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The Political Economy of Ghana's Climate Change Policy: Perceptions of Stakeholders in the Tema Industrial Area.

George Kwabena Osei
MSc International Development Studies

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E-mail: oseigeorge805@gmail.com

Noragric

Department of International Environment and Development Studies

The Faculty of Landscape and Society

P.O. Box 5003

N-1432 Ås

Norway

Tel.: +47 67 23 00 00

Internet: https://www.nmbu.no/fakultet/landsam/institutt/noragric

Declaration

I, George Kwabena Osei, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature……....

Date……

Abstract

Climate change is a defining topical issue in modern development discourse and debate. This is because the negative impacts expected to befall society would erode the gains made in development. Ghana is of no exception to these negative impacts. Flooding, drought, reduced power supply from the Akosombo Hydroelectric Plant, poor agricultural yields are some of the impacts that Ghana may have to grapple. Surprisingly, most literature contributing to climate change in Ghana mainly concentrate on the agricultural sector. The perceptions of the key actors in the industries about climate change require attention like the agriculture sector. It is argued by climate scientists that there is a more significant source of GHG emissions that originate from industrial activities. An analysis of the perceptions about climate change knowledge, policy implementation and the extent that industries may be affected by its impacts in TIA could inform policy decisions about Ghana's climate actions.

A qualitative method, interviewing key industrial and policy actors in Tema Industrial Area (TIA) and realism and liberalism of political economy framework were used to analyze the data. 25 respondents purposively sampled from Ghana's climate change policymaking circle, industries and stakeholders in TIA. Industries and policymakers tend to proffer different and competing explanations about the ideal solutions to combat climate change problems. Realism and liberalism theories describe what influence policymakers, especially the state about what to do to actualize its interest when faced with a challenge.

It was identified in the study that industrial and policy actor's knowledge in climate change issues were widespread. That said, the overall policy document was not known by the industries. The industrial actors did not know the National Climate Change Policy (NCCP) that Ghana has adopted to deal with climate change. Therefore, industries either used their climate change strategy or external climate policy. More so, it was demonstrated that the state, Ghana, was seen by private industries to take the lead in climate action.

Creating awareness about the existence of NCCP and formulating specific climate change policy for industries are recommended for effective mitigation and adaptation processes.

Keywords: perceptions, liberalism, realism, political economy

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My appreciation goes to the staff of the Climate Change Unit of the Ministry of Finance, MESTI, MOTI and EPA of Ghana for their support offered me during my fieldwork.

Dedication

To my parents, Comfort and the late Opanin Osei Kwadwo; Theresa, Peter, Bakhita and Papa my wife and children respectively.

Acronyms and Abbreviations

FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
BBC	British Broadcasting Corporation
EPA	Environmental Protection Agency
MESTI	Ministry of Environment, Science, Technology and Innovation
MOTI	Ministry of Trade and Industry
GHG	Greenhouse gas
KSH	Key stakeholder
IA	Industrial actor
TIA	Tema Industrial Area
GoG	Government of Ghana
AFOLU	Agriculture, Forestry, and Other Land Use
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
UNFCCC	The United Nations Framework Convention on Climate Change
NCCP	National Climate Change Policy

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CHAPTER 1

1.0 Introduction

1.1 Background to the Study

Climate change is one of the existential and multifaceted phenomena that global leaders are devising institutions, mechanisms and strategies to reduce its effects. Scientists and researchers are of the view that changes in the composition of the atmosphere, as a result of increasing concentrations of GHG, which are mostly of carbon dioxide, methane and nitrous oxide, as well as changes in land cover and agricultural activities, are the main causes of warming the earth surface, resulting in high increases in global temperature (IPCC, 2014). According to scientists and researchers, these global increases in temperature have had adverse direct and indirect effects on humans, with most adverse effect predicted to take place in developing countries as a result of having fewer resources to cope with and to adapt to the new conditions (Omambia & Gu, 2010).

Climate scientists and researchers argue that the adverse effects of climate change on humanity are numerous. Some of these adverse effects are drought, rising temperature, changing precipitations, flooding etc. It has been found in research that humanity will be adversely affected by climate change unless global emissions of GHGs are reduced drastically in the next four decades (IPCC, 2014). Admittedly, there is hope if strategies of adaptation and mitigation, such as the use of effects of technology and renewal energy are adhered to by stakeholders (Scheraga & Grambsch, 1998). However, the policies of adaptation and mitigation have remained a subject of fierce debate among countries, especially the developed ones (Giddens, 2009).

Ghana, a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), has recently initiated various climate change policies to tackle the issue of climate change and its impact on the economy. The policies include both mitigations of emissions and adaptations. To achieve its objective, there are several initiatives which are being implemented. These initiatives require the coordination between various stakeholders (MESTI, 2013). Although adaptation and mitigation measures of climate change are the primary responsibility of the Government of Ghana, the private sector equally have a significant role to play in the entire process of addressing climate change(MESTI, 2013).

There are many adaptations, as well as mitigation measures that have been identified. Practices that might be adopted to curb the adverse direct and indirect impact of climate change. They consist of forms such as technical, financial, managerial, scales - global, regional, local, as well as participants -governments, industries, farmers. The applications of these adaptation and mitigation measures and practices are found to be influenced by phenomena such as biological, economic, social factors and by time scales such as instantaneous, month, years and even centuries (Smit & Wandel, 2006). The effect of climate change has also been found to be as a result of the many different activities from the various sectors of the economy, including the industry, agriculture, deforestation, waste, and overpopulation (IPCC, 2014). This thesis is therefore geared towards exploring the perception of climate change and Ghana's climate change policy in an industrial sector and among key stakeholders of climate change.

Exploring perceptions of Ghana's climate change policy among industrial actors and key government agencies hinges on the role industrial sector, and regulatory regimes play on climate change policies. The industrial sector contributes to a significant proportion of global greenhouse gas (GHG) emissions (de Pee et al., 2018). Hence, to tackle climate change, the industries in various countries can cut down CO_2 emissions. This requires strong regulatory frameworks from the governments in order to ensure compliance by the industries, and in the event of non-compliance, punitive actions are meted out. On the other hand, the perceptions of climate change policy among industries and regulatory regimes are of paramount importance because better knowledge of adaptation and mitigation of climate change could influence, and be influenced by, climate change policies (Steves & Teytelboym, 2013).

1.2 Problem Statement

Climate changes continue to pose a major threat to the lives of people on the planet. However, despite its threats to human lives, governments' response to climate change varies significantly between countries. While some governments have adapted political and economic mitigation policies, other governments have done nothing, even denying that climate change is a reality (Steves & Teytelboym, 2013) . Climate change caused by many different human factors; however, industrialization has been found to be a major factor causing climate change. The industrial sector has been found to account for a major share of global greenhouse gases emissions, which destroys ozone layer (De Pee et al., 2018).

Globally, industry is a major source of modernization through wealth creation and prosperity. The industrial sector produces almost a quarter of the world's gross domestic product. The industrial sector is responsible for the production of the material goods which have become indispensable in our everyday lives (De Pee et al., 2018). Due to the contribution of the industrial sector to the economic development of a country, developing countries are even industrializing, adding value to their natural resources. This dispensation has contributed to the increase in global greenhouse gases emissions. Worldwide, the industrial sector contributes more than 25 per cent of greenhouse gas emissions, of which 90 per cent consists of carbon dioxide (CO_2) emissions. It is estimated that between 1990 and 2014, the greenhouse gases emissions from the industrial sector increased by 69 per cent with 2.2 per cent increases every year (IEA, 2017).

Ghana's quest for economic development and growth made it shift its industrial policy of extracting raw materials and exporting unprocessed to a more international market for trade to adding value to its raw materials. Ghana's industrial sector contributes about 28 per cent of its gross domestic product, which makes it the second most contributing sector after the service sector to the economic development of the country. The current contribution of the industrial sector to GDP could be attributed mainly to the mining of crude oil in the year 2010. Key aspects of Ghana's current industrial policy include: expansion of productive employment in the manufacturing sector; creating of a modern productive economy with high levels of value-added; expansion of technological capacity in the manufacturing sector; promotion of agro-based industrial development; promotion of spatial distribution of industries consumers with fairly priced, better

quality products and services; and making firms within the industrial sector competitive on both domestic and international markets (MOTI, 2011).

In its quest to attain economic development through industrialization, the country has unfortunately paid little attention to the contribution of the industrial sector to climate change of the country and its climate change policy. Ghana has had institutional responses to the issue of climate change through its climate change policy (MESTI, 2013). However, the climate change policy has largely focused on mitigation and adaption in the agriculture and energy sector, leaving the industrial sector of the economy, and creating a potential threat to the achievement of the overall climate change policy objectives. This study therefore explores the perceptions of actors in the industrial sector and key government agencies to determine their level of knowledge on climate change, to find out how climate change issues are being implemented in the industries, and how climate change affect the growth of the industries, so as to assist policymakers to come out with effective adaptation and mitigation measures to alleviate the adverse impacts of climate change.

1.3 Objectives and Research Questions

The main objective of this study is to explore the perception of industrial and key actors of Ghana's economy on Ghana's climate change policy, to assist policymakers to come out with effective adaptation and mitigation measures in order to curb the adverse impacts of climate change on the economy. The study specifically seeks to achieve the following:

1. To determine the level of climate change knowledge among industrial actors and key government agencies in Ghana.

This objective is to be achieved by the research question:

What is the level of climate change knowledge among industrial actors and key government agencies in Ghana?

2. To determine how climate change policies are being interpreted and implemented in the industrial sector in Ghana.

This is to be actualized by the research question:

How are climate change policies being interpreted and implemented in the industrial sector in Ghana?

3. To distinguish ways in which climate change is perceived by industrial actors and policymakers to affect the industrial sector in Ghana.

And the research question for this objective is:

In what ways is climate change perceived to affect industries in Ghana today?

1.4 Significance of the Study

Ghana's response to climate change is the National Climate Change Policy (NCCP), provides the composite measures to tackle climate change. The NCCP approach is based on four major areas of concern related to climate change and climate variability in Ghana. They are increasing greenhouse gas emissions and losses of carbon sinks; increasing temperatures; rainfall variability leading to extreme and unpredictable events; and sea-level rises. The address of these

four major areas has mostly focused on mitigation and adaptation in the agriculture and energy sector, neglecting the industrial growth sector of the country. The attention of this study is therefore to address the need to understand the contribution of the industrial sector of Ghana to climate change, to help policymakers bring out effective industrial adaptation and mitigation measures to help alleviate the adverse impacts of climate change on the economic development of the country.

To appreciate what types and forms of adaptation and mitigation are achievable, feasible and likely; who would be involved in their implementation; and what is required to facilitate or encourage their adaptation and mitigation in the industrial sector, there is the need to understand industrial and policy actors' knowledge and perceptions of Ghana's climate change. Hence, in its design setting, the study is aimed at exploring the perception of actors in the industrial sector as well as key government agencies to determine their level of knowledge on climate change, to find out how climate change issues are being implemented in the industries and how climate change affect the growth of the industries in Ghana.

In addition to providing an evidence-based support to future climate change policies, the findings from this study will advance vital information for the pressing need for more reliable and current data on climate change in Ghana, as according to MESTI (2013) the various models and projections have shown conclusions that vary enormously, which creates real uncertainty about the future scale and impact of climate change. Furthermore, this study will contribute to the existing but limited literature on climate change in the industrial sector in Ghana. This will also

provide information for other researchers to further explore climate change in the industrial sector in Ghana.

1.5 Scope and Delimitations

This study will not extend beyond the perception of actors in the industrial sector as well as key government agencies to determine their level of knowledge on climate change, to find out how climate change issues are being implemented in the industries, and how climate change affects the growth of the industries in Ghana. The focus on the perception of industry actors and key government agencies is relevant because it is argued that public understanding, knowledge and research are noted as critical tools to tackle human-induced climate change (Moser, 2010).

The scope of the study also involves qualitative research design or approaches as well as qualitative research analysis of variables. Qualitative research design or approaches are carried out to enhance the understanding of individuals' cultures, beliefs and values, human experiences and situations, as well as to develop theories that describe these experiences (Creswell & Clark, 2011) This study focuses on the perception, understanding, knowledge and engagement of industrial and political actors of Ghana's climate change policy, hence qualitative research design or approach is seen as ideal for the study.

The inclusion criteria for the participants of the study include industries in the Tema Industrial Area (TIA), key government agencies (KGAs) that are involved in the activities of industries in Ghana, key stakeholders (KSH) that have interests in climate change issues, and other

people or individuals who are living nearby the industrial area and as a result are affected by the industrial activities. The Tema Industrial Area is selected as the main study area because the area has the largest number of industries in Ghana. The industrial area was created to spearhead Ghana's industrial plan. On the other hand, the inclusion of stakeholders is because according to Bryson (2004). The inclusion of stakeholders in policy formulation make issues solvable and politically acceptable for the common good.

1.6 Limitations

The researcher acknowledges the fact that industries in Ghana are found all over the country in almost every region, even in the Greater Accra Region, where the Tema Industrial Area is located. There are different industries which are not located in the Tema Industrial Area; however, due to resource constraints and time, the researcher could not include all of these industries in the study.

Using a qualitative research design requires that the sample size of the study is chosen with the goal that saturation is attained. This places a limitation on the study as although the participants of the study are large, the concept of saturation prevents the majority of the participants from being included in the study, unlike quantitative study which allows more participants to be included in the study.

1.7 Organization of the Study

The study has been arranged in five chapters. Chapter 1 of the study introduces the whole study. The chapter consists of the background of the study, the statement, the research objectives and the associated the research questions. The chapter also presents the significance of the study, the scope and the delimitations as well as the limitations of the study. Chapter 2 presents the

literature review. The chapter looks at the various theories, concepts and empirical literature which are related to the study. Chapter 3 describes the methodology applied. The chapter includes the research design, the study and the target population, sampling procedure, sampling frame, sample size determination, data collection instruments as well as data collection procedure and ethical considerations. Chapter 4 presents the research findings and discussion. This analysis is done based on the themes emanating from the interviews that answer the research questions and the corresponding objectives of the study. Chapter 5, the final chapter of the study, presents the findings, conclusions, recommendations and areas which could be considered for future research.

CHAPTER 2

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter presents a discussion and relevant literature found during this study. It presents definitions and theories related to the focus of this study. It discusses the sources of information or literature that relates to climate change, people's perception of climate change, the perception of industries and government agencies on climate change, climate change policies including the adaptations to changing climatic conditions. It also discusses the implementation of these measures or policies and the challenges faced in implementing the adaptation strategies, as it relates to perception and the political economy of Ghana. It also gives a brief on the Tema Industrial Area (the study area of this thesis), the significance of perception to climate change policy implementation, climate change mitigation, as well as some factors that influence the perception of people and industries on the issue of climate change, as it pertains to Ghana. Theoretical underpinnings of the study end the chapter.

2.2 Definition of concepts and terms

2.2.1 Climate Change

Climate and weather are often used interchangeably. The two concepts have very extensive influence on human life on earth. The two concepts are essential for not just for food production, but also health and wellbeing of humans in general, as well as other sectors and industries necessary for human survival on earth. According to Ashfold (2012), the two terms are used interchangeably, but they are different. Weather can be explained as the localized atmospheric conditions of a place at a time, and it entails parameters like temperature, rainfall, wind speed,

humidity, etc. Thus, weather speaks of what is happening momentarily and changes from time to time, and from season to season (Ashfold, 2012). The term climate, however, expresses a summary of statistics on the various or changing weather situations, as they occur at a particular location or territory over an appreciably long period, usually about thirty years(Ashfold, 2012). Climate also includes information about the probability of a particular weather event taking place. The differences that are noted to occur in a long-term climate of say a month or a year are termed climate variability (Ashfold, 2012).

The United Nations Framework Convention on Climate Change (1992) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". Nzuma, Waithaka, Mulwa, Kyotalimye, and Nelson (2010) also define climate change as “a long-term and significant change in the average weather condition of a region which can last for a significant period of time”.

The climate change is further explained to be a change of the average temperature and precipitation of an area (Mabe, Sarpong, & Osei-Asare, 2012). Climate change is a result of several factors interplaying, such as the external forces from outside the earth, the earth's dynamic processes, and more recently, human activities. The external forces that result in climate change consist such processes as variations in solar radiations, variations in the GHG concentration levels, and deviations in the earth's orbit (Nzuma et al., 2010) .

Changes in climatic conditions in recent times have become one of the greatest and most pressing social, economic and environmental problems facing the planet (Nzuma et al., 2010). The

fourth Assessment Report of IPCC on climate change specified that most terrestrial areas in the world would have warmer and fewer cold days and nights (IPCC, 2014). In times past, the earth has witnessed significant increases in temperature and decreases in rainfall, as a result of climate change (Fauchereau, Trzaska, Rouault, & Richard, 2003). Climate change has resulted in very high temperatures and changes in water balance.

2.2.2 Perception

The Business Dictionary defines perception as:

> *The process by which people translate sensory impressions into a coherent and unified view of the world around them. Though necessarily based on incomplete and unverified (or unreliable) information, perception is equated with reality for most practical purposes and guides human behaviour in general* (Business Dictionary, 2019).

Simply put, perception is about how people make sense or be aware of a phenomenon.

2.2.3 Political Economy

A very modern and simplified explanation of the term political economy is one given by *Investopedia* that "Political economy is an interdisciplinary branch of the social sciences that focuses on the interrelationships among individuals, governments, and public policy" (Kenton, 2019). The concept is complex but relevant since various groups and individuals tend to have different ideologies and interests in how an economy or country should be developed (Kenton, 2019).

The *Dictionary of Modern Economics* defines the political economy as "the theory and practice of economic affairs" and mentioned that the term *political economy*, originally, was

applied to wider economic problems of real cost, surplus, and distribution (Horton, Jr, & Schnapper, 1948).

From a conceptual viewpoint, a *Dictionary of Economics* describe the political economy as a "science of wealth" which "deals with efforts made by man to supply wants and satisfy desires"(Eatwell, Milgate, & Newman, 1987). This agrees with the *Dictionary of Economic Terms*, which defines the original intent of political economy as a "branch of statecraft", but which is now "regarded as a study in which moral judgments are made on particular issues"(Gilpin, 1977). Besides Mosco (2009), is of the view that before political economy became a branch of science, and before it came to be an intellectual description for production, distribution and exchange systems, the term used to mean in general sense the social practice, custom and knowledge of how households and communities are managed.

Mosco (2009) further explains that the term "economics" is rooted in the classical Greek "Oikos", which is the word for house and "nomos", the word for law or rules or managing. Thus, economics essentially and initially meant household management, which is a view persisting into the works of many founding influences in classical political economy. Again, "political" derives its meaning from the Greek word "polos", which is the word for the city-state, which was the fundamental unit of a political organization during the classical period. Thus, political economy has its origin in how families and political households are managed, which is what Steuart Denham (1767), meant when he wrote that “what economy is in a family, political economy is in a state”.

The primary concern in political economy is how economic methods and theories influence or shape the political and policy ideologies of a nation. Political economy analyzes how public

policies are created, communicated and implemented (Groenwegen, 2008). Since different persons and groups have varying interests in how a country or economy is to develop, political economy is considered as an interdisciplinary rather than a discipline field. It covers a broad array of potentially competing interests. Political economy can also involve the use of game theory since different groups compete for finite resources and power must determine which courses of action will give the most beneficial result (Gilpin & Gilpin, 2001). Climate change issues are complex. It involves different actors, sectors, scales and different ideologies that attempt to find solutions to the changing climate. Thus, the political economy may provide the analytical framework to situate these complexities for in-depth-analysis.

2.2.4 Adaptation

"Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploit beneficial opportunities" (IPCC, 2018).

In other words, adaptation is any activity by people to reduce the adverse effects of climate change.

2.2.5 Mitigation

"A human intervention to reduce emissions or enhance the *sinks* of *greenhouse gases"* (IPCC, 2018).

2.2.6 Greenhouse Gas (GHG)

It refers to **"**those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation"(UNFCCC, 2011).

2.3 Climate Change Perceptions

In recent years, climate change has become one of the key issues on the global political and economic agenda. Although the problem of climate change has had great effects on nations, yet it has taken at least a long time for it to be a front burner. This was because the global problem of climate change was originally communicated as a scientific problem. The climate change debate has also taken place in industrialised nations.

Generally, the perception and opinion of the people of a nation concerning climate change can be pointed out by two things: public knowledge of the threat represented by climate change and the adoption of climate policy. Deductions from Steves and Teytelboym (2013) are that the relationship between public knowledge of the threat posed by climate change and better climate policy could reflect causal effects in both directions: better knowledge of the causes of climate change could simultaneously influence, and be influenced by, climate change policies. Their study identified three factors, which they believed are influencers of how climate change is perceived within a nation and how the nation approaches the mitigation of climate change:

First, levels of tertiary education. It is believed that higher levels of tertiary education among the citizenry of a nation produce a more sophisticated population. The likelihood is that these educated and sophisticated population would be better informed about the scientific indications and evidence on the issue of climate change.

Second, Freedom of the media. The independence and freedom of the media within the nation has a critical and crucial place in disseminating and assessing relevant and life-transforming scientific findings, particularly in such vital areas as the issue of climate change. It was proposed that free and independent media is a key factor in shaping public understanding of climate change.

Third, the issue of vulnerability**.** The sense of urgency in the formulation and the implementation of climate change policies as well as the level of media education geared towards changing perception and attitude towards the issue of climate change, depending on the level of the country's vulnerability to climate change effects. If a nation is susceptible to climate change, the population is more likely to be aware of climate change in general and its causes, because the government would make it a major subject matter in policymaking.

2.3.1 Climate Change in Ghana

The continent of Africa is reckoned as the world's most vulnerable region in terms of the impact of the effects of changing climatic conditions. Also, due to the economic instability of countries in Africa, the poor in society would be heavily hit with the adverse impacts of climate change.

Ghana's GHG statistics reveal that that nation's total GHG emissions stood at 33.66 million tons (Mt) CO2-equivalent (CO2e) in 2012. When the emissions from the AFOLU sector were excluded, the total emissions came to 18.49MtCO2e for the same year. However, in 2011, which is the official latest reporting year to UNFCCC, Ghana's total GHG emissions, excluding the AFOLU sector, was estimated to be 16.51MtCO2e. The 2011 emissions were 7.9 MtCO2e higher than 2000 levels and 10.9 MtCO2e above total emissions recorded in 1990. When the emissions from the sectors of Agriculture, Forestry, and Other Land Use (AFOLU) were added, Ghana's total emissions, the net emissions increased to 30.60 MtCO2e for 2011. Similarly, the total emissions grew by 14.28 MtCO2e over 2000 levels, and 16.38MtCO2e over emissions recorded 1990. Over the years, the total of emissions in Ghana have been observed to be increasing along with rising population, industrial growth and energy (MESTI, 2015).

Ghana is said to be already struggling with major challenges posed by environmental degradation and poverty, and the issue of climate change presents additional stress for the nation and the citizenry. The likely impacts of climate change in Ghana could be more variable weather conditions and extended periods of drought, with devastating impacts for water and food security, power supply, and Gross Domestic Product (GDP)(Allison et al., 2009).

According to FAO, agriculture as a sector currently employs approximately 56% of Ghana's workforce and accounts for 37% of the GDP (FAO, 2003). Most of Ghana's agricultural production is rainfall dependent. As noted by Kuuzegh (2007) in Ghana's 2007 Report to the UNFCCC, the cash crop cocoa is the main export crop and is of particular importance to the export economy.

Over the past years, the Ghanaian climate has become drier but also more variable. Climate data observed by the Ghana Meteorological Agency between 1960 and 2000 show an increasing rise in temperature and an accompanying variability in rainfall throughout the country. Based on these data, climate models predict that the temperature will rise on average by 2°C by 2050 throughout Ghana. Rainfall is also predicted to decrease in these areas by an average of 11% (Kuuzegh, 2007). Climate change implications are particularly of concerned to the northern parts of Ghana, where environmental conditions are already characterised by desertification, land degradation, deforestation, soil erosion, and inadequate water supply (BBC, 2010).

2.3.2 Climate Change Policies in Ghana

Globally, policymakers continue to pursue and establish an agreement on measures to reduce greenhouse gases produced by human activity, and other causes of climate change, and to

mitigate possible effects on world climate. In 1990, the United Nations General Assembly launched a negotiating process to establish an agreement among industrialized nations to act to reduce their emissions of greenhouse gases. The countries who signed up to the convention decided to develop national inventories of greenhouse gas emissions, establish national programs to reduce emissions, and mitigate climate change.

Ghana joined the United Nations Framework Convention on Climate Change (UNFCCC) in September 1995. Since then, the country is committed to pursuing coordinated actions to reduce greenhouse gas (GHG) emissions and climate change impacts on the most vulnerable people, while continuing to advance national economic development (MESTI, 2015). In Ghana, MESTI and the Environmental Protection Agency (EPA) are the key institutions tasked to co-coordinate the implementation of policies and programs on climate change.

Ghana, like other countries in Africa, faces huge social, environmental and economic challenges that are possible to be intensified by the effects of climate change, if not tackled (Owusu, Asiedu, Yankson, & Baidu-Ntiamoa, 2013). Ghana has been identified to be prone to numerous climate-related calamities such as floods, droughts, disease epidemics, etc. As estimated by the Africa Adaptation Programme – Ghana, 80% of disasters in Ghana are said to be climatically motivated. This has raised a national concern on effective adaptation, mitigation and resilience to climate change in recent years.

After ratifying the UNFCCC in 1995, Ghana reported its first, second and third national communications in the year 2000, 2011 and 2015 respectively. There is currently a National Climate Change Policy launched in 2013, which aims to promote low carbon development,

increase policy coherence on climate change, and increase Ghana's attractiveness to funding for mitigation. Ghana has also submitted its Intended Nationally Determined Contributions (INDCs) to UNFCCC, and recently Ghana ratified the Paris climate change agreement (Addoah, 2016).

The Climate Change Policy of Ghana gives a direction that is strategic and provides possibilities for climate change in the country. The climate change policies of Ghana broadly have three main objectives. They include (1) adaptation; (2) social development; and (3) mitigation (MESTI, 2013). The adaptation policy for climate change in Ghana is very vital in assisting the country as well as the communities in the country to deal with the effects of climate change. To tackle the adaptation problem in the country, four major areas of focus have been established. They are energy and infrastructure, natural resources management, agriculture and food security, and disaster preparedness and response (MESTI, 2013). Ghana continues to experience great differences in social development issues, such as access to health care. The social development policy of the climate change policy in Ghana is, therefore, to address this issue by ensuring the equitable social development (MESTI, 2013). In terms of the mitigation aspect of the climate change policy, the country plans to tackle climate change policy by ensuring low carbon growth (MESTI, 2013).

Table 1. Ghana's Climate Change Policy Summary

Policy	Thematic Areas	Objective
Adaptation	Agriculture and Food Security	Develop climate-resilient agriculture and food systems for all agro-ecological zones.
		Develop human resource capacity for climate-resilient agriculture.
	Disaster Preparedness and Response	Improve the understanding of how appropriate infrastructure can reduce vulnerability and risk to climate-related events.
		Build climate-resilient infrastructure to protect inland and coastal communities, ecosystems and services.
	Natural Resource Management	Minimize the loss of carbon sinks by reducing activities that lead to the destruction of natural ecosystems, especially forest degradation and deforestation.

Policy	Thematic Areas	Objective
		Enhance carbon stocks through programmes that restore degraded forests and other natural ecosystems.
	Energy, Industrial and Infrastructural Development	Minimize the impacts of climate change on health in communities whilst strengthening public health care delivery and preventive care.
		Improve national greenhouse gas inventory mechanisms.
		Strengthen measures to reduce greenhouse gas emissions
Social Development	Equitable Social Development	Identify and improve data recording, reporting, analysis and storage of climate-sensitive diseases at all levels of service delivery.
		Enhance knowledge and sensitize the health sector on the impacts of climate change

Policy	Thematic Areas	Objective
		including issues for vulnerable groups such as the aged, women and children.
		Minimize the impacts of climate change on health in communities whilst strengthening public health care delivery and preventive care.
Mitigation	Low carbon growth	Less reliance on fossil fuels, higher energy efficiency and increased use of renewable energy
		Improve city planning and a more modern public transport system.
		Reduce deforestation and degradation and ensure sustainable forest management.

Source: (MESTI, 2013)

With regards to the implementation of Ghana's climate change policies, the nation's Article 6 Action Plan recognizes public participation as one of the key ways to generate and sustain public

involvement in climate change impact and mitigation. In this regard, the Environmental Protection Agency (EPA) rolled out some programs to:

- *Organize bi-annual forums for all organizations working on issues of climate change;*
- *Initiate an annual climate change youth conference in Ghana;*
- *Introduce climate change environmental clubs in each basic and second cycle institutions;*
- *Introduce annual Environment day competitions in high schools on climate change;*
- *Integrate climate change discussions on radio and TV and*
- *Showcase climate change issues on public fairs and exhibitions.*

The Environmental Protection Agency is also implementing the Ghana Climate change education in schools in collaboration with the French Embassy and TU Delft University of Netherlands (MESTI, 2015).

2.3.3 Impacts of Climate Change in Ghana

Climate change in Ghana affects all sectors of the economy. The exposure of Ghana to climate change is in greater part seen to be the exposure to droughts, floods and sea erosion. Economic, social and infrastructural (MESTI, 2013).

In Ghana, agriculture is the major employer and has experienced most effects concerning climate change. The rainfall distribution in Ghana is a factor influencing agriculture. The rising disparity in rainfall increases the exposure associated with farming as prediction has become very difficult. The amount of rainfall in Ghana are predicted to fall, which will affect the production of

crops and as well as the livelihood of most people. Climate change has changed the land tenure systems, and social relations, and has brought about rural-urban migration. In Ghana, agriculture depends heavily on rainfall patterns, and as such, any changes in the rainfall pattern poses a serious challenge to agriculture. Climate change has brought about droughts, bushfires and environmental degradation, especially at the northern part of the country, where rainfall is very scarce. (MESTI, 2013).

Water is an important commodity in human life. Water is particularly important for agriculture, energy, health, sanitation, manufacturing as well as domestic uses. The availability of water from precipitation shows the availability of the surface as well as underground water. Water for domestic use is already a major problem in the cities of Ghana.

Ghana's economy is heavily dependent on its natural resources. The natural resources of the country are a major contributor to the growth of the economy. The natural resources of the country are the source of food, income, tourism, foreign exchange, etc. This implies that the country's whole life depends on natural resources. This means that the sustainability of natural resources is very important and crucial for the livelihood. Climate change in Ghana, however, affects natural resources as well.

The energy sector in Ghana is heavily affected by climate change. The supply of power for industrial and domestic use is affected as a result of the low level of water at the hydroelectric dams in Ghana, due to the frequent droughts. The exposure of the hydroelectric power to climate change was shown by the output of hydroelectricity in 2003. The year 2003 recorded output of hydroelectric power of 3,885 GWh, or about 60% of the level of 6,610 GWh in 2000, which was

a relatively wet year. Due to this crisis, the country must bring an emergency supply of thermally generated electricity to partially compensate for the decrease in the hydroelectric generation (MESTI, 2013).

The health and sanitation sectors are also affected as far as climate change in the country is concerned. As a result of a flood, there have been increased incidences of water, air and foodborne diseases. A cholera outbreak has been increasing as a result of extremely heavy rainfalls. This has most of the time affected the sanitation of most of the cities in the country, posing other major health risks. These health risks, in turn, brings a heavy toll on the government's budget. The poor water supply in Ghana, as a result of drought, increases the incidence of guinea worm, Cerebrospinal meningitis, and other heat borne diseases (MESTI, 2013).

Climate change in Ghana also has an impact on the infrastructures such as roads, dams, power distribution lines, homes, drains and all structures that life revolves around. Ghana has been experiencing disasters as never before. Floods, rainstorms and strong winds are becoming more frequent than before. Unfortunately, Ghana's infrastructure development does not take into consideration climate change risks. Infrastructure facilities such as roads, bridges, and housing in Ghana are built without taking into consideration climate change risks. This has resulted in heavy loss of property and infrastructure when there is a heavy storm as a result of changes in the climatic conditions. The coastal areas have experienced rising sea levels which has destroyed properties, and it has resulted in investments in infrastructure. Heavy rainfall has usually affected road networks, bringing the huge cost to the state for repairs (MESTI, 2013).

2.3.4 Climate Change and Ghana's Political Economy

The Ghanaian Economy attained a middle-income status in recent years. However, about a quarter of Ghanaians are still poor whilst under a tenth of the population lives in extreme poverty. Greater Accra is the least poor region and the Upper West in the dry savannah is the overall poorest. Between 1991-2013, the general poverty level reduced from 51.70% to 24.20%. The incidence of extreme poverty reduced by 8.1% from the 2005/06 revised extreme poverty incidence of 16.50% (MESTI, 2015). It is thus emphasized that the preservation of the environment is often hampered by poverty. Many people rely on the exploitation of Ghana's natural resources to make a living and cannot see any other viable means of survival.

The country has largely experienced stable and consistent economic growth since 1960. The size of the Ghanaian economy has expanded by nearly 97% with the GDP increasing from USD1.2 million in 1960 to USD 35.9 billion in 2012 in real terms. The expanding trend in the economy corresponds to the increasing energy and greenhouse gas (GHG) emission intensities, especially in the last couple of years. As the economy expands and population grows, lots of energy resources are utilized to meet the growing demand in industry, transport and households (Nachmany et al., 2015).

2.3.5 Perceptions of Climate Change in Ghana

A research conducted by BBC (2010) on Ghanaians' perception of climate change revealed that many Ghanaians do not comprehend the scientific explanations to climate change, although they have noticed changes in the weather and seasons. Ghanaians can tell of rising temperatures, extended periods of drought and increasing variability in seasonal rainfall, but most people, however, do not link these with global climate change (BBC, 2010). Among the Ghanaian public,

there is limited awareness of the concepts of climate change and global warming. Many understand climate change to mean changes in the weather or seasons. Those that have some familiarity with the concepts rarely have enough knowledge to explain them with reference to greenhouse gases. A climate change concept is poorly understood and does not have standard translations in Twi and dagaare (local dialects). The language of climate change is not accessible to most Ghanaians; opinion leaders agree that climate change terminology is a barrier that prevents public engagement. The study summarised the following points as the general perception of climate change in Ghana (BBC, 2010).

It was discovered that Ghanaians' understanding of the changes in climate is not separated from their knowledge of broader environmental changes. Ghanaians are deeply aware of environmental degradation as well as resource depletion. However, most Ghanaians can make little distinction between environmental degradation and climate change. Many farmers and pastoralists in Ghana are becoming frustrated and despaired since they do not have any idea of how they would continue their ventures if the problem of degradation worsens. In addition, other issues that Ghanaians are worried about including bush burning, deforestation, flooding pollution and poor sanitation.

It is also reported that there is a strong tendency for Ghanaians to hold themselves individually and collectively responsible for local changes in the weather. Opinion leaders are particularly concerned for rural communities and the urban poor. Ghanaians can attribute their own activities such as cutting down trees and burning the bush, etc. to the direct causes of the changes they experience in the weather. However, there is little awareness that the problems posed by changing the climate – now or in the future – are likely to have causes that extend beyond Ghana.

The study also revealed that a majority of opinion leaders in Ghana are familiar with the fact that climate change is a global problem. However, most of them believe that the major cause of climate change is "industrialised countries". As such, opinion leaders feel industrialised countries should serve as Ghana to adapt to the devastating effects of climate change.

Ghanaians draw on existing knowledge and beliefs to explain the effects of climate change. For example, many thinks that deforestation in their local area reduces local rainfall, and some incorrectly believe that smoke from cars and factories damages the ozone layer, making it hotter. Many Ghanaians link their country's growing population to climate change, both in terms of the strain it places on natural resources and the creation of ambient heat through higher population density. Some also believe that changes in the weather are the will of God.

Opinion leaders agree on the need to raise awareness of climate change. Yet there has been a tendency to focus on addressing the causes of climate change rather than adapting to its impacts. Several opinion leaders emphasise the need to prioritise the provision of information that will enable the most vulnerable people to adapt. It is believed in Ghana that the media has an important role to play in raising public awareness on climate change. Although the media in Ghana, together with schools, are people’s main source of information on climate change, journalists and other actors in the media feel that it is difficult to report on climate change because of a lack of information and technical expertise within the media sector.

Many people criticise the government at all levels for lack of visible action on climate change and the environment. Those government representatives interviewed say that more will need to be done to tackle the impacts of climate change on Ghana's rural poor; to regulate carbon

dioxide emissions; and to reduce bush fires and deforestation. They suggest that the major challenge is one of the financial resources.

2.3.6 Significance of Perceptions to Climate Change Policy

Research findings have shown that implementing climate change mitigation and adaptation policies seem difficult without considering the views, perception and values of the general public (Lorenzoni & Pidgeon, 2006). According to Leronzonzi, Nicholson-Cole, and Whitmarsh (2007), the level of support or opposition an individual demonstrates to climate change response measures is dependent on his/her attitudes and beliefs on the issue. (Addoah, 2016) points out that it is significant to understand the perception of individuals and institutions, people have the tendency to perceive issues with different levels of seriousness. In his study, he mentions that respondents were more concerned about issues that are observable and easier to comprehend.

Hagen (2013) is of the view that it is very important for climate change policymakers and implementers to have a holistic understanding of the perceptions of the public on the issue of climate change. It is also imperative that they have a good understanding of some of the core factors that might contribute to such perceptions in order to raise support from the public in the design and implementation of the climate change policies and interventions. This is needful because, as pointed out by (Leronzonzi et al., 2007), such understanding is vital in developing a policy framework, and also in the communication of the policies to the general public and other special stakeholders. This allows for a proper inclusive approach to ensuring proper public participation in critical national issues like climate change, its mitigation and adaptation.

Establishing the key influencing factors that determine what shapes both public and individual perception of climate change has been considered to be a sophisticated task.

Nevertheless, previous studies have attempted to describe and make suggestions on the associations between perceptions on climate change as well as other variables. These variables and associations cut across socio-cultural factors, socio-demographic characteristics, cognitive factors such as an individual's knowledge on climate change and also recent weather experiences, i.e. recent experiences with extreme weather events (Akerlof, Maibach, Fitzgerald, Cedeno, & Neuman, 2013; Brody, Demetriades, & Esplen, 2008; Van der Linden, 2015)

With reference to personal experiences with weather events, because climate change is not directly experienced(Whitmarsh, 2008), there is the belief that an individual's perception of climate change is likely to be partially formed or induced by his or her "proximity to danger"; for example through personal experiences of an adverse climate-related event or by living near or in a hazard-prone area (Lujala, Lein, & Rød, 2014). Findings from Leiserowitz (2006) suggests that personal experience with extreme weather events does induce an individual's or group's perception of climate change and thus relates to people's perception and attitude on climate change policy. Examples of such extreme weather events include flooding, excessive rainfalls and severe droughts.

Indeed, findings from IPCC (2014) is that there is a 67-95% likelihood that climate change will result in more intensified precipitation events which can lead to increased floods, land and mudslide, and soil erosion etc. Although there has not been an established link between the experience of climate change and the experience of an adverse weather event (e.g. flooding), it is believe that the experience of a weather event may contribute to a person's perception of climate change making him /her much concerned about the effects and consequences and likely to take action or support initiatives that seek to address it (Spence, Poortinga, Butler, & Pidgeon, 2011).

A study conducted by Addoah (2016) indicated that the experience of weather events such as flood does influence both individuals or groups' perception on climate change, such that, respondents in this study who were victims of flooding within the capital of Ghana had higher scores on the survey items that were used to measure the perceptions of climate change. However, in terms of consequence, personal experience was only a significant predictor of 'perceived seriousness' but not 'perceived concern' of climate change. The study showed that households who were victims of flooding tended to have significantly higher perceptions in terms of how serious the effect of climate change is or will be if not tackled than those respondents who were non-flood victims.

The same Addoah (2016) study further gave a detailed understanding of climate change risk perceptions, highlighting the influence of personal experiences on people's risk perception of climate change. It was noted that the level of concern might not necessarily imply seriousness in relation to the effects of climate change unless there is an experience of a climatic event. It is, therefore, important to consider these in framing and communicating climate change issues as suggested by (Spence & Pidgeon, 2010). It is therefore needful that more education on climate change issues spanning the causes, impacts and responses is done. This is because, probably, more education will help people to understand why climate change should not be the least concern amidst other issues and 'buy-in' to climate change mitigation and adaptation policies(Addoah, 2016).

However, scholars such as Tribbia and Moser (2008) and Auer, Zhang, and Lee (2014) have jettisoned the notion that merely having a perception about climate change does not

necessarily influence people on climate policy implementation. Tribbia and Moser (2008) especially argue that people sometimes prefer certain types of information and information sources before acting on the policy. The moment the climate information is not from the source they are comfortable with; the climate information alone cannot be implemented. More so, People oversimplify climate change issues without regards to its intricate nature.

2.4 Realism and Political Economy

The Peace Treaty of Westphalia in 1648 led to the development of a framework of the modern state in Europe which created the concept of nationalism and established the modern, state-centric concept of realism (Peterson, 2014). Subscribers to the realist theory believe that man is a self-interested and self-serving being. Realism as a theory of political economy sees world politics as a "struggle among self-interested states for power and position under anarchy, with each competing state pursuing its own national interests"(Kegley & Blanton, 2012). In realism, the state is seen as a protectorate of the interest of the state, including the threat posed by climate change.

Manuel-Navarrete (2010) opines that realism supports the development of economic growth which are the root of global environmental problems. To make climate policies work, industries that are engines of economic growth are balanced with decision-making processes of issues of industrialisation that can cause environmental problems. Anthropogenic climate change, climate change as a result of human actions is a consequence of industrialisation (Schipper & Pelling, 2006). Ghana, as a developing country, is also engulfed in a global debate of whether it should reduce GHG emissions. This is where the state actors that make rules, regulations and enforcements about climate change and industries can decide on the best policy option and national

interest. Though climate change is a global issue, domestic policies about it will inform policymakers and politicians about climate its solution.

Realism, as theory, suggests that the state or central government serves as a principal actor in the socio-economic activities and development within a nation. By far, realists argue that in realizing the economic and productive activities in a state, its primary interest is to achieve utmost economic benefit. These interests are often achieved by the institutions or KGAs. It creates instruments for the realization of the set benefits. In this vein, less emphasis is put on international institutions in the process of achieving economic benefits. North (1991) maintains that institutions check the underlying structural political, social and economic activities of the society. The former economy is one key factor that determines any state existence or hegemony in a global system. (Goldfrank, Goodman, & Szasz, 1999). The extent that Ghana formulates and implements her climate policy depends whether KGAs are leaned towards realism thought or not. If the climate policymakers are more realists, their focus would be on maintaining Ghana's interest only even if the interest is not compatible with global climate goals. This means the ideological orientation of state actors may have consequences on global climate policies. This is the appreciation the study wants to ascertain from the state and industrial actors.

2.4.1 Liberalism and Political Economy

Liberalism, unlike realism theory, lessens the value and the role of the state in economic relations as interdependent structures within the global framework. Peterson (2014) states that liberalism is the enlightenment of man and the belief in progress and the advancement of an ideal world where all nations or stakeholders within a nation work together to achieve the betterment of humankind. Liberalism is the driving force behind economic integration and the globalisation

movement. Liberalist thinkers believe that trade and economics are the paths to more a more prosperous, healthy, safer, happier and freer world (Peterson, 2014).

Liberalist theory has democratic structures as its main underlying framework. According to Peterson (2014), democratic principles such as fundamental human rights, the rule of law and property rights are the bases for promoting free trades and capital markets. These inherent attributes of liberal theory underpin the growth of industries.

Liberalism focuses on private individuals and not the state for the realization of the state interest. Rational individuals and firms rather than the state should be empowered to control production and consumption activities within a state. To this end, private interests supersede the interests of the state. Private individuals or businesses are rational actors that are influenced by the market. Profit, not welfare, is the motive that guides their operations in the market. By logical extension, it can be safely argued that in production, these industries will use inputs say energy that is relatively cheaper (fossil fuels) to boost profit. And as the fossil burning continues, the social cost is the emission of CO_2. Liberals reject the claim that biophysical factor can limit an individual capacity to amass wealth. (Northcott, 2011). State actors with this orientation can initiate climate policies that retard the race to reduce emissions. Likewise, industries will concentrate on production processes that give profit without interested in environmental impacts of their actions leading to more emissions of CO_2 to the atmosphere.

Further, some scholars like Bonneuil and Fressoz (2016,p.13) argue that “industrial capitalism based on fossil fuel" directly contributes to anthropogenic climate change. Others like (Eriksen, 2016) denied this charge and points out that the new epoch and the changing climate is

a result of unintentional consequences of industrialization. The bottom line in the opposing arguments above about the role of industries towards climate change cannot be overemphasized. Whether intentional or not, some industrial practices like using fossil fuels contribute to GHG emissions and hence influence climate change.

Table 2. Differentiating the theories

Aspect	Realism	Liberalism
Level	State-centric; atomistic	Pluralist atomistic
Units	states	Firms, states, NGOs, IGOs
View of the state	Unitary actor	Pluralist state,
Behavioural dynamic	The state as a rational actor	Individual as rational but outcomes not always optimal
Game metaphor	Zero-sum	Positive- sum
Market relations	Potentially negative	Positive
System structure	Anarchy/ conflictual	Cooperative/interdependence
variants	Economic nationalism, Mercantilism	Interdependence, capitalism, free trade and market

Note. Adapted from O'brien and Williams (2013). *Global political economy: Evolution and dynamics*.

As shown in Table 1, realism is more state-centric and anarchical while liberalism calls for pluralist state and cooperation between the state and firms, NGOs, IGOs for the actualization of state goals.

2.4.2 Climate change and Realism Theory

Disagreements, conflicts and divisions arising from climate change policies, whether national or international are in a hierarchy (Bulkeley & Betsill, 2013; Giddens, 2009). The ubiquity of political dimensions of climate change involves different actors and stakeholders with different aspirations in a modern state. Climate change policies are formulated by state actors, namely politicians and bureaucrats. In Ghana, for instance, climate change policies are directly handled by the EPA (bureaucrats), which is under MESTI (ministry). The major trait in realism theory is that national interest is achieved by the state and not any other actors.

The development of Realism theory over the years in political economy and international relation has led to the emergence of different strands of realism. Examples of these strands include economic nationalism, mercantilism neorealism and neoclassical realism. All these strands share the same basic elements of the state -centeredness and self-interests in achieving national interest in the anarchic world. Consequently, Donnelly (2000) suggests that realism is insufficient to explain climate change politics and policies because it only looks at the state or international actors and not domestic actors. However, Purdon (2017) rejects this assertion. He suggests that

neoclassical realism can be used to understand climate change issues at both national and international levels. He continues to assert that "climate change is a two-level game involving political forces (international and state-specific) as well as domestic ones to which state leaders must respond" (Purdon, 2017, p.303). Obviously, the state is not the only actor or an interested party in a liberalized Ghana's economy. The emergence of private industries in the economy makes them key stakeholders in Ghana's climate change policy. Anthropogenic climate change makes the inclusion of the industrial sector of Ghana, stakeholder an indispensable actor. This is due to the possible emissions of GHG from industries. To understand how Ghana's climate change policy is operated in a liberalized economy means that neoclassical realism has the attributes that can be used. Rynning (2011,p.33) defines neoclassical realism as “that power dynamics (the independent variable) drive policy but that people and institutions with long and complex histories (the intervening variables) actually make policy, which is classical”. In this study, therefore, the term neoclassical realism is used to represent realism theory in general. The reason is that neoclassical realism inclusion of domestic actors in achieving state interests in complex climate change issues make it relevant and applicable.

2.4.3 Climate change and liberalism Theory

The emergence of the liberal theory emerged ostensibly as a critique of the realism school of thought that the state alone cannot achieve its goals. To the liberals, cooperation and collaboration between different actors in a state are the routes to achieving national interests, including climate change policy outcomes. Liberalism, like realism, also has different strands. These include capitalism, neoliberalism, free trade and interdependence as identified in most

literature. More so, the terms, liberalism and neoliberalism, have been applied in different contexts and usages depending on the subject matter under discussion (Flew, 2014). A recurring theme in these variants is that the state and other non-state actors are to complement their efforts in achieving national interests and goals. Flew (2014) broadly concludes that neoliberalism "as a particular form of policy-related doctrine, or a combination of ideas about the optimal form of market capitalism, combined with concrete proposals for institutional reform that would move particular societies towards such preferred outcomes". The elements of market, capitalism and institutions permeate through the literature of political economy about liberalism theory. In this thesis, the definition of neoliberalism as espoused by Flew (2014) is the context I use liberalism generally.

Different actors' make climate change solutions more complicated and complex as differing interests may emerge. Individuals, industries and NGOs are key actors in a governance system.

The inability of global, national and other non-state actors to address climate change crisis is due to the capitalistic mode of production, consumption and profit maximization(Guerrero, 2018).

Guerrero (2018) argues that neoliberal induced forms of climate change solutions such as Clean Development Mechanisms and other markets schemes are ineffective but create more profits to the industries involved. The assumption is that liberalism inherent support for profit-making is irreconcilable with climate change policies. Yet not everyone agrees that liberalism theory has been defective in climate change policies. Spaargaren and Mol (2013) indicate that through capitalism, GHG emissions externalities are priced. Also, Newell and Paterson (2010) argue that

the use of "market solutions" in climate change policy typify the triumph of neoliberalism. Neoliberal institutions proffer solution to the climate crisis by using the fundamental insights in a liberal framework.

CHAPTER 3

3.0 RESEARCH METHODOLOGY AND METHODS

3.1 Introduction

This chapter deals with the overall methodology and methods used in the study. It takes into account the study area, the research design, the study population, sample size selection, sampling technique, data collection instrument, data collection procedure, Generazability and transferability as well as reliability and validity of the study. Ethical issues surrounding the research are also presented in this chapter.

3.2 Study Area

The Tema Industrial Area (TIA) was selected as the main study area because the area has the largest number of industries, including the heavy industries in Ghana. Tema Industrial Area is preeminent of all the industrial enclaves in Ghana. Its uniqueness stems from the fact that it can boost manufacturing and processing factories and industries and state institutions responsible for climate change policies. TIA contributes significantly to the industrial sector's contribution to the GDP of Ghana.

3.3 Location and Size

Tema Metropolis is a coastal district which occupies about 30 kilometres east of Accra, the Capital City of Ghana. The Greenwich Meridian passes through the metropolis, which meets the equator in the Gulf of Guinea. It is bordered in the northeast with the Dangme West District, south-west by Ledzokuku Krowor Municipal, north-west by Adenta Municipal and Ga East Municipal, north by the Akuapim South District and south by the Gulf of Guinea. The Ashaiman Municipal is an in-lock enclave within the Tema Metropolis. The metropolis covers an area of about 87.8 km2 with Tema as its capital. The population, according to the 2010 Population and Housing

Census, is 292,773. Furthermore, the whole population lives in urban localities. The Metropolis has a household population of 285,139 with a total number of 70,797 households. Tema was created out of a cluster of small fishing villages located around where the Meridian Hotel is situated. History has it that "Torman", as it was originally called was founded by a migrating people called the 'Kpeshie's' who were Ga-Dangmes. The traditional people were later relocated to their present location at Tema Manhean in 1961 when the Tema Habour was constructed. However, due to migration, the dominant ethnic groups are the Akan, Ga-Dangme and Ewe. There are a few groups of the Mole-Dagbani and the Guans.

Tema Industrial Area (TIA) is the leading of the industrial enclaves in Ghana. Together with, Tema Township was created in 1962 by the Kwame Nkrumah, the first prime minister and president of post-independent Ghana. The colonial period was characterized by the exploitation of raw materials for export without value addition. After independence, a lot of import substitution industries were established to reverse the colonial economic architecture of exportation of natural resources that neglected industrialization. TIA was created to spearhead Ghana's industrial plan. TIA, as the biggest industrial estate, typifies an industrial setting and how it relates to the environment. The relevance of studying the perceptions of industrial and political actors about climate change and the actions to be put in place either by assisting them to improve upon the adaptive strategies identified by themselves or through policy reforms which could be political and economic. TIA lies within the Eastern part of Tema metropolis (Figure 1). The total landmass of the area is 23.019 km², and it is divided into two; the heavy and light industrial areas depending on the production capacities. The heavy industrial area comprises firms such as Tema Oil Refinery,

Volta Aluminum Company (VALCO) and many more and the light industrial area comprising NOBAC Food Ltd, Agri processing Ltd etc.

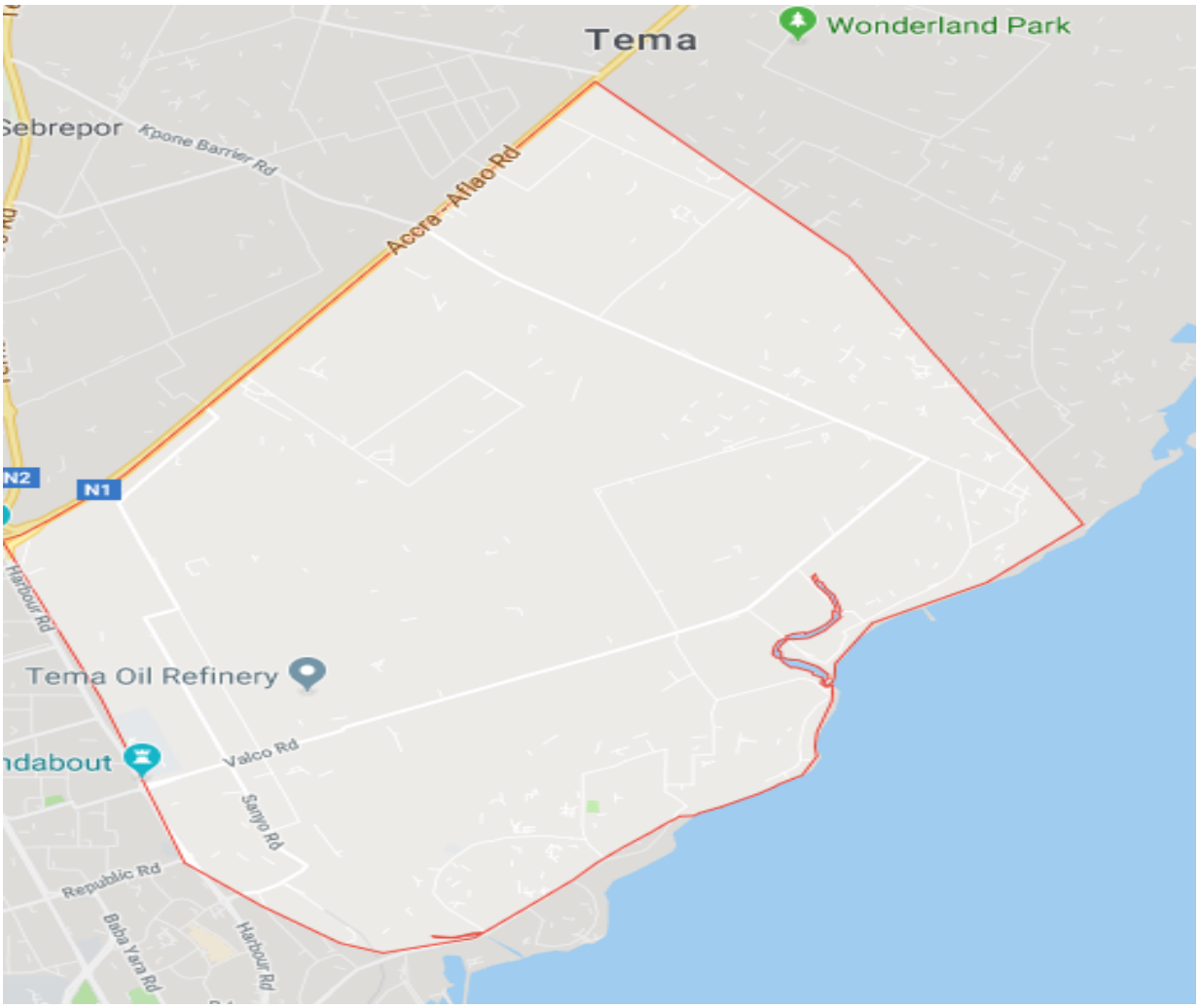

Figure 1. Map of Tema Industrial Area.

Source: Google (2019)

3.4 Research Design

Research design is defined as the blueprint of research. It usually comprises decisions about how the research is conducted, how it is conceptualized, and the contribution of the research (Given, 2008). Research design is a combination of three main interrelated components – theoretical, methodological, and ethical considerations, which are specifically related to the research study. The qualitative research design was applied to this study. The qualitative research design was used in this study because qualitative research design is mostly applied by researchers to study the behaviour of humans, perception and opinions, themes, as well as motivations of human (Martyn & Lyndsay, 2008). Qualitative research design or approach is carried out to enhance the understanding of individuals' cultures, beliefs and values, human experiences and situations, as well as to develop theories that describe these experiences(Creswell & Clark, 2011). This study focuses on the perceptions, understandings, knowledge and engagement of industrial and policy actors of Ghana's climate change policy; hence, qualitative research design or approach is seen as ideal for the study.

There are different types of qualitative research design. According to Phrasant (2013), there are four major types of qualitative research design that are mostly used by researchers and scientists. They include (1) phenomenology; (2) ethnography; (3) grounded theory; and (3) case study qualitative research designs. O'Leary (2017, p.215) defines a case study as "a method of studying elements of our social fabric through comprehensive description and analysis of a single situation or case; for example, a detailed study of an individual, setting, group, episode or event". A case study is used in this study because it gives the researcher the opportunity to study in-depth, the perceptions, perspectives, understandings, and feelings of persons who have really experienced

or lived the phenomenon of interest. This study measures the understanding, perception, and knowledge of people in the industries, key government agencies, key stakeholders who are familiar with the concept of climate change, and people or individuals who have experienced the effects of climate change as a result of industrial activities, or have witnessed the effect climate change have on people and property as a result of heavy industrial activities.

3.5 Population of the Study

Creswell and Miller (2000) have defined the term "population" to mean a collection of people, elements or events under study. According to Fellows and Liu (2003), a population is the full list of all identifiable cases which the researcher seeks to investigate for the purpose of obtaining the required data for analysis. The population of the study comprise all industries, government agencies, and all individuals living in the country. However, the target population or sample included all industries whose productive activities directly lead to the emission of carbons and other pollutants in the Greater Accra Region, as well as key government agencies, stakeholders, and individuals living in the Greater Accra Region of Ghana. The study population, that is the population about which the information for the study is gathered and that the researcher can draw or apply conclusion of the study, included industries whose productive activities directly lead to the emission of carbons and other pollutants in the Tema Industrial Area, key government agencies that are involved in the activities of industries in Ghana, key stakeholders that has interest in climate change issues, and other people or individuals who are living nearby the industrial area and as a result have experienced the effect of climate change or have witnessed the effect climate change on other people and property as a result of the industrial activities.

3.6 Sample Size

A sample size of 25 participants was recruited for the study. The sample size of 25 was based on the recommendation of O'Leary (2017) for a case study research design. To the author, in 'qualitative research', between 10,20 and 30 respondents' interviews are the expectation from the researcher. The sample size enabled me to interview the major policymakers, industrial actors and stakeholders in TIA. Due to the limited time for the collection of data (6 weeks), interviewing 25 respondents provided ample time to dig deep and ask relevant questions about my research objectives. In this light, in-depth issues about climate change were explored which were relevant to the research questions.

Table 3. Distribution of the sample size of participants in the TIA

Participants	**Sample Size**
Industries at TIA (IA)	9
Key government agencies/regulators (KGAs)	8
Key stakeholders (KSH)	3
Individuals living around TIA (ILA)	5
Total	25

Source: Fieldwork

Table 4. Distribution of key industries and stakeholders

Industries and stakeholders	Sector	Category
Ghacem Ltd	Cement	Industry
CIMAF GH LTD	Cement	Industry
Tema Oil Refinery (TOR)	Oil and Gas	Industry
Volta Aluminum Ltd. (VALCO)	Aluminium	Industry
NOBAC food Ltd	Food processing	Industry
Agri Processing Gh. Ltd	Food processing	Industry
Premier Steel Ltd.	Steel	Industry
Tema Steel Company Ltd	Steel	Industry
New Star Poly Products Ltd	Plastic	Industry
Industrial and Commercial Workers Union (ICU)	Workers Union	Key Stakeholder
Association of Ghana Industries (AGI)	Union of Industries	Key Stakeholder
Climate Innovation Centre, Ghana	NGO	Key Stakeholder

Table 5. Distribution of key government agencies/regulators (KGAs)

State Regulators	Category
Ministry of Finance and Economic Planning, Ghana	Government Ministry
Ministry of Environment, Science, Technology and Innovation	Government Ministry
Ministry of Trade and Industries	Government Ministry
Ministry of Energy	Government Ministry
Environmental Protection Authority	Government Agency
Ghana Standard Authority	Government Agency
Ghana Free Zones Authority, Tema	Government Agency
Tema Metropolitan Assembly	Metropolitan Assembly

Source: Fieldwork

3.7 Sampling Procedure

The researcher adopted non-probability sampling due to the qualitative nature of the research design. The researcher employed a purposive sampling technique. Purposive sampling technique is a sampling technique widely used by qualitative researchers to recruit subjects of the study who can provide in-depth and detailed information about the phenomenon under investigation. The pivotal institutions and individuals related to industrial activities and climate change were selected. In other words, participants in the Tema Industrial Area, key government agencies that are involved in the activities of industries in Ghana, key stakeholders that have interest in climate change issues, and other people or individuals who are living nearby the industrial area and as a result have experienced the effect of climate change or have witnessed the effect climate change on other people and property as a result of the industrial activities, were sampled purposefully to be able to provide answers to the research questions bordering on the perception of climate change and industrial activities.

Table 6. The sample size and the sampling technique applied in the study.

Study Population	Sample Size	Sampling Technique
Industries at TIA	9	Purposive sampling technique
Key government agencies/regulators	8	Purposive sampling technique
Key stakeholders	3	Purposive sampling technique

Individuals living around TIA	5	Purposive sampling technique
Total	25	Purposive sampling technique

Source: Fieldwork

3.8 Data Collection Instrument

The data for the study was qualitative, collected through interviews. An interview guide was designed by the researcher to assist in collecting the data for the study. The interview guide was developed with the objectives of the study in mind. The interview guide was categorized into three – the interview guide for those in the active industries, for key government agencies and stakeholders, and for individuals living around the TIA. The interview guide for the industries and for those of government agencies and stakeholders consisted of three sections (See Appendix A and B).

- **Section A** of the guide measured the participants' climate change knowledge, perception and understanding.
- **Section B** of the interview guide looked at how climate change policies are being interpreted and implemented.
- **Section C** of the interview guide solicited information on how climate change is perceived to affect industrial development.

The interview guide for individuals who are living near the Tema Industrial Area and as a result might have experienced the effect of climate change on their livelihood and industries, also consisted of three sections (See Appendix C):

- **Section A** of the guide measured the participants' climate change knowledge, perception and understanding.
- **Section B** of the interview guide elicited information on how climate change has affected the livelihood of the individuals and the development of the community.
- **Section C** of the interview guide took information from the individuals on how climate change policies are being implemented to solve their problems.

3.9 Data Collection Procedure

The researcher sent an introductory letter explaining the purpose of the study and the confidentiality of the information and sent to the industries and the key government agencies and stakeholders as well as the individual participants for permission to conduct the interviews (See Appendix E). Interviewees in this study representing their entities include but not limited to, the following: management personnel, planners, sustainability officers, Technical officers etc., who form an integral part of the decision-making bodies of their organizations. Trochim (2006), is of the view that participants of a study need to be made aware of the purpose of the study so that the participants can make an informed decision as to whether they will participate in the study or not. Permission was granted by the industries, key government agencies, and stakeholders, as well as the individual participants for the interview. The interview and the whole data collection process took a period of six weeks.

3.10 Data Analysis Procedure

The data was organized and analyzed to form structural meaning and essence. After the individual interviews were transcribed with the aid of VLC media player, the data were coded. First, codes were manually assigned to replace the participant identity. The participants from the Tema industrial area were coded as TIA 1 to TIA 9, the participants from the key government agencies were assigned the code KGA 1 to KGA 8, the participants from stakeholders were assigned the code KSH 1 to KSH 3, while the participants living near the Tema industrial area were given the code ILA 1 to ILA 5. All personal identification information was removed from the transcript.

Neuman and Kreuger (2003) described qualitative data analysis as inductive, which involves going from the specific-transcripts and interview notes to the general-codes and themes. Open, axial, and selective coding were used to create themes as pertains to the objectives of the study. Open coding was used in the initial review of the data. Open coding involved finding themes and assigning initial codes to reduce the raw data into smaller groupings. Axial coding was used in the second review of the data. Axial coding involved concentrating on the initial codes and themes to review and examine key concepts and to locate clustering of ideas or concepts. Finally, selective coding was used in the final review of the data. Selective coding involved examining the data and earlier identified codes. In addition to the manual coding processes and verification purpose, NVivo plus for Windows qualitative research software was used to assist in organizing, coding, and identifying concepts and themes from the interview data. All in all, this double-pronged data analysis approach ensured that I had not omitted any relevant topic from my analysis. The use of Nvivo gives comprehensive reports and undoubtedly recompense the additional time of using it for data during research (Basit, 2003).

I used both inductive and priori themes for the analysis. The former was used purposely to examine the political economy theories about climate change. I was, however, cautious not have included irrelevant issues or topics that are not relevant to my objectives. In this light, the research questions (sections B and C) were designed based on the tenets of liberalism and realism of Political economy of climate change. Raw data from transcripts and literature analysis provided the overarching themes that explain a phenomenon (Fereday, 2006). In short, themes and sub-themes were generated on the study's objectives and discussed together with the theoretical framework. Thus, the critical elements under my discussions and analysis were made up of the findings from the study; the interpretations and implications emanating from the results and how they encapsulate realism and liberalism perspectives on climate change.

3.11 Reliability and Validity

Reliability in qualitative research refers to whether the research results are consistent and dependable (Thomas, 2003). Validity in qualitative research, on the other hand, refers to being truthful. That is the participants providing a fair, accurate, and reasonable account of their lived experiences (Golafshani, 2003). Creswel (2009) suggested member checking as a strategy to validate qualitative research. Member checking involves asking one or more participants to verify the accuracy of the research report Creswel (2009). Participants of the study provided the opportunity to view the transcript for accuracy. The researcher reinforced consistency by asking the same interview questions in each of the categories of the study population.

3.12 Generalizability and Transferability

Generalizability of research findings provide means of making conclusions from one study to another study. Polit & Beck (2010) define generalization as "an act of reasoning that involves drawing broad conclusions from particular instances—that is, making an inference about the unobserved based on the observed". This means, based on the findings from this study; one can use the results to represent other industrial settings and other populations in Ghana and more generally. However, some researchers argue that the use of generalization is more applicable to researchers in quantitative traditions than the qualitative traditions (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). In quantitative studies, researchers use larger sample size and data sets as a basis for generalization than the qualitative studies. Given this challenge, researchers in qualitative tradition use transferability to make extensions of their research findings to other settings. Case-to-case transfer of results from one study to another is called transferability, according to Lincoln and Guba (as cited in Polit and Beck, 2010). The findings from this qualitative study could be applied to other industrial settings in Ghana. TIA is the largest of all the industrial enclaves in Ghana. Also, the unique division of TIA into the light and heavy industrial areas make the setting of the study similar to other industrial areas in Ghana like North Industrial Area, South Industrial Area (Greater Accra Region), Light Industrial Area (Sekondi) etc. Again, the sampling in TIA covered both industrial areas, which has the cluster of all the industrial sectors, including processing and manufacturing.

3.13 Ethical Considerations

According to Rafferty and Simons (2006) researchers must uphold the privacy of all information collected about participants throughout the research. Confidentiality of participants'

information involves the researcher protecting records storage and using a coding system to safeguard the participant's identity during data analysis and publishing of results. The identity of the participants in the current study remained confidential. This study used coding on field notes and codes in reporting to help ensure that participants remained anonymous. The anonymity in this study could prevent tracing the specific data attributed to participants in the analysis.

Due to the nature of research, several ethical considerations were considered. First, informed consent, via a consent form, was sought from each of the participants of the study before the interview was conducted (See Appendix D). To ensure confidentiality of information, the participants of the study were not allowed to mention their names, but the only position held. The participants were also given the assurance that they were free to decline to answer any question(s) they were not willing to answer as a result of the threat to their job position, market competitiveness or otherwise. To also protect the confidentiality and anonymity of the participants, the data was analyzed using codes rather than the participants' identity.

Furthermore, participants of the study were given copies of the transcription of their interview for review, and approval before it was used for the analysis. More so, the participants were assured that the information was for academic purpose and that the information given will be treated with absolute confidentiality, and that no other person apart from the researcher and the supervisor, or my school authorities will be allowed to have access to the data.

CHAPTER 4

4.0 RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the study's findings and discussion. The purpose of the study was to identify perceptions among industrial and policy actors of climate change in relation to Ghana's climate change policy. Specifically, the study sought to determine the level and types of climate change knowledge among industrial actors and key government agencies in Ghana and to determine how climate change policies are being interpreted and implemented in the industrial sector in Ghana and to distinguishes ways in which climate change is perceived by industrial actors and policymakers to affect the industrial sector in Ghana. To achieve the specific objectives of the study, a qualitative research design was adopted. Also, realism (neoclassical) and liberalism (neoliberalism) theories were used as a framework of analysis and other priori themes developed from literature.

4.2 Levels of climate change knowledge among industrial actors and key government agencies in Ghana

All participants involved in the study proved to be aware of climate change and what it means. Many of the participants acknowledged having heard the term climate change and knowing what it meant. The findings of the study revealed that the participants understand climate change to be human activities leading to the emission of greenhouse gases, especially carbon dioxide (CO_2) into the earth's atmosphere, thus causing global warming. The findings of this study, therefore, suggest that the industrial actors and the policymakers (key government agencies) are

keenly aware of the climate change situation and issues. A respondent from KGAs expressed the understanding of climate change as:

"Climate change is as a result of human activity that we generate GHG that end up accumulating in atmosphere leading to global warming".

An analogue understanding was expressed by a participant from TIA as "……*in excess of pollutants, particularly carbon dioxide (CO2) in the atmosphere".*

The findings of the study show that the industrial and policy actors of the economy of Ghana do understand issues about climate change and also how it may affect in the industrial sector itself. The understanding of the industrial and policy actors of climate change supports the definition of climate change offered by UNFCCC (1992) that climate change is any change in climate over time, whether due to natural variability or as a result of human activity. Climate scientists state that the build-up of greenhouse gases (GHG) in the atmosphere changes the radiative balance. The net effect of GHG is to warm the earth's surface and the lower atmosphere because greenhouse gases (GHG) absorb some of the Earth's outgoing heat radiation and redirect it back towards the surface, leading to global warming.

When asked what the causes of climate change are, the interview recorded two main responses: human activities leading to the emission of GHGs, and emissions from the activities of the industry. While few of the participants of the study attributed the causes of climate change to human activities that affect the environment, most of the participants put the blame of the causes of climate change on the industries. According to majority of the participants, the chemical wastes from industrial activities, fossil fuels and other industrial pollutants, emissions of greenhouse gases

(GHG) from fossil engines, excessive deposits of heat or heat temperature gases, such as CO_2, into the atmosphere by industrial activities, and excess carbon dioxide from machines released into atmosphere, as the causes of climate change. Respondent in TIA-KSH (Key stakeholder) adds that:

"Fossil fuel and other industrial pollutants are the main causes of climate change".

The knowledge and understanding of the causes of climate change are found to support that of IPCC (2011); that natural internal processes, external forcing, and persistent anthropogenic changes in the composition of the atmosphere or in land use are the general causes of climate change. The anthropogenic activities include industry, agriculture, mining, transportation, construction, deforestation and habitations (development of new human settlements). According to IEA (2013), there are also other factors that cause climate change. However, due to the overwhelming impact of human activities, climate change is easily perceived largely as human-induced. Over the past 40 years, human activities such as the burning of fossil fuels for energy and transportation, changing land use, deforestation, land clearing, oil drilling, coal mining and agriculture have accelerated the release of CO_2 into the atmosphere, way beyond the rate of release from natural processes. This has speeded up the warming of the earth within a short period of time, to the extent that the earth's systems are increasingly unable to adapt (Brody et al., 2008; De Jonge, 2010; IEA, 2013; Kankam-Yeboah K, Amisigo B, & E., 2010).

The participants involved in the study indicated both negative and positive impacts of climate change on industrial development., many of the participants stressed the negative impacts of climate change. These would include: increases in the cost of production, with specifications to industries investing more capital into a power supply and energy sources; reductions in production

and output; reduction in power supply; unstable weather conditions; and the challenge for industries to figure out new and alternative power sources. Responses from the industries and stakeholders suggest increased costs as the main impact of climate change on industrial development. Reductions in production output and reductions in power supply were identified as the next level of impacts of climate change on industrial activities. Unstable weather conditions were the third impact found to be mentioned by most of the participants.

UNFCCC (2011) reported that in terms of the impact of climate change on industry, settlement and society, the areas most likely to be affected are the poorer, often rapidly expanding communities near industries, rivers and coasts. They are prone to climate-sensitive resources and are also prone to extreme weather; and where extreme weather events become more intense and or more frequent, their economic and social costs are predicted to increase. A study led by EPA in 2008 on "Ghana Climate Change Impacts, Vulnerability and Adaptation Assessment" reported that over the past 40 years (1960-2000) average annual temperatures have been rising steadily in 5 of the 6 agro-ecological zones of Ghana. This trend is projected to continue (EPA, 2008). The impacts of the rising temperatures are already taking place, especially in the Tema and Accra Metropolis, where most heavy industries in Ghana are located. This has resulted in more intense rainfall events such as the rainfall and flood events of 23rd April 2008 and 24th June 2009 in parts of Accra. The rainfall wreaked havoc on life and properties, frequent events of drought (e.g., the drought that led to power rationing in 2006), due to low levels of water in the Akosombo Dam, floods, such as the one that occurred in 2007 which affected about 332,600 people, and unpredictable weather, especially late start of the rainfall season and or shorter rainy season (Kankam-Yeboah, Amisigo and Obuobi, 2010).

The participants of the study showed extensive knowledge and understanding of the climate change conditions, as they were able to attest to the conditions or indicators of climate change. Many of the participants' associated climate change with increases in drought and floods, increased temperatures, decreases in water levels, a decline in rainfall and increased weather variability.

The participants view on how to tackle climate change ranged from enforcing educational programs, implementing climate change policies, reduction in the use of air conditioner devices, afforestation, transportation management, reduction in the use of fossil fuel technologies, use of eco-friendly technologies, and reduction in emission of CO_2.

All in all, respondents demonstrated knowledge about climate change-its causes, impacts and suggested solutions to reduce the causes of climate change.

4.3 Interpretation and implementation of climate change policy

The findings from the study revealed that there is no specific national climate change policy for industrial development in Ghana. According to the participants, they are not aware of any national climate change policy on industrial activities in TIA or Ghana in general.

Much of the industries do not have any policy regulating their operations as far as climate change and environment are concerned. Some of the participants in TIA have adopted their own industrial climate change policy. Some of which are internal ones, as well as external – from outside the country.

Although a majority of industries within the TIA do not have any climate change policy, one of the respondent industries within TIA said they subscribed to the International Standards Organization, and therefore ensures that rules and conditions are within the ISO regulations.

"No, we don't have a deliberate policy on climate change. But we have ISO integrated system (ISO 14001:15). As required by ISO, we pursue programs that enhance the environment."

When the industries were asked whether they are aware of any climate change policies from the state, that is the national climate change policy, a majority of the respondents stated they had not aware of a climate change policy. Since most of the respondents in the TIA have no knowledge of the national climate change policy and neither have a working climate change policy within their own organizations, there are no active strategies or intentional efforts being made by them in order to combat climate change. When asked questions related to implementing climate change and which specific activities are undertaken by responding industries within the study area, almost all of them claimed not to carry out a specific activity. They responded either with a simple *"no policy"* or *"no specific climate policy, so we have nothing to implement"*. The government agencies within the area acknowledged not having any localized climate change policy which they determined on their own, due to proximity of TIA to their jurisdiction. They, however, agreed to have "indirect" roles within the national climate change policy.

Responses from some of the industries in TIA suggest that they are open to cooperate with the government or other state agencies in working together to combat climate change. Below are some of the responses on ways industries could implement climate change policy, if available:

"We normally monitor and evaluate our electrical, lighting and air-conditioning devices and take note. We change some of these devices, which helps us measure our progress towards Climate Change" – a respondent from TIA pointed out.

"There are no policies. What we do is make sure our workers work in a good working environment… We rely on government regulations for protecting our workers" – Respondent from TIA

"No monitoring is done, we only support policies by (the) government" – A TIA respondent.

Responses from industries and industry associations within the area revealed the willingness of these industries to cooperate with the government agencies that are mandated to enforce the national climate change. The Environmental Protection Agency (EPA), which is mandated to enforce all national climate change policies within the industrial area was mentioned by most of these industries as the main agency they work with concerning climate change-related issues. EPA ensures that industries and their production processes correspond to national climate change and GHGs emission regulations. The Agency performs this by integrating the overall national policy into regulations for industries to follow or conform to, e.g. the Environmental Impact Assessment Guidelines are developed by EPA and must be met by industries before they are permitted to begin production activities.

As expected, government institutions are to work towards the achievement of national goals, the government agencies surveyed for this study mentioned that though they do not have any direct role in implementing climate change policies, they have indirect roles of supporting the policy implementers. The Ministry of Trade and Industry (MOTI) respondent said the ministry do not

have direct climate change policy for implementation, except to work with other ministries and other government agencies who are directly in charge of climate change. MOTI also mentioned that they do have industrial policies that have various components of regulating the environment. The local assemblies also contribute by, basically, advising the central government in facilitating the government's industrial policies within the TIA.

Some industries had policies which do not necessarily deal with climate change issues in the industrial sector. Kankam-Yeboah et al. (2010), explains that much of the CO_2 emission that is changing the earth's climate originates from the industrialized countries. However, the negative impacts of climate change, such as droughts and floods, are most felt in developing countries, with Ghana being no exception. Hence the country's focus on climate change has been on adaptation measures to deal with the impacts of climate change, rather than on mitigation measures to reduce the sources or enhance the sinks of greenhouse gases.

Not surprisingly, Industries in TIA who had other climate policies had to do with the monitoring and evaluation of CO_2 emission of devices, and the use of good machines and technology in the reduction of CO_2 emissions. On the other hand, the policy actors have their role in the implementation of developing policies and ensuring that those policies are adhered to by the industries. Ghana's climate change policy in the energy, industrial and infrastructural development has to do with decreasing greenhouse gas (GHG) emissions mainly from the energy - including power generation, oil and gas, transport, biomass, industry, and waste sectors (MESTI, 2013). This is to be achieved through national institutional framework for greenhouse gas inventory, improved capacity of relevant sectors (public and private) for national GHG emissions reduction, low emission and clean, technology research, development, diffusion, deployment and transfer,

improve energy efficiency in production and consumption of energy, renewable energy development, comprehensive wastes (solid, liquid and human) management, and minimizing gas flaring (MESTI, 2013). This finding underscores the fact that the policy implementation of climate change in the industrial sector has been neglected by the government of the country. This attitude, therefore, poses a serious threat to the fight against climate change and its impact on individual industries.

In terms of the monitoring of the climate change policy implementation in the TIA, policy actors are responsible for carrying out this duty. However, a majority of the industrial actors interviewed indicated that they do not have specific monitoring systems that check their activities and operations to ensure that they are working with climate change policy. This finding, therefore, shows that the political and policy actors of the country are not carrying out their role in the monitoring of the implementation of the climate change policy in the industrial sector. According to Chibeze (2015), the monitoring and evaluation mechanism of the climate change policy lacks comprehensive details in Ghana, and that the policy seems to be more of an 'initiative' rather than a 'progressive' program.

Above all, it was established that though NCCP exists, industries that are key stakeholders for emissions reduction were not aware of it. Notwithstanding, most of the industries had developed their own climate policies or subscribe to other external environmental policies.

4.4 How Climate change is perceived to affect industries

This sub-theme discusses how climate change is perceived to affect industries. It concludes by using realism and liberalism theories to understand the participants' ideological positions in relation to climate change and industrial development.

All the five themes were priori code themes derived from literature, and they are perceived good industrial development; perceived effect of climate change on good industrial development; perceived culprit of climate change problems in relation to industrial development; perceived solution to climate change problems in relation to industrial development; perceived inputs made in relation to climate change problem.

Many participants from KGAs (regulators) perceived good industrial development to be a reduction in carbon emission, environmental sustainability, economic growth/development, and resource sustainability. Some of the comments on good industrial development include:

"...reduce carbon emissions". (KGA).

"Growth that does not affect the environment." (KGA).

"When industries engage in resource sustainability activities..." (KGA).

Most of the participants in the industries perceived good industrial development to be economic growth or development. They perceived good industrial development as:

"When industries grow, increase employment and income levels of people leading to GDP growth." (KGA).

"Increase in manufacturing capacity and profits". (KGA).

"Making lots of profits and also opening more branches of the company." (IA).

"Profits and creating job opportunities." (KSH).

Majority of the responses among KGAs and IAs saw good industrial development as undertaking industrial activities which do not only exploit natural resources to be processed to meet other growing needs of humanity, but the sustainability concerns as these manufacturing activities are taking place. Good industrialization is perceived among industrial actors in TIA to be contributions to increasing GDP that is eco-friendly, and that creates jobs for Ghanaians. This tells that most industries in Ghana, especially within TIA, have the understanding that industrialization also has negative impacts on the environment either through emissions from fossil engines or through the discharges of harmful industrial wastes/chemicals that destroy land and water bodies. Industries in TIA are not only focused on making a profit at the expense of the environment. As most organizations are conscious of environmental sustainability and global climate change issues, few of the industries only see good industrial development as business expansion and creating new or more branches, making more profits and increasing in manufacturing capacity.

Many KGAs actors perceived good industrial development to be a reduction in carbon emission, environmental sustainability, economic growth/development, and resource sustainability. However, few industrial actors (IA) perceived good industrial development in that direction. To the majority of the industrial actors, good industrial development has to with making lots of profits, creating jobs and expanding activities. This finding suggests that although the industrial actors have knowledge and understanding of industrial climate change, its impacts and consequences to the industry, have little interest in contributing to its solution. Thus, the industry lack action or response to climate change issues. This finding agrees with McKercher, Prideaux, Cheung, and Law (2010), who found that few industries were willing to change their behaviour

voluntarily in response to climate change concerns. According to the authors, the industry is generally unwilling to change their business practices until forced to do so by some external force such as regulators or price changes.

In sum, industrial actors perceived climate change to affect their activities but were more concerned about making profits than concentrating on climate mitigations and adaptations. However, KGAs were concerned about reducing emissions and making industries sustainable in order to reduce climate change impact on the environment.

Again, the participants involved in the study perceived the culprits of climate change problems in relation to industrial development to be the industry, various human activities and the citizens. Some of the responses that the main culprits of climate change in relation to industrial development in Ghana are:

"…so, I blame it on the industries emitting GHG." (KGA).

"I will say the industries. They use a cheaper source of energy, and most often, they are fossils." (KSH).

"…all Ghanaians and is as a result of our actions." (ILA).

Many of the responses demonstrated that there was no unanimity about the actual culprit or culprits of climate change. While some respondents blame the industries, others generalized the blame to the entire citizenry. That said, GHG emissions from industries were identified as a contributing factor causing climate change.

Significantly, the participants selected were of the view that in order to solve the climate change problems in Ghana, there should be the usage of good technologies, reduction in emission, usage of renewable energy, education on climate change, and government support to industries to cut down carbon emissions. Some of the views are:

"Reduction in use of fossil fuels by (using) public transport". (KGA).

"Government regulation of fossil fuels usages in the industries." (KGA).

"Industries using non-fossil fuels as a source of energy." (KSH).

"Promoting efficient use of renewable energy, and not using fossil fuel for manufacturing". (KGA).

"Use of renewable energy, like solar energy". (KGA).

The industrial actors are of the view that a good solution to the climate change problems is to educate the public on climate change and the government to support the industries with subsidies to cut down carbon emissions. They commented:

"Education is key. We need education." (IA).

"Government to provide subsidy for companies to acquire new machines, better machines." (IA).

Technological changes and education emerged as key factors to consider for climate change solutions in TIA. Both the industrial actors and KGAs supported.

More so, the perceived inputs made by KGAs in relation to climate change problems are highlighted below:

"…We develop climate change policies." (KGA).

"We make sure EPA integrates them into industrial guidelines." (KGA).

"We encourage green investments. We come up with policies to be implemented by industries." (KGA).

"We provide government information on industrial activities within Tema." (KGA).

Most of the respondents from KGAs are of the view that the state holds the utmost responsibility in "doing something" about climate change. The state is seen to have the requisite resources and constitutional mandate to not only formulate climate policies but to also enforce its implementation. Few responses also suggest that the responsibility of providing ways to mitigate the impacts of climate change on industries is a collective one. However, the private sector industries expect that the state should take the lead, and the industries would follow.

Most industrial actors were found to be more liberalists than realists. They view climate change as nothing to them as far as they keep making a lot of profits, creating jobs, and opening more branches. They are focused on industrial advances more than the impact climate change may have on the communities and society. This finding agrees with Guerrero (2018) that an offshoot of liberalism, the capitalist mode of production and consumption are geared towards making profits that are made through the exploitation of the people and nature. According to Hennig (2019), these conflicting political and policy views have always been the main reason for the differences in numerous global conventions on climate change, and that has also always been at the center stage of every climate change conventions adopted in the United Nations Framework Convention on Climate Change.

The findings of the study revealed that the policy and political actors (KGAs) were much more abreast with, and open about the effects of climate change on the industrial development than that of the industrial actors themselves. This could be attributed to the fact that because the industries are not willing to change their business practices to deal with climate change issues, and they were more silent on the impact of climate on their activities.

The political and policy actors are of the view that the overall culprits of climate change problems are the industry, followed by human activities and then the citizens. However, the industrial actors perceive the culprits of climate change problem to being as a result of human activities from all the citizens, downplaying their significant contribution to the climate change problems. The industrial actors based their arguments on the fact that global greenhouse gas emissions have grown since pre-industrial times, with an increase of 70 per cent between 1970 and 2004 (24 per cent between 1990 and 2004) (UNFCCC, 2011). The society should, therefore, be held accountable for climate change problems and not only individual institutions (Heffron, 2015).

The participants of the study are of the view that the panacea to the climate change problems is to using good technologies, reduce emission, use renewable energy, educate the public on climate change, and government support to industries to cut down carbon emissions. The industrial actors, who were found to be more of liberals are of the view that there should be the use of good technologies, reduction in emission, and the use of renewable energy. This finding is consistent with the numerous suggestions in the literature on recommended solutions to climate change (Brody et al., 2008; De Jonge, 2010; IPCC, 2018; Kankam-Yeboah K et al., 2010; MESTI, 2013 ; UNFCCC, 2011)

Although realism and liberalism theories have dominated the political economy globally for centuries, these thoughts rarely have a consensus as to which paradigm or policy direction countries should adapt or mitigate climate change. Realists see the state as the only actor that can effectively secure her interest nationally or internationally. Realist theory is, therefore primarily about the state seeking to maximize her interest in issues that affect the state. This presupposes that the state alone can secure what is good for her. Whatever assistance is provided by a third party is deemed as not satisfactory and cannot inure to the benefit of the state. Undoubtedly, climate change is one of the contentious issues in the national and international political economy that policymakers are striving to provide workable solutions. The remits in the changing climate discourse transcend the boundaries of one state. This means that cooperation among states and other industrial actors are needed to combat climate change. It is worth stating that realism and liberalism theories differ from each other, but the frameworks it portends for both states and industries can strengthen climate change policies. So far, however, there has been little or no discussion about how realism and liberalism theories underpin climate change perceptions among key actors in Ghana's climate change policy initiatives. Gardiner (2011) argues that there is "theoretical ineptitude" in addressing climate change problems (p.407). This study is designed to understand this apparent defect in climate change policy narratives in Ghana.

The existence of climate change knowledge by the actors in TIA was clearly described. Most of the respondents recognized that excess CO_2 in the atmosphere was the main cause of the anthropogenic climate change. The existence of the threat that climate change may have on Ghana’s development appears to have led to the passage of NCCP and other related climate

policies. The formulation of these policies has brought to the limelight about Ghana's preparedness to combat the negative challenges that Ghana may face from climate change.

Many of the respondents in the study indicated their knowledge in climate change and gave instances that demonstrated that the climate is changing. While there was no denial of a climate change existence, some respondents believed that people's activities contribute to the causes of climate change. The realists' view of the ontological position of climate change existence was corroborated by both the public and private actors. Liberals also acknowledged the roles that humans, through productive activities, have contributed to climate change. Indeed, the climate can naturally change in a given period. But in this anthropogenic era, it is society's actions that contribute greatly to climate change. Stehr and Von Storch (1995) point out that societies must know the extent that their actions contribute to climate change so that actors can have optimal adaptive measures. The combination of natural or scientific knowledge and societies understanding of the impacts of climate change may broaden the policy options for policymakers.

NCCP adoption in Ghana has been spearheaded by the state or GoG. The preamble of all the climate policy documents indicates that the state's interest in preparing the documents to reduce climate change impacts. It was no surprise that the majority of the KGAs (state actors) intimidated that the GoG represents all the people's interest and must take leadership in climate change solution. Asked about solutions to climate change, a respondent from KGAs replied that:

"The State. The state needs to put down strategic structures to actually push industries and people to observe Climate Change mitigation and adaptation."

To them, this position empowers the state to be at the forefront of initiating measures to combat the negative impacts of climate change.

This finding corroborates well with a study by Weidner and Mez (2008), where the State of Germany through its Government is credited with having successful climate change policies due to its ability to mobilize public support. Although this may true, the state does not always mobilize public support for climate change policies when it considers that climate change policy may have economic implications against the interest of the state and citizens (Macdonald, 2008). It was demonstrated in the study that GoG had not made private individuals and industries an integral part of climate policies despite their tremendous knowledge in climate change.

Ghana's interest in climate change phenomenon is manifested in signing international climate change agreements and protocols. The KGA's indicated in the study that they were aware of the numerous international agreements Ghana have signed. The TIA respondents were not aware of these international protocols of climate change. Individual industries intimidated that they have their own international standard on the environment that they follow and any international or national climate policy. An industrial actor points out that:

"...and looking at one of the clauses, ISO forces us to pursue programs that could enhance the environment. We are certified by ISO 14001. We have an environment, safety and quality. There is a clause in the (ISO) about an environment that forces you to pursue programs that will enhance the environment. As part of the programs under the environment, Climate Change' is part of it."

This means that while the state of Ghana has its own national climate policy for implementation, some industries have their separate standard policies on climate change. An

apparent different policy on climate change implementation may contradict each other and render implementation challenges. Prakash and Potoski (2006) argue that voluntary international environmental agreements adopted by industries could help national governments achieve environmental outcomes. Yet, some scholars may challenge the view that individual's implementation of environmental policies may, in some cases complement government efforts. Followers of realism may take issue with this argument. This is because private individuals may implement their respective policies as they deem fit and could also not be supervised by the state. All of this can lead to weak climate policy implementation. On the other hand, proponents of liberalism would support individual roles of reducing or managing risks associated with the impacts of changing climate (Higgins, 2001). An advantage here is that TIA industries would be able to mainstream an appropriate climate policy that suits their operations rather than the general national policy (NCCP). According to the liberalism theory, the state alone cannot secure her interests in turbulent global issues like climate change. Therefore, the state, together with private industries, must unify their strengths to tackle climate change.

The main thrust of realists' argument encompasses political office holders, bureaucrats and other state officials to ensure that the state's interest in any policy is achieved. It appears from the results of the study that KGA's that were interviewed in the study were abreast with climate change issues and its potential negative effects on industrialization. Some respondents from the KGA expressed abundant knowledge in climate change and its impact on industries. Consequently, climate policies seem to be mainstreaming in government agencies than industries. That said, merely having designated state officials in charge of climate change is not a guarantee that there would be favourable outcomes. But liberals indicate that private industries are key in tackling

climate change. Hence, industries have a responsibility to tackle climate change. Retrofitting (modifying) of industrial machineries to be efficient are some of the suggestions made by respondents in TIA. They argue that tax holiday or reduction in this respect will augment industrial efforts in using effective types of machinery that ultimately reduces energy consumption.

Realism believes in the roles that the state play in international political and policy issues. Proponents of realism argue that because different actors have varying interests in the national and international arena, the state is best placed to secure its interest, particularly climate change. Coercive powers of the state are used by the state officials to achieve the country's interest. Instruments like legislations and taxes are sometimes passed to achieve the goals set. Undoubtedly, climate change poses a threat to the state's quest for development. Some of the respondents in the study indicated that the onerous responsibility lies with state to formulate and implement climate policies. In recognition of this, liberalism thought advances the cooperation between the state and private industries to achieve the state's interest. A majority of the respondents maintained that both state and industrial actors stand to lose from the negative impacts of climate change and must collaborate to offset the negative impacts. A comparative study by Purdon (2017) indicates that climate funds set up by the states to finance climate policies are vulnerable due to the competing pressure from other development policies.

Many industries in the TIA believed that climate change might increase their cost of production. To the realists, the state can introduce some of its sovereign instruments like taxation on industrial products to increase or decrease its price and production. In this case, the Government may use taxation as a tool to support climate change policies and vice versa. Unlike realism, liberalism espouses no direct control in the market conditions but freely determined by demand

and supply conditions. The NCCP does not provide carbon market solution. But the GoG can influence market conditions that ultimately seek to reduce emissions. Reducing taxes on solar panels is one of the mechanisms TIA respondents believed would support climate change solutions.

The awareness by the respondents of climate change knowledge and how it could affect industries is a sine qua non for NCCP implementation. The perception among these actors about climate change issues has been highlighted. That said, policy and industrial actors would need a specific climate change policy to streamline industrial activities about climate change to reduce the negative impacts.

CHAPTER 5

5.0 SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter presents a summary of the study, the conclusions drawn from the findings, the recommendations and the recommendation for further studies.

5.2 Summary of findings

The findings of the study are derived from the research questions that guided the study. The following findings arose:

- All participants in the study reported to be aware of climate change and what it means. A majority of the participants acknowledged having heard the term climate change and knowing what it meant. The findings of the study revealed that the participants understand climate change to be human activities leading to the emission of greenhouse gases, especially carbon dioxide (CO_2) into the earth's atmosphere causing global warming. The findings of this study, therefore, suggest that the industrial actors and the policymakers (key government agencies) are keenly aware of the climate change situation and issues of relevance for the country.

- When asked about the causes of climate change, the survey recorded two main responses: human activities are leading to the emission of GHGs, and emissions do arise from the activities of the industry. While other participants of the study attributed the causes of climate change to human activities that affect the environment, the majority of the participants put the blame of the causes of climate change on industrial actors. According

to a majority of the participants, the chemical wastes from industrial activities, fossil fuels and other industrial pollutants, emissions of greenhouse gases from fossil engines, excessive deposits of heat or heat temperature gases, such as CO_2, into the atmosphere by industrial activities, and excess carbon dioxide from machines released into atmosphere, are the causes of climate change.

- The participants of the study indicated both negative and positive impacts of climate change on industrial development. However, a majority of the participants reported mostly about the negative impacts of climate change. These include increases in the cost of production, with specifications to industries investing more capital into a power supply and energy sources; reductions in production and output; reduction in power supply; unstable weather conditions; and the challenge for industries to figure out new and alternative power sources if they must continue to operate. Responses from the industries and stakeholders suggest increased of production costs as the main impact of climate change on industrial development. Reductions in production output and reductions in power supply were identified as the next level impact of climate change on industrial activities. Unstable weather conditions were the third impacts found to be mentioned by the majority of the participants.

- Although a majority of the participants reported about the negative impacts of climate changes on industrial development, some of the participants of the study indicated also about positive impacts of climate change on industrial development. The participants indicated that climate change within the industrial sector is an opportunity for the industry and the government to develop new and alternative technologies for industrial

development. Others are of the view that climate change issues have increased their market opportunities, that is, the demand for their products.

- The participants of the study showed extensive knowledge and understanding of the climate change conditions, as they were able to attest to the conditions or indicators of climate change. The majority of the participants' associated climate change with increases in drought, increases in flood, increased temperatures, decreases in water levels, a decline in rainfall, and weather variability.

- The participants' views on how to tackle climate change ranged from enforcing educational programs, implementing climate change policies, reduction in the use of air conditioning devices, afforestation, transportation management, reduction in the use of fossil fuel technologies, use of eco-friendly technologies, and reduction in emission of CO_2.

- The majority of the industrial actors do not have any policy regulating their operations as far as climate change and environment are concerned. Some of the participants in the industry have adopted other industrial climate change policy measures, some of which are internal ones, as well as external – from outside the country. On the other hand, some of the industrial companies have adopted other policies that are not climate change specific in the industrial sector.

- The industrial actors indicated that the implementation of climate change policy in the industrial sector has to do with the monitoring and evaluation of CO_2 emission devices, and the use of good machines and technology in the reduction of CO_2 emissions.

- The policymakers – key government agencies and stakeholders, reported that their role in the implementation of the climate change policy in the industrial sector has to do with developing policies and ensuring that those policies are adhered to by the industries.

- Most of the participants indicated that climate change has an effect on the production costs, access to raw materials for production, power supply for industries, and industrial properties and materials. The participants reported that climate change has resulted in an increase in production costs, reduction in raw materials for production, shortage of power supply for industries, and destruction of industrial properties and materials.

- While the industrial actors are of the view that the culprits of climate change in Ghana are a result of human activities from all the citizens, a majority of the policymakers are of the view that the main culprits of climate change problems are the industry in Ghana. To policy makers, the industry is engaged in unsustainable use of resources, which affects the environment.

- A majority of the participants reported that a good solution to the climate change problems is one that has to do with the use of good technologies, reduction in emission, use of renewable energy, education on climate change, and government support to industries to cut down carbon emissions.

- According to the majority of the participants, the solution to the climate change problems in Ghana should be the pursuit of the state or government and the industry. The proponents of the state or government responsible for solving the climate change problems are of the view that the state has the authority to enforce what is good for the nation, and that

individuals cannot do much on their own. The state and the government have the resources, regulations and the policies. On the other hand, the proponents of industries in solving the climate change problems are of the view that the emissions are from industries, and so they should be responsible for the solution to the problems.

- Meanwhile, development of climate change policies, ensuring policy integration, encouraging green investments, providing information on industrial activities, educating people on climate change, and advocating for new technologies are some of the inputs the participants indicated they or their institutions have made in relation to climate change problems in Ghana.

5.3 Conclusion

The study concludes that participants' have knowledge and understanding of the concept of climate change and its impacts on industry. Undoubtedly, as they survive the impacts of climate change, they are observant and concerned about the changes in climate. The participants showed extensive knowledge and understanding of climate change, and they were able to attest to the environmental changes that they perceived to have occurred over the years and associated them with climate change. However, from the overall responses gathered on the level of climate change knowledge, it can be concluded that many of the industrial players and government agencies, do not really regard climate change as a huge problem for them. For instance, their responses on the causes of climate change were from general perspectives instead of citing actual things they do within their organization that contributes to climate change and not.

The study concludes that there are no specific national climate change policies on industrial development in Ghana. As a result of that, some of the industries in Ghana make use of other integrated policies, such as ISO standards, in ensuring that they operate within their international environmental standards.

The study also concludes that the industry in Ghana is not abreast with the national climate change policy, as a majority of the industry indicated that they are not aware of any climate change policy in Ghana for industries. The lack of specific national climate change policy on industrial development as well as the lack of awareness of any national climate change policy, as indicated by the participants, may create a barrier in the implementation of climatic adaptation strategies aimed at curbing the current and expected future impacts of climate change.

Another important conclusion drawn from this study relates to the implementation of the national climate change policies. The findings of the study revealed that there is lack of proper monitoring systems that checks the activities and operations of the industry to ensure that they are working with the climate change policy standards and with the carbon dioxide emission limits. The study, therefore, concludes that the policy implementation of the industrial component of the national climate change policy has been neglected by the government of the country. This attitude, therefore, poses a serious threat to the fight against climate change and its impact on the industry and its overall effect on the individuals as well as on the entire country.

The policymakers' role in the implementation of the climate change policy in the industrial sector has to do with developing policies and ensuring that those policies are adhered to by the

industries. However, as per the report of the industrial actors and stakeholders, no serious monitoring is done by the policymakers to ensure that the industry meets the requirements.

The study concludes that although the industrial actors have knowledge and understanding of industrial climate change, its impact and consequences to the industry, the actors have very little interest in its solutions. Thus, the industry lacks the will to respond to the climate change problems. While the political actors perceived good industrial development to be reduction in carbon emission, environmental sustainability, economic development, and resource sustainability, because of the unwillingness to deal with the problems of climate change, a majority of the industrial actors, perceived good industrial development to be making profits, creating jobs and also expanding activities.

Finally, the findings suggest that industrial actors are more liberal in their appreciation of climate change issues. They view climate change as less relevant to them. They focus on themselves rather than the impacts climate change will have on the communities and the society at large. On the other hand, the policymakers in these findings can be said of being both liberalist and realist in orientations. The realists are found to be in support of good industrial development supporting climate change issues, while the liberalists are in support of allowing the industry to operate without interference for economic development.

5.4 Recommendations

The following recommendations are made based on the findings and conclusion of the study:

- There is a lack of national climate change policy dealing with industrial development in Ghana. The present national climate change policy looks at industrial activities and other

energy issues as one thematic area. This study, therefore, recommends that a new sector-oriented national policy on climate change on the industry be designed to deal with the industrial development of the country. The policy should focus only on the industrial sector in Ghana. This way, the country will be able to deal with climate change as far as the industrial sector in Ghana is concerned.

- The findings of the study revealed that there is a lack of awareness of the national climate change by the industry. This knowledge gap should, as a matter of urgency, be filled by creating awareness of the national climate change policy to the industry.

- The government should ensure that the national climate change policy and its related issues and other pro-environmental policies, with their accompanying bye-laws and behaviour expectations, as well as sanctions, are effectively disseminated.

- Policymakers should also have the political will to ensure policy implementation, as lack of political will on the part of policymakers was found in the study to impede the implementation of the national climate change policy in the industrial sector. Transitional support from the government and effective monitoring and evaluation has been found to be linked to the adoption of new practices.

- Furthermore, as suggested by the participants, ensuring policy integration, encouraging green investments, providing information on industrial activities, educating people on climate change, and advocating for new technologies, enforcing educational programs, reduction in the use of air conditioning devices, afforestation, transportation management, reduction in the use of fossil fuel technologies, use of eco-friendly technologies, and

reduction in emission of CO_2, should be the focus of the government, industry and the citizens of Ghana.

5.5 Recommendations for further studies

- The political and policy debates on the impacts of climate change and how states can mitigate its effects will continue to be a key matter of serious discussions at international conferences. In this case, more research is needed on realists and liberalists perspectives to climate change for informed policy decisions at national and international levels.
- The level of understanding and dispositions of policymakers and top government officials to climate change could also be researched to determine the political will of policymakers in dealing with the climate change issues in Ghana.
- The public knowledge and understanding of climate change should also be examined to assist the government and policymakers to make informed decisions, especially in disseminating information on climate change to the general public. The study could, among others, look at the mode of communication and dissemination of information about climate change within the general public.

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Appendix A

INTERVIEW GUIDE - INDUSTRIES

SECTION A: CLIMATE CHANGE KNOWLEDGE

Q1. How long have you been working in this company and your position?

Q2. What do you think causes climate change?

Q3. What impacts do you think climate change may have on industries, if any?

Q4. What do you think can be done to tackle climate change?

SECTION B: HOW CLIMATE CHANGE POLICIES ARE BEING INTERPRETED AND IMPLEMENTED

Q5. Does your company have climate change policies? (Probe: if Yes or no)

Q6. How does your company implement the climate change policies?

Q7. Do you have specific climate change policies or practices in your company?

Q8. How does your company monitor the implementation of the climate change policies?

SECTION C: CLIMATE CHANGE AND INDUSTRIAL DEVELOPMENT PATHWAYS

Q9. What do you see as good industrial development your company has achieved so far?

Q10. Do you think the climate change problem can affect the good industrial developments of your company?

Q11. What climate change problem/challenges does your company experience?

Q12. Who is the culprit/ and who is not the culprit of the climate change problem being experienced in your company?

Q13. What do you think are good solutions to the climate change problem in your company?

Q14. Who do you think is responsible for the solutions to the climate change problems?

Q15. What input do you try to give to help solve the climate change problem?

Q16. Who do you think should be responsible for the overall solution of the climate change problem? Is it the state or the private companies?

Thank you

Appendix B

INTERVIEW GUIDE – STAKEHOLDERS AND KGAs

SECTION A: CLIMATE CHANGE KNOWLEDGE

Q1. How long have you been working in this company and your position?

Q2. What do you think causes climate change?

Q3. What impacts do you think climate change may have on industries, if any?

Q4. What do you think can be done to tackle climate change?

SECTION B: HOW CLIMATE CHANGE POLICIES ARE BEING INTERPRETED AND IMPLEMENTED

Q5. Does the work of your institution have something to do with climate change policies in industrial companies in Ghana? (Probe: if Yes or no)

Q6. How does your institution ensure that climate change policies are implemented by the industrial companies?

Q7. Who is responsible for ensuring the implementation of climate change policies in the industrial companies?

Q8. How does your institution monitor the implementation of the climate change policies?

SECTION C: CLIMATE CHANGE AND INDUSTRIAL DEVELOPMENT PATHWAYS

Q9. What do you see as good industrial development?

Q10. Do you think the climate change problem can affect the good industrial developments of industries?

Q11. What climate change problem/challenge does the industrial companies have?

Q12. Who is the culprit/ and who is not the culprit of the climate change problem in the industrial companies?

Q13. What do you think are good solutions to the climate change problem in the companies?

Q14. Who do you think is responsible for the solutions to the climate change problems?

Q15. What input does your institution try to give to help solve the climate change problem?

Q16. Who do you think should be responsible for the overall solution of the climate change problem? Is it the state or the private individuals?

Thank you

Appendix C

INTERVIEW GUIDE – INDIVIDUALS(ILA)

SECTION A: CLIMATE CHANGE KNOWLEDGE

Q1. How long have you been living in this area?

Q2. Have you heard about climate change?

Q3. What do you know about climate change?

Q4. What do you think causes climate change?

Q5. What impacts do you think climate change may have on you personally, if any?

Q6. What do you think can be done to tackle climate change?

SECTION B: HOW CLIMATE CHANGE POLICIES ARE BEING IMPLEMENTED AND INTERPRETED

Q7. Are you aware of Ghana's climate change policies?

Q8. In your opinion, do you think climate change policies are being implemented?

Q9. Do you think individuals are taking any measure to reduce climate change?

Q10. Do you think industries are taking initiatives to reduce climate change?

SECTION C: CLIMATE CHANGE AND DEVELOPMENT

Q9. What do you see as good development?

Q10. Do you think the climate change can affect the good development in this area?

Q11. What climate change problem/challenges does this area experience?

Q12. Who is the culprit/ and who is not the culprit of the climate change problem being experienced in TIA?

Q13. What do you think are good solutions to the climate change problem?

Q14. Who do you think is responsible for the solutions to the climate change problems?

Q15. What input do you try to give to help solve the climate change problem?

Q16. Who do you think should be responsible for the overall solution of the climate change problem? Is it the state or the private businesses?

Thank you

Appendix D

CONSENT FORM

TOPIC: Perceptions of Climate Change in Tema Industrial Area, Ghana

INVESTIGATOR: George Kwabena Osei

I ……hereby confirm that the investigator has explained what constitute an informed consent. The purpose and nature of the study has been explained to me.

I understand that the information provided for this study will be used for academic research purpose only.

I understand that anonymity and confidentiality of the information provided would be maintained.

I understand that I can decline to answer any question I feel unwillingly.

Signature of research participant

Date ----------

Signature of investigator…….

Appendix E
LETTER OF INTRODUCTION

Norwegian University of Life Sciences
Faculty of Landscape and Society
Department of International Environment and Development Studies

Our ref.	Your ref.	Date
Reference letter		28.01.2019

LETTER OF INTRODUCTION

TO WHOM IT MAY CONCERN

Dear sir or madam:

By this letter I would like to introduce Mr. Osei George, an MSc student at the Department of International Environment and Development Studies at the Norwegian University of Life Sciences, Ås, Norway. He is currently starting his data collection in Ghana, conducting interviews regarding perceptions of climate change in the industry sector (companies and policy makers) in the Tema industrial area. He will carry out his interviews between 29th January and 15th February, 2019.

The study is carried out as a requirement towards the completion of his MSc thesis in development studies at the Norwegian University of Life Sciences. The results will be published for this academic purpose as an MSc thesis. The anonymity of all respondents, including individual industries or institutions, will be ensured.

The study will contribute to enhanced understanding of climate change as well as climate change policy options in Ghana.

I would be very grateful for every assistance you can provide to Mr. Osei George in carrying out his study. Should you need further information, please do not hesitate to contact me by email: siri.eriksen@nmbu.no.

Yours sincerely

Siri H. Eriksen

Professor Siri Eriksen, MSc supervisor

P.O. Box 5003
NO-1432 Ås, NORWAY

www.nmbu.no
post@nmbu.no

+47 67 23 00 00

Norges miljø- og biovitenskapelige universitet
Noregs miljø- og biovitskapelege universitet
Norwegian University of Life Sciences

Postboks 5003
NO-1432 Ås
Norway