

Tucker, J. A., Guess, A., Barberá, P., Vaccari, C., Siegel, A., Sanovich, S., ... & Nyhan, B. (2018). Social media, political polarization, and political disinformation: A review of the scientific literature. *Political polarization, and political disinformation: a review of the scientific literature (March 19, 2018)*.

Tullow Oil (2014), 'Tullow in Ghana': https://www.tullowoil.com/Media/docs/default-source/3_investors/2014-tullow-ghanareport.pdf?sfvrsn=4 (accessed 19 December

Tullow Oil (2017), 'TEN fields', 9 November: https://www.tullowoil.com/operations/west-africa/ghana/ten-field (accessed 19 December 2017).

Van den Hove, S., Le Menestrel, M., & De Bettignies, H. C. (2002). The oil industry and climate change: strategies and ethical dilemmas. *Climate policy*, *2*(1), 3-18.

Van Dyck, L. (2002). A new partnership between science and politics. *EMBO reports*, *3*(12), 1110-1113.

Van Gyampo, R. E. (2011). Saving Ghana from its oil: a critical assessment of preparations so far made. *Africa Today*, *57*(4), 49-69.

Ville, S., & Wicken, O. (2013). The dynamics of resource-based economic development: evidence from Australia and Norway. *Industrial and Corporate change*, *22*(5), 1341-1371.

Walker, B., & Salt, D. (2012). *Resilience thinking: sustaining ecosystems and people in a changing world*. Island press.

Walt, G. (1994). How far does research influence policy? *The European Journal of Public Health*, *4*(4), 233-235.

Watts, D. J. (2004). The "new" science of networks. *Annu. Rev. Sociol.*, *30*, 243-270.

Weber, M. (1946). From Max Weber: Essays in sociology (H. Gerth & C. W. Mills, Trans.). New York, NY: Oxford University Press.

Weber, M. (1952). The Protestant ethic and the spirit of capitalism (T. Parsons, Trans.). New York, NY: Scribner. (Original work published 1934)

Weber-Fahr, W. (2002). Exploration of oil identified by two-photon microscopy. *Scientific reports*, *11*(1), 1-20.

Weber-Pillwax, C. (2004). Indigenous researchers and Indigenous research methods: Cultural influences or cultural determinants of research methods. *Pimatisiwin: A Journal of Aboriginal & Indigenous Community Health*, *2*(1).

Weiss, C. H. (1998). Evaluation: Methods for studying programs and policies (2nd ed.). Prentice Hall.

World Bank (2015), 'Ghana: Sankofa Gas Project', 7 November: http://documents.worldbank.org/curated/en/173561467986250592/Ghana-Sankofa-Gas-Project (accessed 27 October 2017).

Wynne, B., & Lynch, M. (2015). Science and technology studies: Experts and expertise.

Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European journal of education*, *48*(2), 311-325.

Yin, R. K. (2012). Case study methods. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 141–155). American Psychological Association. https://doi.org/10.1037/13620-009.

Zahariadis, N. (2007). Ambiguity and choice in public policy: Political decision-making in modern democracies. Georgetown University Press.

Zhai, M., Hu, R., Wang, Y., Jiang, S., Wang, R., Li, J., ... & Zhu, X. (2021). Mineral Resource Science in China: review and perspective. *Geography and Sustainability*.

Appendix 1. Interview Guide

UNIVERSITY OF GHANA

UGBS UNIVERSITY OF GHANA BUSINESS SCHOOL

Department for Public Administration and Health Services Management

Interview Guide for a Qualitative Study on:

Regulatory Policy Making in Ghana: Relationship Between Science and Politics in Shaping Policy Formulation in the Upstream Petroleum Sector

I am Albert Frimpong, a PhD Candidate at the Department for Public Administration and Health Services Management *of University of Ghana Business School, Legon. This field research is being conducted as part of my Ph.D. studies. Your participation in this study is very important but voluntary and you can withdraw at any point. Any information provided for this study would be treated with utmost confidentiality and used only for academic purposes. I would be grateful if you could answer the questions below. If you agree please kindly endorse this consent form for me. Thank you.*

Interview Guide I: Academic Institutions/ Public Regulatory Bodies/Civil Society Organizations only.

1. To begin with, please kindly tell me a little about yourself, thus…your position, years for working in current position, the specific roles you perform in relation to your institutions mandate and any other things.
2. Please what do you understand by the concept policy (probe participants to
3. Different types of polices exist for different purposes in an organization or state, can you please share with me some of the types you are aware with and the role it plays. (Probe: on the types of policies).

4. Please how do you understand regulatory policy, are there regulatory policies for the environment, if any please describe the regulatory policy environment in Ghana (probe for some of the regulatory policies in Ghana at the various stages of the upstream petroleum chain; Exploration stage, Development stage, Production stage}
5. Which organisation or bodies are in charge of the formulation of regulatory policies in Ghana? *(Probe: generally, but focus on policies on the environment and all environmentally related activities)*
6. What are the processes of regulatory policy formulation in Ghana (probe for factors that influence the formulation)?
7. Generally, what is the role of science in policy formulation in Ghana? (Probe for the role of Research Statistics and Information Management Directorates of the relevant ministries and associated challenges).
8. Generally, what is the role of politics in policy formulation in Ghana? (Probe for government and partisan interest in policy formulation).
9. What are your views on policy regulation in the petroleum sector over the past decades?
10. What factors/forces drive regulatory policy formulation in Ghana? *(Probe to find out if partisan politics, clientelism, traditional cultural values and belief systems are considered factors)*
11. What are the roles of science and politics in regulatory policy formulation process in Ghana?
12. Which policies regulate the upstream petroleum in Ghana?
13. Who formulates regulatory policies in the upstream petroleum in Ghana? (key stakeholders or institutions involved, probe to find out whether political party representatives are usually part of the process, academics, policy venues)
14. How are regulatory policies in the upstream petroleum in Ghana formulated?
15. What is your view on the regulation of the upstream petroleum industry in Ghana? (Probe for the positives and challenges and the causes).
16. What forces drive the formulation of regulatory policies in the upstream petroleum in Ghana?

17. How do science and politics relate when it comes to the formulation of regulatory policies in the upstream petroleum in Ghana?
18. What are the implications of this relationship on policy formulation in the upstream petroleum industry in Ghana?
19. Based on the discussion so far, if you have any question, clarification or additional contribution, please go ahead.

    If none, then accept my appreciation for the time and contribution to knowledge.

    THANK YOU.

Interview Guide II: Interview Guide for Oil Exploration Companies only

1. To begin with, please kindly tell me a little about yourself, thus…your position, your institution, years for working in current position, the specific roles you perform in relation to your institutions mandate and any other things.
2. What are your activities in the upstream petroleum industry in Ghana?
3. Which policies regulate your activities in the upstream petroleum industry?
4. What factors have the greatest influence on your activities in this sector? *(Probe for political, cultural and scientific factors)*
5. What are your views on regulations of the upstream petroleum sector in Ghana? *(Probe for fairness, apolitical approach/free from partisan politics, respect for scientific knowledge, respect for cultural values, does the policies achieve its purpose etc)*
6. How does science and politics regulate your activities in the upstream petroleum industry in Ghana? (Probe for which one dominates and why).
7. How does science and politics influence the formulation of the policies that regulate the upstream petroleum sector in Ghana?
8. What are the challenges you encounter over the years in regulatory policy formulation in the upstream petroleum sector in Ghana?
9. Based on the discussion so far, if you have any question, clarification or additional contribution, please go ahead.

    If none, then accept my appreciation for the time and contribution to knowledge.