A system thinking approach to addressing implementation challenges of local content policy in resource-rich countries.

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"A System Thinking Approach to Addressing Implementation Challenges of Local Content Policy in Resource-rich Countries"

Kwadwo Ayeh Obiri

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Supervisor: Dr Bassam Bjeirmi

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Abstract

The study espoused a multi-strategy approach encompassing system thinking (ST) tool of causal loop diagram (CLD) and mixed-method methodology to address local content policy (LCP) challenges of Infrastructure, Human Resource Capacity (HRC), Technology and Finance. ST considered the challenges as a 'system', thereby providing a comprehensive approach to identifying and analysing the interconnections among the variables affecting the challenges of LCP implementation in the Ghanaian oil industry. Underpinning ST and CLD is the concept of feedback that allows complex issues (LCD) to be viewed as an interconnected set of circular relationships, thus aiding in a holistic understanding of an issue from different perspectives. The CLD allowed the challenges to be modelled into Local Content Development (and sub-models of Infrastructure, HRC, Finance, and Technology with its attendant strategies) model and subsequently validated qualitatively.

Additionally, a literature review and questionnaire were used to extract LCP lessons from two perspectives: developing and developed countries. The study of the comparator countries found that the LCP implementation follows a worldwide trend: employment, procurement, training and technology transfer and financial support to local firms. The Ghanaian LCP focuses on the 'low hanging fruits', overly ambitious with unachievable targets not cognisant of Ghana's

developmental state and comparative advantage, and the pre-requisite factors for effective implementation. These pre-requisites include independent state institutions, adequate infrastructure, and credit facilities for local companies and suppliers. The lack of access to finance to local companies can be attributed to the lack of dedicated funding and the 'one-man company' syndrome, which is often not well structured, classifying them as high-risk for loans.

The study uncovered two critical issues affecting local capacity building: policy coordination and harmonisation among stakeholders and sustainable funding. The policy coordination should be three-fold: the regulator (and related government agencies), academia, and the industry. These issues have been exacerbated by pervasive political interference in the administrative and operational functions of state oil and gas (O&G) institutions. This persistent interference has led to rent-seeking behaviour and the national oil company being used as a 'cash cow' to finance the central government's projects. An implementation strategy is developed based on political leadership, institutional strengthening, policy coordination and harmonisation, and a national development plan.

Keywords: Local Content Policy; Causal Loop Diagram; Challenges; Oil and Gas; Ghana.

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This thesis is dedicated to my beautiful daughter, Ama Obiribea II.

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LIST OF ABBREVIATIONS

ABFA	Annual budget funding amount
AfDB	Africa Development Bank
AIP	Australian Industry Participation
BNDES	Brazilian National Development Bank
CLD	Causal loop diagram
EDC	Enterprise Development Centre
EIA	Energy information administration
FDI	Foreign Direct Investment
FFO	Full and fair opportunity
GDP	Gross Domestic Product
GATT	General Agreement on Tariffs and Trade
GATS	General Agreement on Trade in Services
GETFund	Ghana Education Trust Fund
GNPC	Ghana National Petroleum Corporation
HRC	Human Resource Capacity
IOC	International oil company
ICV	In-country value
JV	Joint venture
LCP	Local content Policy
LC	Local content
LNG	Liquefied natural gas
LCD	Local content development
LCF	Local content fund

LOC	Local oil company
LPG	Liquefied petroleum gas
MoE	Ministry of Energy
NCDF	Nigerian Content Development Fund
NNPC	Nigerian national petroleum corporation
NOC	National oil company
O&G	Oil and Gas
OPEC	Organisation of the Petroleum Exporting Countries
OSO	Offshore Supplies Office
PC	Petroleum Commission
PDP	Productive Development Policies
PNDC	Provisional National Defence Council
PMRA	Petroleum Revenue Management Act
PIAC	Public Interest Accountability Committee
QualSD	Qualitative System Dynamics
QuanSD	Quantitative System Dynamics
R&D	Research and Development
SR&ED	scientific research and experimental development
SME	Small and medium-sized enterprises
ST	System thinking
UBS	Union Bank of Switzerland
WTO	World Trade Organisation

LIST OF PUBLICATIONS

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CHAPTER ONE: INTRODUCTION TO RESEARCH

1.1 Introduction

The chapter commences with a background to the study, exploring the resource curse phenomenon and policies for addressing it. Subsequently, the research problem and justification, the research's aim and objectives, and the originality of the research are discussed. The above is followed by a brief description of the research methodology and the thesis structure.

1.2 Background

Natural resources have paradoxically been the catalyst of underdevelopment, political instability, and environmental pollution, termed the resource curse in many African countries. This resource curse is a paradox that connotes those countries with more natural resources turned to become underdeveloped than countries without natural resources (Obiri et al., 2019). The predominant justification for the resource curse is 'Dutch disease', coined due to the immediate hardship in the Netherlands that followed the discovery of Oil and Gas (O&G) in the North Sea, Europe (The Economist, 2005). Broadly, there are two routes to increase the value contribution from natural resources to stimulate socio-economic growth and in that process avoid the resource curse: fiscal policy and non-fiscal policy measures (Amoako-Tuffour et al., 2015; Kalyuzhnova et al., 2016).

Fiscal policy measures have been the usual means of generating revenue for the host country's coffers through royalties, subsoil payments and other tax instruments. On the other hand, the non-fiscal policy measures come in the form of local content policy (LCP). The LCP aims to leverage the petroleum value chain to generate sustained and inclusive growth through economic diversification and employment opportunities (World Bank, 2016). The policy seeks to integrate the 'extractive enclave activities' with the rest of the national economy to curtail dependence on the petroleum industry.

The LCP was first introduced in the North Sea, Europe, in the 1970s, ranging from direct imports restrictions to direct state interventions (Kalyuzhnova et al., 2016; Kemp, 1990). Since its introduction, it has been estimated that 90 per cent of resource-rich countries now have LC legal provisions (McKinsey Global Institute, 2013). In 2013, the Ghanaian government passed its version of the LC policy into law to promote value-addition and develop local capacities in the oil industry's value chain. Consequently, several studies have focused on how best to maximise benefits from the oil resources and avert Ghana from joining the bandwagon of resource-cursed countries in Africa. These studies are mostly centred on LCPs and their derivatives: governance, regulations, enforcement, LCP enhancement, and country's vulnerability (Abudu and Sai, 2020; IMANI, 2019; Ofosu-Peasah, 2018, 2017; Asumadu-Sarkodie, 2016;

Ablo, 2015; Senoo and Armah, 2015; Chitor 2012; Gyimah-Boadi and Kwasi-Prempeh, 2012; Gyampoh 2010; Ablo 2012).

The Ghanaian Local Content Policy Framework underpinning the LC law identified three key implementation challenges: Technology, Finance (hereafter referred to as finance), and Human Resource Capacity (MOE, 2010). This new study comprehensively addresses these challenges that previous studies have not tackled. To confirm the challenges prior to the main research, a pilot study (see Appendix 1 for data collection and analysis) was conducted in Ghana to help narrow the study on the fundamentals of the challenges and capture any additional challenges not in the government's policy framework. Participants of the pilot study considered infrastructure, human resource capacity (HRC), finance and technology to be the critical challenges to local content implementation in Ghana, which, in turn, became the central themes for the study.

This new study focuses on understanding the role infrastructure development can play in stimulating development in resource-rich countries, which previous studies have ignored. Additionally, the study focuses on devising strategies to address the LC implementation challenges of HRC, technology, and finance. Sigam and Garcia's (2012) argued that the above themes are critical for widening the local industry base in resource-rich countries. According

to them, there are two broad instruments for implementing LCP to expand the industry base: (1) focusing on increasing local participation and (2) focusing on building up local industry capacity.

The former is more effective for short-term results, increasing rents and promoting rapid domestic industry incorporation into the industry's value chain. These instruments can include LC performance targets, joint ventures (JV) between local firms and international oil companies (IOCs), percentages of domestic suppliers' preferences, taxation regimes and regulation purchases of local goods. The latter instrument looks at the long-term perspective of building national and local skills, giving domestic players the ability to create and take advantage of opportunities (Ayelazuno and Graham, 2022; Abudu and Sai, 2020; Marcel et al., 2016; Sigam and Garcia, 2012). Among the instruments for the latter group includes investing in infrastructure, developing an education system that generates the right skills for the local industry, promoting research and development (R&D) to spread knowledge, and stimulating the creation of industry clusters and linkages. The latter option aligns with the themes of this new study, which is sustainable over the long term.

1.3 Research Problem and Justification

Many resource-rich countries in Africa live in poverty and underdevelopment with a slight improvement in their livelihoods. These frustrations built over the years in the host communities have bred militants in Niger Delta, Katanga, and Cabinda in Nigeria, Congo, and Angola. This study has become imperative due to the continuous deterioration in Ghana's socio-economic development despite over ten decades of mining gold, diamond, and other minerals. In Ghana, the country is seeing patterns where mining concessions awarded to foreign companies have been taken over by illegal miners termed 'galamsey' locally. The study aims to avert Ghana from joining the bandwagon of commodity-cursed African countries and, in that process, unravel and propose alternative policies to the contemporary Ghanaian situation, under-development amid abundant natural resources.

To that end, this study is premised on building local industry capacity, as argued to be the most sustainable approach to using LCP implementation to widen the industry base (Marcel et al., 2016; Sigam and Garcia, 2012). Building local industry capacity will require addressing the fundamental challenges of Infrastructure, Technology, Finance, and Human Resource Capacity (HRC). The infrastructure consists of physical and institutional infrastructure. Similarly, HRC

consists of developing Ghanaian capacity, skills and capability, and knowledge creation.

The technology deals with developing the capacity to develop, receive, transfer technology, and disseminate knowledge. Finance deals with increasing access to capital by local firms. Stimulating broad-based economic development using the country's resource wealth will require addressing the aforementioned impediments to catalyse domestic industries' expansion and growth. To that end, the study tries to shift the conversations on LCP from LC performance targets and regulations which are adequate for the short-term benefits to tackling these challenges, which will be more sustainable and, in that process, build internationally competitive local industry. The strategies developed are expected to guide Ghanaian policymakers and stakeholders in making informed decisions regarding the petroleum industry.

1.4 Aim and Objectives

Aim: Develop an implementation strategy for addressing local content challenges in resource-rich countries using Ghanaian oil industry as a case study. The following objectives are set out:

- Evaluate the existing institutional and regulatory framework of Ghana's oil industry.

- Critically review the challenges of local content implementation in Ghana.
- Analyse good practices in local content strategies around the world.
- Analyse the interaction among the local content implementation challenges and its strategies using casual loop diagrams.

1.5 Originality of Research

As already stated earlier, many studies concerning various aspects of LCP in resource-rich countries. In Ghana, studies on LCP have neglected the implementation challenges identified in the Ghanaian Policy Framework. Therefore, the research intends to investigate these challenges by moving LCPs discussion from short-term benefits using mandatory regulations to solving these challenges. The study differs from previous studies on LC on two fronts: (1) the research's focus on addressing LCP challenges, and (2) the methodology employed in the study. Research studies on local content policy have been limited to capturing 'low hanging fruits' such as employment but not addressing challenges that can diversify the Ghanaian economy. Consequently, this current study addresses the role infrastructure development (physical and institutional) plays in stimulating resource-based development. Similarly, the study delves into the

sustainable way of addressing the challenges of human resource capacity, technology, and finance.

The four challenges are considered a 'system', which then uses system thinking as an analytical framework to establish a cause-and-effect relationship among the challenges. This research study is the first to employ system thinking and its tool of causal loop diagram (CLD) to analyse the LC challenges. The underlining philosophy for adopting ST was to consider the challenges as a 'system' with multiple interdependent components, stakeholders and feedback processes all interacting in a non-linear relationship in the Ghanaian oil industry. The methodology provides a systematic process in simplifying the potential factors that can influence the LC challenges and, in that process, enhances understanding of the root causes of the problem under investigation.

Additionally, the methodology's resultant effect provides a basis for policy discussion and, more importantly, challenges policymakers and research participants to be cautious in recommending policy without understanding its full implication. The study's findings and recommendation are expected to guide policymakers and industry players within the O&G industry, especially Ghanaian policymakers, to make an informed decision on these challenges.

1.6 Study Process

In pursuit of the research aim and objectives, the study is grounded on a mixed-method methodology encompassing quantitative and qualitative studies. Adopting this methodology is argued to provide a better understanding of research problems than either approach (Creswell and Clark, 2007; Creswell and Clark, 2011; Teddlie and Tashakkori, 2009). The use of the mixed method enhances accuracy, yields a greater depth, and minimises the weakness of using qualitative or quantitative methods alone (Kumar, 2014). Additionally, the study employs system thinking (ST) and causal loop diagrams (CLD) to model the challenges. The adoption of ST aids the research participants to understand the interconnection and interrelationship of the models' challenges.

The feedback concept underpinning ST sees the world as an interconnected set of circular relationships compared to the linear cause-and-effect view of the world. Subsequently, the LC challenges were modelled into causal loop diagrams with additional variables extracted from experts in the oil industry. The variables used for the modelling were based on the need for a small size, which will be manageable, and, more importantly, ignores any variable without significant impact on the subject matter in the context of the study area. Interviews and questionnaires were used to validate the various models and rank the challenges respectively. Participants for the

research were sampled using non-probability sampling comprising stakeholder and snowballing sampling strategy.

1.7 Thesis structure

The rest of the thesis is divided into several chapters. Chapter 2 reviews the literature on local content definitions and their arguments, the study area's institutional and regulatory framework underpinning LC implementation, and finally, LC implementation challenges are reviewed. Chapter 3 explores LC policy lessons from both developed and developing countries.

Chapter 4 examines, presents, and justifies the study's methodological framework. It commences by presenting the study's research methodology and its different strands and system thinking methodology. Chapter 5 develops and presents the initial causal loops diagrams for the identified LC challenges. Chapter 6 presents the qualitative findings and analysis of the focus group and interviews. Chapter 7 presents the quantitative research findings and analysis of the questionnaire. Chapter 8 converges the analysed findings of Chapters 6 and 7 for discussion. Chapter 9 presents the conclusion and recommendations of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter commences with a literature review on local content definitions, arguments, and petroleum sector linkages. It then delves into the study area's institutional and regulatory framework underpinning LC implementation in Ghana. Other critical themes reviewed include the role of the national oil company and the industry regulator and, finally, the challenges of local content implementation in Ghana.

2.2 Local Content Policy: Definitions, Arguments, Sector Linkages, and Value Chain

This section reviews what constitutes local content (LC) policy in the extractive industry, arguments for the LC policy and the various stages along the oil industry's value chain where LC can be maximised.

2.2.1 Local Content Policy Defined

Local Content Policy (LCP) is defined as "*a policy that evolved from creating backward linkages by supplying input to the local economy through the transfer of technology, the creation of local employment opportunities, and increasing local ownership and control*" (World Bank, 2013). The International Petroleum Industry Environmental

Conservation Association (IPIECA) defines the policy as the added value brought to resource-rich countries through the O&G industry's activities (ibid). Similarly, it is an industrial tool that can empower domestic producers to partially grow their domestic inputs and gain international technology and managerial expertise (Kalyuzhnova et al., 2016).

Due to the general consternation surrounding LCP, there is a new tendency to rename LC policy with different definitions and activities but with the same connotation (Ovadia, 2016). For instance, the country of Oman has rebranded LC to be called in-country value (ICV), defined as "*the total spends retained in a country that benefits business development, contributes to human capacity development and stimulates productivity in the economy*" (Ovadia, 2016). The main objective of ICV is for local content development- building domestic human resource capacity, and manufacturing. Broadly, LCP is categorised to be part of productive development policies (PDPs) or industrial policies (IPs), which consists of government interventions or programmes that increase the shares of employment, goods and services, and financial value to the local industry value chain (Tordo et al., 2013).

2.2.2 Arguments for and against LCPs

Empirical evidence suggests that the impact of LCPs is mixed (Veloso 2006), no matter which side of the argument. Tordo et al. (2013), in their research work on LC, categorised arguments for LCPs as follows. Firstly, to correct market failure - a situation in an economy where the quantity of goods demanded by consumers does not equate to suppliers' quantity. Proponents and governments often use this to justify LCPs by developing the capacity of local industries and providing them with preferential treatment to capture more economic benefits. Secondly, LCPs protect infant industries from unfair competition. Ado (2013) supports this argument by stating that LCPs intend to protect infant industries and ensure that, with time local firms can partner multinational corporations (MNCs) and learn from them, as evident in Norway's LC model (Tordo et al., 2013; Neum 2008).

These international service companies tend to have market power and have established relationships with international oil companies (IOCs) that displace local firms from the value chain. It is further argued that, without government intervention, domestic firms tend to die out. Consequently, LC's restrictions lead to cooperation between local and foreign firms with positive effects on the economy. A study by Alfaro and Rodriguez-Clare (2004) indicated that MNCs' interaction with local firms due to LCPs tend to have positive

knowledge spillovers to suppliers. In addition to the above arguments, proponents argue that LCPs create value addition, and is used by governments to create job opportunities for host communities to reduce social pressure, thereby providing O&G companies with the '*license to operate'*.

Since host communities tend to be affected adversely by the activities of O&G operations, international standards for environmental and social impact set principles for compensation (Ado, 2013; Tordo et al., 2013). These communities tend to lose livelihood temporarily or permanently and as a result, should be compensated (Warner, 2011). This compensation could be infrastructure provisions, sourcing labour and materials, and employing from affected communities. To that end, it is suggested that local content policies can be seen as the "*extension of Corporate Social Responsibility* (CRS)" of companies (Senoo and Armah, 2015; Ado, 2013). Moreover, it is even argued that LCPs have succeeded in gradual preventing conflicts in the Niger Delta, Nigeria (Ihua et al., 2011) and bringing harmony to post-war Liberia and Sierra Leone (Warner, 2011).

Conversely, there are compelling arguments against the use of LC policies. Firstly, the misalignment between policy objectives and instruments for LCP. Tordo et al. (2013) argued that before adopting LCPs to tackle market failures, it should be examined to determine

whether there are externalities, and the suitable instruments were chosen to correct the externalities. They argued that if there are externalities due to inadequate training of the labour force to work in the sector, the first approach is to determine whether training would be sufficient, or the country's educational system demands structural changes. If the approach would overcome the labour deficits, imposing LC regulations is not the best way of addressing the issue.

To counter MNCs' market power, the solution would be adequate competition, regulations, and market supervision. These regulations must be free and fair, with equal access to procurement opportunities for domestic suppliers. The other argument against the policy is that it violates international regulations and stifles international competition and trade. LCPs violate the World Trade Organisation (WTO) agreements such as the General Agreement on Tariffs and Trade (GATT), the agreement on Trade-Related Investment Measures (TRIMs), the General Agreement on Trade in Services (GATS), and the Agreement on Government Procurement (GPA). The TRIMs prohibit WTO members from enacting LC regulations that stipulate domestic purchase by an enterprise or restrict the volume or value of imports a company can purchase vis-a-vis the level of products it exports.

These prohibitions are meant to provide a level playing field for both local and foreign investors. However, new WTO members have a period or transitional arrangement (two, five and seven years for developed, developing and least-developed countries, respectively). The above suggests that all O&G producing countries except Vietnam that acceded to WTO before 2006 have exceeded their transitional arrangement under GATT (Tordo, 2011), including Ghana.

2.2.3 Petroleum Sector Linkages

In the study of industrial structure, Hirschman (1958) introduced three types of sector linkages between the commodity sector and the industrial sector:

- Fiscal/Financial linkage: This relates to resource rents (royalties, taxes) generated from the resources and is used to promote industrial development in other sectors of the economy or saved.
- Consumption linkage: Relates to income earned due to the production of commodities generating demand for domestically produced industrial goods. Sigma and Garcia (2012) argued that WTO rules – removing protective tariffs encouraged consumption linkages to be experienced abroad rather than in host countries.
- Production linkages: Which consists of backward linkage in the supply of extractive industry inputs, and forward linkage in the

processing of commodities (Kaplinsky, 2011; Sigma and Garcia, 2012; Tordo, 2013 cited Hirschman 1958).

However, another linkage called horizontal - the capabilities developed in the production linkages serve other sectors' needs (Sigma and Garcia, 2012; Kaplinsky, 2011). In other words, an increase in the output of a particular industry affects the other industries' activities in terms of increasing demand for their products and increasing government revenue for developmental objectives (Tordo et al., 2013). In these linkages, employment is created directly and indirectly and induced effects because of the O&G activities (Bacon and Kojima, 2011). Induced effects consist of the impacts of spending of those employed in the industry on local goods and services**.**

2.2.4 Value Chain

The industry's value chain is spread along the exploration, development, and production stages, as illustrated in Figure 2.1. These value chain stages present an opportunity for local production linkages and their subsequent supply to the oil industry. Whether these inputs can be produced and supplied locally depends on the level of development of the host country. The various stages in the industry's value chain are expounded from 2.2.4.1 to 2.2.4.5.

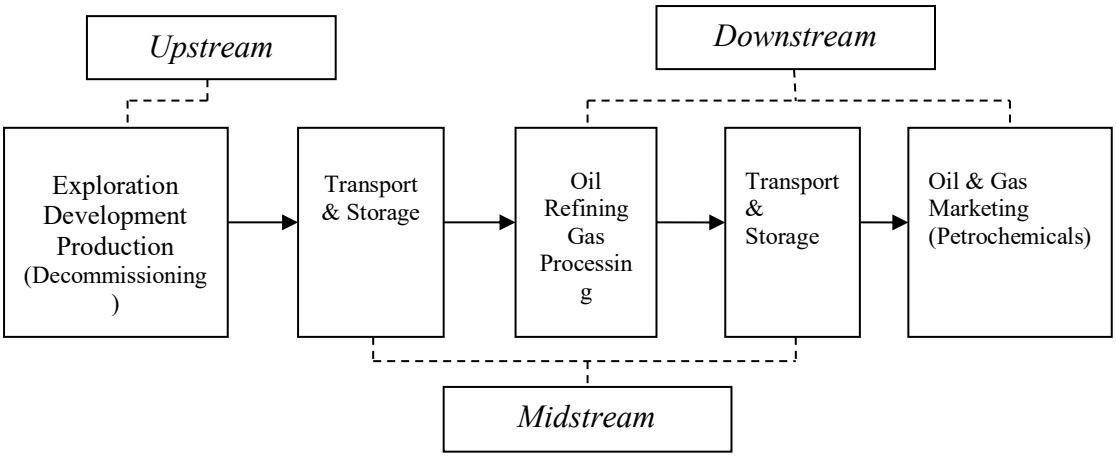


Figure 2.1: O&G industry structure. Source: Sigam and Garcia (2012).

2.2.4.1 Exploration

The first stage is the exploration stage which begins by using aerial or satellite photography to find hydrocarbons and assess their commercial quantity (Sigam and Garcia, 2012). Sedimentary basins are identified using relatively inexpensive and straightforward means such as gravity or magnetic surveys (UBS, 2004; Tordo, 2011). Data are then interpreted through complex computer analysis of the subterranean formations to determine the possibility of hydrocarbons (ibid). Data interpretation leads to the initial assessment to determine the commerciality of the discovery based on the quantity and quality of oil found. At this stage, most resource-rich countries cannot supply goods and services during the exploration phase due to technology and speciality, which are mostly lacking in the host country (UBS, 2004; Tordo et al., 2013). In most cases, the following services required at this stage are outside the local contractors'

purview: directional drilling, cementing, logging, perforating, completion equipment, and well stimulation.

2.2.4.2 Development

After the initial assessment and appraisal that indicate the discovery to be sufficient, the development stage is carried out (UBS, 2004; Tordo, 2011; Sigam and Garcia, 2012). The development stage includes drilling development wells to determine the size and commercial viability and all activities needed to prepare the site for commercial production. At this stage, infrastructure is built for transportation, supports the wells, aggregates the production, provides initial separation and processing of the produced fluids, and connects to the transmission infrastructure that carries the product to market (ibid).

Local content input at this stage is limited due to the scale and specialised nature of development at the development stage. Inadequate capacity in host countries forces most oil companies to outsource these services at the early stages of O&G development. At this stage, the project can be deemed financially and economically unviable, leading to a cessation of the activity (UBS, 2004; Tordo et al., 2013). Most times, it is after this stage that host governments start laying the groundwork for LC policies and legislation.

2.2.4.3 Production

This phase involves building extensive infrastructure both onshore and offshore for full–scale production, from the production wells to processing facilities and evacuation routes (UBS, 2004; Tordo et al., 2013). Infrastructure onshore is less expensive and complex than offshore - especially in deep waters such as the Gulf of Mexico and the Gulf of Guinea. At this stage, the operator performs a test to determine the wellbore flow rate of hydrocarbons. Most of the gas produced at this stage is reinjected into the reservoir or flared. However, with the recent campaign against gas flaring, host countries are now establishing gas processing facilities to be exported in liquefied natural gas (LNG) or for power generation.

Most host countries stand to benefit from fiscal linkages, backward and forward linkages. Regulations are enacted to force oil companies to consider local inputs in their operations. These regulations can be the number of locals employed, and goods and services procured locally. Also, at this stage, the scale of operations increases, demanding less specialised skills, providing domestic suppliers with an opportunity to expand oil activities. Once the major infrastructure for oil production has been put in place, the inputs required for continuing production declines apart from critical inputs such as electricity and water (UBS, 2004; Tordo et al., 2013).

2.2.4.4 Midstream

The midstream encompasses O&G treatment, transport, and storage. This is where forward linkages can be created to the produced gas from the wells. Excess gas can be transported in LNG, which demands a liquefaction plant for processing before transportation. Here again, the LNG business and its attendant activities demand specialised training, which most resource countries lack. However, LC policies can encourage foreign companies to transfer knowledge and technology to domestic companies.

There are opportunities for local companies to take advantage of the transportation and storage of crude oil. Crude oil is normally transported through pipelines, railroad tank cars, ocean tankers from processing facilities to storage terminals, refineries, export locations, and final consumers. Many opportunities are available along the O&G transportation routes, such as welding, transport drivers, pipe construction and general construction services reserved for locals or in conjunction with foreign companies to partake in the value chain.

2.2.4.5 Downstream

Downstream encompasses refining and marketing. Refining involves the process of separating hydrocarbons molecules present in the crude oil and converting them into finished petroleum products such as gasoline, gas oil, fuel oil, kerosene, and liquefied petroleum gas

(LPG) for purposes of transportation, residential and commercial heating, power generation, petrochemical production, and asphalt formation (UDS, 2004; Tordo et al., 2013). Marketing refers to the distribution and sale of these refined products. Generally, power generation, transport, and heating are the three main energy-related uses of oil, whereas non-energy related serve as feedstock for the petrochemical industry. This stage presents opportunities for forward linkage and rapid industrialisation.

2.3 Ghana's Institutional and Regulatory Framework

This section reviews the institutional and regulatory framework governing the oil industry in Ghana. It focuses on the history of the oil industry in Ghana, the local content policy (LCP) and regulation, and the two key state institutions (upstream regulator and national oil company) in implementing the LCP. The next topic briefly reviews the history of the oil industry in Ghana.

2.3.1 A Brief History of O&G Exploration in Ghana

The oil industry in Ghana can be categorised into four phases. The first phase is from 1896 to 1967. It started under Britain's colonial rule and continued to the first republican government under the leadership of Kwame Nkrumah. This period focused on onshore surveying and seismic data acquisition in Half Asini, the Western Region of the country. According to the British oil company Tullow

(2012), exploration in Half-Asini materialised because of oil seeps found onshore at the Tano Basin in the western region. It is estimated that from 1896 to 1897, the first well produced 5 barrels of oil per day (bopd) at a depth of 35 metres (GNPC, 2008). The second phase in the oil exploration started from 1968 to 1980.

The second phase involved the search for O&G, both onshore and offshore and was intensified during Prime Minister Busia's reign and later under military leader Acheampong in the 1970s. This intensity resulted in the discovery of the Saltpond oilfield by Amoco, which produced approximately 3.47 million barrels of oil between 1978 and 1985 (Tullow, 2012). During the same period, North Tano and Voltarian basins and the first deep-water wells were explored. The third phase occurred between 1981 and 2000. This period fell under President Rawlings' administration culminating in passing several petroleum laws, fiscal and petroleum agreements, and establishing institutions to aid O&G exploration. The state-owned Ghana national petroleum corporation (GNPC) was established in 1985 to be responsible for the exploration and production (E&P) of O&G (GNPC, 2012).

The present phase started in 2001 under President Kufuor to restructure and streamline the mandate of GNPC to focus on its primary objective of E&P of O&G. The relative weakness of GNPC in

terms of technical and financial capability resulted in partnerships with IOCs (Tullow Ghana Limited, Kosmos Energy Ghana, Anadarko Petroleum Corporation), leading to the commercial discovery of O&G off the coast of Ghana in 2007. Since the commercial discovery, all wells drilled showed about 75 per cent indications of O&G (Tullow, 2012).

These discoveries led to the passing of the new Petroleum Revenue Management Act (PMRA) (Act 815) for managing petroleum revenue and Petroleum Commission Act, 821, establishing Petroleum Commission to regulate the upstream sector. Similarly, the National Petroleum Authority was established to regulate the downstream sector, and Local Content and the Local Participation Regulations 2013 to regulate the oil industry for the benefit of Ghanaians. The relevant laws concerning the study are explained in detail in the next sections.

2.3.2 Local Content Policy and Regulation

The Ghanaian Local Content and Participation refers to the level use of indigenous expertise, goods and services, people, businesses, and financing in the O&G activities (MoE, 2010; PCG, 2017a). The Ghanaian policy framework developed in 2013 has the following objectives:

- Maximise the benefits of O&G wealth generation using local expertise, goods and services, job creation for people, businesses, and financing in all aspects of the industry,
- Development of local capability across the value chain through education, skills and expertise development, transfer of technology and know-how and an active R&D portfolio,
- In a decade of the policy implementation, achieve at least 90 per cent local content and local participation in all aspects of the value chain,
- Developing O&G industries and supporting industries that will sustain economic development (MoE, 2010; PCG, 2017a).

In 10 years, the government hopes to achieve at least 90% full local participation in all aspects of the O&G value chain. To achieve this target, the policy framework emphasises the mandatory local provision of goods and services, employment and training of Ghanaians, technology transfer, and local capability development. Regarding procurement, local goods and services that are competitive in price, quality, and timely availability must be considered during tendering. The policy framework also identified potential challenges to impede the policy implementation (detailed in section 2.4), which becomes the basis of this study.

The above Policy Framework was passed into law called Petroleum (Local Content and Local Participation in Petroleum Activities)

Regulations 2013 (LI (legislative instrument) 2204). This regulation provides a comprehensive legal framework for local content, containing most of the policy's key points. The law, inter alia, is intended to:

- Promote value-addition and create jobs through local expertise, goods and services, businesses and financing in the petroleum sector and their retention in the country.
- Developing domestic capacities across the value chain through education, skills and technology transfer, and research and development programmes; and
- Achieve a minimum level of domestic employment and ensure in-country spending for the petroleum industry value chain's goods and services (PCG, 2017b).

Appendix 2 summarises the key LC provisions (regulations 11, 12, 13, 14, 15, 16, 17 and 18) of the LI 2204. The regulations established the Local Content Committee to oversee, coordinate, and manage LC development, prepare guidelines including targets for LC reporting, and undertake LC monitoring and audit. Enterprise Development Centre (EDC) was established to enhance local businesses' capacity to meet the standards of the petroleum industry, which is currently limited in its impact on Ghanaian small and medium-sized enterprises (SMEs) (Ablo, 2015). Despite this, the EDC project has made tremendous progress in building local businesses' capacity through

targeted training. The driving force behind all the above, according to Ovadia (2014), is to create inter-sectorial linkages in the broader economy and facilitate the utilisation of human and material resources in the petroleum industry.

However, studies conducted in countries, i.e., Angola and Nigeria, with similar LC regulations show that the same regulations provide an avenue for local elites to capture rents (Ovadia, 2012; 2013; 2014). Nevertheless, the LC law is believed to have chalked some successes regarding the people employed in the Ghanaian industry. For example, out of 6900 employed in the industry, over 90% are Ghanaians, and 40% are in managerial positions (lower and mid-level) (Ovadia, 2016). These figures are slightly higher than those reported by Amoako-Tuffour et al. (2015). Despite the above, the target set in the policy is described by Acheampong et al. (2015) as prescriptive and overemphasises domestic ownership and makes the schedule challenging to implement given the limited timeframe of 10 years to achieve the 90 per cent target.

Additionally, they argued that the regulations ignore the country's industrial development state, making it difficult to achieve the target. In another observation by Ovadia (2016), Ghana's LC is like Nigeria's LC concerning the schedule of oil services, targets, and definition of

local content. Nevertheless, he argued that Ghanaian law is weaker in preventing indigenes 'fronting' for foreign companies.

Consequently, the study intends to investigate the adequacy of the LC regulations, the successfulness of the policy in Ghana and whether the country is on course to achieve the LC policy's 90% target.

2.3.3 Industry Regulator

Petroleum Commission Act, 2011 (Act 821) establishes the Petroleum Commission (PC) to "*regulate and manage the utilisation of petroleum resources and to coordinate policies…"* (Petroleum Commission, 2019). The Petroleum Commission (hereafter referred to as the commission or PC) has the following functions:

- Promote sustainable and cost-efficient petroleum activities for the overall benefit of the country,
- Suggest national petroleum policies to the sector minister,
- Monitor and ensure compliance with policies and regulations relating to the oil and gas industry,
- Promote and ensure compliance with local content and local participation as outlined in the Petroleum Exploration and Production Act 1984 (Petroleum Commission, 2019).

The LI 2204 requires a contractor and a subcontractor to submit a long term and annual local content plan to the commission for

approval which must correspond with the work programme in the industry's intended activity (ibid). The Local Content plan comprises consideration given to local goods and services, Employment and Training Sub-plan, Research and Development Sub-plan, Technology Sub-plan, Legal Services Sub-plan, and Financial Services Sub-plan. Additionally, contractors and subcontractors are required to submit to the commission a proposed contract or purchased order, quarterly forecasts of purchase orders to be sole-sourced or through competitive tendering, and submission of an annual local content performance report covering all its projects for the year under review (Petroleum Commission, 2019).

Despite the above laws, the petroleum commission faces challenges with interference and adequate monitoring of LC laws. Hickey et al. (2015) and Skaten (2018) argued that PC lacks autonomy over the regulation of the upstream petroleum activities and is often bypassed by the sector minister in decision making, especially when petroleum agreements are signed.

To that end, the study intends to determine the effectiveness of LC monitoring and enforcement in the industry. Secondly, the study would investigate whether the PC is adequately resourced to deepen the LC implementation and if there are challenges; why?

2.3.4 National Oil Company

The Ghana National Petroleum Corporation (GNPC) Act 1983 (PNDC Law 64) established a state-owned company, GNPC, to partake in exploration, development, and production on behalf of the state. Among other functions, the corporation shall:

- Obtain the greatest possible benefits from the development of its petroleum resources,
- Ensure effective transfer of technology to Ghana,
- Ensure development of domestic capabilities in the industry,
- Ensure training of Ghanaians for the industry,
- Engage in R&D related to the oil and gas industry (GNPC, 2019).

The functions, as mentioned earlier, are to be achieved either solely or in collaboration with other companies to deepen the local content and local participation in the oil industry. Initially, GNPC was modelled on Brazil's national oil company, Petrobras, as the industry regulator and a commercial entity (Skaten, 2018). In 2002, the regulatory authority of GNPC in the upstream and downstream was transferred to the Petroleum Commission and the National Petroleum Authority, respectively. Subsequently, private capital was injected into it, transforming the corporation into a commercial upstream operator in 2002 (Hickey et al., 2015).

There are three ways GNPC is deepening local content and participation: (1) partnering IOCs in offshore to build technical capacity for future E&P; (2) Voltaian Basin Project which is to be explored and managed solely by GNPC; and (3) GNPC Scholarship Foundation to train technical experts in the industry. The 5-year initial phase of the Voltaian Basin Project includes 2D seismic data acquisition and processing, environmental impact assessment, community relations management and drilling of two conventional wells hampered by the financial demands of the project (GNPC, 2012; Skaten, 2018). Appendix 3 categorises the current investments of GNPC, which spans from telecommunication, and hotels to the oil industry. Also, GNPC has a subsidiary called Exploration and Production Company, Explorco, which the state company uses as a strategic tool to build operating capability through the Joint Operating Company (JOC) concept (GNPC, 2019).

Another strategic investment by the corporation to increase the transfer of operating capability is GNPC-Technip Engineering Services Ltd. This joint venture service company provides engineering services to the O&G industry. In addition to the strategic investments to build local capacity, the GNPC Scholarship Foundation provides Ghanaians with scholarships to study abroad in technology, engineering, science, and mathematics. Skaten (2018) argued that GNPC has been instrumental in the country's petroleum industry's growth, but the

change in government comes with a new policy and direction that limit the long-term technical and financial stability of the corporation.

Other issues are limiting the growth of the state company. For instance, GNPC has been accused by the Public Interest Accountability Committee (PIAC) (the committee responsible for overseeing the oil revenue management) and the Auditor-General of wasting oil revenue over the years. In 2014, GNPC advanced US$50 million to the Ministry of Finance, which is yet to be paid back (Reporting Oil and Gas, 2016). In December 2018, it was reported that GNPC has agreed to give the Ghana Health Service US$1m for five years to cover the cost of medical drones (PIAC, 2018). Another issue raised is the GNPC's use of US$41 million of its share of oil revenue to support crude oil purchases by the Volta River Authority (state-owned power producing company) (Reporting Oil and Gas, 2016).

The corporation has deviated from the core mandate into a quasi-financial institution granting loans with dire implications for the country's oil sector. This has resulted in an accusation from various civil society organisations (CSOs) that the corporation has become a '*slush fund*' for the government. Consequently, the African Centre for Energy Policy (ACEP) recommended the amendment of GNPC Law 64

to bring the corporation activities under parliamentary scrutiny viz approval of loans and use of resources (ACEP, 2017).

Under this section, the study will determine whether the NOC is adequately resourced and whether it is deepening the LC implementation as the law establishes it intended, and if there are challenges, why?

2.4 Challenges of Local Content Implementation in Ghana

The production of O&G from the country's oilfields is expected to contribute to socio-economic development via the indigenisation of the petroleum industry's needs. This, however, is constrained by several factors that impede the full realisation of the objectives of LCPs. These challenges confronting the implementation are reviewed from 2.4.1 to 2.4.4.

2.4.1 Infrastructure

Infrastructure encompasses physical and institutional infrastructure. Physical infrastructure such as communication and energy infrastructure are needed to support industry linkages, create new industries, and expand the local business. A weak infrastructure curtails the expansion of the manufacturing base, and its availability constitutes an environment enabling business development and productivity (Sigam and Garcia, 2012). Providing and maintaining the

necessary infrastructure is essential for the local supply industry to be more competitive (ibid). INTSOK (2013) argued it is necessary for information dissemination in terms of IT infrastructure, which helps foster local content in petroleum industry activity. In African countries, the infrastructure deficit is large and lagging other developing countries. The World Bank (2009) estimated that sub-Saharan Africa would need $93 billion per year to bridge its infrastructure deficit (Arezki and Amadou, 2016).

Furthermore, in Africa, it is estimated that weak infrastructure accounts for 40 per cent and 60 per cent of transport costs for coastal countries and landlocked countries, respectively, thereby undermining producers' competitiveness and lowering consumers' welfare as inputs and final goods are more expensive (UNECA, 2011). Putting the above in context, African transport cost is four times higher than the typical developed countries, complicating equipment and materials imports of (McKinsey and Company, 2010). The above quality plays a significant role in influencing profitability considerations for investors (INTSOK, 2003). By far, the regular power supply is the most significant source of infrastructure challenges in sub-Saharan Africa (Arezki and Amadou, 2016). Sigam and Garcia (2012) postulated four ways resource-rich countries can bridge this gap in Africa: (1) appropriate legal, institutional, and regulatory framework, (2) streamlining private involvement and

financing, (3) taking into consideration social factors during investments, (4) looking for support in investment promotion agencies in foreign investments.

On the other hand, institutional infrastructure is the government's institutions responsible for formulating, implementing, and regulating O&G policies (see study's specific state institutions under section 2.3). Weak institutions result in a high cost of setting up an enterprise, and countries with weak or unclear property rights inhibit entrepreneurs from using land titles as collateral to access a credit facility (AfDB, 2015). These factors result in entrepreneurs operating an informal economy, making it difficult to transact business with IOCs. Public institutions play a key role in drafting industrial policies to support local industry by establishing company registries, enforcing contracts and laws, and providing infrastructure aligned with planned LC objectives (Kazzazi and Nouri, 2012).

These policies will increase the reliability of institutions and the legal system, create the enabling infrastructure for business development, and provide the incentive to enhance sound business practices (INTSOK, 2003). If the resource country institutions are weak, studies show a negative impact on natural resource management (Robinson, 2006; Jensen and Wantchekan, 2004; Collier and Hoffler, 2005; Hodler, 2006). To build institutional infrastructure, Klueh et al.

(2007) recommended the establishment of a public outreach and analysis office to (a) develop a public registry of competent domestic vendors, (b) advise locals on the mechanisms and potential for a joint venture with IOCs, (c) and plans for supporting domestic training and capacity building, and R&D.

In Ghana, the physical and institutional infrastructure is inadequate to support LC implementation. It is estimated that during the 2000s, infrastructure contributed over one percentage point to the country's annual per capita GDP growth (Forster and Pushak, 2011). Furthermore, it is estimated that Ghana spends about $1.2 billion per year on infrastructure, equivalent to about 7.5 per cent of GDP, and $1.1 billion is lost each to inefficiencies (Forster and Pushak, 2011). Currently, Ghana's infrastructure deficit is estimated in the range of about US$ 30 billion will require an annual expenditure of $2.3 billion to close the gap (Forster and Pushak, 2011).

Accordingly, the government has taken some initiatives to bridge the infrastructure gap. In 2014, the government of Ghana established Ghana Infrastructure Investment Fund (GIIF), wholly owned by the government, to mobilise, manage, coordinate, and provide financial resources for infrastructure investment (GIIF, 2019). Similarly, section 18 (1) of the Petroleum Revenue Management Act (PRMA) (Act 815) stipulates that not more than 70 per cent of the petroleum

revenue shall be transferred to the annual budget funding amount (ABFA – part of the national budget) annually. More importantly, section 21 (3) of the PRMA stipulates that in the absence of a long-term national development plan, the spending within the budget shall focus on agriculture, industry, and physical infrastructure.

Despite these provisions, there have been various reports of violation of the laws on petroleum revenue usage. For instance, in 2019, the public interest and accountability committee (PIAC) claimed that no oil cash (maximum 25 per cent of the amount allocated for public investment expenditure under the ABFA) was allocated to the Infrastructure Fund in violation of section 21 (4) (b) of the PRMA Act, 2015 (Act 893), and section 5(1) (b) of the GIIF Act, 2004 (Act 877) (PC, 2019d). Despite the violations of these laws, those responsible have not been held accountable.

2.4.2 Human Resource Development

Human Resources Capacity (HRC), according to Williamson et al. (2003) and Abbay (2008), over the years, has been defined and interpreted in varied ways. The concept is closely related to education, training, and development (Yamoah, 2014). HRC, according to Groot and Molen (2000), can also be defined as "*the development of knowledge, skills and attitudes in individuals and*

groups of people relevant in design, development, management and maintenance of institutional and operational infrastructures and processes that are locally meaningful" (Groot and Molen, 2000). In general, insufficient HRC is considered one of the significant challenges curtailing LC implementations in Africa (Peek and Gantes, 2008; Sigma and Garcia, 2012; MoE, 2010; Darkwah, 2013; Omenikolo and Amadi, 2010).

The availability of locally skilled personnel will benefit both the host country and the oil companies. First, skilled shortages impede the host country's goal of incorporating the local workforce into the oil industry (Sigam and Garcia, 2012). Secondly, from the oil companies' perspective, an inexperienced and inadequate workforce in the host country can cause delays, increase costs, and hamper the fulfilment of LC requirements. To that end, Ghana's government is trying to boost local human resources in the oil industry in many ways. First, the local content laws enacted (see section 2.3.2) requires oil companies and their sub-contractors to commit to developing locals in the field. Especially, sections 9 (3) and 17 stipulate that an LC plan shall include an Employment and Training Sub-Plan, section 18 deals with Succession Plan, and section 19 on Middle and Junior level positions (PCG, 2017b).

The Employment and Training sub-plans require that the plan include forecasting hiring and training, anticipated skill shortages and

expenditure for training, training requirements, time frame, and quarterly submission of the plan. It further includes a comparative analysis of the employment and training sub-plan for monitoring compliance (ibid). A Succession plan is part of the Employment and Training sub-plan, which details how positions not occupied by Ghanaians can soon be replaced. Secondly, as discussed above (section 2.3.5), the state-owned oil company GNPC is also mandated in developing the local workforce via partnerships with foreign firms and locals.

The government agencies such as Ghana Education Trust Fund (GETFund) and the Scholarship Secretariat are sponsoring locals to pursue programmes in Ghana and outside. Despite the above efforts, there remains a shortage of skilled workforce for the oil industry. According to Peek and Gantes (2008), the shortage of skilled workers in resource-rich countries is caused mainly by (1) inadequate educational facilities, (2) inadequate vocational and technical training, (3) lack of school accreditation, and (4) demand for higher-skilled professionals (Peek and Gantes, 2008). Accordingly with support from the IOCs, the Government of Ghana established Enterprise Development Centre (EDC) to train local SMEs in Takoradi, Ghana. The EDC was initially funded at the cost of US$5 million over five years period by the Jubilee partners (Tullow Ghana, Anadarko,

Kosmos Energy, Petro SA and GNPC) which is now closed because of funding.

According to Damman et al. (2011), the gap analyses conducted before establishing the EDC showed that local firms lack the technical expertise, financial capital and competitiveness required for participation in the industry. Subsequently, it has been found that the EDC failed to empower local firms in terms of economic capital, and human capital development, thereby undermining efforts to increase local participation (Ablo, 2017). It is, therefore, essential that a strategic plan is put in place to ensure human capital development. As argued, human capital development creates a significant contribution to organisational competencies and the transfer of technology in developing countries (Cosar, 2011; Monday, 2015). Technology transfer does not diffuse only through formal R&D but also through skilled labour employment (Cosar, 2011). In other words, human capital facilitates technology adoption in resource-rich countries (Monday, 2015).

2.4.3 Technology

Developing countries lack the capacity to develop internal technology to support petroleum industry activity, resulting in a dependency on foreign companies to aid in that process. Development of technology

can exist in two ways: endogenous development via internal resources and R&D; and technology transfer using external resources from out of the organisation (Ghanadi, 2003). Moreover, a complete technology transfer can take place through formal channels such as:

- FDI, licensing, a joint venture, and various mixed methods,
- Informal channels, i.e., reverse engineering of technology embodied in goods and services and replicating production processes in published patents (Saggi, 2003).

Tarek (2002) also proposed that direct foreign investment, cooperation investment, direct sell or buy, turnkey projects and licensing constitute five major groups of technology transfer methods that resource-rich countries can utilise. In all this, local R&D centres have an essential role in creating and transforming foreign accessed knowledge into industrial applications (Owusu, 2014) and serve as critical energisers to industrialisation and economic expansion in oil-producing countries (Mohamed et al., 2010). However, host countries' R&D is typically inadequate due to insufficient public funding and ineffective support for research and dissemination of the knowledge, thereby reducing their capability as a vehicle for upgrading indigenous companies (Owusu, 2014).

Similarly, Saggi (2003) argued that international technology flows to recipient countries are impeded through weak domestic absorption

capacities, poor infrastructure, restrictions on inward technology, trade, investment flows, and inadequate regulatory systems. To create the conditions for domestic companies to emerge and narrow the technological gap between domestic and foreign firms, there must be an industrial infrastructure to build on (INTSOK, 2007). Similarly, domestic firms' ability to absorb advanced technology depends on local firms' organisational and technical capabilities (Cusumano and Elenkov, 1994).

In Ghana, the Local Content (LC) Policy Framework recognised technology as one of the barriers to the country's quest to maximise benefits from the resources. Consequently, the LC outlined provisions that will be used in ensuring technology transfer to the country. Section (9) of the LC law deals with the LC Plan that oil companies must submit to the regulator for approval. In there, section (9) (3b and c) details that the LC plan should entail a Research and Development Sub-Plan and Technology Transfer Sub-Plan (Petroleum Commission, 2019). The law stipulates that before commencing any petroleum activity, a contractor should submit a programme for R&D in the country.

Additionally, the R&D Sub-Plan shall outline a revolving three to five-year programme for O&G related research in Ghana, expected expenditure, advertise for proposals on R&D activities concerning the

contractor's work programme, and update the contractors' R&D activities annually (ibid). The monitoring of technology transfer shall be done via annual submission of a technology transfer report detailing the technology transfer initiative pursued and the current results.

2.4.4 Finance

In most resource-rich countries, the difficulty in accessing funds is one of the biggest challenges facing LC implementation (Heum et al., 2003; Omenikolo and Amadi, 2010; Ovadia, 2014; and Ramdoo, 2016). This difficulty arises from the government's lack of readily accessible funds or private financial institutions. Due to this challenge, resource-rich countries cannot finance large projects, thereby resorting to partnerships with institutions to bear the financial risks of O&G development. The acknowledgement of this challenge in the Ghanaian LCP supports similar research findings. For instance, studies identified the lack of financial support as the common challenge in domestic Ghanaian and African companies' operations at all levels of the oil industry's value chain (ACEP, 2017; Amoako-Tuffour et al., 2015; AfDB, 2015). This challenge is exacerbated by the high cost of borrowing and intense competition for local funds from international players with access to cheaper financing sources from international financial markets (ibid).

In 1953, the Bank of the Gold Coast was established and later divided into the Bank of Ghana (the central bank with the responsibility to ensure the stability of the country's financial system by regulating, supervising, and directing the banking system), and the Ghana Commercial Bank, a commercial lender (BoG, 2018; Oxford Business Group, 2011). Today, there are 23 licensed banks, both state-owned and foreign banks. In 2014, it was estimated that the banking industry total assets increased by 41.0 per cent year-on-year to $14. Billion in September 2014 compared to 35.4 in 2013 (BoG, 2018). In terms of credit to the private sector in real terms, the sector grew by 26.6 per cent in 2014 compared with 13.1 in September 2013.

The market is described to be top-heavy in terms of assets as the top quartile of the domestic banking sector is estimated to be approximately 56% of the industry's total operating assets (ibid). The second subsector of the lending spectrum is the microfinance subsector organised into three tiers by the BoG. Tier 1 consists of about 144 rural and community banks owned and managed locally. These rural and community banks provide credit to small-scale farmers and businesses within a limited geographic area under the Association of Rural Banks (BoG, 2018). Similarly, tier 2 consists of the traditional Susu (saving) companies that collect savings and provide small amounts of credit in microfinance loans. It is estimated that there are about 484 microfinance institutions in Ghana.

The last tier consists of about 70 money lenders or microcredit organisations that do not accept deposits. In recent years, the banks and microfinance institutions have faced financial instability resulting in the collapse of nine banks due to insolvency. Some of these insolvent banks, such as Capital Bank and UT Bank, are under the control of Ghana commercial bank, and the other seven insolvent banks merged into one limited company, Consolidated Bank Ghana. The financial instability is characterised by large fiscal and current account deficits, a volatile exchange rate, low GDP growth and high inflation, and the acute energy sector debt crisis (BoG, 2018; Oxford Business Group, 2019a).

This financial instability has also affected the microfinance sector in which it is estimated that out of the 500 licensed microfinance institutions in 2018, 211 have either become non-operation or categorised as distressed by the regulator (ibid). This subsector is characterised by severally impaired capital, inability to meet regulatory capital adequacy requirements, low asset quality and liquidity crises (BoG, 2018). Also, the regulator estimates that $10 million is owed to more than 700,000 depositors by these companies, which invariably affects the financial services sector (ibid). All the above have affected the local financial institution's ability to prefinance oil and gas projects in the industry.

In a nutshell, it can be observed from the themes that Ghana's primary strategy for building local capacity is via the enforcement of the LC Laws. The questions that arise are:

- *How effective has the implementation of the LC laws been?*
- *What policy options exist that can complement the LC laws implementation?*
- *What policy options can be used to address the identified LC challenges?*

2.5 Local Content Development

Local Content Development (LCD) deals with developing domestic industries' capabilities and competencies and promoting innovation, technology, and R&D to stimulate economic growth in the domestic production of goods and services of a country. Such growth is caused by improved technology, value addition to goods and services, and education quality. The implementation of LC policies, as evidenced in the literature, can be used to achieve economic growth, economic diversification, and general socio-economic development.

When used to encourage diversification and the development of backward linkages, LC policy is seen as a trade-off between short-term efficiency and long-term economic development (Tordo, 2011). Also, careful implementation of the policy ensures spill-over benefits of the petroleum industry to the national economy's non-extractive

sectors. As evidenced by experiences of developed and developing countries, such benefits, argued Kazzazi and Nouri (2012), are significant when linkages between the primary resource sector and other sectors are established.

Chapter Summary

The chapter reviewed local content definitions, arguments, and key actors in local content maximisation. It then reviewed Ghana's oil industry's institutional and regulatory framework, focusing on the upstream regulator, the national oil company, the Local Content Policy Framework, and the LC regulations. These reviews identified gaps in the institutional capacity, regulatory laws, and challenges of local content implementation in Ghana. The chapter ends with a review of the challenges confronting LC implementation in Ghana.

CHAPTER THREE: METHODOLOGICAL FRAMEWORK FOR THE STUDY

3.1 Introduction

This chapter seeks to explain and justify a structured approach to selecting a research methodology to achieve the aim and objectives of the study. It commences by setting out the research methodology and its different strands, the adopted research philosophy, research design, and system thinking methodology. The appropriate methodology is selected to achieve the study's aim and objectives.

3.2 Research Methodology

Figure 4.1 illustrates the methodological framework for the study, which comprises four stages. Stage 1 includes the introduction and the research aim and objectives, LC policies and studies in Ghana, and a pilot study (detailed in section 4.3.9). Stages 2, 3 and 4 include literature review, system thinking models and primary data, and research findings, recommendation, and conclusion, respectively (detailed in the subsequent sections). From the perspective of the objectives of the study, Kumar argued that a research study could be classified as descriptive, explanatory, exploratory, and correlational (Saunders et al., 2007; Kumar, 2014). Descriptive research systematically describes a situation, phenomenon, or attitude towards an issue. Explanatory research explains why and how there

is a relationship between two aspects of a phenomenon (Kumar, 2014).

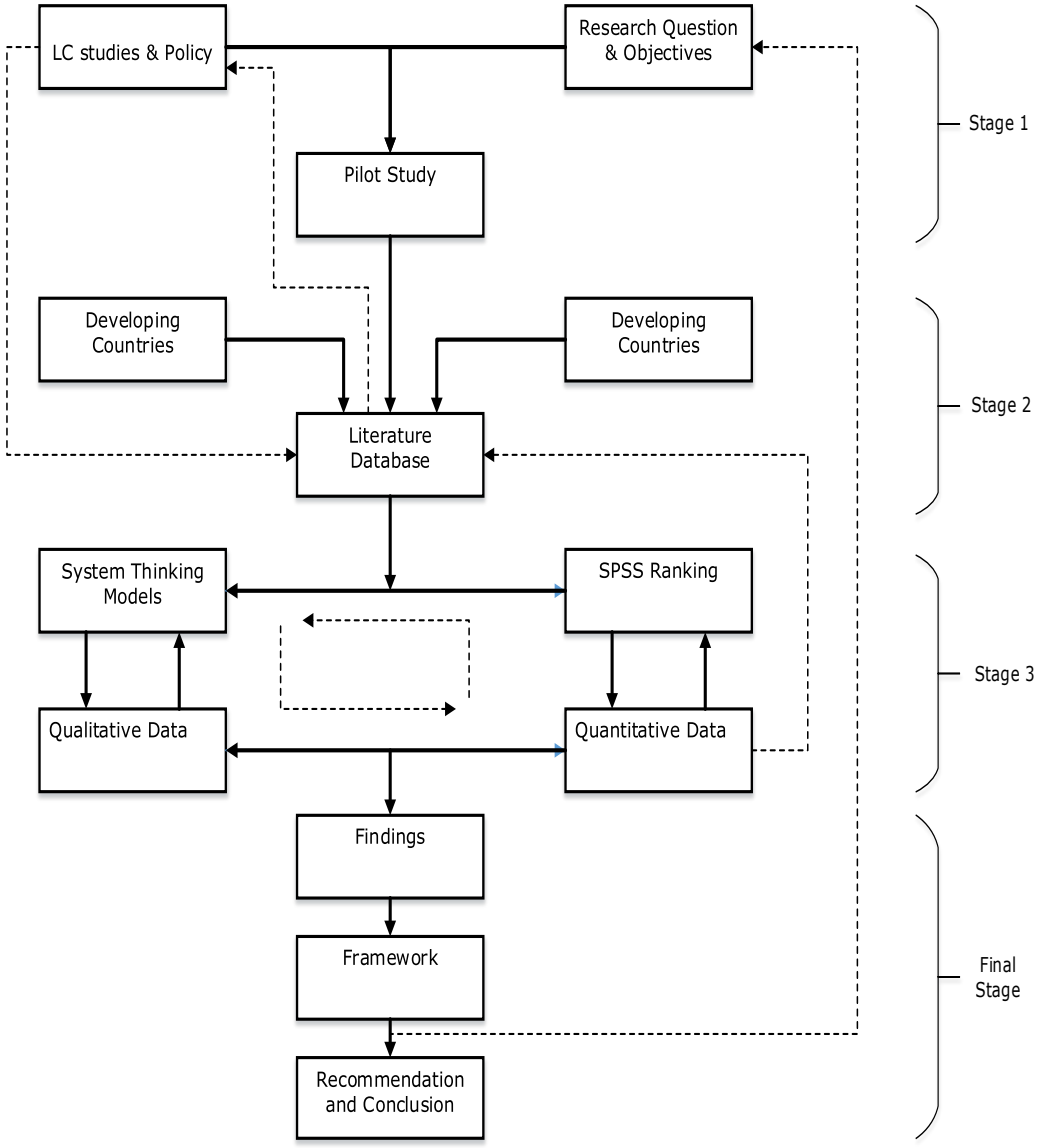


Figure 4.1: Methodological framework for the study. Source: Author generated.

Likewise, exploratory research "*aims to seek new insights into the phenomenon, ask questions, and assess the phenomena in a new light*" (Saunders et al., 2007, p.598). Correlational research investigates a relationship between two or more aspects of a

phenomenon (Kumar, 2014). Similarly, from the mode of enquiry perspective, a research study can be classified as quantitative, qualitative, and mixed-method approaches. However, this classification of types of research on these perspectives is not mutually exclusive, thus a study categorised from a research objectives perspective can also be classified from the mode of enquiry perspective (Kumar, 2014).

Consequently, exploratory research seeks new insights into this study to generate new empirical evidence and relevant local content concepts and strategies that might be lacking and formulate hypotheses or recommendations for further studies (Creswell, 2007). Additionally, the study uses a mixed-method research methodology to explain local content implementation challenges from different perspectives.

3.2.1 Mixed Method Methodology

The quantitative research strategy investigates the relationship between variables measured scientifically and numerically (Saunders et al., 2012). This method is rooted in the philosophy of rationalism with the explicit purpose of quantifying the extent of variation in a phenomenon using a large sample size (Kumar, 2014). Also, it generates statistics via questionnaires and structured interviews. The objectives, design, sample, and questionnaire that constitute the

quantitative research process in quantitative are predetermined. On the other hand, the research process in qualitative is not predetermined.

A qualitative research strategy is an exploratory form of non-statistical research to understand opinions and thoughts and underlying reasons for motivations (Bryman 2002). Its data collection method is unstructured as it explores attitudes, opinions and experiences through interviews or focus groups to elicit an in-depth opinion from participants (Dawson, 2009). Spencer et al. (2003) argued that qualitative research seeks to provide an extensive understanding of people's perspectives, opinions, experiences, and histories within a specific context. The following authors have differentiated the above methodologies (Blaikie, 2000; Cavana et al., 2001; Cramer, 2003; Maxwell, 2005; Berg, 2007; Creswell, 2003; Thomas, 2003). Table 4.1 summarises the differences between the methodologies. However, the fundamental difference between the two methodologies is the procedure (Elgobbi, 2008). More importantly, neither of the above methodologies is superior to the other, just that they both have their strengths and weaknesses (Dawson, 2009; Ackroyd and Hughes, 1992:30). Accordingly, the mixed-method approach was adopted to minimise the weaknesses of the methodologies, as illustrated in Table 4.1.

Table 4.1: Differences between qualitative, quantitative, and mixed methods approaches.

Difference with respect to:	Quantitative	Qualitative	Mixed methods
Underpinning philosophy	Rationalism: That human beings achieve knowledge because of their capacity to reason (Bernard 1994:2).	Empiricism: The only knowledge that human beings acquire is from sensory experiences (Bernard 1994:2).	That knowledge can be gained through both the capacity to reason and sensory experiences.
Approach to enquiry	Structured/rigid/predetermined methodology.	Unstructured/flexible/open methodology.	Can be structured, unstructured or both.
Main purpose of investigation	To quantify the extent of variation in a phenomenon.	To describe variation in a phenomenon.	To quantify and/or explore with multiple or mixed methods a phenomenon to enhance accuracy or yield greater depth.
Measurement of variables	Emphasis on some form of either measurement or classification of variables.	Emphasis on description of variables.	Measurement and/or description.
Sample size	Greater sample size.	Fewer cases.	Larger sample size for some aspects and smaller for others, depending upon the purpose.
Analysis of Data	Subjects variables to frequency distributions, cross-tabulations or other statistical procedures.	Subjects responses, narratives or observational data to identification of themes and describes them.	Quantitative or qualitative or both.
Communication of findings	Organisation more analytical in nature, drawing inferences and conclusions, and testing magnitude and strength of a relationship.	Organisation more descriptive and narrative in nature.	Similar to the quantitative and/or qualitative approach.

Source: Adopted from Kumar (2014)

There are two schools of thought as to what constitutes the meaning of mixed-method methodology. The first is when a mixed-method methodology combines qualitative and quantitative approaches in a single study. According to Creswell and Clark (2007:5), a mixed-method "*as a method focuses on collecting, analysing, and mixing both qualitative and quantitative approaches, in combination, provides a better understanding of research problems than either approach alone*". Qualitative and quantitative research inclines inductive reasoning and deductive reasoning, respectively, and the mixed method is attached to abductive reasoning (Saunders et al., 2012). Morgan (2007: 71) explained that inductive reasoning is data-driven in qualitative research while deductive reasoning is theory-driven and used in quantitative research, and abductive reasoning is a movement between the two.

Research experts advocate the first school of thought as a practical approach to social enquiry (Creswell and Clark, 2011; Brew and Hunter, 1989; Teddlie and Tashakkori, 2009; Bernard, 1994). Additionally, the methods help quantify and explore a phenomenon that enhances accuracy and yields a greater depth of the study (Kumar, 2014). The methodology is based on the premise that it allows the researcher to have a complete picture of a situation and reconfirm the findings, enhancing the accuracy and meaningfulness of the study's conclusion (ibid). Alexander et al. (quoted in Gilbert 2008: 126) championed the second school of thought, which argued that the mixed-method approach applies when the methods

used are from the same paradigm, i.e., qualitative - usage of focus groups and in-depth interviews. This study uses the first school of thought, thus combining qualitative and quantitative approaches. In terms of mixed-method structure (design), the study uses convergent parallel design (also known as the concurrent approach), thus analysing the questionnaire and the interviews separately and subsequently combing the methods during the discussion stage (Edmonds and Kennedy, 2017).

This design separately collects and analyses qualitative and quantitative data and then merges the results at the discussion stage to assess convergence or otherwise. The convergent design's essence is to provide deeper understanding by examining the issue under consideration from different perspectives. The study, therefore, starts with qualitative methods (pilot study via in-depth interview) followed by quantitative (for ranking of pilot study outcome variables and measure other issues coming out of the literature) and followed again by qualitative (validation of models). The mixed-method adopted is complicated and time-consuming (Tashakkori and Teddlie, 2003; Onwuegbuzie and Johnson, 2004; Creswell, 2006). Despite the above assertions, the mixed method was adopted based on the following:

- explore LC challenges from both qualitative and quantitative perspectives; thus, qualitative will look from an in-depth perspective while quantitative looks at the extent of the diversity,

- when accurate and complete information from one approach is challenging to obtain,
- enhancing and enriching the accuracy, validity, and reliability of the findings,
- when there is a need to explain your findings (Kumar, 2014).

3.2.2 Research philosophy

Research philosophy provides the whole philosophical foundation for conducting the research and guides the researcher's knowledge development. In other words, it is the window through which the researcher views the world. According to Esterby-Smith et al. (1997), research exploration helps identify the appropriate methods to be employed during the study, including the nature and the source(s) of evidence to be obtained and how such evidence would subsequently be interpreted to answer the research questions. Ontology, epistemology, methodology, methods, and data sources constitute five research elements (Grix, 2002; Scotland, 2012). Ontology refers to "a theory of being" that primarily deals with assumptions and claims about social reality, including perceptions "about what exists, what it looks like, what units make it up and how units interact with each other" (Blaike, 2000; Mash and Furlong, 2002:18; Tuli, 2010). This philosophy has two strands: objectivism and constructivism (or subjectivism) (Bryman, 2012; Grix, 2002).

On the one hand, objectiveness believes "social phenomena and their meanings have an existence that is independent of social actors" (Bryman, 2012: 33). Conversely to objectivism is constructivism (or subjectivism) which claims that "social phenomena and their meaning are continually being accomplished by social actors…" (Bryman, 2012:33). Similarly, epistemology deals with the nature of knowledge and theory, their methods, validation, and limits (Blackbrun 1996; Cohen et al., 2007; Grix, 2002; Mash and Furlong, 2002). In other words, epistemology constitutes adequate knowledge in a field of study (Saunders et al., 2009). Simply put, "how knowledge can be created, acquired and communicated" (Scotland, 2012:9).

Epistemology can be classified into positivism and interpretivism approaches. These approaches are the fundamental paradigms of quantitative and qualitative research. Positivism is based on reason, truth and validity values gathered through direct observation and experience and measured using quantitative methods and statistical analysis (Blaike 1993; Saunders et al. 2007; Hatch and Cunliffe 2006; Easterby-Smith 2008). Positivism is associated with the natural sciences (Saunders 2003) and follows a theory-driven fixed research plan (Clark 2004). The above is deemed objective and focuses on searching for truth (Easterby-Smith et al., 2002; Ritchie and Lewis, 2003).

Arguing in favour of positivism, Trochim (2006) postulated that knowledge is meant to explain the phenomena we experience. Therefore, studies using the positivist approach are considered objective and detached from the collected data and emphasis is put on the structured methodology to enable repetition and statistical analysis (Saunders 2003). On the other hand, interpretivist consider multiple realities (Denzin and Lincoln, 2003). In other words, it disregards the view that there is a set of definite laws meant to be followed in all circumstances. Also, interpretivist focuses on "understanding, not the explanation, focusses on the meaning that actions have for agents, tends to use qualitative evidence and offers his/her results as one interpretation of the relationship between the social phenomena studied" (ibid).

Again, the interpretive paradigm is mainly concerned with how people make and interpret the world around them through sharing their experiences via the medium of language (Easter-Smith et al., 2002). Saunders et al. (2007) argued that the interpretivism paradigm focuses on understanding how humans make sense of the world, and further expounded by Creswell (2007) that this view of reality is at least partially social constructed. Additionally, the interpretive approach allows identifying and exploring areas where there is limited understanding by interpreting the meaning gained from the participants in their natural context and provides an extensive understanding of people's perspectives, experiences, and histories within a specific context (Easter-Smith et al., 2002; Spencer et

al., 2003). Table 4.2 illustrates the positives and negatives of positivism and interpretivism.

Table 4.2: Strengths and weaknesses of positivism and interpretivism schools of thought

	Strength	Weaknesses
Positivism	Wide coverage of the range of situations Fast and economical	Inflexible and artificial Not effective in understanding processes
Interpretivist	Ability to understand people's meaning Adjusts to new ideas/issues as they emerge	Needs a great deal of time and resources Difficult analysis and interpretation Difficult to control pace, progress and endpoint

Source: Adapted from Easterby-Smith et al. 2002.

In this research, the chosen research philosophy is pragmatism, argued to support mixed-method research (Tashakkori and Teddie, 2010). Pragmatism arises from situations, actions, consequences, and importantly focuses on the research problem and uses all approaches available to understand the problem instead of focusing on methods (Creswell, 2009 cited Rossman and Wilson, 1985; Morgan, 2007; Tashakkori and Teddlie, 1998). Put differently, the philosophy allows the researcher to choose the appropriate methods and procedures to gain in-depth knowledge about the issue under study. In choosing pragmatism, Creswell (2014) provided the following rationales:

- Pragmatism has multiple realities and is therefore, not committed to a particular system of philosophy. Therefore, it is argued that this philosophical perspective aligns with the notion of mixed methods

research which gives inquirers the liberty to draw from both quantitative and qualitative assumptions.

- Pragmatism offers the inquirers the liberty of choice regarding methods, techniques and procedures that best meet their research purposes.
- Proponents of this philosophy do not see the world as an absolute unity. Similarly, proponents of mixed methods approaches are not restricted to one approach for collecting and analysing data.
- To pragmatists, the concept of truth is what works at a given time. Similarly, mixed methods researchers employ both quantitative and qualitative data to better understand a research problem.
- In a nutshell, pragmatism offers the mixed methods researcher the freedom of choice of multiple methods, different worldviews, different assumptions, and data collection and analysis.

The preceding assumptions underpinning pragmatism philosophy aligns with the study's strategy to employ a multi-strategy approach, including system thinking methodology, to achieve the study's objectives. The use of qualitative and quantitative methods aids in exploring new understandings and quantifying the extent of variation in the study area. Additionally, the above philosophical standing of pragmatism backs the adoption of system thinking to study the causal relationship between the Local Content implementation challenges. In turn, this brings in a new perspective to understand the research problem in a non-linear perspective where the

challenges are considered a 'system'. As this research focuses on devising implementation strategies for local content challenges, pragmatism is the appropriate approach that helps explore new ideas about the phenomenon from different perspectives.

3.2.3 Research Strategy: A case study

Stage 2 of the study, as illustrated in the methodological framework study (see Figure 4.1), begins here. This study aims to address 'how' and 'what' strategies to address LC challenges in Ghana. Consequently, case-based research addresses 'how' and 'what' questions about past or current phenomena, mainly when it draws on multiple sources of evidence (Regin, 2007; Saunders et al., 2007). Case-based research is valuable when the issues at stake are not adequately understood, previous studies have produced contradictory results, the phenomena being researched are new and need to be explored in their natural context or when existing theories or explanations of the phenomena are weak (Creswell, 2007; Kohlbacher, 2006).

Using a case study as a preferred design, the sampling (number and selection of cases), and the unit of analysis are two critical issues to be considered when using a case study as a preferred design (Yin, 2014). Also, selecting a case for study, it is argued that the nature of the research phenomena must determine the contents of the case (Patton, 2002), which in turn, provide rich content for the problem under investigation. Therefore,

the case is purposefully identified and selected to gain an in-depth understanding of the phenomenon (Ritchie et al., 2003). Here, the case is Ghana's oil and gas (O&G) industry focusing on the government policy of Local Content intended to spur national development. The Ghanaian Local Content Policy and Participation Framework 2013 identified some challenges likely to impede its implementation (MoE, 2013). Therefore, this study focuses on these challenges and how to address them in the context of Ghana.

To help understand the challenges, multiple local content implementation cases are studied from two perspectives: developed countries – UK, Norway, Canada, and developing countries – Nigeria, Angola, Brazil. These countries were selected from various geographical locations based on their long experiences in the LC implementation in the O&G industry. The adoption of multiple case countries to provide background knowledge across the world "allows the comparison of results obtained from multiple cases (Yin, 1994), enhancing the validity and generalizability of results. More importantly, as Yin (2003) argued, a case study is not meant to generalise other cases but to investigate the cases and suggest apt lessons and recommendations. Therefore, the research will study policy lessons from the case countries and suggest appropriate lessons to address the central theme of the research, the four challenges of Local Content implementation.

3.3 Methods of Data Collection

Stage 3 (indicated in Figure 4.1) deals with data collection methods. The choice of the tools for the data collection was based on the study's purpose and the problem under consideration, and the methodology, as already indicated above. Broadly, there are two approaches to gathering information to answer the research question(s). These are primary data, gathered first-hand either through qualitative or quantitative means, and secondary data gathered from prepared works of authors, which can be in the form of articles, census data, and government publications. This study makes use of both primary and secondary data. In qualitative research, the tools vary from observations, textual analysis, and interviews. For this research, interviews were considered the most appropriate method for the qualitative aspect of the study.

Interviews are classified into structured, semi-structured and unstructured. Unstructured interviews, sometimes called life history interviews, are appropriate for in-depth or life history researchers (Dawson, 2009). This helps achieve a holistic understanding of the interviewees' points of view (ibid). Structured interviews are verbally administered questions from a list of predetermined questions with little or no variation and scope for follow-up questions to responses that warrant further elaboration (Gill et al., 2008). This makes this method quick and easy to administer with no intention of depth investigation.

Sandwich between the above methods is the semi-structured interview. The semi-structured has predetermined key topics (loosely) to define areas to be explored but makes room for the interviewee or interviewer to diverge from pursuing an idea or response in more detail (Britten, 1999). Primary data will involve conducting semi-structured interviews (i.e., focus groups and in-depth interviews) structured in line with research questions to elicit experts' views on the Ghanaian petroleum industry. This method allows the researcher to probe questions relevant to the study but not initially within the schedule (Neuman 2006). It is further argued by Parahoo (2006) that this method is flexible in terms of allowing the researcher to change words to bring the interviewees back on track. Parahoo (2006:329) further stated that "*validity is enhanced because respondents can be helped to understand the questions and interviewers can ask for clarification and probe for further responses if necessary*".

On the other hand, the quality of responses when using semi-structured interviews is greatly influenced by the researchers' skills and experience (Robson 2002). In designing the interview schedule, as Gill et al. (2008) argued, it is essential to ask pertinent questions that will yield more information to answer the research questions and aims. Additionally, good questions in qualitative research should be open-ended, neutral, sensitive, and understandable (Britten, 2009) when drafting the interview questions. Therefore, the researcher adopted semi-structured interviews (in-depth, focus group and telephone interviews) for the qualitative part of the study.

On the quantitative aspect of this research, a questionnaire was used. Questionnaires can be classified into closed-ended, open-ended and or a combination of both. Close-ended questionnaires consist of having a questionnaire with predetermined answers. The open-ended questionnaire is mainly used in qualitative research, consisting of questions where the respondents can write answers to questions without any restrictions. The third type consists of a combination of both types. The methods used in the study are explained in detail in the subsequent topics.

3.3.1 Primary Data

Primary data comprises qualitative and quantitative data. Primary data were obtained from the focus group to discuss and validate the causal loop diagrams and their policy intervention. Further primary data were obtained from in-depth interviews that served as a backup for participants who could not participate in the focus group. On the other hand, the close-and-open-ended questionnaire was meant to rank the LCD challenges and elicit participants' opinions on themes from the literature review. The questionnaire and the qualitative data are complemented by secondary data in answering all the objectives. All the above is discussed in detail in the subsequent topics.

3.3.1.1 Focus group

This method was used at stage 3 (indicated in Figure 4.1) for validation of the causal loop diagram (CLD) for Local Content Development (LCD) and

its sub-models. This method shares many features with semi-structured interviews and is sometimes considered a method on its own. A focus group is a group discussion on a particular topic explicitly organised for research purposes (Gill et al., 2008), and the researcher, sometimes called a moderator or facilitator, guides, monitors, and records the discussion (Kitzinger, 1994; Morgan, 1998). It is used to generate information on collective views and the meaning behind those views. The method helps generate a rich understanding of participants' experiences and beliefs (Morgan, 1999). Furthermore, it allows the researcher to receive a wide range of responses in one meeting with participants to ask each other questions and help participants remember issues they might otherwise have forgotten (Dawson, 2015). Even group effect and participant interactions serve as valuable resources in data analysis.

The disadvantage of this method is that it is challenging to extract personal views during the analysis. Participants sometimes may find it challenging to communicate, and personal views are contaminated by other individual or group views and opinions (ibid). Also, the discussion can easily be highjacked by one person or group of people to the detriment of others if the moderator or facilitator is not in control or on top of the issue. This, therefore, requires practice and a well-prepared interview schedule to ensure that every member has a say and contributes to obtaining varied and rich data. To elicit maximum information from participants, attention should be given to the group composition and group mix, which always

impacts the data by paying specific attention to the mix of ages, gender and professional social statuses (Gill et a., 2009). To mitigate this impact and make the discussion successful, consideration was given to participants' interaction before the focus group proceeded (Dawson, 2015).

Another important factor considered is the group size. Dawson (2015) advises that it is better to slightly over-recruit and manage than under-recruit and risk having the discussion cancelled or unsatisfactory. The ideal number for a focus group should be nine, emphasising odd numbers as they work better than even numbers (ibid). All the above factors were considered during the focus group. Before the discussion, formal letters (see Appendix 5) were sent to four stakeholders in the Ghanaian O&G industry: the government of Ghana's public institutions (Petroleum Commission-regulator, Ministry of Energy, and the national oil company, GNPC), O&G companies (local firms and IOCs), civil society organisations (CSOs) and academia (Universities and R&D centres) requesting their permission to partake in the study. These institutions were chosen based on their roles (and expertise and recommendation) in implementing LC policy ranging from regulation to policymaking.

Table 4.3 summarises the composition of the focus group and their areas of expertise, totalling nine participants. It must be stated here that the Ministry of Energy in Ghana was gracious enough to grant the team room for the discussion.

Table 4.3. Summary of Focus Group Data

Participants	**Focus Group Participants' code name**	**Age range**	**Position in Organisation**	**Type of Organisation**
01	FGP/AD/01	41-50	Acting Director	Government Institution
02	FGP/DO/02	30-40	Director of Operation	Local oil company
03	FGP/PA/03	41-50	Policy Analyst	Government Institution
04	FGP/MA/04	41-50	Managerial	Local oil company
05	FGPP/BA/05	41-50	Banker	Government Institution
06	FGP/TA/06	30-40	Technical Adviser	Academia
07	FGP/LE/07	30-40	Lecturer	Academia
08	FGP/PA/08	30-40	Policy Analyst	Financial institution
09	FGP/LCO/09	30-40	Local Content Officer	Government Institution

Source: Author generated

The discussion lasted two hours with intermittent refreshment breaks. Before the discussion, broad areas of discussion topics must be developed by the researcher or the group beforehand (Kumar, 2014). This provides a broad frame for discussions followed by specific discussion points as part of the discussion (ibid). This procedure was adopted in the discussion (and the in-depth interviews) by dividing it into two stages: (1) the model validation stage and (2) specific discussion points based on the validated

model and the interview schedule. The following outlines the process for the group' discussion:

- Respondents' consent was sought to record the discussion. After the respondents' approval, the researcher conducted a seven-minute presentation in the study area. This was to remind the participants of the issues under consideration. These initial processes were essential to creating a warm and conducive environment for both interviewer and the participants (Berg, 2007; Strauss and Corbin, 1998).
- Model validation stage (see Chapter 5 and Chapter 6 for models' conceptualisation and the validated models, respectively); printed copies of the models were circulated to participants, and the discussion followed.
- Existence of causal relationship in causal loop diagram (CLD) for LCD and its sub-models of Infrastructure, Technology, Finance and Human Resource Capacity: Participants were asked to review the diagram to (1) add or drop variables (cause, effect); (2) identify any missing relationship; (3) confirm the existence of a relationship or otherwise (Alasad et al., 2013).
- The researcher, as the moderator, proceeded with the discussion, and the LCD model and its sub-modes were validated. The first stage ended here.
- The second stage started with issues emanating from the validated model, and the interview schedule (see Appendix 5) based on

strategies for addressing the LCD challenges. After a thorough discussion, the meeting ended here.

3.3.1.2 In-depth interview

This one-on-one conversation method with briefed participants in an area of study was employed at stages 1 and 3. The study adopted this method to complement the focus group and enrich the primary data. More importantly, the method acted as a backup to absentee participants in the focus group to participate in the study. The one-on-one interview followed the same process outlined in the focus group, as indicated in section 4.3.1.1. The only exception here is that it was in the form of a one-on-one interview than a group. Table 4.4 illustrates respondents identified through purposive sampling and subsequently interviewed. The interview centred on the validation of the LCD model and its sub-models.

Table 4.4: Summary of interviewees' Data

Interviews	**Interviewees code name**	**Age range**	**Position in organisation**
01	RP/LLO/01	30-40	Local Content Officer
02	RP/LLO/02	30-40	Local Content Officer
03	RP/AD/03	41-50	Director
04	RP/LE/04	30-40	Lecturer/Policy Analyst
05	RP/TO/05	30-40	Technical Officer
06	RP/LCC/06	40-50	Local Content Coordinator

3.3.1.3 Questionnaire

In designing the questionnaire, Likert-scale was used extensively to measure the respondents' attitudes to local content policy and its challenges. The respondents' answers range from 'strongly agree to strongly disagree' and 'very low to very high' for ranking purposes. This serves two purposes: they measure the intensity of participants' attitudes towards the various aspect of local content implementation challenges in Ghana; and provides techniques to combine the attitudes towards different aspects into one overall indicator (Kumar, 2014). The questionnaire consists of both open-and-closed-ended questions, are which part of stage 3 of the study. The former seeks opinions and thoughts, while the latter elicits factual information (Kumar, 2014). Whether to use open-ended or close-ended should be based on the purpose for which the collected information is to be used, the type of study population and the proposed format for communicating the findings (ibid).

Based on the above guidelines, the study adopted the method to help reach a broad audience of experts, thereby enriching the primary data. The above methods were used in preparing questionnaires based on the research objectives and themes emerging from the literature review. Figure 4.2 outlines the process involved in constructing and administering the questionnaire.

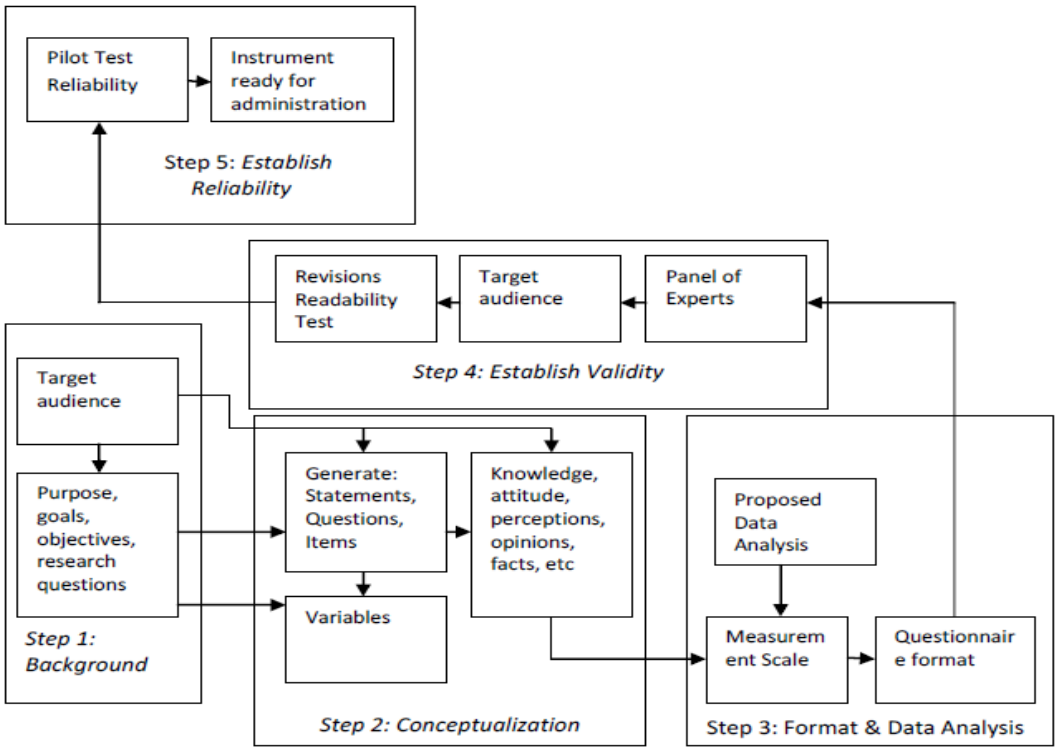


Figure 4.2: The questionnaire design process. Source: Adapted from Radhakrishna (2007).

Figure 4.2 starts by considering the study's purpose and the target audience. The study's purpose and objectives led to the literature review in chapter two, reviewing local content development challenges in Ghana and worldwide. A questionnaire is then designed based on the pilot study's outcome and the literature. The Likert scale is widely adopted in the questionnaire design, the easiest to construct and the most frequently used attitudinal scale in quantitative research (Kumar, 2014). The questionnaire was then submitted to the researcher's supervisory team for review. After this stage, it was pilot tested to capture all the relevant information and clarify any ambiguities. Follow students at Robert Gordon University help in this process.

Throughout this research, the researcher adopted a strategy of testing (questionnaire, interview schedule, and central themes of the study Etc.) before the main studies to anticipate potential difficulties and resolve them before the actual studies. The questionnaire was administered via an online questionnaire (using Google Forms) and in a public place. The difference between an online questionnaire and administration in a public place is that, with the former, the questionnaire was sent via the respondent's email and the respondent's response is received and analysed automatically in the researcher's google account. The latter involves hand-delivering a hard copy to respondents, and the researcher waits or comes back later to receive the completed form. The latter form of administering the questionnaire was time-consuming and more expansive than the former. In all, 120 questionnaires were administered to O&G industry players in Ghana.

3.3.2 Secondary data: Literature review strategy

Research integrity increases significantly if the researcher collects data from different sources. Therefore, the secondary data provides foundational data on Local Content (LC) to complement the primary data in achieving the research objectives. As already indicated in chapter 2, there is extensive literature on the local content policy. To have background research of the study area, the literature search was confined to case countries of developed and developing countries and any existing theories in the field. The literature review started with reviewing existing studies on

LC policy and legislation in Ghana. Consequently, a gap in the literature was identified, which formed the research basis as explained in Chapter 1. As indicated in the methodological framework for the study (Figure 4.1), stage 1 ended here.

Stage 2 (Figure 4.1) reviewed developed and developing countries based on their respective LC policy experiences. The essence of this is to provide background lessons to Ghana concerning the challenges of LCD (see more in Chapter 3). These data were sourced from governments' websites, journal databases such as Google Scholar, science direct, emerald, World Bank publications, UN database, OnePetro, examining relevant references, and signing up to Google (alerts). Data collected from government websites was then authenticated by calls and emails to reduce inaccurate information on governments' websites, especially in Africa. Secondary data from books and journals are targeted to be 70% credible (Ugochukwu, 2008). Secondary data provided readily available data in greater volume and provided a basis for comparison (Saunders et al., 2012). Data gathered through secondary sources was analysed by inspecting, cleaning, highlighting useful information, and conducting rigorous analysis.

3.3.4 Sampling and Sample Size Justification

Sampling is selecting research participants or cases for a particular study (Saunders et al., 2007). Similarly, a case sample primarily identifies the larger category the case belongs to or represents (Ragin, 2007). There are

two main classifications: probability-based (random) sampling and non-probability sampling (Teddlie and Yu, 2007, Saunders et al., 2007; Ragin, 2007). The above techniques help reduce data collected and the resources needed for a study by focusing on data from sub-groups rather than all possible cases or elements (Saunders et al., 2007). Probability sampling is mainly used in quantitative research and involves a large portion of a population selected randomly (Tashakkori and Toddlie, 2003).

On the other hand, non-probability sampling selects cases based on a particular purpose, not randomly as in probability sampling. Additionally, non-probability sampling concerns the depth of information obtained, while probability focuses on representativeness and generalisation of findings (Teddlie and Yu, 2007). Two types of non-probability sampling are adopted for the study: purposive sampling strategy and snowballing sampling strategy. Jewell and Hardie (2009: 62) defined purposive sampling as selecting respondents suitable for answering your research questions based on the researcher's judgement. In this study, the above method was used to select respondents who possess the requisite traits, information and understanding of Local Content Development to achieve the stated objectives of the study.

Purposive sampling achieved two goals: (1) the involvement of Local Content policymakers and implementers in Ghana and those directly affected by LC regulations (local oil companies and foreign oil companies).

Narrowing it down, stakeholder purposive sampling was used in "identifying major stakeholders who are in designing, giving, receiving or administering the programme or service being evaluated, and who might otherwise be affected by it" (Palys, 2008, p.697). This method places less importance on the sample size but rather on the sample size's quality (Koerber and McMichael, 2008). The other method considered for the study is snowballing sampling, which involves selecting a sample using networks (Kumar, 2014). Snowballing sampling is used when it is difficult to identify participants for the study (Saunders et al., 2007). Using the snowball sampling technique, the researcher first collects data from key participants, asked to identify and recommend potential stakeholders for the study.

Both purposive and snowballing were applied in data collection until the process reached a saturation point. This concept applies when a researcher gathers data to the point of diminishing returns when no new information is being added (Bowen, 2008; Miles and Hubrman, 1994). Saturation in data is argued to occur around 12 participants in homogenous groups (Guest et al., 2006) or around 11 participants (Latham, 2013), consistent with the study.

3.3.5 Pilot Study

The pilot study is used in stages 1 and 3 of the research. A pilot study is defined as a small-scale version conducted before the primary research (Polit and Beck, 2000). It can help correct potential deficiencies and lapses

in designing a procedure that can subsequently be addressed before the primary studies (Aitman et al., 2006). Stage 1 involves conducting a pilot study to ascertain the challenges identified in the Ghanaian LC policy framework before the main study (see Appendix 1 for data collection and analysis). Consequently, the researcher used purposive sampling to identify the participants and interviewed six industry stakeholders (regulators, policymakers, experts). Subsequently, the findings became the research's central theme. Similarly to the main study, respondents were briefed in a letter about the study's aim and why they needed to be involved. The pilot study helped narrow the central theme of the research on Infrastructure, Technology, Human Resource Capacity and Finance as the main challenges of LC implementation in Ghana. It also allowed the researcher to establish contact with industry stakeholders as future resource personnel for the study.

At stage 3 of the study (Figure 4.1), the pilot study pre-tested the LCD model and its accompanying interview schedule and the study's questionnaire before the primary data collection phase. It helped the researcher have first-hand information about the suitability of the model and clarify ambiguity in the design and the language of the questionnaire and the interview schedule. The models and the questionnaire were first emailed to participants, followed by a telephone conversation for comments and suggestions to achieve the above. Four respondents with an understanding of system thinking and local content policy were used in the

model pilot study. This process was valuable to the researcher in modifying the model and incorporating their suggestions for the main validation.

The initial testing of the interview schedule helps explore and investigate the interview schedule's understanding. Before proper data collection, the best practice is first to pilot the interview schedule on several respondents to understand whether the schedule is clear and capable of answering the research questions, and where possible, changes to the interviews schedule are made before the main study (Gill et al., 2009). The pilot study brought the usefulness and simplicity of the research methods adopted for the main study.

3.4 Data analysis

As already discussed above, the study employed interviews and questionnaires to collect field data. The interviews data is analysed using content analysis and Nvivo. On the other hand, the questionnaire data comprises a close-and-open ended questionnaire, which is analysed separately. The close-ended and open-ended questions are analysed using IBM SPSS software and content analysis. These various methods are described in the following sections.

3.4.1 Qualitative Data Analysis

To analyse the interviews and the focus groups data, the study adopted content analysis meant "*to provide knowledge and understanding of the*

phenomenon under study" (Downe-Wamboldt, 1992, p.314). Content analysis is a qualitative method used to analyse text data and interpret its meaning (Cavanagh, 1997; Schreier, 2012; Hsieu-Fand and Shannon, 2005). As a research method, it represents a systematic and objective means of describing and quantifying phenomena (Schreier, 2012; Downe-Wamboldt, 1992). Therefore, what to analyse depends on the study's research question (Schreier, 2012). The text to be analysed can be verbal, print or electronic format obtained from narrative responses, interviews, focus groups or print media (Kondracki and Wellman, 2002). Content analysis focuses directly on the transcript of human communication, capturing the key themes that emerge from the text (Fransosi, 2004).

Content analysis is suitable for studying organisations, beliefs, attitudes, and human relations (Harris, 2001). Consequently, this analysis method can be considered appropriate for analysing interviews to understand and explore people's opinions (Golicic and Mentzer, 2005). According to Kondracki et al. (2002), this method is the easiest way to detect information on corporate social responsibility, including local content (Patten and Crampton, 2004; Ado, 2016). It helps provide insights into complex models of respondents' thought and language use (Osobajo, 2017), thereby allowing the researcher to assess and understand the causal relationships developed in Chapter 5. The content analysis comes in two distinct forms: mechanistic, which is form-oriented and depends on the frequency of terms, and the second form is interpretive, which focuses on

meanings embedded in communications (Beck et al., 2010; Smith and Taffler, 2000).

The study used the latter to extract the meaning contained in the respondents' data. The research adopted Creswell's (2009) six-step process, as shown in Figure 4.3, for analysing the qualitative data. The first step involves preparing the data. The interviews were transcribed verbatim from the recorded conversation. The transcribed data was later sent to the respondents to authenticate the transcription. Greater emphasis was placed on the text as the unit of analysis considered one of the essential decisions when using content analysis (Graneheim and Lundman, 2004). The next step was reading the interviews several times to gain a general view and key ideas in the text. This resulted in dividing the text into units. After this stage, Nvivo software was employed to code the data.

Coding can be a label that captures elements of the data. Two distinct forms of coding: complete coding categorises "anything, and everything of interest" to the study question, and selective coding identifies the corpus of interest of the study questions (Braun and Clarke, 2013:206). The rest of these stages are discussed in Chapter 6. It must be stated here that the researcher is cognisant that content analysis is a reflective process, as in all qualitative analyses (Erlingsson and Brysiewicz, 2017). In other words, coding, categorising, and identifying the themes are not linear progression

that can be a one-time event but a continuous process until the data is thoroughly exhausted.

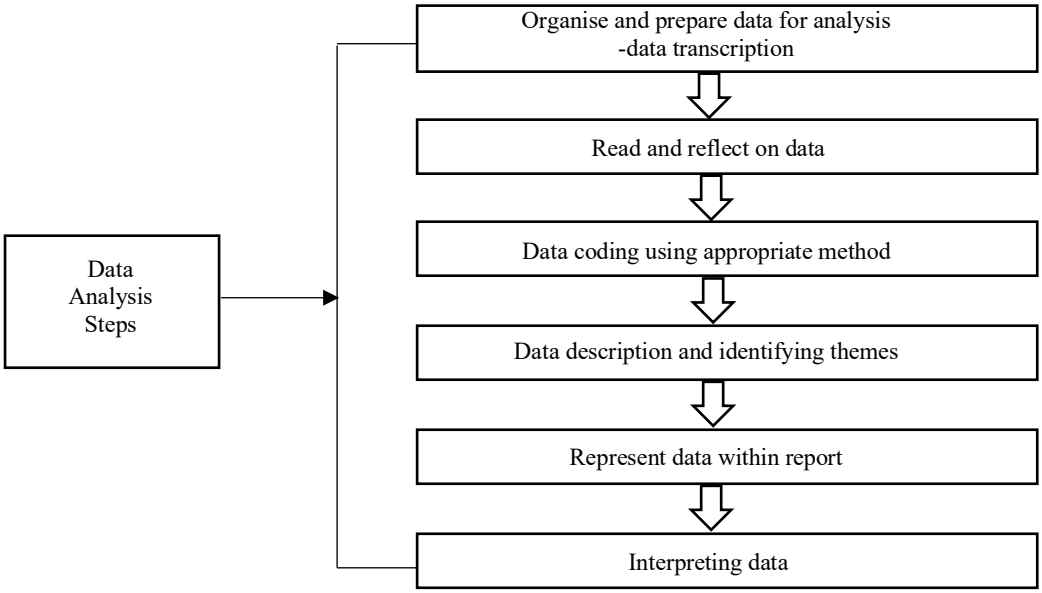


Figure 4.3: Data analysis process (Creswell, 2009).

3.4.2 Quantitative Data Analysis

This is the first phase in the analysis of the questionnaire data. The participants' responses received in the Google Forms are automatically described and summarised in a meaningful way to interpret the data, i.e., graphical representation of the data. This data from Google Forms is subsequently transferred to Excel for editing. The quantitative data is edited to eliminate inconsistencies and incompleteness (Kumar, 2014). This process can be achieved by scrutinising the completed research instruments to identify and reduce misclassification and gaps in the respondents' information (ibid). Incomplete responses from the respondents are discarded at this stage. Additional respondents' data is inputted into excel to complete all the questionnaire responses.

The data is systematically inputted into SPSS for descriptive analysis and subjecting the data to a reliability test, thus checking whether the data measure what they are intended to measure. Healey (1990) stated that descriptive statistics help summarise and describe the data and present results clearly, concise, and summarised. The collected data was then subjected to an internal consistency test using Cronbach's Alfa to ensure reliability. The mean and standard deviation aid in ranking the variables while the median determines the majority opinion on the agreement or otherwise with the statements. Details of the questionnaire analysis are carried out in Chapter 7.

3.5 System Thinking

System thinking (ST) refers to seeing things as a system and a whole rather than considering the parts individually (Sterman, 2000). The theory underpinning system thinking sees the world as a complex system and consequently supports understanding its interconnectedness and interrelationship (ibid). It can also be defined as a "framework for seeing interrelationships rather than things, for seeing patterns of change rather than static snapshots" (Senge, 1990). The above definitions of system thinking bring two critical themes: the interrelationship and interdependencies that form the basis of adopting this methodology to explain the relationships and interdependencies in the Local Content implementation challenges. In other words, this methodology allows

researchers to understand the factors, relationships, and feedback in a system.

What then constitutes a system? It describes any group of interacting or interdependent parts that form a complex and unified whole with a specific purpose (Kim, 1999). In other words, for anything to be called a system, it must have a specific purpose that provides a kind of integrity that holds the individual parts together, and the system must attempt to maintain stability through feedback (ibid). Simply put, a system can be a group of interrelated elements forming a complex whole with multiple interdependent components, highly dynamic involving multiple feedback processes and having non-linear relationships (Sterman, 1992; Alasad et al., 2013). To that end, the study considered the LCD challenges as a system to assess the interrelationships in the challenges.

Hence, the adoption of ST allows both the researcher and respondents to understand the phenomenon from multiple and diverse perspectives ultimately aid in better policy. One of the tools used in ST is the causal loop diagram (CLD) which is defined as the "*diagrammatical representation of the interrelationships in a system based on a cause-and-effect scenario*" (Obiri et al., 2020). ST and CLD are based on the feedback concept, which sees the world as an interconnected set of circular relationships. The above concept is markedly different from the linear cause-and-effect way of viewing the world, i.e., "A" causes "B" causes "C". In other words, the linear

perspective sees the world as a series of events that flow one after the other.

The feedback loop perspective, on the other hand, sees the world as an interconnected set of circular relationships, i.e. “A” causes “B” causes “C” causes “A”, Etc., as illustrated in Figure 4.4.

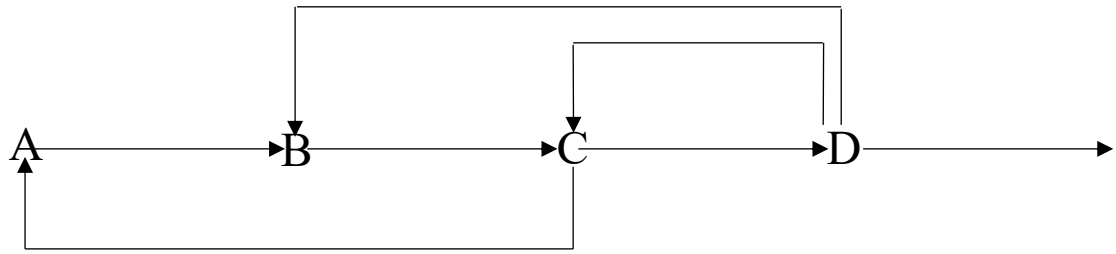


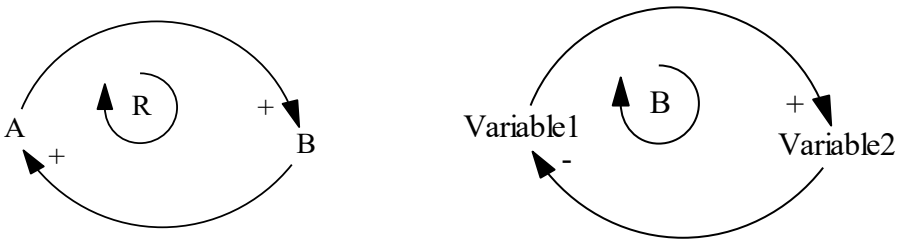
Figure 4.4. Feedback loop perspective (Adapted from Kim, 2014).

These interrelationships in the variables give a more precise explanation of the issue under consideration, and therefore you are in a better position to address the problem than the linear perspective (Kim, 2014). The feedback loop also provides a better perspective into how and why things happened, thereby helping you better understand all the forces producing the behaviours we are experiencing. Consequently, the above underpinning theories were the guiding reasons system thinking (ST) was adopted for the study. As already stated above, this allows the study of the interrelationship among the LCD challenges to provide better insight and understanding of the problem via the feedback loop perspective embedded in the CLD.

The CLDs are used in visualising the variables in the system, which helps to analyse the situations and better understand the dynamics driving a particular issue in each situation (Helen de Pinho, 2015). Two significant building blocks of CLD: reinforcing and balancing processes, are employed in building the models. A reinforcing loop is when an action produces a result that influences more of the same action, thus resulting in growth or decline at an ever-increasing rate (Helen de Pinho, 2015). In other words, the reinforcing loop can be defined as when feedback increases the impact of change, and it can either be a positive reinforcing that produces virtuous cycles or a negative reinforcing that produces vicious cycles (ibid). On the other hand, the balancing loop generates the resistance forces that limit growth, maintain stability, and achieve equilibrium.

Figure 4.5(a) depicts a structure that feeds on itself to produce growth or decline called reinforcing loop; thus, an increase in "A" leads to an increase in "B" (as indicated by the "+" sign) and which in turn leads to an additional increase in "A". The plus sign means the variables change in the same direction (polarity), not necessary that the values increase. The balancing loop depicts that an increase in "variable 1" leads to an increase in "variable 2" which, in turn, leads to a decrease in "variable 1", as illustrated in figure 4.5(b). The negative sign near the arrow indicates that the values of the variables change in the opposite direction. Additionally, a reinforcing loop can be identified simply by counting the number of the "-" arrows (it is

reinforcing if "-" is an even number irrespective of the "+" signs). On the other hand, it is a balancing loop if you have an odd number of "- ".



(a) A Reinforcing loop (b) A Balancing loop

Legend

⟶	A causal relationship
+ (-)	Indicate that the effect is positive (negative)
B	Indicates Balancing loop
R	Indicates Reinforcing loop

Figure 4.5: A reinforcing and a balancing loop

Figure 4.6 outlines the stages used in constructing the LCD model and its sub-models. The Figure is partly based on Sterman's (2000) two stages in developing qualitative system dynamics used to model CLDs. These stages consist of problem identification (factor identification) and subsequent construction of CLDs based on factor identification. Further explanations of the above are given in Chapter 5.

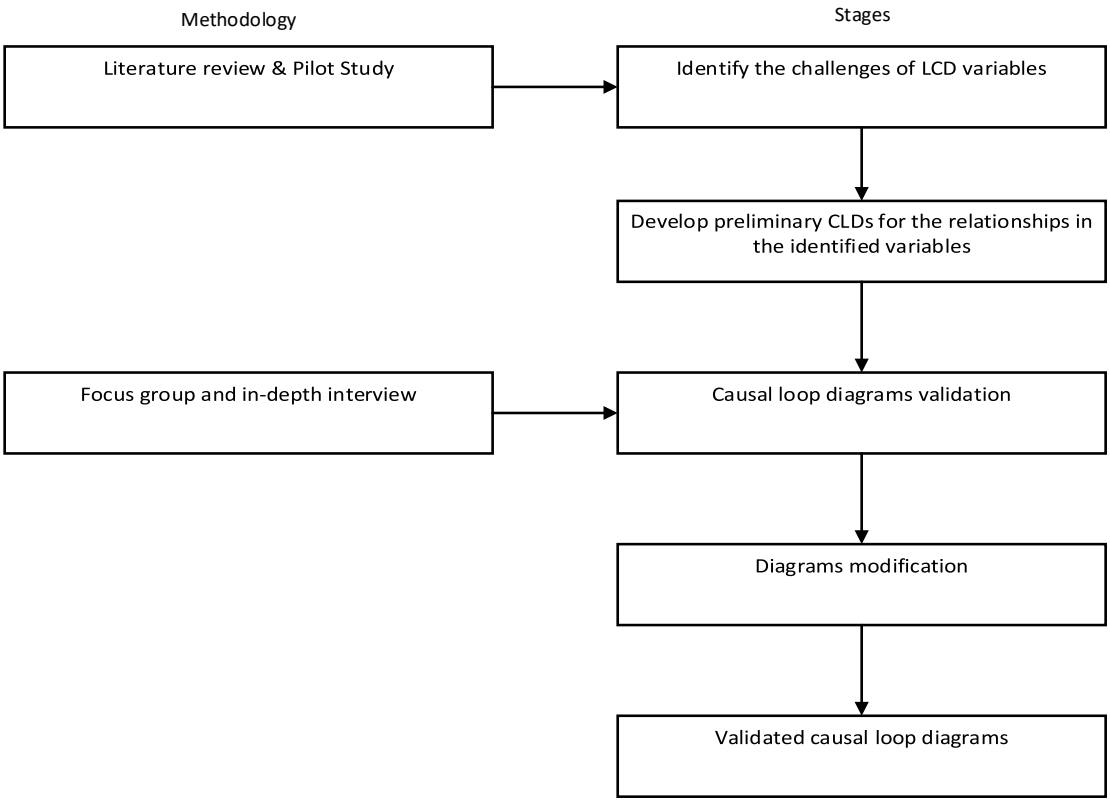


Figure 4. 6: The development stages of the CLDs models. Source: Adapted from Alasad et al. (2013).

3.6 Ethical Considerations

This study was conducted according to Robert Gordon University's Research Ethics Policy, intended to promote sound ethical practice in academic research. The policy sets guidelines and principles relating to the ethical development, implementation, and dissemination of research. Research ethics deals with doing what is right in a study and avoiding hurting the respondents (Orb et al., 2001), and essential elements such as sincerity, honesty and human respect should be considered before selecting participants (APA, 1992). The above guided the study in selecting the required stakeholders in Ghana's petroleum industry. Data gathering

through the study's methods were also done by seeking expressed willingness and voluntary consent (Lupto, 2004). The participants were informed in advance of the purpose of the research, what type of information will be collected, and the potential implication of the respondents' research.

Additionally, participants were assured that the data collection process would cause no physical injury to both participants and the researcher. Participants were further informed that they would be expected to give their views free of coercion on Ghana's O&G industry and the challenges confronting Local Content implementation. Participants were reminded of the code of ethics guiding the studies and further assured that the information collected will be treated with the utmost confidentiality and anonymity, avoid biases, and correctly report evidence gathered (see Appendix 7). In other words, the participants were assured that the information supplied would not be traced back to them and made available to third parties without their permission. The qualitative data transcripts were sent to the participants for review to ensure factual reporting of the collected data.

3.7 Chapter Summary

The chapter discussed the research methodological framework for the study that outlined the stages involved in the research's conduct. The study adopted a mixed-method methodology, and justification is provided. It then

discusses the data collection method, which is centred on both qualitative and quantitative methods to minimise the weakness of each method. The primary data collected was analysed using the content analysis method and SPSS for interviews and questionnaires. Similarly, justification is provided for system thinking and its causal loop diagram for the study. The causal loop diagram was used to model the LCD challenges, which delves deeper into the issue under consideration by understanding the interconnected relationships between the variables used in modelling. The chapter ends with ethical considerations governing the research, in line with Robert Gordon University's research ethics.

CHAPTER FOUR: CASE STUDY COUNTRIES

4.1 Introduction

This chapter aims to extract Local Content (LC) policy lessons for Ghana from two perspectives: developed and developing countries. The developing countries comprise Nigeria, Angola, and Brazil, and the developed countries, on the other hand, comprise the UK, Norway, and Canada. Each case countries comes with a section on policy lessons drawn from LC implementation.

4.2 Developing Countries

In addressing the LC challenges in Ghana, three resource-rich developing countries were selected based on their decades of experience in implementing the LC policy. Further details of those selected developing countries are discussed in sections 4.2.1 to 4.2.4.

4.2.1 Nigeria

The Organisation of the Petroleum Exporting Countries (OPEC, 2018) estimated that the oil and gas (O&G) sector in Nigeria accounts for about 35 per cent of GDP, and petroleum exports revenue represents over 90 per cent of the total exports revenue of the country. It is estimated that crude oil and natural gas production accounts for over 80 per cent of the country's revenues (Osobajo, 2018; Iwayemi and Fowowe, 2011; Watts, 2004). The petroleum industry's influence and contribution to the Nigerian economy

have resulted in the neglect of critical sectors such as manufacturing and agriculture, leading to Dutch disease (Akinlo, 2012; Ogen, 2007).

The country is facing what the World Bank describes as "massive developmental challenges" comprising dependency on oil and lack of economic diversification; inadequate infrastructure; lack of solid institutions; governance issues; public financial management systems; human development indicators; and poor living conditions (World Bank, 2017a).

4.2.1.1 Nigerian Local Content Policy

Since the 1960s, there have been varying levels of local content requirements in the Nigerian petroleum industry. The 1969 petroleum act, for instance, stipulated protection for local Nigerian firms and the developing of the human capacity for the industry (Acheampong et al., 2015). The 1969 Petroleum Drilling and Production Regulations (PDPR) advocated the nationalisation of petroleum resources, thereby moving the ownership of these resources from foreign to government control. By 2005, the local content requirement had increased beyond a basic preference for domestic goods and services to the issuance of 23 directives mandating specific domestic goods and services (Adewuyi and Oyejedi, 2012).

However, a review of LC indicated that the policy, since its inception in the various agreements, had had minimal impact on Nigeria's economic returns

(Adewuyi and Oyejedi, 2012; Acheampong et al., 2015). In the early PDPR there was no requirement to train indigenes employed in the petroleum industry or set benchmarks (such as percentage) during licenses acquisition. The early 2000s witnessed aggressively and focused approaches to LCPs to ensure increased usage of Nigerian goods and services in the sector (Munoz, 2018). In preparation for passing the new bill on LCP, the Nigerian national petroleum corporation (NNPC) set up training and development centres and educational support funds to support human resources. It also established the Nigerian Content Division (NCD) to implement and monitor the policy's provisions (Ezeani and Nwuke, 2017).

More importantly, the NCD was to drive local industrialisation efforts by developing local capacities in fabrication, engineering, and manufacturing materials. The NCD, in addition to the above, issued unbinding directives in 2006, among other things, providing a quota on certain services that can be procured outside the country (Acheampong et al., 2015). After many years of unsuccessful LC implementation, a new wide-ranging bill on LC was passed into law called Nigerian Oil and Gas Industry Content Development Act (NOGICD) or simply National Content Act (NCA) in 2010. The NCA was developed to ensure substantial usage of domestic goods and services and human capital (focus on value addition and technology transfer) in all activities carried out in or connected with the Nigerian O&G industry. The act establishes a board and a forum. The former is the

Nigerian Content Development and Monitoring Board (NCDMB) (hereafter referred to as "the Board"), which is to guide, monitor, coordinate and implement LC provisions. The latter is the Nigerian Content Consultative Forum which serves as a forum for sharing ideas and experiences on LC. Section 2 (3) of the act stipulates that promoting Nigerian content development shall be the criterion for awarding oil blocks, oil fields and lifting licences, and any other activity related to the industry (NCDMB, 2016). This implies that priority shall be given to indigenous Nigerian independent operators and service companies that demonstrate ownership of equipment, local people, and capacity to execute the work.

There were also explicit requests for foreign oil companies to submit the Nigerian content plan (plus annual content plan) before bidding for any project, and the board shall review and assess the plan before issuing a certificate of authorisation to the operator. In assessing the plan, the board shall consider goods and services provided within the country and consideration for locals' training and employment as stipulated by section 2 (10) of the act. Another key aspect of the act is section 41(2), which stipulates "*…international or multinational companies working through their Nigerian subsidiaries (to) demonstrate that the Nigerian subsidiaries own a minimum of 50 per cent of the equipment deployed for execution of work*". According to Acheampong et al. (2015), the above provision ensures high-end equipment utilised in-country remains in Nigeria after decommissioning and for technological transfer and in-country value addition.

In addressing the shortcomings of the PDPR in terms of training and development, the act explicitly asks companies to employ only locals in the sector's junior and intermediate cadres. The board uses its authority in approving the expatriate quota before its submission to the ministry of internal affairs as a means of monitoring expatriates employed in the sector. The joint qualification system (under section 55) -the web-based portal- developed as an outcome of the act has effectively monitored the usage of local skills and industry procurement decisions (Ovadia, 2015). The JQS serves as a reference point for local skills in the industry and a data bank for national skills development. Furthermore, local contractors are vetted on determinable criteria, including technical and financial capabilities (ibid).

The other provision in the act is the establishment of the Nigerian Content Development Fund (NCDF), funded through 1 per cent collected from every contract awarded in the upstream sector to provide credit facilities, promote human capital development, execute infrastructure projects, and address capacity-building issues (Ovadia, 2014).

4.2.1.2 Policy Impact

Studies have confirmed that backward linkages exist in at least three sub-sectors of the Nigerian industry (fabrication and construction, oil well construction and completions, control systems, and information communication technologies) (Adewuyi and Oyejide, 2012). Furthermore,

the study revealed that supply chain patterns of international oil companies and their subcontractors are about 55.1 per cent of their inputs from local companies. On the other hand, the study also revealed that procurement decisions of these companies are decided outside Nigeria.

Notwithstanding the above, there remain challenges after decades of implementing LC in Nigeria. It is estimated that over the next 30 years, the country must spend $3tillion on economic infrastructure to propel socio-economic development (Leadership, 2017). Similarly, studies have identified the lack of adequate infrastructure to support industrial development as one of the challenges facing the country's LC implementation in the O&G industry (Heum et al., 2003; Omenikolo and Amadi, 2010; Ibilola, Balouga, 2012). Additionally, Nigeria's O&G production is hampered by instability and supply disruptions (EIA, 2015) from insurgents in the Niger Delta which produces over 60 per cent of the country's oil.

From 2009 to 2012, it is estimated that the country lost about US$10.9billion to oil theft and vandalism (Onuoha et al., 2015). Another issue that affects LC implementation is local firms' inability to finance projects in the petroleum sector (Heum et al., 2003; Omenikolo and Amadi. 2010; Ovadia, 2014). Nigeria's banks' financial incapacity compounds the above to provide tenured loans to local firms (Olorunfemi, 2001; Ogiemwonyi, 2001). A study by Vaaland et al. (2012), using interviews

and case studies, found that both financial institutions and indigenous companies expressed a critical shortage of financial resources for developing the local industry in Nigeria.

These banks and financial institutions have significant problems lending the required capital needed by indigenous companies at reasonable interest rates. Consequently, Vaaland et al. (2012) attributed the funding issue to a combination of two factors: unrealistic risk assessment by the banks leading to a low score of these companies, weak legal protection for lenders and inadequate public systems to monitor past payback behaviour among borrowers. In addition to the lack of financial support, Vaaland et al. (2011), in the same study, argued that local firms lack technical and managerial competencies to participate fully in the industry (Omenikolo and Amadi, 2010; Aneke, 2002; Ariweriokuma, 2008; Ibilola, 2012; Onuoha et al., 2015).

4.2.1.3 Policy Lessons

The Nigerian content has established production linkages between the commodity sector and the limited industrial sector. These are attributed to the stringent nature of the LC laws mandating local purchases of goods and services, joint ventures between foreign companies and locals, human capacity building and annual reporting of targets. The LC law emphasises that priority shall be given to local companies to demonstrate the capacity to execute the work. The capacity to execute the work is in line with 'full

and fair opportunity' practised in the UK, Norway, Canada, and Australia. The mandatory JV have enabled capacity building and transfer of technology to indigenous firms. However, there are outstanding challenges: inadequate infrastructure, insufficient technical expertise, inadequate finance to support SMEs, a volatile political environment, and corruption.

4.2.2 Angola

Before independence, the Angolan economy was relatively diversified, with solid agriculture and manufacturing sectors (Tordo and Anouti, 2013). After independence, the economy gradually relied on the extractive industry, particularly oil and diamonds. This has made the country's socio-economic development to be driven by proceeds from the extractive industry. The oil sector constitutes about 1/3 of the country's GDP and over 95 per cent of its exports (World Bank, 2018). A study indicated that the diamond sector's contribution to GDP has reduced from 5.7 per cent in 2005 to 1.2 per cent in 2008, while in 2008, oil contributed over 56% to GDP, and 96% and 80% of exports value and government revenues, respectively (Teka, 2011).

Despite the attempts to diversify the economy through increasing lands for cultivation, the agriculture sector only represents about 11 per cent of GDP. This is partly due to the overvalued exchange rate over the years, thereby undermining agriculture and other non-oil sectors (World Bank, 2018).

Additionally, infrastructure, skills weaknesses, and a challenging business climate constrain investment outside the O&G sector. This conundrum of diversification of the economy is driving resource-rich countries in Africa in adopting local content policies.

4.2.2.1 Angola Local Content Policy

Angola's local content's objectives are to ensure Angolanisation of the workforce and local sourcing of goods and services. This policy of Angolanisation of the country's workforce started in 1979, with law 10/79 giving Sonangol, the state oil company, exclusive rights over the country's resources. In 1982, a decree was issued, 20/82 of 1982, to "*endow the People's Republic of Angola with national personnel able to assure the functioning of the economic key sectors"* (Council of Ministers, 1982). The above decree laid the foundation for LC in the country's O&G workforce, which covers recruitment, training, and career progression (preference for indigenes provided they meet the requirements) (Tordo and Anouti, 2013).

The 1982 decree's objective remains the same as the law of 2009, "*to provide the Republic of Angola with national workers capable of ensuring the functioning of this sector of the national economy*" (ibid). Apart from the above, domestic sourcing of goods and services is enforced through Decree 13/03 of 2003, meant to achieve: (i) socio-economic development and (ii) fairness in the distribution of the country's wealth (ibid). In terms of institutional responsibility of LC implementation and monitoring, the

ministry of petroleum is responsible for LCPs formulation and regulation of Angolanisation of workforce aspects.

Companies' recruitment and training must be approved yearly by the sector ministry and monitored through an annual implementation report submitted to the ministry that reports progress against the plan, challenges encountered and proposed solutions. Table 3.1 provides a breakdown of the annual contributions oil companies and related companies make to the ministry of petroleum for training purposes.

Table 3.1: Angola: Annual contributions to the training and development fund.

Company's scope of activities	**Annual contribution**
Holding a prospecting license	$100,000
Appraisal or exploration	$300,000
Production, processing, or refining	15 cents per barrel produced
Storage, transmission, distribution, and marketing of petroleum products	0.5 per cent of annual revenue
Services	0.5 per cent of the value of the contract

Source: Tordo and Anouti (2013)

In case of non-compliance, companies are banned from entering new contracts, and a second offence to the regulation is punishable by three times the value of the fine. The other means through which Angolanisation is achieved is through PSAs entered in conjunction with Sonangol. These agreements emphasise the recruitment and training of indigenes to reach

the level of knowledge. Apart from preferential treatment for the employment of locals, the law emphasises domestic sources of goods and services. Decree 127/03 stipulates that state companies or private companies with at least 51 per cent of their capital owned by locals will enjoy preferential rights over foreign ones when sourcing goods and services.

4.2.2.2 Policy Impact

Angolan Content policy's success can be based on the policy's objective: Angolanization and domestic sourcing of goods and services. To boost local companies' capabilities, Chevron (with additional funding from Spanish International Cooperation Agency for Development) established Angola Enterprise Program to develop SMEs' local capacity to provide quality–driven products and services for the oil industry (Tordo and Anouti, 2013). The Angola enterprise program provided technical assistance and financial support to indigenous companies through funding the Luanda Business Incubator, which specialises in human resource, management, and finance training (ibid). Total E&P has also created a Zimbo fund to promote microfinance. Again, a joint guarantee fund has been created by Total and Banco Totta de Angola to increase SMEs' access to capital and reduce the bank's lending risks (CAE, 2010). The fund is estimated to have created 300 jobs via dozens of indigenous SMEs (ibid). Challenges exist in areas of infrastructure, credit access, and technical expertise. Price Waterhouse

Coopers (PWC) (n.d.) argued that despite the favourable economic climate in Angola, the current transport and logistics infrastructure remains a significant problem for SMEs' growth in the country. The 27 years of civil war left most of the country's infrastructure destroyed, especially in rural areas (AfDB, 2006; World Bank, 2011).

The country spends almost $4.3 billion per year on infrastructure, with most of the funds skewed toward transport (World Bank, 2011), predominantly funded by domestic fiscal resources, and China, a source of external finance through what PWC describes as "infrastructure for oil trade" agreement. The World Bank (2011) estimated that addressing the country's infrastructure challenges within a decade would require a sustained $2.1 billion per year. To finance priority projects and essential infrastructure, the government in 2012 established a sovereign wealth fund, the Fundo Soberano de Angola and ring-fenced the equivalent of 100,000 b/d of oil revenues (about $5billion as of October 2012) (PWC, n.d.) for infrastructure financing.

The other challenge hindering the growth of indigenous Angolan firms is access to a credit facility. Tordo and Anouti (2013) and Ovadia (2012) argued that Angolan companies are not financially resourced to compete and provide quality goods and services to the oil companies' standards. In a study by Ovadia (2012) on the dual nature of LC in Angola, she found

that the primary concerns of the IOCs are the low level of education and human resources in Angola. Ovadia (2012) further argued that the oil companies are wary of additional risks by switching from reputable international service companies to unproven Angolan companies and employing locals for key management positions.

4.2.2.3 Policy Lessons

The Angolan LC focuses on Angolanisation of the workforce and domestic sourcing of goods and services. The various decrees on the policy emphasise local employment, human capacity development, a partnership between state-owned companies and IOCs, and annual local content reporting. A training and development fund is supported by annual contributions from oil companies at different stages of E&P. The Angola state-owned company, in contrast to Nigeria's NNPC, Sonangol, is at the centre of the local content implementation in terms of domestic sourcing of goods and services. As a result of the long civil war destroying the country's infrastructure, there has been a deliberate policy to improve infrastructure through "infrastructure for oil trade" with foreign governments and international institutions. Apart from this constraint, the literature found insufficient technical expertise and credit access as some of the challenges hampering local Angolan companies.

4.2.3 Brazil

Brazil produced 3.24 million b/d of petroleum, making it the ninth-largest producer globally and the third largest after the United States and Canada in the Americas (EIA, 2017) as of 2016. Apart from production, EIA (2017) estimated that the country is the eighth largest and third-largest energy consumer in the world and the Americas, respectively. During the initial phase of the oil industry, full ownership of the O&G fields was vested in the state, thereby monopolising exploration, transportation, distribution, and marketing. For instance, decrees 336 of 1937 and 395 of 1938 nationalised the O&G sector and related products (Tordo and Anouti, 2013).

In 1953, a new government passed a law number 2004 to create the state-owned company Petrobras, with monopoly rights over all upstream operations and help promote domestic sourcing of goods and services. As of 2013, it was estimated that Petrobras produced 1.9 million bpd out of the 2.7 million produced in the country (EIA, 2014). By 1960 the number of domestic suppliers to the oil industry had supplied more than 60 per cent of the material and equipment sourced by the state-owned oil company (Tordo and Anouti, 2013).

4.2.3.1 Brazil Local Content Policy

Brazil adopted import-substitution industrialisation, like many governments in Latin America, to produce national industries to reduce the dependency on imports (Korinek and Ramdoo, 2017). Brazil's LC policy is linked to its

overall industrial strategy to protect domestic industry and increase local firms' competitiveness (Anout and Tordo, 2013). In the upstream sector, Petrobras controls over 90 per cent of the production of O&G in Brazil and has considerable control over transportation through its subsidiary, Transpetro. Since the 1950s, the company has improved its operational abilities and increased its competitiveness in the industry.

In 1955, the Petrobras established an R&D centre known as Ceneps, which integrated within the company's operations and strategic objectives (Anout and Tordo, 2013). This centre's net effect is the Petrobras breakthrough in setting a deep-water drilling record in 1999 and building a floating platform on a single column in 2005. As a result of nationalistic and protectionist policies in the industry, the LC level is high – the domestic market met about 94 per cent of Petrobras requirements (Nordås et al., 2003). However, Acheampong et al. (2015) argued that the LC policy's resultant effect was higher costs and lower quality and productivity than similar products on international markets. In protecting the domestic market from the competition, platforms and supply vessels imported are levied 18 per cent duty, and general duties to protect the domestic market range between 10 to 20 per cent (Nordås et al., 2003).

The local requirements are briefly stated under the main principles of the National Energy Policy and not expressly laid out in the Oil Law (Law number 9.478/97) (Redo, 2010). National Energy Policy Council is

responsible for policy design that establishes guidelines for LCP in coordination with the sector ministry, the Ministry of Mining and Energy. The National Agency of Petroleum, Natural Gas and Biofuels (ANP) is responsible for regulatory activities. During bidding processes for O&G licenses, ANP inserts LC commitments for oil companies to comply with them. Furthermore, oil companies must submit an LC plan committing to the acquisition of domestic goods and services, and decisions for licenses are mostly based on this (Acheampong et al., 2013). Bidders are expected to outline the minimum exploratory programme and the signing bonus, and the percentage of local content they will commit to, which are used in calculating a points system to rank the bids (Barosso and Macedo, 2015).

Regarding financial support to domestic firms, the country's financial institutions impose a minimum requirement of local content as a prerequisite for financing. The Brazilian National Development Bank (BNDES) also impose a minimum LC requirement to offer financing facilities to local suppliers in the industry (Nordås et al., 2003; Anout and Tordo, 2013). Secondly, the development bank provides loans at lower rates for industrial purchases of machinery and equipment aimed at technological development (Korinek and Ramdoo, 2017). Thirdly, the bank provides loans for investments that promote technological and production capacity for products not currently manufactured in the country (ibid). To create an industrial base in Brazil, the government provided a protectionist

environment for domestic industries such as automotive and steel. (Sigam, 2012).

One exception to the above is that oil companies can import equipment that cannot be supplied domestically. These restrictions have encouraged international companies to establish industrial activities locally (Cunha, 2007). Apart from the general requirement of LC in Brazil, there are fiscal incentives to promote the policy. These include tax reductions for compliance, quotas for a preferential purchase of domestically produced goods in government tenders and subsidised financing (Rothmann, 2013). To enhance technology development and transfer, oil companies must invest 1 per cent of each field's gross revenue in O&G related R&D- half of the company's research facilities and the rest in local universities, and research institutes accredited by ANP (Filho, 2000).

In 2003, the government launched the Program for the Mobilisation of the National Industry of Oil and Gas (PROMINP) to increase LC through industrialisation and intervention in three strategic areas: qualification, industrial policies, and industry performance (PROMINP, 2011). The programme identifies gaps and structures initiatives to close the identified gap. Consequently, the programme launched a qualification plan evaluating the demand for labour which subsequently introduced a training programme in educational institutions. In the second area, a methodology was developed for assessing local content following confusion on reporting

and monitoring of LC. In 2004, a framework agreement was initiated between Petrobras and a national small business support association, Sabrae, to identify opportunities along the value chain for SMEs participation (Anouti and Tordo, 2013). Under the third strategic area, a competitive diagnostic study of the country was carried out to identify domestic supply capacity and gaps and challenges for goods and services.

4.2.3.2 Policy Impact

Local content implementation has increased usage of Brazilian goods and services in the O&G sector. It is argued that the inception of PROMINP is the reason behind the improvement in the participation of local industry in investments from 57.3 per cent in 2003 to 74.3 per cent in 2010 (Anouti and Tordo, 2013). There has been an improvement in the forward linkage. According to Barroso and Macedo (2015), it is estimated that between 2000 and 2014, domestic refining capacity increased by 12 per cent. However, this figure lags 22. 5 per cent and 25.4 per cent of domestic production and consumption, respectively.

Consequently, it is investing in improving and increasing domestic refineries' capacity to make for the shortfall and reduce imports of finished products. Increased local content levels have stimulated 875,000 jobs and brought additional income worth $21.billion to the industry (Paz, 2014). In the shipping industry, the number of people employed has increased from 2,000 in 2000 to 20,000 in 2006 (ibid). On the other hand, the policy's

trade-offs have led to higher costs, and delivery delays have hindered Petrobras from achieving its production and financial targets (Anouti and Tordo, 2013).

4.2.3.3 Policy Lessons

The development of LC in Brazil is linked to the overall industrial strategy of developing and protecting the domestic industry. The country focuses its attention on building the oil industry capacity under the state-owned oil company's tutelage, Petrobras. As a result of the preferential treatment given to Petrobras, it accounts for over 60 per cent of oil and gas production in the country and refining and transportation of products. Also, there are clear structures governing the industry: ANP is a regulator, and CNPS is responsible for the policy design of LCPs. To achieve industrialisation, Brazil's government provided a protectionist environment to develop nascent domestic industries.

In terms of financial support, the government adopted the following: BENDES to financially support local companies in the industry, provide tax waivers for oil companies in compliance with the LC laws, and quotas for a preferential purchase of locally produced goods in government tenders. To stimulate the development of the domestic technological industry, Petrobras emphasised local technology development through licensing agreements with international suppliers. Oil companies were required to invest a percentage of oil revenue in research and development in oil

companies and, Brazilian research facilities and the local universities. The state oil company also had its research facilities specifically for the O&G industry and partnered with local universities to produce fit-for-purpose solutions for its production challenges. A diversified industrial base and domestic technical capability were crucial in quickly adapting and developing new technologies through partnerships with foreign companies.

4.2.4 Summary of Findings

The LC strategy in the studied countries comprises control, ownership, decision making, and preference for the industry's local goods and services. The implementation of the strategies is predicated on developing local capability, training, and education, and ultimately diversification of the local economies. Similarly, the implementation of the policy is based on allowing local firms to work and acquire the requisite knowledge through preferential treatment to reach international standards. In all the countries, clear institutional structures have been established with responsibilities for implementing the LC. All three countries have national oil companies participating in commercial activities on behalf of the state. However, Petrobras and Sonangol are at the centre of LC implementation in Brazil and Angola regarding the domestic sourcing of goods and services.

In addition to the LC laws, Brazil has accompanying funding support measures from local banks, and the NOC plays a significant role in helping local firms secure funding. Similar measures have been initiated in Angola

and Nigeria but are not extensive in financially supporting local firms. Implementation of the LC in Angola and Nigeria is hindered by infrastructure, and requisite manpower with the skill set for the industry. Measurement of local content in Angola, Nigeria and Brazil follows the worldwide trend in terms of man-hours, size and volume, tonnage, certification, number, amount of local expenditure and other defined measures.

There are two broad metrics for measuring LC: labour and value content measurement and the time dimension growth of local content measurement (Acheampong et al., 2015; Tordo et al., 2013). In Brazil, a methodology has been developed with industry stakeholders based on the above areas. However, in Angola and Nigeria, there is a lack of robust metrics for measuring and reporting LC to ensure effective implementation (Nwapa, 2018; Ovadia, 2016). Measuring the success of LCP in Nigeria and Angola in terms of retaining capital, adding value, and creating jobs is a difficulty due to the lack of openness and the inadequacy of monitoring and evaluation (ibid).

4.3 Developed Countries

In addressing the LC challenges in Ghana, the experiences, and lessons of the following developed countries: Norway, the UK, and Canada, with decades of LC implementation, have been examined and analysed. Further details of these countries are discussed in sections 4.3.1 to 4.3.4.

4.3.1 Norway

The country's upstream petroleum activities started in the mid-1960s, and the first offshore field came on stream in 1971. Norway is the eighth and the third largest producer of O&G, respectively, in the world (MPE, 2018). However, oil production has been declining since 2012 due to the absence of significant discoveries and the possibility of peak oil in the existing fields (IEA, 2014). Despite the decline of oil production in recent times, the industry remains the largest and most important sector when measured in value creation, state revenue and exports to the Norwegian economy (MPE, 2014). According to Norwegian government estimation, the O&G industry has contributed approximately US$1,546 billion to the country's GDP-measured according to 2013 US$(ibid).

4.3.1.1 Norway Local Content Policy

The Petroleum Act (Act No. 72 of 29 November 1996) and the National Petroleum Regulations (Regulation No. 653 of 27 June 1997) provide the basis for licenses acquisition in Norway (Neum, 2008; Acheampong et al., 2015). The fundamental principle in these laws is that the state owns petroleum resources within Norway. Initially, the government saw oil exploration business to be too risky to risk public funds. However, this changed in 1972 with a new administrative structure based on different functional responsibilities. The ministry of petroleum and energy is responsible for decision-making and the award of licenses. All development plans are finally approved by parliament. Technical control and resource

management are under the control of the Norwegian Petroleum Directorate.

Moreover, commercial participation by the state led to the establishment of Statoil in 1972 to take care of commercial interest on behalf of the government and counterbalance the IOCs in Norway (Heum, 2008). Other state companies such as Gassco AS were also established for the transportation of Norwegian gas. In 1985, the state-owned oil company participation interest was divided into two: Statoil commercial participation and the State's Direct Financial Interest in the O&G industry. Subsequently, Petoro AS was established as a state-owned limited company to manage SDFI through direct government participation in the industry by financing E&P expenses and receiving corresponding dividends commensurate with its shares.

Apart from the above, the government 1972 passed a royal decree (article 54, §54) to regulate local content, thereby ensuring local goods and services are given preferences provided there were competitive (price, quality, service and schedule) (Klueh et al., 2009; Olsen, n.d.). However, Norway does not have explicit legislation on local content apart from the government's preference that domestic firms should be chosen on price, quality, service, and schedule (Nodas et al., 2003). Also, the Goods and Services Office was established to monitor and work together with IOCs to develop domestic industry, encourage JV and R&D, and establish targets

for indigenous participation in the industry (Klueh et al., 2009). Also, to encourage local goods and services, the government set up a Supplier Development Program (UNCTAD, 2013), focusing on enhancing production links between foreign companies and indigenous firms which helped create industry clusters.

In Norway, local content levels in petroleum activities are considered high: investments for developing new petroleum fields are between 50-60% (measured by value-added), and maintenance and operations are 80% (Heum, 2008). This is partly attributed to the advantage of the geographic proximate of the country and the industrial competence of the local supply and service providers. The essential requirement for local content development success in Norway and any prospective country involves "enhancing the domestic knowledge base through arrangements that allow for a dynamic industrial and technological development, that gradually expands domestic competencies and capabilities to competitive levels" (Heum, 2008).

Norway had no petroleum service and supply industry, no R&D sector, and no sectoral institutions to manage the resource but had an advanced shipbuilding industry, engineering base and the third largest fleet of ships in Europe (Kalyuzhnova et al., 2016). Supporting the above arguments, Heum (2008) stated that Norway has been successful due to active state involvement and regulation and utilising existing industrial and engineering

capacity and capability to develop an O&G service and supply industry internationally. The existing industrial and infrastructure competencies were easily adjusted and extended into the O&G industry, which consists of the following:

- The shipping industry, manufacture of ship equipment and shipyards for handling offshore operations,
- Availability of extensive process facilities,
- The mining industry's existing skills were relevant to the oil and gas industry. For instance, geological competence was relevant for O&G mapping and interpretation of seismic data (ibid).

4.3.1.2 Policy Impact

The Norwegian LC model has successfully built local capacity and competence in which Statoil stands out as an example. Through direct state interventions, Norwegian firms played an active role in the goods and services supplied to the O&G industry. These consist of petroleum and non-petroleum goods and services such as banking services, fabrication and construction delivered to the Norwegian industry have had considerable spill-over effects on the broader economy (Brander et al., 2013). The Ministry of Petroleum and Energy, Norway, estimated that about 1230 companies supply goods and services to all value chain stages (MPE, 2018). In 2012, Domestic oil suppliers do not make substantial contributions to oil companies in the Norwegian Continental shelf, but foreign oil suppliers and foreign petroleum industries (Jacobsen et al., 2010). The usage of local

goods and services has resulted in the country's employment creation. For instance, Brander et al. (2013) estimated that employment in the oil and gas industry accounted for about 1 per cent of total employment in 2012.

4.3.1.3 Policy Lessons

Upon discovering oil, state institutions and policies were quickly established and passed to regulate and monitor the implementation of the local content policy. Norway had no prior industrial knowledge and experience in the oil industry before discovering oil. State institutions subsequently established had different functional responsibilities for policymaking, technical management, and commercial participation. These institutions, in turn, gave direction to the industrial policy arrived via consensus-building for long-term decisions. In a bid to develop domestic capacity, there were industrial policies to develop domestic capacity in the oil industry. These actions resulted in establishing two state-owned companies, and the state allowed competition among Norwegian companies (Statoil, Norsk Hydro and Saga-privately owned) to get the best out of these companies.

Also, there was temporary protection of indigenous companies to allow domestic participation in oil companies' supply chains. However, this policy of protectionism was temporary (Kalyuzhnova et al., 2016). Joint ventures were encouraged between local and international firms for technology transfer and capacity building, with most foreign firms acting as technical operators. The policy helped increase the spin-off effects of oil and gas

development via legislating domestic participation in offshore and onshore activities. To achieve these economic spin-offs, the policy mandates or incentivises oil companies and related businesses to establish their activity within the host country and employ locals, as happened in Norway (ibid).

In addition to the above, Norway had an advanced academic environment during the discoveries, providing domestic knowledge. Again, oil companies were encouraged to enter R&D projects with local universities and research institutions (Neum, 2008). This helped enlarge the local knowledge base and provided the industry with the requisite personnel. In a nutshell, Norway's long-term objectives were focused on national control and state participation, technology transfer, building domestic capability and competence, and promoting industrial policies.

4.3.2 The UK

UK produces about one million barrels per day (b/d) of petroleum liquids, making it the second-largest producer in Europe after Norway (EIA, 2016). Out of this production, over 97 per cent of its liquid production came from offshore. In an economic report on UK's O&G industry, it was estimated that O&G provided 76 per cent of the country's primary energy, 60 per cent from indigenous production, making an estimated contribution of £17 billion to the country's balance of trade in 2016, and the oil industry supports over 300,000 jobs in the UK (Oil and Gas UK, 2017). Also, it is estimated that industry expenditure of £1 million sustained jobs across the

UK economy in 2016 (ibid), and in all, the oil and gas industry contributed 2.3% to GDP. The country's supply chain is estimated to export £12 billions of goods and services to other basins worldwide.

4.3.2.1 UK Local Content

The UK and Norway developing as an oil region during the same period had different LC approaches- the former favoured less interventionist policy and the latter, state-led policy at the early stages of oil production (Kalyuzhnova et al., 2016). Despite the divergence in the approach towards LC, the countries mentioned earlier prove that O&G late-comers can develop internationally competitive goods and service industries amid existing technology and industrial clusters (ibid). In 1965, the UK government implemented a discretionary licensing system for prospective oil companies that emphasised rapid exploration programmes and local suppliers' use (Klueh et al., 2009).

In 1973, a new offshore policy was introduced as a result of; the discovery of large oilfields - Forties and Brent, the first oil shock due to the oil embargo from the middle east disrupting the supply of oil and a resultant sharp rise in price and apprehension over the inadequate participation of British firms in the supply of goods and services to the oil industry and the rise of nationalist sentiment in Scotland (Smith, 2011; Civitas, 2013; Klueh et al., 2009).

Prior to 1973, a report was commissioned by Prime Minister Heath directed at increasing the domestic content of UKCS expenditure. The IMEG Report, as it was called, was published in 1973, dealing with British supply capability. IMEG's key conclusion was that the offshore supply market was expanding domestically and internationally, and thus, the domestic market share of 25-30% could be increased to 70% by the late 1970s (Smith, 2011). Smith (2011) argued that IMEG's recommendation was interventionist to address foreign enterprise's gradual dominance. Key recommendations adopted were adopted:

- Establishment of an institution to improve the performance of the British offshore industry accountable to a minister,
- Offshore operators and contractors should provide a confidential quarterly return on their purchases, staff employment and sub-contractors. Further explanations should be given on purchasing and tendering practices and plans,
- Supporting British supplies to counter cheap export credits from overseas suppliers through the provision of subsidised credit,
- Encouraging joint ventures with foreign suppliers to 'plug' gaps in domestic industrial capability,
- Equipping domestic suppliers with information and advice service and,
- Incorporation into the (then discretionary) UKCS oil and gas licensing system of an assessment as to whether an applicant had given British

firms 'full and fair opportunity' (FFO) to compete for business (Civitas, 2013).

Accordingly, the policy created; (1) the Offshore Supplies Office (OSO)-directly from the first recommendation of the IMEG report, (2) a scheme to support local suppliers financially, and (3) an auditing procedure to monitor oil companies' purchases by the OSO. Nevertheless, companies were not sanctioned for breaching the requirements but were likely to face difficulties in future bidding rounds. In assessing the OSO, Civitas (2013) argued that it successfully supported the British industry by using quarterly returns to assess whether domestic companies have been given 'full and fair opportunity' (FFO) during tender bidding.

Furthermore, there were non-statutory Memorandum of Understanding and Code of Practice (it stipulated that tender documents should be drafted not to the disadvantaged of local firms, OSO could suggest more local bidders, companies bidding should show local content estimates, clearly delineated criteria for bid evaluation and oil companies should inform OSO before awarding a major bid to foreign companies) between OSO and the United Kingdom Offshore Operators Association. This agreement invariably committed the offshore operators to the FFO (Civitas, 2013).

In terms of financing, OSO had the power to sponsor discretionary funding applications under the Industry Act (Civitas, 2013). However, from 1973 to

1976 an amount of £23 million (in 2010 terms) was committed. Again, in the late 1970s, the National Enterprise Board committed similar amounts (ibid). In terms of R&D, many UK firms received funding from the European Commission for expanding research and innovation (ibid). The UK government also provided support for science and engineering at Scottish and British universities (Civitas, 2013). OSO estimated that R&D expenditure totalled £250 million (in 2010 terms), with three-quarters of it provided by the private sector (ibid).

Apart from the government's support, Offshore Energy Technology Board and the OSO financed research and development in the offshore industry, mainly commercially directed projects. In the 1990s, due to a strengthened relationship with the European Union, the government policy of promoting LC within the UK offshore O&G industry changed to supporting private investors in a competitive environment to develop export markets (Klueh et al., 2009).

4.3.2.2 Policy Impact

According to a study commissioned by the industry body, Oil and Gas UK, it estimated that more than 3,000 companies were directly involved in the UK oil industry (BBC, 2014). The oilfield services sector of the UK supplies goods and services to both domestic markets and foreign oilfields. The same study estimated that the O&G industry is worth about £35 billion to the UK economy. In terms of employment, the industry is estimated to

support over 300,000 jobs through direct and indirect employment and jobs induced by the industry's wider economic contribution (Oil and Gas UK, 2017). However, the above estimate represents over 13,000 fewer jobs than in the preceding years. The pace of contraction has slowed to 4.2 per cent over the last 12 months (2017) compared with 19.4 per cent and 15.6 per cent in 2015 and 2016 respectively (ibid).

Direct jobs resulting from operating expenses are expected to be stable in the near-term, sequel to improvements in existing facilities to help extend their economic limit. Indirect jobs associated with capital investment have a less specific outlook because they depend on new project sanctions (ibid). Finally, the induced jobs are a by-product of spending across the business's value chain, with its associated wealth distributed across the domestic economy (Oil and Gas UK, 2017).

4.3.2.3 Policy Lessons

The creation of OSO helped achieve the initial target of 70 per cent of UK content and even passed that target in 1979. In 1987, 87.2 per cent achieved was considered the peak figure and later dwindled to 78 per cent in 1991. The OSO supported JV between British firms and foreign companies and supported domestic firms' marketing efforts both in the UK and overseas, which helped create employment and international competitiveness for British firms. The above helped augment technical progress by raising research and development undertaken (Civitas, 2013).

Furthermore, the government established institutions such as the National Enterprise Board, Offshore Energy Technology Board, and the OSO dedicated to supporting research and development and science and engineering programmes related to the offshore industry.

The UK and the European Commission's government all supported R&D. More importantly, the establishment of voluntary arrangements between the OSO and UKOOA to ensure 'full and fair opportunity' (FFO) to British firms helped increase domestic supplies to the industry. The lesson here is that foreign oil companies should be encouraged than mandatorily required to source goods and services. More importantly, the government must institute financial schemes to support local firms, local universities, and local R&D centres to advance technology research in the sector. Lastly, it is not enough to prescribe local content requirements without upgrading local universities to train and build local capacity.

4.3.3 Canada

In 2015, Canada was the fifth-largest producer of crude oil and natural gas globally, with the third-largest crude oil reserves (98 per cent comprising oil sands reserves) after Venezuela and Saudi Arabia (Export Gov, 2018). Natural gas in Canada comprises both conventional and unconventional sources, including natural gas from coal, tight gas, and shale gas. Shale gas production and tight gas accounted for 4 per cent and 47 per cent of natural gas production in 2014. However, it is estimated by the National

Energy Board of Canada that by 2035, shale and tight gas will account for about 90 per cent of Canada's natural gas production (Thomas Reuters, 2017). According to Natural Resources Canada (2018), Canada's energy sector accounted for almost 9.9 per cent of total nominal GDP or 187 billion to nominal GDP in 2016.

4.3.3.1 Canadian Local Content

In Canada, the federal and provincial governments are the legal owners of lands containing petroleum resources. However, there are privately owned petroleum resources. Specific LC regulations are found in the federal, provincial and agreements, including the Impact and Benefits Agreements (IBAs) with indigenous communities. The IBAs have evolved, broadly entail labour provisions, economic development provisions, community provisions, royalties, and direct payments (Korinek and Ramdoo, 2017). The federal government has jurisdiction over offshore waters and continental shelf, whiles the provincial authorities have responsibility for onshore activities. Unlike Norway, Canada has no national O&G company, but Newfoundland and Labrador have a wholly-owned O&G company with no special rights or privileges to downstream licenses (Stikrmsn Elliott, 2017).

Following the oil crisis in 1973, the liberal government of 1975 created a federally owned oil company called Petro-Canada to ensure national control over oil's strategic assets. However, the company was gradually privatised

after the crisis. Most local content requirements in Canadian upstream activities are found in the provinces. For instance, Nova Scotia, Newfoundland and Labrador have LC requirements and preferences for domestic contractors and employees (Stikeman Elliott, 2017). Furthermore, it is required that oil companies must give preferences to services and goods manufactured in the province when such goods and services are competitive in terms of price and quality.

Additionally, the Investment Canada Act (ICA) requires that the federal government approve any Canadian business acquisition by foreign investors above certain thresholds. More importantly, the investor must make an undertaking concerning the retention of Canadian employees and senior staff. The Canadian business refers to businesses located in the country irrespective of equity control. Stikeman Elliott (2017) argues that many proponents have a separate benefit agreement with local Aboriginal groups apart from the above requirements. This is triggered by the likelihood of petroleum resource projects adversely impacting Aboriginal groups' rights.

These benefits are preferential hiring, training, business opportunities and funding for local social programmes and infrastructure. In terms of financial support, local companies can access funds through Export Development Canada to promote broader policy goals such as promoting regional economies and boosting R&D (Korinek and Ramdoo, 2017). Additionally,

the Federal Scientific Research and Experimental Development (SR&ED) is a tax incentive to encourage Canadian companies of all sizes to conduct scientific research and experimental development in Canada (GoC, 2015; Korinek and Ramdoo, 2017).

The tax incentive comes in three forms: an investment tax credit, income tax deduction and a refund. The government has been using the Income Tax Act to stimulate R&D with some of the historic measures summarised below:

- 1944- Companies could deduct an amount equal to 100% of the current expenditure of research from their taxable income,
- 1960 – deduct one-third of capital expenditure,
- 1962 -1966 – incremental tax deduction equivalent to 50% of current and capital expenditure
- 1967 – Introduction of cash grants under the industrial research and development incentives act. These cash grants equal 25% of capital expenditures and 25% of current expenditures (GoC, 2015).

Additionally, Korinek and Ramdoo (2017) argued that the federal and provincial governments provide financial resources to finance public R&D and public goods such as information and infrastructure to facilitate developing suppliers' capacity, clusters, and professional skills.

4.3.3.2 Policy Impact

In 2013, Canada's O&G industry employed directly and indirectly over 902,000 across the country, and FDI rose from $27 billion in 1999 to $182 billion in 2013 (Invest in Canada, 2016). According to Natural Resources Canada (2018), the energy sector directly employed 270,000 and indirectly supported over 600,000 jobs in Canada. In a report to determine the contributions of the O&G services sector to the Canadian national economy, Howard and Yager (2015) estimated that the oil and gas services (OGS) sector contributed $75 billion to the country's GDP in 2009 and $65 billion in 2006.

Again, the taxes paid amounted to $17.3 billion by the OGS, and jobs created by the OGS sector amounted to 685,000. The country has a liberalised environment that encourages private and foreign participation. Most of the refineries in Canada are owned by vertically integrated companies. The country is ranked 11th globally in refining capacity, 1.9 million barrels per day (MMb/d), behind Russia, Saudi Arabia, the United States, Iraq, Iran, and China (NEB, 2018).

4.3.3.3 Policy Lessons

The general approach to LC in Canada is a partnership between the federal and provincial authorities and the oil companies to make certain aboriginal groups or interest groups' opinions factored into agreements. Therefore, companies are required to offer opportunities to local firms and ensure

technology transfer and employment. The government uses an income tax deduction to entice Canadian companies to conduct scientific research in their area of specialisation and provides the public infrastructure to facilitate the development of enabling environment for suppliers. The provinces have wholly-owned O&G companies and specific local requirements requiring purchasing local goods and services when such goods and services are competitive in terms of price and quality.

Furthermore, the provinces are given regulatory authority over natural resources. For instance, Newfoundland and Labrador provinces have their state company for E&P in the oil industry. The exception to most state-owned companies' rule is that the local state-owned company has no special privileges and rights regarding access to oil blocks but competes with other IOCs. In terms of foreign investment, the ICA requires any acquisition of local companies above a certain threshold to be approved by the federal authorities, and the investors make undertaking concerning the retention of local employees.

4.3.4 Summary of Findings

Local content in the studied countries follows the worldwide trend of LCPs: employment, procurement, training, technology transfer requirements, monitoring and enforcement mechanisms, and the support generally given to local companies by host governments. The LC's fundamental principle is

to offer "full, fair and reasonable" access to employment and tendering opportunities. Domestic firms are supported with information during the contract tendering process and have robust reporting mechanisms and flexibility in implementation. Secondly, the country's educational system's alignment with the demands of the industry through public and private partnerships, removal of over-burdensome regulations and encouraging engagement between industry and research.

This latter policy means that for local companies to be internationally competitive, the LC policy must continuously be reviewed and effected when necessary. The law encourages strategic alliance-building, innovation and technology uptake between local firms and foreign companies. Tax incentives are used to encourage domestic research and innovation. Additionally, oil companies must invest a portion of their revenue in local universities and research centres. In Norway and the UK, the regulatory agencies emphasised that local companies that measured in price and quality per the demands of the international oil companies were selected for supplies and participation. In measuring targets, the developed countries emphasised the need for foreign companies to show in tender documents that local goods and services are given preferences provided they are competitive. To ensure compliance, agencies, such as the Goods and Services Office and Offshore Suppliers Office were created to rigorously monitor and enforce the government directives of increasing local content and participation.

4.4 Chapter Summary

The chapter delved into case countries of local content implementation from two perspectives; developed and developing countries. The developed countries consist of Norway, the UK, and Canada. On the other hand, developing countries comprise Nigeria, Angola, and Brazil. The above countries were chosen based on their long experiences in the LC implementation. The developed and developing countries have the principle of "full, fair and reasonable" opportunity embedded in the LC implementation regarding local employment, training, and tendering opportunities. However, the developed countries have capacities and policies for building local skills for the industry, developing and absorbing technology than the developing countries. Consequently, the study would like to assess the factors that have made developed countries successful, and on the other hand, developing countries less successful in the LCP implementation.

CHAPTER FIVE: SYSTEM THINKING MODEL

5.1 Introduction

The chapter commences with the model structure, development of the initial Local Content Development (LCD) model, and the system boundaries for the primary model and its sub-models. Subsequently, the identified challenges of Infrastructure, Finance, Technology and Human Resource Capacity are individually modelled using a causal loop diagram. The chapter ends with an initial model pretesting, and the lessons learnt thereof.

5.2 Model Structure

The model is structured in two parts: first, the causal loop diagram (CLD) for Local Content Development (LCD) is made up of Infrastructure, Human Resource Capacity (HRC), Finance, and Technology and the second part breaks the CLD for LCD into sub-models comprising Infrastructure, Finance, Technology and Human Resource Capacity. The entire model structure conceptualises the causality among the challenges to influence LCD. The adoption of the system thinking tool of CLD is used as an analytical model to systematically explain the relationships among the four challenges of local content (LC) implementation. The process provides deeper insights into the issue with its attendant strategies. The CLD models the relevant variables to reveal visual representations of the interactions and feedback loops among the LC challenges. This helps reveal the source of the challenges (Andi and Minato, 2003).

Additionally, this mental model helps explain the influencing factors of an issue and its source, which industry experts must validate. In system dynamics (SD) model design and development, different authors have considered the stages that should be followed, summarised in Table 5.1.

Table 5.1: System dynamics modelling process (Luis et al., 2004 cited by Alasad et al., 2013)

<table>
<tr><th>Randers (1980)</th><th>Richardson and Pugh (1981)</th><th>Robert et al. (1983)</th><th>Wolsteholme (1990)</th><th>Sterman (2000)</th></tr>
<tr><td>Conceptualisation</td><td>Problem Identification</td><td>Problem definition</td><td>Diagram conceptualisation and analysis</td><td>Problem articulation</td></tr>
<tr><td rowspan="2">Formulation</td><td>System Conceptualization</td><td>System Conceptualisation</td><td rowspan="3">Simulation phase (1)</td><td>Dynamic hypothesis</td></tr>
<tr><td>Model formulation</td><td>Model Representation</td><td>Simulation Model</td></tr>
<tr><td rowspan="3">Testing</td><td>Analysis of model behaviour</td><td rowspan="2">Model behaviour</td><td rowspan="3">Formulation Testing</td></tr>
<tr><td>Model evaluation</td></tr>
<tr><td>Policy analysis</td><td>Model evaluation</td><td rowspan="2">Simulation Phase (2)</td></tr>
<tr><td>Implementation</td><td>Model use or Implementation</td><td>Policy analysis and model use</td><td>Policy formulation and evolution</td></tr>
</table>

However, the main activities constituting the modelling process of these different frameworks are the same. Using Sterman's (2000) categorisation process, as shown in Table 5.1 within this study, the first two stages constitute Qualitative System Dynamics (QualSD), which deals with model conceptualisation, and the last two also constitutes Quantitative System Dynamics (QuanSD) which is outside the scope of this study. Basically, the QualSD is for problem identification (factor identification), designing CLDs

that fall within the study's scope, while QuanSD is for quantitative computer simulation and testing.

Model building begins with listing those factors that have a significant influence on the desired output. In identifying the influences, the methods such as observation, discussion, interviews, and existing data are employed (Alasad et al., 2013). Furthermore, assessing stakeholders' (Ghanaian oil industry players) databases can identify the problem to be modelled (Sterman, 2000). This can serve as a significant source of data as it contains both mental data and interpretations for other sources of information (Forrester, 1992). Consequently, building the model for this study started with problem articulation (see Chapter 4) and factors identification, thus, those variables that significantly influence the outcome, and modelling the factors based on cause-and-effect (explained in detail from section 5.2.1 to 5.3.4).

The identified challenges impeding LC implementation in Ghana are used for the preliminary model. The above outcome is grouped into four challenges; Infrastructure, Finance, Human Resource Capacity, and Technology (henceforth called variables; a term used interchangeably with challenges) were determined for the study. These variables are called Enabling (drivers); Infrastructure, Finance, Human Resource Capacity, and Technology, and the Outcome; Local Content Development (LCD).

5.2.1 Initial Causal Model Development

In constructing a causal model, a researcher uses the model to explain the relationship among concepts related to a specific phenomenon (Asher, 1983). Additionally, it allows a researcher to assess a variable's influence directly or indirectly on another variable. This study's model is predicated and builds on previous works by Acheampong et al. (2015), Kazzai and Nouri (2012), Heum et al. (2011), and Klueh et al. (2009), dealing with factors that drive value creation and local content development in general. In summary, the above authors produced frameworks based on different combinations of the main determinants that drive successful local content development: macroeconomic environment, legislation concerning the business, infrastructure development, and local policies.

This new study differs from the above in two ways. Firstly, the methodology employed when modelling the variables is in the form of system thinking (ST). Secondly, incorporating new variables is in the form of Finance and Technology. This study uses ST to analyse the LC implementation challenges of Infrastructure, Finance, Technology and Human Resource Capacity. Figure 5.1 depicts the structure, and the links between the model conceptualised based on the areas mentioned earlier, and therefore, it requires further testing to confirm their appropriateness and validity. The model's dynamic hypothesis is the causal relationships among the system elements expressed in CLD. The causal loop diagram representing the model's hypothesis depicts how each factor can affect the model outcome

directly or through other intermediate variables and the effect one variable has on others (Alasad et al., 2013).

Construction of the dynamic hypothesis in the models was derived from the literature review (see Chapter 2, section 2.4), the subsequent assembling of the mental models of Robert Gordon University academic staff and PhD students, and experts in the oil industry to help with the initial modelling. These mental modelling discussions centred on the participants' perception of how the Ghanaian oil industry works vis-à-vis the local content (LC) implementation, its challenges, and the system drivers. In other words, the links in the models are conceptualised based on the participants' understanding of LC implementation in the industry. The above guidelines were used in developing the links between the CLD in Figure 5.1 and the sub-models in section 5.3.

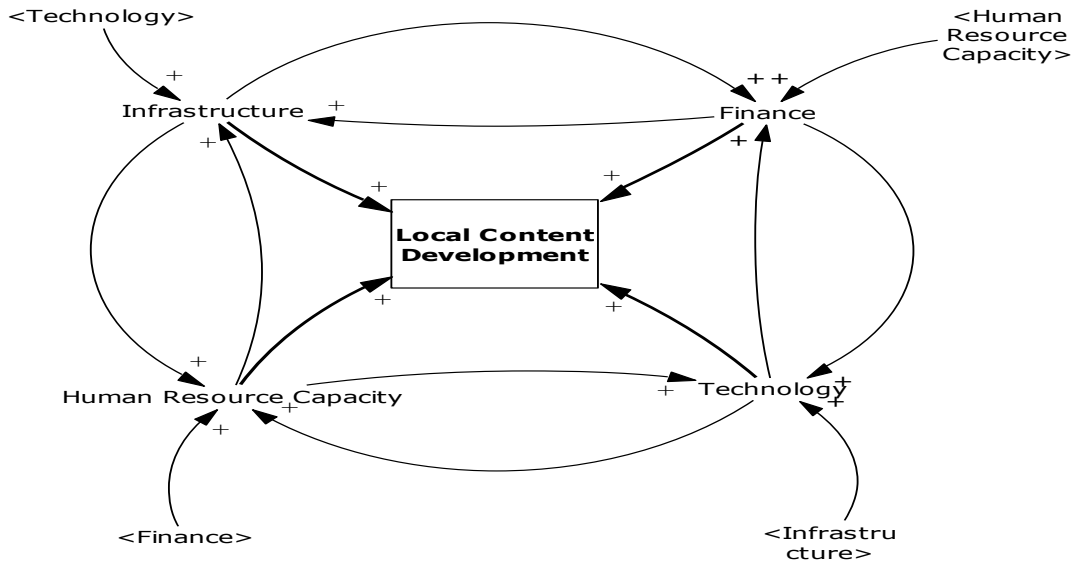


Figure 5.1: A Conceptual Model for Local Content Development Challenges.

The enabling variables (Infrastructure, Finance, Human Resource Capacity, and Technology) are the essential elements of the system as they drive the other parts and can be differentiated from the outcome, which are plan elements that can be used to measure success. The arrows shown in the model represent causal paths or the hypothesis between enabling variables. In constructing the model, infrastructure was found to impact Finance directly, and likewise, Finance on infrastructure. Hence, the link from infrastructure to Finance was constructed, and vice versa. The conceptualisation of the variables established the following casual links: Infrastructure – HRC; HRC - Infrastructure; HRC – Technology; Technology – HRC; Technology – Finance; and Finance to Technology.

Additionally, a causal link is established between HRC – Finance, and vice versa; and Infrastructure – Technology, and vice versa. Studies suggest that Infrastructure, Technology, Human Resource Capacity and Finance links established in the model have a direct impact on Local Content Development (Acheampong et al., 2015; Kazzai and Nouri, 2012; Heum et al., 2011; Klueh et al., 2009; IFI, 2018; MoE, 2010; Ostenson, 2017; ADB, 2015). The plus sign (+) at the end of the arrow shows a direct impact. All the above variables interact to create a conducive environment for Local Content Development. This analytical model's essence is to explain the interactions between the challenges of LCD, which is to aid in prescribing policy alternatives to the said challenges.

The above conceptualisation (fig. 5.1) will lead to understanding the oil industry stakeholders' perception of the relationships between the four LC challenges, the barriers to success, the system drivers, and the effective strategies for tackling the challenges.

5.3 Causal Loop Diagram Development of the Sub-Models

The CLD is premised on the feedback loop concept that sees issues as circular relationships but not from a linear perspective. These circular relationships give a better explanation of all the factors likely to influence a phenomenon under consideration, and therefore the research participants are in a pole position to proffer solutions (Kim, 2014). Minato (2003) defined CLDs as the visual representations of the interactions and feedback loops affecting LCD challenges that capture the source problems. A CLD is usually in the form of one or more closed loops that illustrate cause-and-effect linkages (Kim, 1999) and comprises the building blocks of feedback.

A feedback loop has the characteristic of giving a system its dynamic nature (Meadows and Robinson, 1985), which can be categorised as a positive (reinforcing (R)) loop with a function of increasing or decreasing indefinitely and a negative (balancing (B)) loop which stabilises over time. The model's hypothesis represented in the CLDs illustrates how each enabling variable can affect the model outcome directly or through other intermediate variables and the effect one variable has on others (Alasad et al., 2013). These interactions also depict the direction and kind of causality among

different variables in the system (Love et al., 1999). For example, if a causal relationship exists between 'a' and 'b', which is depicted by an arrow. If an increase in the variable 'a' causes an increase in the 'b' variable, the relationship is positive.

Conversely, if an increase in the variable 'a' causes a decrease in 'b', the relationship is negative. The above scenario, in addition to the underlisted guidelines, is used in mapping the sub-models:

- Factors identification/Theme Selection - Kim (1992) argued that the construction of CLD is part of articulating and communicating deeper insights about complex issues. Therefore, CLDs should not be seen as an end unto themself. It is imperative to identify or understand the issue under consideration first. This should lead to listing those factors that significantly influence the output.
- Determining the appropriate time horizon for the problem under consideration. In other words, understanding the relationship between factors that describe the behaviour pattern over time (Alasad et., 2013).
- Boundary Issue: What should inform the modeller in choosing the variable for the CLD, and at what point do you stop adding to your diagram? This issue can be addressed by staying focused on the issue and ignoring those variables that are not critical to the problem under consideration (Kim, 2002). Again, the modeller should be asking questions such as "If I were to double or halve this variable, would it

have a significant effect on the issue I am mapping?" and "how detailed should the diagram be?" (Richardson,1991; Kim, 2002; De Pinho, 2015).

5.3.1 System Boundaries

The system boundary provides a complete picture of the possible cause-and-effect variables used in designing the LCD model and its sub-models. More importantly, the system boundary sets the limit of the variables included in the modelling based on participants' understanding of local content policies in the Ghanaian petroleum industry. It must be stated here that in addition to the guidelines outlined in section 5.3, the identification of variables for the system boundary was predicated on having a small and manageable model size, only variables with direct impact or significant influence on the output (Obiri et al., 2020; Alasad et al., 2013).

This, in turn, facilitates easy appreciation and understanding of the model. Table 5.2-5.5 details the variables for the sub-models extracted from the literature review (see Appendix 4) and interviews, as mentioned earlier. Here again, it must be stated that some of the variables that constitute the system boundary were based on participants' understanding of the factors that can influence LC implementation in Ghana.

Table 5.2 System Boundary for Infrastructure Sub-System

Challenge Code	Challenge Type
Infrastructure (I)	**Type 1: Endogenous Variables**
I_1	Infrastructure capacity
I_2	Social Environment
I_3	Employment
I_4	Disputes
I_5	Theft
I_6	Business Environment
I_7	Reputation
I_8	Legal action
I_9	Delay
I_{10}	Economic growth
I_{11}	Legal cost
I_{12}	Local Content Development
	Types 2: Exogenous Variables
I_{13}	Institutional infrastructure
I_{14}	Social infrastructure
I_{15}	Educational infrastructure
I_{16}	Business development infrastructure

Table 5.3 System Boundary for Human Resource Capacity Sub-System

Challenge Code	**Challenge Type**
Human Resource Capacity (HRC)	**Type: Endogenous Variables**
HRC_1	Human resource capacity
HRC_2	Relevant programmes
HRC_3	Local content development
HRC_4	Expatriates
HRC_5	Knowledge transfer
HRC_6	Local content fund
HRC_7	Economic growth
HRC_8	Training
HRC_9	R&D Centres
	Types 2: Exogenous Variables
HRC_{10}	Joint Venture
HRC_{11}	Higher education institutions
HRC_{12}	Local content policy
HRC_{13}	Business development infrastructure

Table 5.4 System Boundary for Finance Sub-System

Challenge Code	**Challenge Type**
Finance (F)	**Type: Endogenous Variables**
F_1	Local oil companies
F_2	Financial institutions
F_3	Training
F_4	Local content fund
F_5	Participation
F_6	Economic growth
F_7	Local content development
F_8	Technology transfer
F_9	Joint venture
F_{10}	Business environment
F_{11}	International oil companies
F_{12}	Insurance
F_{13}	Local content policy
	Types 2: Exogenous Variables
F_{13}	Oil and Gas fees and charges
F_{14}	Development partners
F_{15}	Local content policy

Table 5.5 System Boundary for Technology Sub-System

Challenge Code	**Challenge Type**
Technology (T)	**Type: Endogenous Variables**
T_1	Skills development
T_2	R&D centres
T_3	IOCs obligations
T_4	Joint venture
T_5	Technology transfer
T_6	Technology capacity
T_7	International competitiveness
T_8	Worker agitations
T_9	Political interference
T_{10}	Expatriates
T_{11}	Economic growth
T_{12}	IOCs obligations
T_{13}	Local content development
T_{14}	Business environment
	Types 2: Exogenous Variables
T_{13}	Local content policy

5.3.2 Infrastructure Sub-Model

Figure 5.2 depicts the various cause-and-effect scenario of different factors likely to impact infrastructure development in the oil industry. Using Vensim software and the guidelines outlined above, Table 5.2 formed the critical parameters in modelling figure 5.2. As already explained above, these boundary parameters are based on the participants' understanding of local content policies usage in the petroleum industry and the need to have a manageable model size for easy appreciation of the intricacy involved in developing infrastructure for the industry.

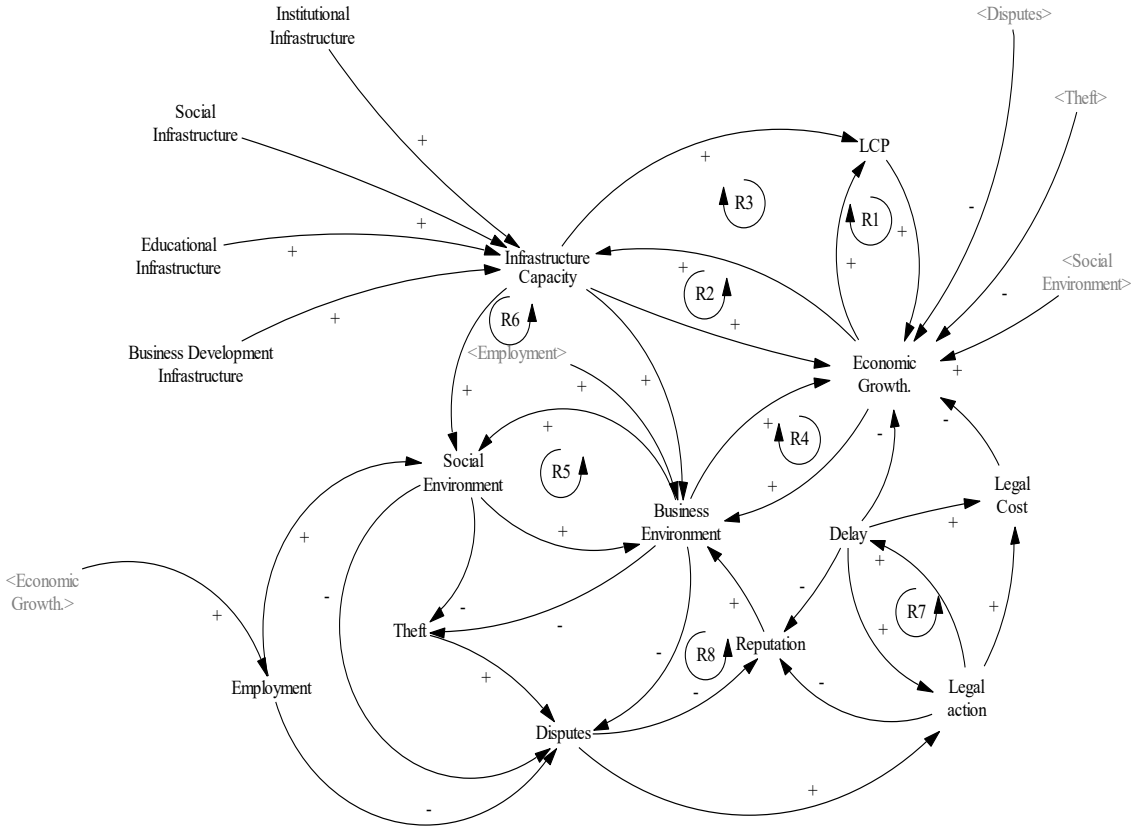


Figure 5.2: Causal Loop Diagram of Infrastructure sub-model

Figure 5.2 dynamic hypothesis (cause-and-effect diagram) is expressed in the interrelations between different causes in the system, creating cause and effect loops, making LCD variables form a network of dynamic behaviours. It can be seen from the infrastructure sub-model that it contains the feedback loops of reinforcing (positive) from R1 to R8. Hereafter, this analytical model's emphasis will be on dealing with the loops as indicated in Figure 5.2, which are dealt with in Chapter 6. Figure 5.2 illustrates that, as Infrastructure Capacity increases, it will impact Social Environment, Economic Growth, Business Environment and Local Content Development (LCD) variables positively. Also, Infrastructure Capacity impacts economic growth, which positively impacts infrastructure Capacity, thereby forming a reinforcing loop, R1. As LCD increases, it positively impacts Economic Growth and Economic Growth, which positively impacts LCD, forming another reinforcing loop R2. Again, the increased LCD will impact Economic Growth, and Economic Growth will positively impact Infrastructure Capacity forming loop R3.

Here, it must be noted that disputes and theft variables will negatively impact economic growth, while the social environment impacts economic growth positively. Reinforcing loop R4 suggests that an increase in Economic Growth impacts the Business Environment positively, and the Business Environment will positively impact Economic Growth. R5 suggests that an increase in Infrastructure Capacity will impact the Social Environment, which in turn impacts the Business Environment, Economic

Growth, and finally, will impact Infrastructure Development. Reinforcing loop, R6 suggests that an increase in the Social Environment affects the Business Environment, and the Business Environment positively impacts Social Environment. Also, R7 suggests that an increase in Delay will increase Legal Action, and an increase in Legal Action will, in turn, increase Delay. Finally, the last reinforcing loop R8 suggests, that as the Business Environment increases, it will reduce Disputes, and reduced Disputes will positively affect Reputation, and a positive Reputation will encourage Business Environment.

In the above cause-and-effect scenario for infrastructure development, the diagram focuses on one of the foundational blocks of CLD, *Reinforcing Loop, R1 – R8*. The questions that arise are:

- *how do you effectively deal with a reinforcing loop in the above scenario*?
- *What are the policy options for the above scenario?*

5.3.3 Human Resource Capacity Sub-Model

The human Resource Capacity model is the second model within the LCD system model. Figure 5.3 provides a construct of human resource capacity development typical of oil-rich developing countries. The system boundaries of Table 5.3 are used in constructing the model, which is divided into endogenous and exogenous variables.

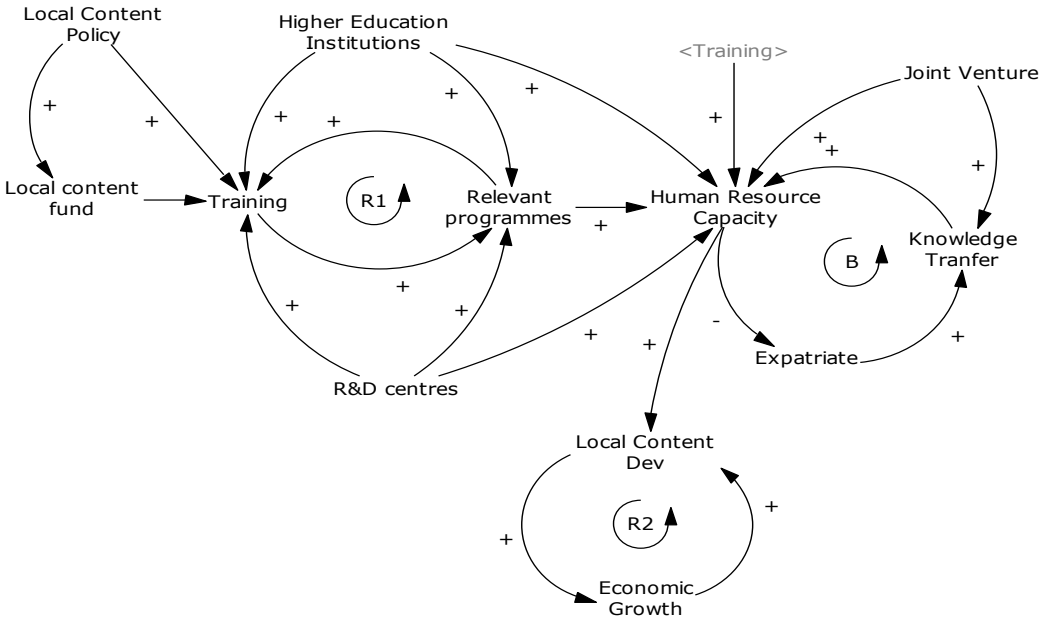


Figure 5.3: Causal Loop Diagram of Human Resource Capacity sub-model

The Human Resource Capacity sub-model has three feedback loops: reinforcing and balancing loops, as indicated in Figure 5.3. This Figure illustrates that a well-drafted Local Content Policy, Local Content Fund, Higher Education Institutions and R&D centres combined to influence Training positively. As Training increases, it will influence Relevant Programmes, which in turn will influence Training positively. At this juncture, a reinforcing feedback loop is formed (R1). Again, the variables of Higher Education Institutions, R&D centres, Relevant programmes, Joint Venture and Training will affect Human resource capacity positively, hence with plus sign attached to the arrow signifying the positive effect. As Human Resource Capacity is developed locally, the number of Expatriates required

is negatively affected, reducing their number. However, the presence of Expatriates will affect knowledge transfer to the host country positively.

The other variable that positively affects Knowledge Transfer, as indicated in Figure 5.3, is the existence of a Joint Venture (JV) between local and foreign companies. Consequently, as Knowledge Transfer increases, it will then affect Human Resource Capacity positively. At this point, a balancing loop (B) is formed, which suggests that the Human Resource Capacity variable's development reduces the Expatriate's variable. However, the presence of Expatriates boosts Knowledge Transfer and, in turn, boost Human Resources Development. It can be noted here that local content regulations should be crafted to not deprive the country of the experience that comes with expatriates' presence.

Again, as Human Resource Capacity is developed locally, it positively affects Local Content Development, leading to Economic Growth, and likewise, as Economic Growth increases, it will increase Local Content Development positively. At this point reinforcing loop (R2) is formed, which means that as Local Content is developed, more goods and services will be produced locally, replacing imported goods and services, leading to Economic Growth. This sub-model has three exogenous variables: Local Content Policy, Higher Education Institutions and Joint Venture.

Here too, the emphasis is on the feedback loops, reinforcing and balancing loops, R1, R2 and B and the system as indicated in Figure 5.3. How does it influence policy intervention vis-à-vis the challenge of HRC in the Ghanaian oil industry?

5.3.3 Technology Sub-Model

The Technology sub-model is the third model within the LCD model using the variables shown in Table 5.4. Figure 5.4 illustrates that, as local content policy increases, it will positively impact Local Content Fund and IOCs obligations. Thus, Local Content Policies will set out IOCs' requirements to ensure knowledge transfer, and a fund can be set up to boost knowledge transfer. The variables of Local Content Fund (LCF) and IOC obligations will impact the Joint Venture positively. Similarly, Joint Venture and R&D will impact Technology Transfer and Skill Development positively. An increase in Skills Development will lead to Technology Transfer. Again, as Skills Development, R&D centres and Technology Transfer all increase, it will lead to greater Technological Capacity. At this juncture, the feedback loops of reinforcing and balancing start forming.

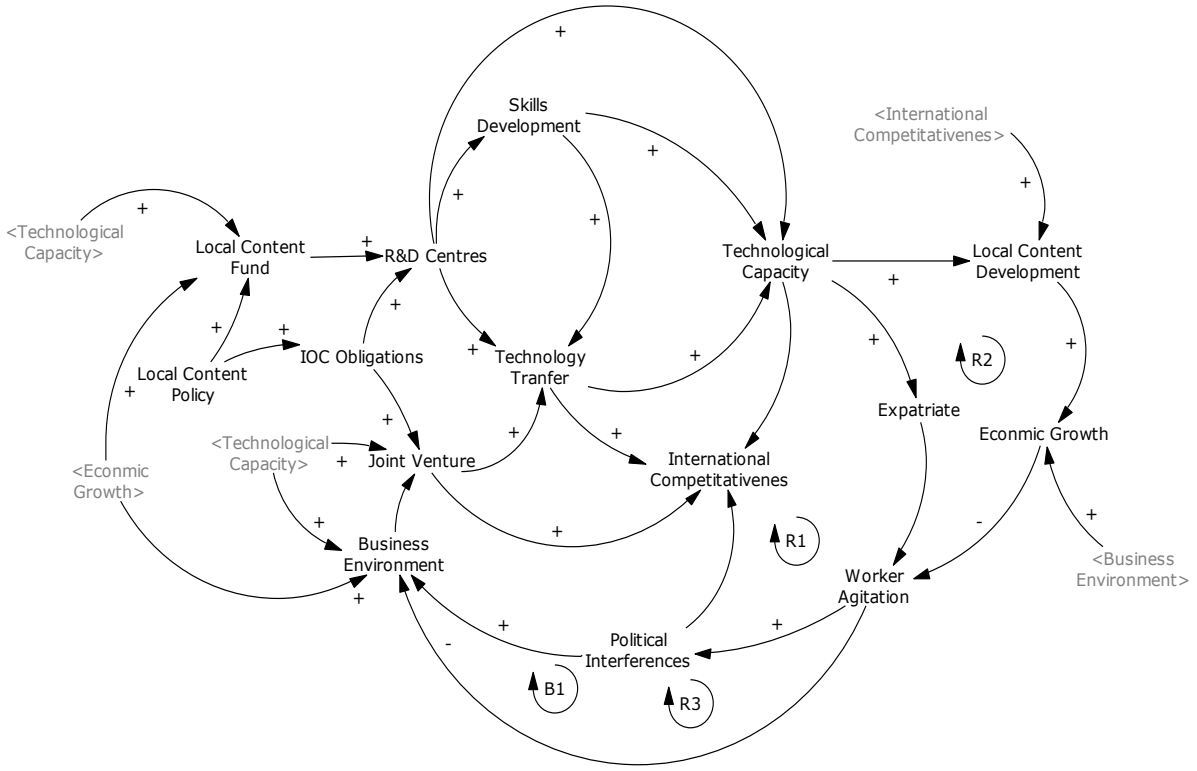


Figure 5.4: Causal Loop Diagram of Technology sub-model

When Technological Capacity is developed, it will, in turn, impact Local Content Development and, at the same, Technological Capacity will reduce (impact negatively) Expatriates. As the variable Local Content Development increases, it will positively impact Economic Growth and reduce Worker Agitation. As Technological Capacity is developed, the Expatriate variable will be reduced, which in turn is expected to impact the Worker Agitation variable (will be reduced). The greater Worker Agitation, the more Political Interference is increased, which in turn will affect Business Environment, which also, in turn, will affect Joint Venture positively, leading to Joint Venture increasing Technology Transfer positively and finally, Technology Transfer affecting Technological Capacity to form R1.

Reinforcing loop, R2 forms (indicated in Figure 5.4) because of an increase in Economic Growth (as a result of Technological Capacity affecting Local Content Development and Business Environment which in turn affect Economic Growth) will reduce Worker Agitation, which in turn affect Political Interferences positively, which also affect Business Environment positively. The loop continues, which affects Joint Venture positively, which affects Technology Transfer, and finally has a positive impact on Technological Capacity.

At B1 (balancing loop), an increased in Technological Capacity affects Expatriate positively, which in turn affects Worker Agitation positively. The greater the variable Worker Agitation, the more that the Business Environment variable is affected negatively. The Business Environment will affect Joint Venture positively, which will affect Technology Transfer and, finally, Technology Transfer affecting Technological Capacity positively. Similarly, at R3, Economic Growth (increased because of increased in Technological Capacity and Local Content Development and Business Environment) will affect Worker Agitation positively, which in turn will affect Business Environment negatively. As the loop continues, the Business Environment will affect Joint Venture, which affects Technology Transfer positively and finally affects Technological Capacity. Finally, the rest of the model system illustrates that as the variables Joint Venture, Technology Transfer, and Technological Capacity develop, they positively impact the

variable of International Competitiveness. In other words, the competitiveness of local companies will be raised.

Similarly, in addressing the issue of technology transfer, the focus will be on the feedback loops, reinforcing and balancing loop, R1-R3 and B1 and the CLD, as indicated in Figure 5.5. The subsequent validated model will inform the policy alternatives.

5.3.4 Finance Sub-Model

Table 5.4 provides exogenous and endogenous variables used in conceptualising the Finance sub-model labelled Figure 5.5. From the said Figure, as Local Content Policy increases, it impacts Insurance, Local Content Fund, and International Oil Companies positively. Similarly, as International Oil Companies increases, it also positively impacts Local Content Fund, and the reverse is also the case; Local Content Fund impacts Local Oil Companies positively. This then impacts on Local Content Fund positively, thereby forming the reinforcement loop R1.

In addition, increases in Local Content Fund will increase Training, which impacts Local Oil Companies, which then positively impacts Local Content Fund, thereby forming the reinforcing loop, R2. Another reinforcing loop (R3) is formed between Local Oil Companies and Business Environment. Thus, any increase in Local Oil Companies will impact Business Environment positively, which will, in turn, impact Local Oil Companies. Again, Business

Environment will impact International Oil Companies (IOCs) positively, and IOCs will then impact Business Environment positively, forming the reinforcing loop R4.

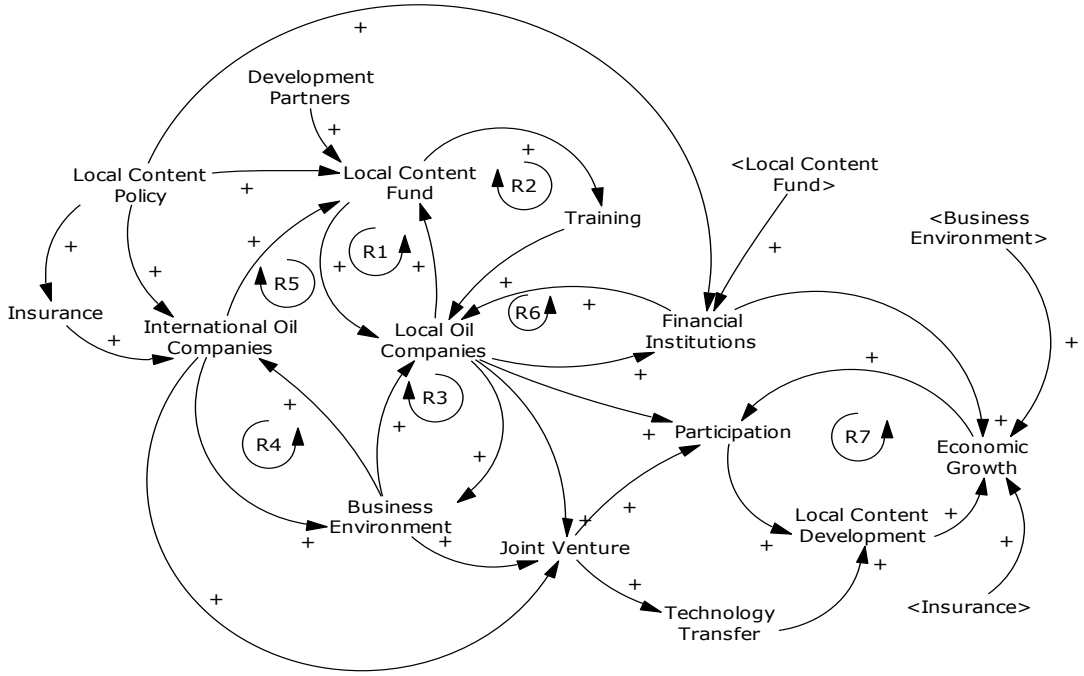


Figure 5.5: Causal Loop Diagram of Finance sub-model

As IOCs increase, it will impact LCF in a manner that results in an increase, impacting Training. As Training increases, it will impact LOCs, which will impact positively on Business Environment, and then finally, this will impact IOCs, thereby forming reinforcing loop R5. Reinforcing loop R6 is formed because of an increase in Local Content Policy (LCP), which impacts Financial Institutions positively, leading to a positive impact on LOCs, which will boost Financial Institutions. As IOCs increase, it will impact Joint Venture positively, which increase will impact Participation and Technology

Transfer positively. Increases in Participation and Technology Transfer will impact LCD positively, resulting in a positive impact Economic Growth. Increases in variables such as Business Environment, Financial Institutions, and Insurance variables will all impact Economic Growth positively and thereby impact Participation positively, forming the reinforcing loop R7.

As stated in the preceding themes, the question that arises will be focused on the *reinforcing loops, R1 – R8 and the system as a whole and its policy options*. It must be stated that the final loops for this sub-model and the preceding ones can change depending on the *research participants' validation of the CLDs*. In Chapter 6, the final models on the above themes are produced with their attendant strategies based on participants' validation of the models as a conceptualisation of the issues in the LC implementation in Ghana.

5.4 Initial Models Pretesting

After constructing the initial LCD model, the researcher decided to elicit experts' opinions on whether the CLD for LCD and its sub-models demonstrate and capture all the critical variables for LC policy implementation in Ghana. Additionally, pretesting allows the researcher to assess the models' clarity, clarify ambiguities about the purpose of the model, and identify potential obstacles before deciding the appropriate method for the validation. The model was sent to three experts in system thinking and local content analysts to critique the models. This allowed the

researcher to factor the responses into the final models for qualitative validation. Based on this pretesting, a focus group was chosen as the validation method, allowing the researcher to ask a follow-up question and assess how other participants would react or disagree with the identified variables. It also became apparent how the online workbook emailed to respondents would need rewording to include detailed instructions to the participants.

5.5 Chapter Summary

This chapter primarily focused on developing and explaining the initial CLD for LCD and its sub-models based on the participants' understanding of LC implementation, among other factors. Using Vensim software, the four variables of Infrastructure, Technology, Finance and Human Resource Capacity were developed into causal loop diagrams depicting cause-and-effect in the models. The models produced reinforcing loops, R1 – R8 for the Infrastructure sub-model, reinforcing and balancing loops R1-R3 and B1 for the Technology sub-model, reinforcing loops R1 – R8 for the Finance sub-model, and reinforcing and balancing loops R1-R2 and B for HRC sub-model. Thus, the cause-and-effect relationship in the models helped explain the root cause of the issue under consideration. The chapter concludes the initial verification process.

CHAPTER SIX: QUALITATIVE FINDINGS AND ANALYSIS

6.1 Introduction

The chapter analyses primary data collected via a focus group and one-on-one interviews with the Ghanaian oil and gas industry stakeholders. The data collection methods were employed to gain insight into the experts' opinions on the linkages in the constructed models and the solution to the LC challenges. As the primary data collection method, the focus group was primarily used as it allowed the researcher to assemble all the stakeholders in one meeting, therefore reducing research costs, while the one-on-one method served as a backup method for any research participants unable to attend the group discussion. The chapter commences with a systematic explanation of the qualitative approach and ends with analyses findings.

6.2 Qualitative Approach

A total of 15 research participants were selected using purposive and snowball samplings from players in the oil and gas industry to participate in the study. The focus group and the face-to-face had nine participants and six interviewees, respectively, selected from policymakers and regulators, civil society organisations, educational institutions, O&G companies, and financial institutions. This selection was premised on participants' expertise relevant to the aims of the research. The participants' interdisciplinary background brought a broad perspective in line with the nature of the study (demographic data shown in Tables 4.3

and 4.4 (Chapter 4)). Before the interview, letters were sent to potential interviewees detailing the study's purpose, the interview schedule (see Appendices 5 and 6) and the research's general ethics (see Appendix 7). This is consistent with Ryen's (2016) assertion that research subjects have the right to know that they are being researched, the nature of the research, and the right to withdraw.

To systematically and logically analyse and then interpret the collected data, the study adopted the steps proposed by Creswell (2009), as shown in Figure 4.4 (Chapter 4). The first step involves organising and preparing the data in the form of a thorough transcription of the recorded data without altering the meaning, context and words used by the respondents. To ensure the transcribed data's accuracy, transcripts of the interviews were sent via emails to the interviewees to authenticate the accuracy of the information. The next step involves reading and reflecting on the transcribed data to familiarise with the content and its general sense. After this stage, the collected data was exported into NVivo software for coding based on pre-determined themes extracted from the interview schedule. The collected data was then explored to identify phrases and sentences that capture or explain the pre-determined themes.

This process was repeated until the collected data was exhausted and new themes emerged. The last two steps involved representing the data within the report and interpreting it. The interpretation of data involved using the

themes identified during the coding process, which Creswell (2009) postulated allows the data gathered to be reduced to a meaningful size.

6.3 Findings

The interviews' findings are divided into two sections: Section one covers interviewees' opinions about the existence of relationship elements in the causal loop diagram (CLD), which disentangles the problem under consideration. Section two presents the participants' policy recommendations predicated on the models.

6.3.1 Section 1: Relationship Elements

This section presents a detailed analysis of the respondents' data as to whether any relationship exists within the causal loop diagram (CLD) for Local Content Development (LCD) that comprises the enabling variables of Infrastructure, Technology, Finance and Human Resource Development. Additionally, the sub-models of the above CLD are analysed. The next topic analyses the relationships in the causal loop diagram for LCD based on the interviewees' opinions.

6.3.1.1 Causal Loop Diagram for Local Content Development

This explores the possibility of causal relationships in the conceptual model for local content development (LCD) based on the identified challenges. More importantly, the model serves to disaggregate the central theme of the research, provide deeper insights and challenge research participants

to holistically consider the cause and effect of any policy recommendations thereof. As argued by Boateng et al. (2013), the use of feedback diagrams (CLD) can:

- Contribute to policy discussion,
- Need to persuade stakeholders of new insights,
- Challenge policymakers to be wary of overconfidence in taking decisions, and lastly,
- Help policymakers know the essence of endogenous views in effective policymaking.

Consequently, the model hypothetically represents how the enabling variables of infrastructure, technology, human resource capacity and finance affect the output, local content development. After a brief introduction to the research topic, the participants opined on what constitutes a causal relationship and, more importantly, as used in the conceptual model.

"When enabling factors can result in a change of an output factor" ***RP/LLO/01***

"…when an event causes a resultant effect…" ***FGP/AD/01***

"…factors that have a positive impact on local content development…" ***FGP/LE/07***

"a causal relationship exists between two entities when another factor causes an outcome…" ***RP/AD/03***

"The challenges we have in implementing the policy...availability of these impact local content development." ***FGP/BA/05***

"…the model confirms…one way or the other what had been said in terms of problems and the contributing factors…" ***FGP/PA/03***

The quotations demonstrate the participants' perspectives of the cause-and-effect relationship used in constructing the models. The respondent, **FGP/BA/05,** used the challenges facing LC policy implementation to explain the causal linkage by stating that the availability of infrastructure, technology, finance, and human resource impacts local content development. Research participants unanimously acknowledged the importance at the early stages of the legislative instrument on local content having an enabling environment to support the policy implementation. Most respondents contended that local content success would be marginal and with little impact in the host country without these prerequisite variables.

"… it is good to pass the law…but you need the enablers. One of the critical ones was Supply Chain Development Program". ***FGP/AD/01***

"…infrastructure for me it shouldn't be limited to roads, electricity and stuff like that…you need something like standard authority…do they have requisite experience to certify and enforce laws and regulations…" [sic] ***RP/LLC/06***

"In our analysis what we saw in the case of the Brazil…they had an active Supply Chain Development Program (HRD) and they used that to push and support the [local content] policy with funding…" [sic] ***RP/TO/05***

"Local Content in Ghana is around 20% but the fundamental problems are still there…" ***FGP/MA/04***

"The issue of financing, technology transfer and capacity issues persist as you move higher the value chain around like FEED, engineering etc. Because Ghanaians are currently in charge of logistics, transport etc. the authorities are somehow happy." ***FGP/LCO/09***

Some research participants refer to these variables as "enablers", which have been critical in LC implementation success in Brazil and elsewhere. In Ghana's case, one research participant acknowledged these fundamental challenges impeding the LC policy and legislation. According to this respondent, Ghana is focused on capturing the commanding heights in transport, restaurants, sewing of jackets, and logistics which he termed as:

"…low hanging fruits…" ***FGP/PA/08, FGP/LCO/09***

All the research participants identified a causal relationship in the conceptual model for LCD. One participant used the term "interplay" (**FGP/LE/07**) to denote the variables' relationship.

"…interplay exists in these enablers; infrastructure, HRC, Technology, finance which impact local content development positively…" ***FGP/LE/07***

"…the relationship between infrastructure and technology is strong…and between technology and finance likewise strong…" ***FGP/TA/06***

"Without requisite local skills and expertise, the employment aspect of the policy will fail…and for that purpose, you need physical and institutional infrastructure to bring to fruition. So, that strong relationship exists between infrastructure and local skills and expertise development." ***RP/LLO/02***

"Yes, the four factors have relationships with each other… and all the factors have positive impacts on local content development." ***FGP/AD/01***

"…infrastructure is the crucial catalyst for developing human resource and technology…and to some extent the financial institutions…" ***RP/LE/04***

"A causal relationship exists in the model…which is generally agreed to be the factors for LCD." ***RP/LCC/06***

Explaining the importance of these variables and their causal relationships, participants accentuated finance availability as crucial in developing infrastructure to support local suppliers and manufacturers. Similarly, finance can be used to support supply chain development programmes and training and the development of technology via R&D. Interviewees had a consensus on causal relationships in the variables of infrastructure, human

resource development and technology transfer. The institutional aspect of infrastructure is responsible for setting standards, setting targets, monitoring, and enforcing compliance in-line with LC regulations on manpower training, succession planning and technology transfer policy by oil companies and suppliers. This will be anchored in physical infrastructure to support domestic technology development and human resources training in local research institutions and universities.

Accordingly, the research participants concluded that these factors' availability is imperative for the thriving of local content development in the oil industry. Whilst it can be concluded that all the interviewees concur on the causal relationship in the conceptual model, several participants opined that the rate of impact of the variables on each other and the output differs. For some of the interviewees, if values are assigned to the variables, some variables will be higher, as expressed in the below quotes.

"…there are those relationships among all the factors…just that some factors have more impact than others. For instance, the rate of HRC and infrastructure impact is high on LCD…" ***RP/LLO/01***

"…impact level of the factors in the order of finance, infrastructure, human resource and technology…" ***RP/LCC/06***

"The only difference is that some of the impact of the challenges on the other factors is minimal." ***FGP/MA/04***

"…in all of this infrastructure and HRC have more impacts on local content development…" ***FGP/TA/06***

"…all the four factors serve as the enablers for local content development with differing impacts level…" ***FGP/LE/07***

The above quotations demonstrate the participants' attempt at quantifying the varying impacts levels of the variables. In other words, the enabling variables have no equal value to the output variables (**FGP/AD/01**). Two of these interviewees agreed that, in the context of local content development in the oil industry, the impact of technology on infrastructure would certainly not be the same as the impact of infrastructure on technology. Likewise, the impact of HRC on infrastructure will not be much as vice versa. Participant **RP/LLO/01** suggested that "some of the models' relationships are not that strong, especially the impact of technology and HRC on infrastructure is minimal". In all of the variables, participants **FGP/BA/05** and **FGP/TA/06** argued that finance would be the main driving force, followed by infrastructure, human resource and technology. The interviewees suggested the addition of the following variables to the model.

"Some of the challenges are regulatory in nature…which can fall under institutions…" ***RP/TO/05***

"Another regulatory challenge is… institutional theft war/institutional collaboration…" ***FGP/LCO/09***

6.3.1.2 Causal Loop Diagram for Finance Sub-Model

This theme delved into the causal loop diagram (CLD) for the Finance sub-model and is meant to help formulate finance policy. This breaks down the various factors that will influence the policy thereof. This gives research participants a broader and holistic perspective in understanding any policy's consequence that will be proffered. After a brief explanation of the model, respondents were asked to discuss the linkages in the model and identify any missing variables or linkages not representative of the issue under consideration. The responses were centred around the variables of the Local Content Fund (LCF), business environment, and financial institutions in linking with the other variables in the model.

Furthermore, the research participants' responses were categorised into those who support the usage of the local content fund and those against its use. Two-thirds of the respondents supported creating the local content fund to support local business's ability to participate in the oil industry. This group argued that a secretariat should be established with clear rules regarding which projects it can fund and the qualifying criteria.

"A secretariat for the fund with clear rules, what projects they can fund and the qualifying criteria..." ***RP/LLO/02***

"…in terms of determining who qualifies should be determined externally…a special committee…made up of representatives from both the state and the private players in the industry…" ***RP/AD/03***

"…clearly outline the process for submitting your business plan, you need to show your 3-year financials, KPIs, the management structure that meets the benchmark…" ***FGP/BA/05***

"…the fund should make sure you (local company) are using the money for what you said you would use for, such that you can pay or contribute back into the fund." ***RP/LE/04***

For some of the LC fund's proponents, "the operationalisation of the fund matters as well as the sources of funds" to ensure return on the state's money and curtailed misappropriation. This will demand what the respondents called "business enablers" to build and structure companies (**FGP/BA/05**). This respondent, who is a banker, further stated below.

"…the fund beyond giving you the money should now make sure that there is an accelerator program…in terms of providing business support services, incubator services…in terms of providing business support services, incubator services etc". Either than that, I can guarantee you that people will go and use the money for

whatever they deem fit" ***FGP/BA/05.***

"…there is a challenge where the money will be given to politically connected companies…" ***RP/AD/03***

Research participants expressed concern that the O&G revenue sources should have been specified for the LC fund. Participants further recommended that "in terms of determining who qualifies should be determined externally…a special committee…made up of representatives from both the state and the private players in the industry" **RP/LCC/06**. Conversely, the other respondents emphasised that, from a long-term perspective, the country should focus its attention on "how responsive is the financial sector is to the oil and gas industry and the general local content ideology" [sic] **FGP/DO/02**. The local financial institutions' high-interest rate is seen as a barrier to the local supplier growth. One interviewee cited the challenge his company went through in securing a loan from a bank.

"…our company produces chemicals for Tullow Oil Company and other IOCs…we went to the bank for a million Ghana Cedis [approximately $200,000 as of 2019] …the bank said they will charge 26% interest plus collateral. This is a big barrier to local suppliers. So, if you are bringing in this fund, then, of course, this fund will be giving you money with an interest of less than 10% which helps" ***FGP/PA/08****.*

This high-interest rate is partly attributed to the local companies' poor credit rating, no collateral or history, making it challenge to extend loans. Again, the facilitating funds to "what we refer to as 'one-man company' or poorly structured company in an unfavourable macro environment, and the lack of guarantees" is seen as risky by the banks …" **RP/AD/03.** An official from the upstream regulator, PC, said the commission has tried to encourage the local banks to cooperate to support businesses but with no success.

"…the commission held a program for these financial institutions and told them the need for them to come together instead of going in isolation, but the level of trust is another thing all together…it is their orientation, the truth of the matter they would not want to go into oil and gas." ***RP/LLO/02***

For one research participant, the pool concept introduced in the insurance sector can be replicated in the financial industry. This involved "…6 local companies came together to form something like a pool concept or Ghana Insurance Syndication Concept. As a result, the firms were able to syndicate and placed the insurance collectively with this pool…" **FGP/BA/05**. The other means of supporting the banks and local companies is through government guarantee but "*there is a lot of history to this government guarantee, usually when the government guarantees people are bound to take it as free monies, they can default or as seen mostly default*" **RP/AD/03**.

Respondents were asked whether current government policy in addressing the issue of finance has been successful. Most respondents said much had not been done regarding implementing the LC fund, "*which was supposed to help actualise this…was not set up several years after the passage of the regulations*" **RP/LE/04**. However, officials from the regulator who was part of the discussion disagreed. They said, "*the fund has been established…and an account has been opened at the BoG…and contributions are being made*". Beyond that, the regulator's official further said the following:

"*…financial services guidelines being developed by the PC…the PC has engaged at various forums and brought the association of bankers in Ghana together with businesses to dialogue yearly and see how they can work together on every PC forum and especially during local content forums…and also for the local businesses to share their challenges and the issues they have*" **FGP/LCO/09**.

The regulator's respondents argued that it is not part of their core responsibility to finance local companies but "to facilitate collaboration between the banks and SMEs" **RP/LLO/02**. For one respondent, "*government has a number of credit facilities through MASLOC, NEIP, EximBank among others" to assist SMEs. The challenge is that "these are not well coordinated and often grant small facilities (e.g., MASLOC), requires a number of steps and are politicised in some cases*" **RP/LCC/06.**

6.3.1.3 Causal Loop Diagram for HRC Sub-Model

The next developed sub-model is the human resource capacity, demonstrating the factors needed to develop the oil industry. As discussed in the preceding models, the respondents were briefed on the causal loop diagram for HRC. Subsequently, respondents were asked to discuss, analyse, and suggest new linkages in the model. Respondents' suggestions included making the "*variable local content more explicit as the policy and the law are two different things…probably, you should rename that variable, local content regulation (law and policy)*" **FGP/PA/08**. Likewise, research participant **FGP/PA/03** made the point that "…*emphasis needs to be placed on relevant human resource…because not all human resource is relevant to the industry*".

In pursuit of building human resources for the industry, research participant **FGP/AD/06** observed that different government agencies are pumping millions of dollars into "*training which is not relevant and coordinated in identifying the required personnel to plug the skill gap*". Furthermore, research participant **FGP/AD/06** suggested that "we can chip in skill gap in terms of human capacity in the sub-model; you need to know where the problems are…the skilled gap…you need to identify the gaps and then train the right people". According to some respondents, at times, what the government can do to ensure its people are adequately trained is:

"…put in policy and ensure monitoring and compliance with succession planning as quoted below" ***FGP/PA/03****,*

"…the PC must have a clear metric for measuring plan…and means of verification" ***RP/LLO/01***

"…the documentation of the succession plan success has been averaged so far." ***FGP/PA/07,*** *and*

"…there should be punitive actions for those who don't comply." ***RP/LCC/06***

One respondent who works with an IOC said, "*the petroleum commission (PC) has been doing fantastic in the past few years…they have been a pain in the neck of international companies",* but *"then there are areas that probably we Ghanaians who are working with these foreign companies…we need to whistle-blow any infractions on the part of the companies*" **FGP/AD/01**. Research participant, **FGP/DO/02** agreed with **FGP/AD/01** and cited what he believes is happening in the industry "*the oil companies seek permission from the PC to bring in an expatriate with a certain skill that is not available for many months with the assumption that he will train a local as required by the succession plan. This plan is truncated along the way, and then the oil companies request for permission to bring in a new expatriate with the cycle being repeated*". It is at this point that the PC should ask "*what level of training did the first transfer in relation to the succession plan achieved"* and *"Ghanaian workers in these companies should be blowing whistle of these activities to the PC*" **FGP/DO/02**.

Apart from the above, interviewees suggested that the models' variable training component should encompass the Enterprise Development Centre (EDC) and the technical institutions. They argued that there are different levels of training: training (given by oil and gas companies to their employees) either on-site or remote and the formal training you will get from a technical Institute. This calls for close collaboration between the institutions, as quoted in the respondents' suggestions below.

"There are three-way partnerships: technical Institute, universities and R&D centres and they all work side by side in the industry (building a three-way partnership)." ***RP/LE/04***

"Strong partnership between the educational institutions; higher education, technical institute and the R&D centres…and of course, they have to be funded either from the local content fund or by industrial itself…" ***RP/LLO/02***

Also, either resourcing existing universities or setting up "Ghana Petroleum Institute similar to what the Mexicans calls Mexican Petroleum Institute (MPI)…which is one of the things that have advanced local content a lot in Mexico" **RP/LE/06**. Research participant **RP/LE/06** suggested that what Mexican Petroleum Institute (MPI) does is bring the different research bodies together. The MPI is a government-funded body but a technical think tank researching reservoir work, local content related stuff and other issues that bring the industry together. Juxtaposing this with local universities, some research respondents argued that the local universities are not

producing the requisite personnel with their responses quoted below.

"…there is a mismatch between curriculum…and what is being taught in the schools to be able to really fill what the industry actually needs…so you realize that there is a lot of theoretical aspects been done in school…" ***FGP/MA/04***

"…when they come out (graduate) the practical side is missing…and that delays the succession planning meaning how quick a Ghanaian can take over an expatriate position…" ***FGP/LCO/09***

"We have a lot of engineers in country…however we do not have a specialization, so it becomes difficult to close that gap which makes it difficult not to accept expatriates into the industry…" ***RP/LLO/02***

"…currently we have two institutions which are not well-resourced COTVET and CICAM…so the kind of equipment and machinery they need to develop the capacity is not there…" ***RP/AD/03***

The above situation has led the TEN and Jubilee development partners (Ghana offshore oil fields) to set up a training centre at Takoradi Technical University, Ghana, to develop people's capacity in instrumentation and mechanical skills Etc. An official from the sector ministry said they are trying to improve the "*kind of curriculum used, retooling, thus equipment and machinery…the practical things to help people understand is not readily available and looking at the cost of enrolling which is quite expensive for*

people" **FGP/LCO/09**. Whilst there was a unanimous agreement among the research participants that the JV variable is to bridge the skill gap in the local companies, respondents further agreed that this has not been successful.

Some participants intimated a culture within the Ghanaian business sector that discourages partnership among small companies that respondent **RP/TO/05** characterised as "*everyone wants to be the boss*". Invariably, this culture creates small companies that are not viable, without any formal structure, lack market capital and technical capacity to access loans from banks or pay their share of equity in partnership with foreign companies. As a result of the above, local companies that "*partner foreign oil companies do that without participating in the day-to-day activities in the partnership*" **RP/LE/03**. Consequently, many local companies 'front' (as referred by the respondents) for the oil companies and suppliers and just receive their profit at the end of the financial year. This defeats the intended purpose of transferring skills and know-how to locals. Respondents' responses are quoted below.

"…there is a certain culture problem when it comes to forming partnership…" ***RP/LLO/02***

"So, what is happening in practical is fronting…so somebody comes and say, I have a company registered with the petroleum commission, but he really doesn't

want to go into the actual production of material that will be supplied…" [sic] ***RP/TO/05***

"We realized that we [PC] were not implementing local content after all because if you go and import items and supply to the oil and gas companies you have developed nobody's capacity". ***RP/LCC/06***

"…what happens is that people will just say that I have a farm somewhere I will produce meanwhile they are importing the food to come and supply which is difficult to locate the source…which is defeating the purpose of the joint venture." ***FGP/AD/01***

"Fronting is a big deal defeating succession planning, local capacity building and knowledge and technology transfer…" ***FGP/PA/03***

To achieve the intended purpose of the JV will require monitoring by PC and applying punitive sanctions. As one respondent puts it, "*there should be consequences when you do not follow, you see if somebody fronts and goes free, he will front again*" **FGP/LCO/09**. Respondents were asked about any government policy towards addressing human resource capacity and whether it has been successful. One respondent estimated that in 2019 alone, state institutions such as GetFund, and GNPC Foundation (under state oil company) enrolled over 50 students in the University of Aberdeen and Robert Gordon University, UK. Respondents' responses are quoted below.

"*Yes, Scholarships have been awarded and petroleum desks established in 4 universities locally.*" ***RP/LLO/02***

"…there has been a lot of training in various oil and gas programs in the UK…" ***RP/LE/04***

"…probably £5 million has been spent on fees etc. on students abroad since 2009…" ***RP/TO/05***

The above quotes show there is a deliberate effort to boost the human resource capacity in the industry. However, the question that arose as posed by one respondent was, "*are these people using their skill sets gained from the abroad training in the Ghanaian oil industry*?". The answer to that is "*when you go to the PC, there are four to five people who did programs at the University of Aberdeen (petroleum economics, engineering, geoscience Etc.) who are actually doing the work and delivering on their mandate. However, most of the graduates tend not to be employed due to the programmes they offered mostly management programmes*" **RP/TO/05**. Domestically, the PC has some initiatives that focus on an internship for graduates and technical skills training.

"Ghana Upstream Internship Placement (GUSIP)…for graduates who have finished tertiary institutions." ***FGP/TA/06***

"…the Accelerated Oil and Gas Capacity (AOGC) Training focuses on training people in vocational and technical education as well." ***FGP/PA/08***

"The EDC was to develop to train indigenous Ghanaian companies…" ***RP/LLO/02***

"Business Advisory and Enterprise Development Department (EDC) replaced the EDC, but funding has become an issue as…" ***RP/LCC/06***

Under the Ghana Upstream Sector Internship Programme, the PC liaise with the oil companies and then places graduates into the companies to acquire six months to one-year practical experience. The Accelerated Oil and Gas Capacity trains individuals and the EDC to equip local firms' capacity to bid for contracts. The initial seed capital of $5 million by the jubilee partners has elapsed, and EDC is now "*under the auspices of the commission within a department called Business Advisory and Enterprise Development Department who then do the same role as the EDC, but sustainable funding has become an issue*" **RP/LCC/06.**

6.3.2.4 CLD for Technology Sub-Model

The technology sub-model delves into the various factors and linkages employed in its construction. Research participants were asked to discuss and confirm the linkages or suggest any additional variables with the ultimate aim of aiding technology policy formulation. As quoted below, one respondent suggested adding technological infrastructure as part of the

model.

"Technological infrastructure plays a very key role in all of this…" ***FGP/LCO/09***

For research participants, **FGP/LCO/09,** "even though we have technology as a factor, the subfactor should include technological infrastructure that comprises fibre optics to facilitate research, training and business" should form part of all the infrastructure needs enumerated in the model. The state oil company and the local companies are expected to access industry software through a joint venture, buying from the open market or incentivising local technology development. However, some research participants observed that the joint venture does not have its intended impact as local companies are not interested in acquiring the know-how but rather 'front' for international companies. This 'fronting' illegal under the law has become pervasive due to the regulator's lax monitoring and due diligence.

The other issue respondents raised is the misplaced priority of the funding agencies in the country. Research participant, **FGP/PA/08,** observed that "*if Getfund can channel its resources properly in supporting research and improving technical institutions physical infrastructure…they will be able to support local training and research and innovation*". For one respondent, "*the availability of funds and the proper utilisation of it can improve local training and domestic innovation…so, that relationship exists between*

finance, HRC and technology" [sic] **FGP/LCO/09**.

Other research participants argued that the LC implementations' challenge is "*regulatory in nature*" **FGP/BA/05**. Responding to the challenge of regulations, officials from the PC said, "*the commission has the right kind of guidelines to help people understand the industry but was lenient during the early years of industry"* [sic] **RP/LE/04**. Respondent **FGP/MA/04**, therefore, said, "*provisions made in the local content L.I [legislative instrument] need to be clarified for people to understand and then get to know the benefits*".

A respondent who works with an IOC said, "*companies normally find it difficult in complying with technology transfer plan and sharing their technology with local partners as the companies deemed it as trade secrets*" **RP/TO/05**. Initially, the PC was reluctant in applying punitive actions against non-compliance and instead encouraged the companies to share their technology with their local partners who have not been successful. Therefore, the research respondents suggested that the country invests in developing domestic technology through local universities and R&D centres appropriate to our [the country] needs.

"…so, when it comes to industrialization what we do is to keep importing technology…" [sic] ***FGP/DO/02***

"We must start developing indigenous technology through R&D centres and local universities…and have the appropriate technology to our needs…" ***FGP/TA/06***

"…indigenous technology can only be possible with the appropriate funding of R&D, requisite personnel to man these centres and universities, and the infrastructure base to support the development…" ***RP/LLO/01***

…there is also on-going drafting of national technology policy by NDPR." ***FGP/LE/07***

Respondents were asked to comment on the current technology transfer policy and whether it has been successful. They argued the E&P Law requires at least 5% per cent equity participation in oil blocks by indigenous companies as a condition for signing a PA (petroleum agreement), but this has "*not yielded the expected transfer of technology as many (local firms) are not active participants in activities on the field*" **RP/TO/05.** For one respondent, "*the local content regulations in both the petroleum and electricity sectors provides for technology transfer through the promotion of local participation. It has not been that successful. Local companies need help (financial and capacity) to identity and absorb the requisite technologies*" **RP/LCC/06.**

6.3.2.5 CLD for Infrastructure Sub-Model

Similarly, this theme focuses on the various factors influencing infrastructure policy in the oil industry, as depicted in the sub-model. Respondents were asked to discuss the linkages in the model and suggest any additional variables that will aid in formulating the industry's appropriate infrastructure policy. One respondent suggested that technological infrastructure "*plays a very key role in all of this…even though we have technology as a factor…we also need technological infrastructure such as fibre optics…and it should be part of all the infrastructure needs enumerated in the model*" **FGP/LCO/09**.

Most of the respondents observed that the starting point for formulating infrastructure policy would be to assess the "*physical and invisible infrastructure, so the question is, what is the level of visible infrastructure we have that can form a basis for the local companies to pick up from" and "we need to look at our environments and ask…what is the level of physical infrastructure, are we good*?" **FGP/LCO/09**. These questions prompted discussion about the difficulties businesses have to endure, increasing operation costs.

"…we know the poor infrastructure we have in this country. It is a disincentive for local and foreign investment in the industry." ***FGP/PA/08***

The other issue repeatedly mentioned was the interference by politicians and influential groups in parastatal institutions' administration. Research participants observed that in Norway, you hardly hear about the issue of local content and political actors influencing Statoil's work because the system works. Additionally, Norway is recognised as having a specific culture around commercial openness and the politics of business.

"…the system is not working…we should just allow the system to work." ***FGP/LE/06***

"…there exists no institutional structure to assist in the development of local companies…and we don't have things of that nature here…" ***RP/LE/04***

As the research participants' responses quoted below show, there is no collaboration between the PC and other state agencies. All these institutions tend to follow their programmes which are duplicates and overlap with other state's programmes.

"…all the institutional weaknesses and lack of collaboration in the state agencies for a common good…" ***RP/AD/03***

Once the system is not running satisfactorily compared to other countries, observed **FGP/LE/06,** then "*we must look at the policymakers and institutions Etc. whether they are equipped and resourced to work…the*

institutional structure is there all right…but there's something that's supposed to drive that…and skilled human resource capacity is one of them…." [sic]. This research participant contends that it is not enough to have the institutional structure, but the institutions' requisite personnel and independence are crucial elements. The other issue during the discussion is building domestic R&D to take the lead in the invention. Most of the "*existing research institutions across the country are in a poor state*" **FGP/LE/06** to even assist the state oil company and other agencies in their activities. This situation is attributed to a lack of financing and national strategy for developing domestic technology.

"All these have links with the finance…the money but the question is where is that money also coming from…even if the money comes and then you don't have people who could teach the thing well, what will happen exactly?" ***FGP/MA/04***

"It is then that the ministry of energy must have a link with the academic institutions and the technical universities as well…" ***FGP/LE/07***

Research respondents were asked about any current government policy on infrastructure and whether it has been successful. The responses ranged from equipping and establishing new regulatory institutions for the industry to upgrading critical infrastructure. A respondent said, "*on the part of institutions, several institutions, including the LC Secretariat and the Accelerated Oil and Gas Capacity Programme, have been established*" **RP/AD/03**. Research participant, **FGP/AD/01**, noted that "*within the oil*

and gas space, most of the policies are there…the question has been the implementation of it…to the extent that has helped in the improvement of the regulatory mandate of these institutions. That one, there is a big question mark".

However, the petroleum commission has passed over eight regulations to support the E&P act within three years. The government has been able to do the first licensing round with some issues and held one or two fora in the industry. So, research participants **FGP/MA/04** and **RP/LE/06** concluded that "…*at the institutional level some capacity has been built and the guys in charge of that are doing ok, and the regulation quality is actually not that bad compared to the mining institutions*".

Research participant **RP/LE/02** said, "*when you look at the NRDIG's [Natural Resource Governance Institute] resource governance index…it has some particular sub-component that measures regulatory quality. In sub-Saharan Africa, Ghana ranks number one for oil and gas. However, it is not the same for mining*". Comparatively, "*the oil and gas industry has been successful than the mining as the country learnt a lot of lessons from mining. During the oil production inception Ghana did not want to repeat that the mistakes they had made both in terms of regulations and revenue management*" **RP/LE/04.**

6.3.3 Section 2: Policy Improvements Responses

This section focuses on the policy recommendation from the research participants that can be used to address the Local Content implementation challenges, as demonstrated via the causal loop diagrams. These suggested policies are predicated on the validated causal loop diagrams in the first section of the interview schedule. The next topic deals with policy improvement for human resource capacity.

6.3.3.1 Policy recommendation for Human Resource Capacity

More broadly, research participants emphasised that the "*government has to ask the question, where do we see the industry going in the next 10 to 20 years…and how many more engineers, geoscientists, gas economics do we need to train*?" **FGP/LE/07.** Since the advent of the oil industry, anybody who wants to study abroad in oil and gas related course is granted a scholarship and, after studies, goes back to Ghana and cannot find a job. Consequently, respondents suggested the following.

"…training should be more targeted and tailored and coordinated with other state institutions…" ***FGB/BA/05***

"Human resource capacity should be built in areas where there is demand. Opportunities for hands-on experience should be created…" ***RP/LLO/01***

"…to do that the government or the state needs to have a clear agenda of what it wants to do in the next 5 to 10 years." ***RP/AD/03***

The above responses suggested that there should be a gap analysis to identify and target areas where there is a demand for human resources in the industry. The government should collaborate with various state agencies and "aggregate the number to be trained for government institutions, ministry of energy, the PC, energy commission and the universities" **RP/LE/04.** This is because the global call for the energy transition to renewable energy will impact the industry's vibrancy. The other issue has to do with effectiveness in monitoring the LC laws, which officials of the upstream regulator, PC, refuted the claims for being responsible for the lax monitoring and compliance of the LC regulations.

*"Many people point their fingers at the PC…PC is just one institution…Indeed we are the ones to enforce the law…**RP/LCC/05***

Officials of the PC argued, "*implementation is not PC but three-fold…. you have industry, PC and the academia or civil society*" **RP/LLO/02**. The industry has its role, which is to comply with the LC laws on human resources. Academia offers support by providing research-based information on the industry, as the respondent responses are quoted below.

*"Academia is weak which is not playing its part to support R&D…more of their courses are theoretical and management". **RP/AD/03***

"Through training, and establishment of specialised universities…it has mostly worked. Emphasise must be on practical development and skills development". ***FGP/LCO/09***

The PC officials argued, "*LC is largely driven by R&D and technology…PC cannot innovate those technologies or fund or put money into those technologies*" **RP/LLO/02**. This is the responsibility of Technical Universities and Universities in Ghana, which must play their role. The PC must facilitate partnerships between technical training institutions both in Ghana and abroad. Other respondents supported the PC's position that Ghanaians employed in the industry should do their best and report any infractions on the companies in line with succession planning.

"…Ghanaians who are working with these foreign companies we need to whistle blow any infractions on the part of the oil companies." ***FGP/LE/07***

"Ghanaians' workers in these companies should be blowing whistle of these activities to the PC." ***FGP/AD/01***

"Once the AOGP is developed fully…we can decentralize or open branches in the other regions of the country…" ***RP/LLO/02***

The last quote above from the respondent **RP/LLO/02** suggested that the AOGP should be decentralised to other regions of the country to facilitate easy access so "*people don't have to always come down to Accra to be*

trained". This had been an issue as most projects are centralised in Accra, making it difficult to be accessed.

6.3.3.2 Policy recommendation for Finance

The research participants' policy improvement responses centred on those who favoured the usage of the Local Content (LC) fund for supporting local businesses, training, and R&D and those who argued that the fund would be used as a "*political tool*" as seen in other countries in the sub-region. The proponents of the setting up of the fund observed that "the fund has to be contributed to by the private sector and government paying an amount into the fund…then both the government and Industry jointly administer this fund with clear guidelines and rules as to which company qualifies for what" **RP/LE/04**. The fund will provide funding to the companies at much more competitive rates than if they were going to the local financial institutions to borrow.

Sometimes, the challenge is, "*the local companies are not properly run or setup…so they don't have the management structures. A classic example is 'one-man company', which is often not well-structured, no ISO certificate, no business plan, HSE policies etc…..in that case, local suppliers find it difficult getting loans from the banks. In that case, it is not so much an issue of financing but the lack of managerial structures in place to*

assess the financing" [sic] **FGP/BA/05**. Other respondents' suggestions are quoted below.

"The LC Fund should be made to function as expected. Also, the government should facilitate mergers and partnerships among local companies. ***RP/TO/05***

"…encourage the players to go into joint venture-ship…the only key thing that can be done is to encourage the local players to pull their resources together…and form JV and stop this notion of 'one-man' company" ***FGP/BA/05****.*

"The PC should take a second look at helping in the restructuring of the local companies in terms of a business plan, management style, succession…which helps to improve the companies' credibility" ***FGP/PA/03***

Conversely, one-third of the respondents did not support the usage of oil revenue to support SMEs. According to them, as argued by one respondent, "*you cannot say the government should set aside the saving of the oil revenue to fund companies…what is the guarantee that they will pay, the criteria that would be adopted wouldn't it be seen as favouring some people*?" [sic]. **RP/LCC/06**. Furthermore, respondents cite existing government schemes like Microfinance and Small Loans Centre (MASLOC), predominantly used to reward ruling political party members.

"…government has a number of credit facilities through MASLOC, NEIP, EximBank among others" to assist SMEs. The challenge is that "these are not well

coordinated and often grant small facilities (e.g. MASLOC), requires a number of steps and are politicised…" ***RP/LE/04***

"I disagree with the suggestion that people's oil revenue should be used to support SMEs". ***RP/TO/05***

These respondents argued that the regulator should encourage partnership and allow the private sector to play the leading role in financing SMEs. In this instance, the commission says they are encouraging "*the vehicle of forming joint ventures where Ghanaian companies are quite serious, you know you are partnering a company because you do not have the financial capability…your agreement should be in such a way that you participate fully in it in terms of executing the contents of the contract and then be able with time…build up your finance and assets*" **FGP/LCO/09**. The PC said through the forum they organised for the banks and the local companies, and it came to light that "…*the banks and the IOCs claimed that aside local firms not having the capability…. when even you guarantee for them and decide to pre-finance them as soon as they get the contract, they switch the banks. So, it is about being trustworthy, creditworthiness…*" **RP/AD/01.**

"The PC should take a second look at helping in the structuring of the local companies in terms of a business plan, management style, succession…which helps to improve the companies' credibility." ***FGP/DO/02***

The other factor beyond the companies is the government's role in managing the macroeconomic fundamentals to reduce interest rates. The research participants also noted that the banking industry is evolving, but it has not evolved as expected. Banks must be very innovative in realising the opportunities in the oil industry with "*tailored products just for the oil industry…if you have banks specialising in financing oil and gas project, it makes it easier…they should be innovative and have tailored made products for the industry*" **FGP/LE/07**.

"A national development bank with a lower interest rate that links credit to some measurable performance indicators…" ***RP/AD/03***

Some research respondents raised the "*concept of carrying over*" to gradually build the indigenous firms' finances. One respondent said, "*these days, we have cash flows and receivables, you can use your share of the cash flow to pay us(company) at a lower cost. So basically, they do not have to go and borrow at 30%, but they (local suppliers) are carried by the IOC forming a joint venture with them*". A research participant observed that "*the challenge with that is the company needs to have already established some ground presence…meaning that if you are a new company, then this sort of thing really won't work*" [sic] **RP/TO/05**.

Supporting the 'concept of carry-over', another research participant said, "*this idea of foreign companies carrying local companies at early stages for*

some years often works and even the government does that in the petroleum contract. For instance, GNPC has 15% carried interest in all contracts, so this is free 15%, GNPC does not pay any of the project's development. The IOCs pay that, and then on production, GNPC pays its share of the capital cost "[sic] **FGP/DO/02**. This method of carrying the local firms, a research participant, **FGP/TA/06,** strongly recommended that; "*this way of financing should not be legislated as it becomes prescriptive and some turn to abuse this prescriptive-based rules*". Rather the research participant said, "*it should be left with the foreign companies and the local companies…once you see that the local company has the capacity then this option can be adopted*" **FGP/TA/06**.

"The concept of carry-over can be adopted to ease the financial burdens local companies face during the partnership with foreign companies" ***FGP/DO/02***

The other recommendation is to enable the business environment, which is more challenging. The government can "*push the monetary policy rate down Etc., such that businesses can borrow less than 10% that is the real issue*", as research participant **RP/LE/04** observed. Furthermore, "*now the Bank of Ghana (BoG) has the MPR at 16%, but the average borrowing cost in Ghana is around 27%... that is 1000 bases points more than the policy rate. It just shows you there is a bit of gap or disconnect which needs to be filled. That one is more long-term because in the long term if the money is there, you do not need the local content fund. The medium*

to short-term will be, yes, the fund, of operationalising it with certain guidelines". **RP/LE/04**

6.3.3.3 Policy recommendation for Infrastructure

Research participants' responses are grouped into two: one deals with improvement in the oil industry's institutional structure, and the second deals with physical infrastructure improvement. Research participants observed that institutional development calls for establishing institutions to train and certify artisans to international standards to work for the industry. First, infrastructure deficit "*could be attributed to the fact that at the policy level, we do not set our priorities right. Policymakers or politicians are often wasteful*" **RP/LCC/06**. One research participant observed that "*politicians are ready to spend state resources on things that benefit them, but not necessarily, the masses. Various sectors are quite often starved of adequate resources for infrastructural development*" **RP/TO/05**.

For some research participants, "*the challenge lies in the fact that quite often, projects are overpriced. This happens because most public institutions employ procurement processes and selection matrices which are not transparent*" **RP/LCC/02**. Another respondent said, "*a myriad of procurement policies and regulations exists, but effective implementation is lacking*". Therefore, this respondent said, "*the sector agencies must be allowed to work independently''* **RP/LCC/06**.

"State institutions must be empowered to conduct a value for money analysis to curtailed mostly inflated government projects…" ***FGP/TA/06***

However, this respondent said, "*it does not mean there is interference…but there is no clear demarcation of roles…when issues come there are no clear roles to tackle. Once the roles are not clearly defined…you see overlaps…. issues should be sent to the appropriate agency to address…. the institution should be allowed to work devoid of political interference*" **FGP/PA/08**. By abusing the use of procurement process such as "sole-sourcing" which is not value for money-oriented, the state tends to lose huge sums. In certain instances, observed **FGP/DO/02,** projects are awarded to contractors who are not well-resourced; this often results in projects suffering delays and cost overruns. It is worthy to note, said participant **FGP/MA/04,** that institutions supposedly have performance monitoring and evaluation outfits tasked to audit ongoing infrastructural projects. Conversely, such auditors are easily influenced by contractors, and they eventually compromise on expected standards.

A research participant said, "*another big challenge has to do with institutional corruption*" **RP/AD/03**. Research participant RP/AD/03 further observed that "*sometimes "infrastructural project/development funds from international donor agencies such as USAID, DANIDA and DFID are wantonly diverted to other projects for political expediency*". For some respondents, "*we have a perverse society which does not take account of*

foreign aid seriously…sadly most of those at the helm of affairs see foreign aid as free money and hardly make judicious use of it" **RP/TO/05** and **RP/LCC/06**. Even government agencies charged with accountability over the usage of oil revenue, Public Accounts Committee of Parliament, is "*not acting in a way that is biting enough; hence people act with impunity*". Other policy improvement responses of the participants are quoted below.

"Aid coordination with development partners to be enhanced, so that donors could be part of projects they fund so that they can be part of the monitoring process" ***FGP/LCO/09***

"There is an urgent need for strong political will to stamp out corruption…" ***FGP/PA/03***

"There is a need for groundswell activism by advocacy groups, CSOs and the general public; various endeavours must be encouraged" ***FGP/LE/07***

"More serious penal sanctions need to be applied to serve as a deterrent to would-be offenders". ***RP/AD/03***

Successive governments have invested in energy access, road, and other infrastructure developments. This needs improvement in terms of both quality and access. The government should develop practical steps to allow the private sector to invest in some of these infrastructures.

"…there must be standardisation or clarification of laws concerning PPP to attract private participation in infrastructure development…" ***RP/TO/05***

"The shortfalls of the Policy will be addressed through the enactment of PPP law." ***FGP/BA/05***

"There has not been a deliberate attempt by the government to create industrial zones in the oil city of Takoradi". ***FGP/PA/08***

For one research respondent, the challenges of the road, highway, and electricity sectors are due to the central government's financial constraints. According to respondent **FGP/PA/03,** for instance, "*roads tolls collected and managed by the Ghana Road Fund Secretariat is insufficient to cover the cost of road infrastructure*" [sic]. The Ministry of Roads and Highways and its agencies have been in existence for more than 20 years and have the technical capacities to successfully develop roads and highways. However, "*the lack of funds has affected the development and maintenance of road infrastructure in Ghana, resulting in deteriorating road networks*" **FGP/PA/03**. The government strategy is to attract private finance through loans and public-private partnerships to bridge the infrastructure gap's financing. There is a National Policy of Public-Private Partnerships legislation framework currently used to develop and implement Public-Private Partnerships projects in Ghana.

The shortfall of the policy includes "*its provisions are binding and not enforceable through the court system, therefore, the government may not strictly follow it, and the lack of provisions on key aspects of PPPs such as Social and Environmental Safeguards issues. This will require the enactment of PPP policy to assuage private investors' fear of losing capital*" **FGP/PA/08**. When considering oil and gas specifically, some infrastructure development has been done not by the government but by the industry itself. When you go to the Takoradi enclave, you would have thought the government would help establish an industrial enclave and support it with utilities. This research participant said, "*in Takoradi, small industrial zones are at the behest of the private sector, not necessarily the government. There has not been a deliberate attempt by the government to create industrial zones in the oil city of Takoradi. At least, you would expect the municipal authorities to acquire land and lease to the private sector*" **RP/LE/04.**

6.3.3.4 Policy recommendation for Technology

For one respondent, due to the lax attitude in ensuring compliance to regulation on technology transfer, any "*technology transfer in the industry has not been due to the government policy. It has more to do with the companies themselves*" **RP/AD/03**. Research participant **RP/AD/03** explained that "*when the foreign supply chain and oil companies and the locals signed their JV agreement, there are clauses in there that help them basically to do the transfer of technology not necessarily because of the LC*

legislation". This claim by research participant **RP/LE/03** corroborates with a local company representative as quoted below.

"Our company in Takoradi, 100% locally owned provides services to Tullow oil without any expatriates' involvement in their activities. Initially, they had expatriates training them in chemical mixture etc. in their operations. This kind of activities goes on independently regardless of what the government is doing". ***FGP/AD/01***

However, the PC officials said, "*we have realised there is a gap, and currently, we are developing guidelines on national technology transfer policy for the upstream to address some of these challenges*" **RP/LLO/02**. More importantly, the PC officials argued, "*we expect industry and academia to drive the R&D and the tech transfer…so PC only does the facilitation and the enforcement, and there are guidelines to address some of the identified gaps*" **RP/LLO/02**. Furthermore, they argued "*academia contribution to research and innovation is insignificant…more of their courses are theoretical and management and that is not the job of the PC*" **RP/AD/03.** To address the complaints of the PC officials, one respondent emphasised the importance of equipping local R&D centres, which are quoted below.

"We must start developing indigenous technology through R&D centres and local universities…and adopting appropriate technology to our needs…" ***RP/AD/03***

For some respondents, the "*PC should strengthen their monitoring mechanism such that if any company is found culpable…and then they will be sanctioned appropriately…once the policy of sanctioning is in place, they cannot concoct figures*" **FGP/MA/04**. Beyond the LC requirement to take up equity shares, indigenous companies must be made to demonstrate the capacity and technology acquired through their participation. The respondents stated that local companies' capacity must be upgraded with the requisite manpower to absorb the technology and the financial muscle to purchase technology on the open market, as quoted below.

"Local companies need help (financial and capacity) to identity and absorb the requisite technologies". ***RP/LCC/06***

"…currently what we are emphasizing on is that in the execution of a contract the indigenous company should have a role to play in the execution of the contract whiles the foreign firm has a role to play". ***FGP/LCO/09***

Other researchers emphasised the importance of Ghana drafting an industrial policy that holistically looks at the broader economy. Research participant, **RP/LCC/01,** stated: "*local content in oil and gas is also about "building linkages; backward, horizontal, forward etc…there is no way you can do that if you do not have an industrial policy*". He further averred "*you could but what happens is…you then build 'silo' industrial that are not*

necessarily connected to a bigger picture". What should hold different sectorial policies together is the country's holistic industrial policy.

"Technology transfer is steep in industrial policy". ***RP/LCC/01***

"As we speak, what is the industrial policy of the country?" ***FGP/BA/05***
"What do we want to do in the next 5 to 10 years?" ***RP/LE/04***

The research respondents stated that the successful technology transfer in the oil industry among, other factors, depends on industrial policy. That means there must be a long-term industrial policy of the country which is not subject to any party dictates. One respondent said, "*We (Ghana) talk about One-District One-Factory policy, One-Village One-Dam policy and all that micro-level industrialisation programs. However, the question is, how is the oil and gas sector connected to all this? Moreover, where is the industrial policy strategy of the country*?" **RP/LCC/06**. In answering that, the research participant said, "*there must be a long-term industrial policy not subjected to party dictates*" **RP/LCC/06**. Instead, the NDPC [Ghana's National Development and Planning Commission], in collaboration with relevant agencies, should develop a broad industrial policy and then, out of that, you can do the industrial sectorial area policies.

The political parties can borrow thematic areas from the industrial policy to draft their parties' manifestoes. According to respondent **RP/LE/04,** the

country should ask, "*If you look at the oil and gas sector, you ask yourself what do we want to do with the technology transfer in the oil and gas sector in a way that aligns to the bigger industrial policy at the government level*" [sic]. Other quotes from different respondents are quoted below.

"There must be that environment that will support the tech transfer…It will not be done in a vacuum…" ***FGP/LE/07***

"…the national upstream technology transfer policy should feed into the bigger national tech transfer policy…" ***RP/LCC/06***

6.3.4 Ranking of the Challenges

Respondents were asked which of the most urgent variables and the reason(s) for their assessment. These responses are twofold: two-thirds of the respondents ranked the variables in the order of importance, while one-third favoured not ranking the variables but stressed that all the variables are important and must be addressed concurrently to create a conducive environment for the LC policy to thrive. Most respondents ranked finance as the most critical variable in local content development, followed by infrastructure, human resource, and technology.

Those respondents in favour of ranking observed that the interest rate has remained high in Ghana for almost a decade, and most of the local banks have no capacity to finance some of these energy investments. Without

financial support, argued research respondent**, FGP/LE/09,** "*local participation requirements might be difficult to achieve*". In other words, the capacity to increase the requisite workforce, technology transfer and infrastructure will be challenging to achieve without funds. For some research respondents, building capacity and technology will require local firms' financial capacity to train workers and even buy technology on the open market. The second variable ranked mainly by the participants is infrastructure, with respondents' quotations below.

"I will say infrastructure…you cannot do anything about tech transfer or skills developing if there is no base to support or facilitate it. That is the most urgent, the earlier we got or started putting infrastructure in place the better. ***RP/LLO/02***

"If you have a certain infrastructure in-country…I am talking about for instance the Tema Shipyard, a certain key one which helps in the acceleration of it…you can do more volumes of work in-country [building of FPSO etc.]". ***FGP/DO/02***

In supporting the importance of infrastructure to LC implementation, one respondent said, "*doing more volume of work in-country, whether done by a JV or foreign company increases in-country spend. A JV company will employ Ghanaians anyway… and an indigenous company will also employ Ghanaians. Nevertheless, if there is infrastructure, we will be able to do more. I talked about the FPSO…during TEN we were able to fabricate*

models' tools in Ghana…however, we cannot go beyond a certain limit because there is not the needed infrastructure…if there were then, we could build the whole FPSO here which means several companies coming in and more people being employed" [sic] **RP/AD/01.** Other respondents' responses are quoted below.

"Human resource and infrastructure..." ***FGP/LCO/09***

"Building capacity (human resource and technology transfer) …because without it we would always hire people or compel international oil companies to hire people from the neighbouring countries and what will happen is there would be the repatriation of income to the neighbouring countries instead of value retention…" ***FGP/LE/07***

Other respondents saw the availability of human resources as the third significant challenge in the oil industry. According to one respondent, "*I am talking in the sense of companies and individuals…if local companies can invest in their staff…it means they will have experienced staff or if you like qualified staff which will help them win contracts. In winning contracts, they will be able to make profits out of it…and be able to build infrastructure or even acquire technology…technology is on the market*" [sic] **FGP/LE/07**. Also, research participant **RP/AD/03** also observed: "*If you want a software, you can just purchase it you do not need a foreign company to give you a technology…so if they can reinvest in their own*

company, they can be able to address some of these issues and financing might not be an issue".

"For LC to be effective, all the areas must tackle together as each addresses a specific challenge towards the achievement of a specific goal." ***FGP/AD/01***

The other respondents argued that there is a relationship among all the variables that create conditions for the LC's implementation to be effective. They stated that, for instance, the success of technology transfer and human resource development would depend on viable local infrastructure. Likewise, infrastructure development that forms a base will depend on the availability of funds. Because of the influence, each variable has on the other; these variables must be tackled together.

6.3.5 Industry Regulator

Respondents were asked to comment on the performance of the vital institution, Petroleum Commission (PC), in the upstream industry and any challenges affecting the institution's running. This question's essence was to assess whether the PC is resourced and implementing the LC as intended. The respondents' opinions are quoted below.

"The PC is currently run better than the mining institutions and is in better shape..." ***FGP/AD/01***

"I think the commission is in much better shape than it was some years ago". ***FGP/TA/06***

"Holistically speaking, I think the PC is much strengthened now". ***RP/LCC/06***

The respondents observed that "*there is quite a lot of push on local content implementation…so I think they are working in the right direction with respect to this. However, the fundamental question is, how are we measuring local content?*" **RP/AD/03**. Also, there is an "*allegation that the place has been filled with so many people which is diluting the quality of their work…sometimes people do not even have desks to sit on*" **FGP/PA/03**. Research participants emphasised the lack of institutional capacity to enforce the LC legislation, especially technology transfer, human resource development and succession planning, and clamp down on fronting.

"Capacity to effectively monitor the LC implementation" ***RP/LLO/01***

"…the fact that they also have capacity gaps and issues they need to address". ***RP/LE/04***

The officials from the PC underscored that the implementation of JV is a challenge due to fronting by local companies and the poorly structured nature of these companies. Participants postulated an element of 'lack of

trust' among local companies that inhibit them from forming JV; they prefer 'one-man businesses' prevalent in the country.

"Companies (locals) fronting for foreign companies and, which seems to be pseudo-JVs. Small companies (locally) are poorly structured…" ***FGP/PA/08***

"*You see poorly structured local companies…dotted all over Ghana even though* we have a business development department, and we are trying to persuade them and show them the importance of it…it is still a challenge…" **FGP/TA/06**

"There should be consequences when you do not follow, and you see if somebody fronts and goes free, he will front again. That is where PC comes in, they are the regulators, they should set the rules…but how do you qualify as a local company to form a joint venture with another company within a month…some of them do not even exist…" ***FGP/LCO/09***

Some participants observed that the PC suffers from a conflict of laws, policy incoherence, and collaboration between state agencies. Participants stressed that "*depending on leadership at any point in time in a state agency, a particular state agency decides to cooperate or not, which creates many challenges. Going forward, it is important to have wholistic view of all of the laws where there are conflicts or overlaps and streamline it*" [sic] **RP/LLO/02.** According to a research participant, **RP/LE/04**, the PC is not adequately resourced and does not have the capacity to monitor and implement the LCP.

"Definitely in terms of technical personnel and resources". ***RP/LE/04***

A respondent who disagreed with the above comment said the PC has "*a lot of highly qualified legal brain in the industry to attend to. They are well resourced. However, the PC needs to continually innovate and be independent of political interference in their day-to-day activities*". **RP/LCC/06**

6.3.6 National Oil Company

Participants were asked to assess another key institution, Ghana National Petroleum Corporation (GNPC,) in implementing the LC and any challenge in the corporation's operational challenges. In answering this question, participants stated that GNPC gets the first cut of any revenue per the petroleum Act. It is estimated that between 2011 and now, Ghana has received a little over $5 billion in terms of petroleum revenue receipts. About 35% of that, roughly 1.5 or 1.6 billion dollars, is money that has been allocated to GNPC to run their operations. Consequently, one respondent posed this question "…*what significant thing has GNPC used the money for*?" **FGP/PA/08**.

The participants argued that "*civil society has been championing for a long time that GNPC finance statement should be published which the corporation published 2014 to 2016*" **RP/LE/04**. However, the 2017-2020 statements have not yet been published. The research participant stated

that "*civil society was proposing to use the corporation's financial statement to do some basic accounting and return on equity and capital to measure the profitability of the company…because we know that GNPC has been the 'cash cow' of the State for a long time*" [sic] **RP/LE/04**. The research participants' quotations below proposed ways of improving the operational performance of GNPC, including reducing government interference in the corporation's operation.

"I also do not think the government should be appointing board members…maybe one or two but the entire board should reflect the people they serve…" ***RP/LE/04***

"They do not have enough capacity to stand on their own…" ***RP/TO/04***

"Poorly structured and poor corporate governance..." ***FGP/MA/04***

The research participants proposed that board members of the corporation can be selected from the broad society, including "*a representation from labour Etc.…and I think if we can do that most of them (state enterprises) will be run well so that the whole issue of political interference will be minimised*" **RP/LCC/06**. For one respondent, the "*CEO [Chief executive officer] appointment should be a public process via advertisement, and then everybody can put in the application supervised by public services commission. The one who qualifies signs KPI [Key performance indicator], and, if you do not deliver, you are sack*" **RP/LE/04.**

6.3.7 Emerging theme

During the interviews, one theme that came up regularly in the interviews was political interference. Research participants expressed concern that this is prevalent in parastatal agencies' administration and the implementation of the LC policy.

6.3.7.1 Political Interference

Research participants observed that politicians interfere in the administration of state institutions and enterprises. This interference comes in recruiting staff, training, procurement decisions, public funds, and the general administrative functions. As can be observed by the research participants' quotes below, students sponsored abroad and even recruited into government agencies and oil companies are not based on merit.

"Also, back to the locals when anything is given to us, we need to take it well, there are situations where people do not recruit the right people…somebody gets the opportunity because he knows somebody who knows somebody…" ***FGP/FGP/02***

"…when the opportunity comes for recruitment "we present the weakest human resource that should be trained in between the fields…largely, the policy has been turned into favouritism." ***FGP/PA/08***

Likewise, participants observed that the government's tender on infrastructure projects is rigged and interfered in by politicians to favour

contractors who do not qualify. Public administration of parastatal companies such as GNPC and the PC gets politicised in these institutions' strategic visions and the allocation of resources. This, in turn, affects the effectiveness and administration of the institutions.

"The trouble is that a lot of the state enterprises in Ghana are been run by political appointees". [sic] ***RP/AD/03***

"Political interference and lack of focus on the Corporation's core mandate…" ***RP/LCC/06***

6.3.8 Chapter Summary

This chapter provided a detailed analysis of the qualitative data gathered from the research participants. The analysis primarily dealt with the linkages in the conceptual model of local content development and the sub-models of infrastructure, finance, technology, and human resource development. The study found that the above four factors' availability serves as the enablers for Local Content Development in the oil industry. Also, analyses are provided of the research participants' policy recommendations for addressing the challenges in implementing the LC policy in the oil industry.

The challenge of finance, for example, the policy suggested ranged from the establishment of a Local Content Fund with clearly established rules

that depoliticise the operationalisation of the Fund in the short-term and the long-term focuses on improving the macroeconomic environment. The two key LC implementation institutions, PC and GNPC, were assessed on deepening the policy implementation. In all the above, one key theme came up in the analysis: political interference in state institutions' operational duties for addressing the LC challenges. These findings will form the basis for discussion in chapter eight.

CHAPTER SEVEN: QUANTITATIVE FINDINGS AND ANALYSIS

7.1 Introduction

This chapter presents and analyses the questionnaire collected from the Ghanaian oil and gas (O&G) industry stakeholders. The questionnaire comprises close-ended and open-ended questions; the former has predetermined answers for quantification and statistical purposes, while the latter is meant to gain insight into the respondents' choices of the closed-ended questions. The chapter commences with the quantitative approach adopted for collecting the data and ends with the presentation and analysis.

7.2 The Quantitative Approach

Google forms were used in the design of the questionnaire. The questionnaire was then distributed online via participants' emails and hand-delivered to participants unable to be reached online. The questionnaire was centred on the study objectives and other issues that arose from the literature review. Before commencing the questionnaire's distribution, consent letters were sent to potential research participants' detailing the aim, ethical issues and seeking their approval for participating in the study. Of 120 questionnaires distributed (60 each via emails and hand-delivery), 57 questionnaires were completed and returned via email within the first two weeks, and a further 29 arrived via hand-delivery within three months.

Five questionnaires were discarded and subsequently classified invalid due to being wrongly completed or not fully completed, culminating in 81

responses (representing a 57.3% response rate). The high response rate is attributed to the enhanced cooperation and assistance the researcher received from the Ghanaian Ministry of Energy and the Petroleum Commission, oil companies in Ghana in distributing the questionnaire to their employees, and persistent follow-up emails from the researcher.

Cronbach's Alpha is one of the most prominent reliability tests (Eisinga et al., 2012), the study employed it to assess the questionnaire's internal consistency, which resulted in a value of 0.786, above the minimum required level. Consequently, as Cronbach's alpha value of 0.786 is greater than 0.5, it indicates higher reliability of the questionnaire.

7.3 Demographic Characteristics of Respondents

This section presents the analysis of the demographic data of the research participants. The section's essence is to demonstrate that the respondents selected for the study have the requisite background, knowledge and experience. Table 7.1 below shows the characteristics of the participants of the study.

Table 7.1: Demographic characteristics of Respondents

Gender	**Frequency**	**Per cent (%)**	**Valid Per cent**
Female	24	29.6	29.6
Male	57	70.4	70.4
Total	81	100.0	100.0
Age			
20 - 29	23	28.4	28.4
30 - 39	45	55.6	55.6
40 - 49	9	11.1	11.1
50 and above	4	4.9	4.9
Total	81	100.0	100.0
Level of Training			
PhD	6	7.4	7.4
MSc/MBA/MEng	35	43.2	43.2
BSc/BEng	37	45.7	45.7
Other	3	3.7	3.7
Total	81	100.0	100.0
Work Experience			
Below 4 years	33	40.7	40.7
5 – 9 years	35	43.2	43.2
10 – 14 years	8	9.9	9.9
15 years and above	5	6.2	6.2
Total	81	100.0	100.0

Source: Field Survey

The study highlights the stakeholders' years of experience and level of education as being more relevant than their actual age, as argued by Morgeson et al. (2008) and Maheswari and Krishnan (2014). Table 7.1

indicates that the majority (45.7%) of the respondents had a minimum of a first degree, followed by 43.2% with a master's degree, 7.4% with PhDs, and others with certificates such as HND Etc. constituting 3.7%. As shown in Table 7.1, all the respondents have extensive years of working experience, with the minimum being four years representing 40.7%. Most of the respondents had a minimum working experience of 5 years.

Table 7.2 shows that the respondents' organisational background is spread across all the Ghanaian O&G industry stakeholders. Tables 7.1 and 7.2 indicate diverse demographic characteristics, institutional background, extensive knowledge, and experience, which justify the snowball and purposive samplings adopted for the study (see Chapter 4). This broad spectrum of data collection ensures that the opinions of all the critical stakeholders in the oil industry are factored into the study.

Table 7.2: Distribution of Respondents Organizational Involvement in Local Content Policy

Which Organization describes your involvement in local content policy?	**Responses**		**Per cent of Cases**
	N	**Per cent**	
Government Agency	24	28.6%	29.6%
Civil Society	10	11.9%	12.3%
Local Company	18	21.4%	22.2%
International Oil Company	31	36.9%	38.3%
Other	1	1.2%	1.2%
Total	84	100.0%	**103.6%**

Source: Field Survey

7.4 Descriptive Results and Analysis

This section presents and analyses the descriptive results of sections 2 and 3 of the questionnaires (see Appendix 8). The section focuses on assessing respondents' opinions on local content implementation, its challenges, and their understanding of the LC policy's intended purpose in the Ghanaian oil industry, as shown in Table 7.3. There are a total of 255 multiple responses from the 81 respondents, with most of the respondents picking local participation (66%), encouraging technology transfer, job creation, and increase employment (all having an equal percentage of 25.9%) as the intended purpose of LCP in the upstream oil and gas sector. Likewise, those who chose increase goods and services were 56, representing 21.9%. These results indicate that the research participants have a good understanding of the purpose of LC legislation and policies in Ghana.

Table 7.3: Distribution of Respondents description of the Intended Purpose of LCP in the Upstream Oil and Gas Sector.

Which of the following would you use to describe the intended purpose of LCP in the upstream oil and gas sector?	**Responses**		**Per cent of Cases**
	N	**Per cent**	
Local Participation	66	25.9%	81.5%
Increase Goods and Services	56	21.9%	69.1%
Encourage Technology Transfer	66	25.9%	81.5%
Job Creation and Increase Employment	66	25.9%	81.5%
Other	1	0.4%	1.2%
Total	255	100.0%	314.8%

Source: Field Survey

The descriptive results of the closed-ended statements of Sections Two (questionnaire) were assessed on a 1-5 scale point except for statements 7 and 9, which were measured on a 1-4 scale point. The rationale for using the former scale is to offer a broader spectrum of assessment, while the latter is restricted to a four-point scale supported with a qualitative question to elicit more responses. Additionally, the above different scales were predicated on giving respondents more choices to achieve the study's objectives. Table 7.4 indicates 81 respondents' responses to the question concerning the relevancy of local content policy (LCP) in the industry. A total of 74.1% of the respondents deemed the local content policy (LCP) "very relevant" to the oil industry, and 25.9% said the policy is "relevant".

Table 7.4: Relevant of LCP in the oil and gas industry

Options	**Frequency Percent (%)**		**Valid Percent**	**Cumulative Percent**
Not Relevant	0	0.0	0.0	0.0
Relevant	21	25.9	25.9	25.9
Very Relevant	60	74.1	74.1	100.0
Other	0	0.0	0.0	
Total	81	100.0	100.0	

Source: Field Survey

Consequently, research respondents were asked to provide reason(s) to support their answers in Table 7.4, quoted below.

"Local content participation is very vital in any country solely because it encourages the participation of local nationals through jobs creations and service rendering." ***QOE/EM/01***

"Technology transfer and capacity building in the oil and gas industry." ***QOE/EM/02***

"To ensure proper utilisation of the oil resources to the benefit of the Ghanaian people." ***QOE/CSO/01***

"LCP is essential to the effective and efficient development of oil and gas resources. Fostering participation by indigenous society that host oil and gas operations is good partnership for the mutual benefit of all actors. It also ensures responsible corporate citizenship on the part of oil and gas operators." ***QOE/LOC/01***

"Building industrial capacity through equity participation." ***QOE/LU/01***

"The LCP gives room for a certain percentage of locally produced materials, personnel, financing, goods and services." ***QOE/LOC/08***

Despite most of the respondents (as indicated above) considering the local content introduction to be relevant to Ghana's economic development, the industry's LC regulation was deemed inadequate. In Table 7.5, most respondents (64.2%) considered the local content regulation inadequate in the oil industry. The rest of the respondents (22.2%) deemed the

regulation adequate, with only 13.6% saying the LC regulation is highly adequate.

Table 7.5: How adequate is the Local content regulation in the oil industry?

Statement	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Not adequate	52	64.2	64.2	64.2
Adequate	18	22.2	22.2	86.4
Highly adequate	11	13.6	13.6	100.0
Other	0	0.0	0.0	
Total	81	100.0	100.0	

Source: Field Data

To that end, Statement 10 asked respondents for their reason(s) for their answer(s) in Table 7.5. These responses are varied and are quoted below.

"There have been some constraints specifically in areas such as human resource capacity, technology among others but the government has steps in place to control and maximize the benefits." ***QOE/LOC/08***

"There are regulations that set objectives and targets. However, these targets are only met in kind. Also, the implementation of the regulations appears to be insufficiently monitored and improved. For example, very little learning takes place in young indigenous persons who are seconded to oil and gas companies for training. This Ghana industry has faced this issue for a long time now, but the government and actors appear oblivious to it." ***QOE/LOC/09***

"The 20% participation of local contents in the oil industry is good but not the best. The transfers of technology and capacity building has not reached its full heights." ***QOE/LU/04***

"The regulations are not enforced." ***QOE/LU/04***

"Because it has the ingredient to help develop the LC, but lack of proper implementation is not making it successful." ***QOE/CSO/01***

"There is still a missing link between the oil and gas industry and academic institution for strong collaborative research. The IOC must be forced through laws and legislation to undertake collaborative research with local universities at the highest level." ***QOE/CSO/02***

"Monitoring by officials of the LCP is not enough to keep companies in the oil and gas in check." ***QOE/CSO/03***

"At least 50% of management staff are Ghanaians from the start of the license." ***QOE/EM/01***

"The aspect of local participation has led to job creation thus improving the growth of the economy." ***QOE/PC/01***

"Diffuse market power of foreign suppliers" ***QOE/LU/03***

"I believe there has been a lot done by the PC to ensure this, but I think there are too many political interferences and interests that fight against its effectiveness." ***QOE/LOC/07***.

"Salary level is low as compared to expats" ***QOE/CSO/40***

"There is still a missing link between oil and gas industry and academic institution for strong collaborative research. The IOC must be forced through laws and legislation to undertake collaborative research with local universities at the highest level." ***QOE/PC/71***

"In as much as the local content regulation is specific to the nation whose oil and gas resources are being exploited, more should be done (stringent measures) to the exploitation of local human resource." ***QOE/CSO/44***

"More mechanism must be in place to enhance the implementation of the LCP regulations." ***QOE/LOC/45***

"Five years of implementation revealed a number of limitations or weaknesses that must be addressed. Monitoring by officials of the LCP is not enough to keep companies in the oil and gas industry in check." ***QOE/EM/17***

"There are still gaps in the area of accountability and policy direction for the oil industry." ***QOE/CSO/33***

Similarly, Statement 11, as indicated in Table 7.6, is to assess whether local content policy (LCP) has been successful in the industry. As shown in the Table, most of the respondents, 49 out of 81 (60.5%), deemed the LCP successful, while 39.5% ticked 'no' the policy as not to be successful. The above data is despite the respondents' earlier concerns about the adequacy of the current LC regulations (indicated in statements 9 and 10). For these respondents (60.5%), despite the challenges with the current LC regulations, the regulations have improved local capability.

Table 7.6: Will you say LCP in the oil and gas industry has been successful in Ghana since 2013?

Statement	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Yes	49	60.5	60.5	60.5
No	32	39.5	39.5	100.0
Total	81	100.0	100.0	

Source: Field Data

Respondents' reasons for Statement 11 were varied and are quoted below.

"The local participation has led to capacity building and job creation Etc." ***QOE/LOC/06***

"There has been a massive boost in the tax base for the government due to the larger local manufacturing industry." ***QOE/LOC/07***

"Over 320 and more contracts worth more than $1.8 billion have been awarded to locals." ***QOE/LU/06***

"There has been job creation for the local population. Additionally, there has been a good collaboration between oil companies and the host communities where the explorations are carried out. Again, more development projects like roads and schools have been constructed through oil revenues." ***QOE/LU/15***

"It has promoted a business-friendly environment, stimulated investment and created more jobs." ***QOE/EM/09***

"It has promoted the maximization of value-addition and job creation using local expertise." ***QOE/LU/17***

For some respondents, the LC policy has not been successful due to the following reasons.

"It has created unnecessary delays and raises the cost of goods and services." ***QOE/LOC/08***

"But there is more room for improvement. For example, there is more room for improvement in the area of transfer of technology to indigenous companies." ***QOE/LOC/09***

"Inadequate technical and financial capacity." ***QOE/LOC/11***

"The country lacks the expertise of persons required for the job." ***QOE/LOC/33***

"A greater share of technical services required by the industry is still imported. Moreover, a great number of very important roles are still filled by expats with an indigenous workforce representing mainly frontline and middle-level staff. The very essence of the LC regulations are being realized but the fact that it is failing is also not being recognized and addressed." [sic] ***QOE/CSO/22***

"Lack of skills and technical know-how." ***QOE/EM/30***

"Lack of monitoring and evaluation." ***QOE/CSO/33***

"There are no visibility studies to know how technology have been transferred and more expat keep on coming." [sic] ***QOE/LU/34.***

Statement 13, as indicated in Table 7.7, assesses whether Ghana is on course to achieve the minimum target of 90% local content set in the LC policy. The respondents' overall mean of responses resulted in 1.96, meaning that most respondents 'disagree' that Ghana is on course to achieve the minimum target. This is consistent with the frequency distribution (Table 7.7), which indicates that most of the respondents, 37 out of 81 (45.7%), 'disagree' with the statement. The above confirms the results of statements 9 and 10 that despite the good intentions of the LC policy, Ghana will not achieve the targets and aims set out in the policy if the policy's challenges are not addressed.

Table 7.7: To what extent do you agree that Ghana is on course to achieve the minimum target of 90% LC level in the oil industry?

Statement	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Strongly Disagree	29	35.8	35.8	35.8
Disagree	37	45.7	45.7	81.5
Neutral	7	8.6	8.6	90.1
Agree	5	6.6	6.2	96.3
Strongly Agree	3	3.7	3.7	100.0
Total	81	100.0	100.0	

Source: Field Survey. *Mean = 1.96, Standard Deviation (SD) = 1.18. Note: 0-1=Strongly Disagree; 1.01-2= Disagree; 2.01-3=Neutral; 3.01-4=Agree; 4.01-5=Strongly Agree*

To that end, Statement 14 elicited the reason(s) for the respondents' answers to Statement 13, as quoted below.

"Uncertain, as there is still room for government and good political will." ***QOE/CSO/40***

"The petroleum commission's involvement in every step of the contract process is critical and has yielded positive results. Also, some goods and services are reserved for Ghanaians which will, in turn, increase the percentage of local content. Other initiatives are being brought on board e.g., the Accelerated Oil and Gas Capacity Programme which is a PC initiative will help to achieve a good percentage in maximizing Ghanaian content in the industry." ***QOE/CSO/41***

"The petroleum regulators in the country are doing their best to push the indigenous companies to do well and also setting policies that will allow companies that are new to the industry thrive." [sic] ***QOE/CSO/44***

"The rate of implementation of technology transfer is quite slow. Same for the cost of capital for oil and gas projects. The industrial infrastructural base required for achieving the target is absent." ***QOE/LU/10***

"Corruption" ***QOE/EM/17***

"Employment is mostly at a junior level and less in the technical aspect." ***QOE/EM/28***

"Is a step in the positive direction and for now we may not see the full effects but with time we will get there." ***QOE/EM/39***

"I believe the government is doing its best to make sure this goal is achieved but there are cases where we see that local content involvement is limited to lack of skilled personnel in the local market." ***QOE/CSO/48***

"For most positions occupied by foreigners, the organization has to show on paper succession plans (a local being groomed to take over) but sometimes, it is only on paper." ***QOE/LOC/29***

Likewise, Statement 15 focuses on whether the Petroleum Commission (PC) is adequately resourced to monitor and implement the LCP in Ghana.

From Table 7.8, 31 out of 81 respondents (38.3%) 'agree' that the PC is adequately resourced to monitor and implement the policy. This is consistent with the average mean of 3.30, corresponding to "agree" with the statement.

Table 7.8: Indicate whether the implementation institution (Petroleum Commission) is adequately resourced to monitor and implement LCP.

Statement	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Strongly Disagree	1	1.2	1.2	1.2
Disagree	23	28.4	28.4	29.6
Neutral	17	21.0	21.0	50.6
Agree	31	38.3	38.3	88.9
Strongly Agree	9	11.1	11.1	100.0
Total	81	100.0	100.0	

Source: Field Survey. Mean = 3.30, Standard Deviation (SD) = 1.042

Statement 16 assesses the effectiveness of the LC policy implementation in the industry. As indicated in Table 7.9, 53.3% constituting most of the respondents deemed the LC policy implementation's effectiveness to be 'average'. The frequency assessment (53.1%) is consistent with the average mean of 2.59.

Table 7.9: In your opinion, how effective has the LC policy implementation been?

Statement	Frequency	Per cent	Valid Per cent	Cumulative Per cent
None	1	1.2	1.2	1.2
Average	43	53.1	53.1	54.3
Good	25	30.9	30.9	85.2
Strong	11	13.6	13.6	98.8
Very Strong	1	1.2	1.2	100.0
Total	81	100.0	100.0	

Source: Field Survey. Mean = 2.60, Standard Deviation (SD) = .785

Comparing the above results with statement 15 indicates that the upstream regulator (PC) is resourced to implement the LC policy. Despite the PC's resourcefulness, the LC policy implementation was considered not to be effective. Consequently, statement 17 elicited respondents' reason(s) for the results of Statement 16, as quoted below.

"There is a degree of engagement of local services, manpower and a 'show' of knowledge transfer- at least statistics exist to prove these. However, these statistics have become the showpiece of the industry to obscure the abysmal achievement and potential of the current implementation regime and abject lack of improvement of the regime. It is only a matter of time, and it will become very clear to all that Ghana's LCP has failed its people." ***QOE/CSO/44***

"The success of LC required effective collaboration between industry, state/regulatory agencies and academia. These interplays have not been quite successful. Must be improved." ***QOE/LOC/09***

"Limited financial and technical capacity for local participation in upstream oil and gas industry. Lack of adequate resources to monitor and implement the LCP regulation." ***QOE/CSO/40***

"There are still loopholes in the monitoring system that makes some international companies circumvent some of their local content obligations." ***QOE/LOC/45***

"Effectiveness is measured in terms of the overall outcome of an implementation, which in my view hasn't been up to the same standards set in other elite oil and

gas-rich countries. E.g., Effectiveness- Norway (48%), Brazil (30%), Ghana (8%)." ***QOE/LOC/29***

"The LC policy's implementation is doubled up with partisan politics. This makes it difficult to achieve our target." ***QOE/EM/17***

"The regulator needs to undertake more monitoring and audits." ***QOE/LOC/40***

"More room for improvement in the area of good political will and accountability." ***QOE/LOC/08***

"Lack of good governance ad business environment." ***QOE/PC/01***

"PC has never met any of their LCP targets." ***QOE/PC/06***

"The LCP implementation been on a slow pace due to reason such as inadequate infrastructure, lack of finance etc." [sic] ***QOE/LOC/08***

"Because of skill shortage in the Ghanaian labour force." ***QOE/LU/04***

"Overambitious local content policy." ***QOE/LU/42***

"Reduces international competitiveness of the country's economy." ***QOE/LOC/47***

Statement 18 asked the respondents to rank the challenges to LCP implementation in Ghana, with the results indicated in Table 7.10. Upon rating, respondents indicated the highest challenge as finance, which

recorded a mean of 3.36, followed by infrastructure (3.20), human resource capacity (2.98) and technology with a mean of 2.98. To ascertain the overall views of respondents on the challenges to LCP implementation in Ghana, an overall mean was calculated, resulting in the mean of means of 3.12, indicating that the stated challenges to LCP are high when measured on the scale.

Table 7.10: Mean and Standard Deviation of Challenges to LCP implementation in Ghana.

SN	Challenges Associated	N	Mean	Std. Deviation
1	Human Resource Capacity	81	2.98	1.107
2	Infrastructure	81	3.20	1.166
3	Technology	81	2.94	1.004
4	Finance	81	3.36	1.248

Source: Field Survey. Note: 0-1=Very Low; 1.01-2=Low; 2.01-3=Moderate; 3.01-4=High; 4.01-5=High

Statement 19 sought to ask respondents to mention any other challenges not captured in Statement 18. Respondents' responses are quoted below.

"Legislative instruments not well detailed" ***QOE/LOC/50***

"Conflict of laws/incoherent policies" ***QOE/PC/51***

"Apathy is a general disease that plagues public sector activity in Ghana generally." ***QOE/PC/01***

"In the oil and gas sector, this canker appears to be eating very deeply. Well experienced persons in the oil and gas sector appear to be aware of the failings of Ghana's LCP implementation regime, yet it would appear that persons with authority and power to make change happen are sitting on the fence and busily occupying desks for their business as usual. They pursue other priorities." ***QOE/PC/02***

Statement 20 focuses on assessing the relevancy of other critical success factors for local content development. As shown in Table 7.11, each variable has a mean above 3.5, making the variables relevant for local content development. Also, the overall average of all the variables together is 3.75, which indicates 'high' on the measuring scale. When the values of the factors in Statement 19 are compared with factors in Statement 20, they still perform well.

SN	Critical Success Factors	N	Mean	Std. Deviation
1	Independent State-owned Oil Company	81	3.58	1.035
2	Human Capacity and Education	81	3.78	1.025
3	Infrastructure	81	3.85	1.026
4	Technology	81	3.77	.926

5	Good Governance	81	3.72	1.164
6	Finance	81	3.80	1.112

Table 7.11: Mean and Standard Deviation of Relevance of Critical Success Factors for Local Content Development.

Source: Field Survey. Note (corresponding mean responses): 0-1=Very Low; 1.01-2=Low; 2.01-3=Moderate; 3.01-4=High; 4.01-5=High

Statement 22 is to measure whether the state-owned oil company GNPC is adequately resourced to increase local content in the industry. From Table 7.12, out of 81 respondents, 34 respondents, representing 42%, deemed the above statement 'moderate'. In other words, GNPC has a moderate capacity to deepen local content in the oil industry. Both this question and the preceding question on the Petroleum Commission (PC) effectiveness indicates that the two key state institutions, GNPC and the PC mandated to increase local content, are not doing much in that regard. In the case of the PC, the respondents also observed that the institution is resourced (Statement 16), but its performance is average when it comes to implementing the policy.

Statement	**Frequency**	**Per cent**	**Valid Per cent**	**Cumulative Per cent**
Very Low	6	7.4	7.4	7.4
Low	23	28.4	28.4	35.8
Moderate	34	42.0	42.0	77.8
High	11	13.6	13.6	91.4
Very High	7	8.6	8.6	100.0
Total	81	100.0	100.0	

Table 7.12: Please indicate whether GNPC is adequately resourced to increase local content and local participation in the oil industry.
Source: Field Survey

Statement 23 subsequently asked respondents for the reasons for statement 22, which are quoted below.

"GNPC have all it takes to be involved more deeply than they currently are. Staff of GNPC attend all the training in the world and get seconded to IOCs. GNPC's major problem, however, is independence to operate – budget, clout to pursue their project with no or minimal government interference, etc." [sic] ***QOE/EM/39***

"We lack infrastructure for the sector's development of LC and LP. Financial support for local participation and content is low to non-existence. Low human capacity – less educationally qualified personnel." ***QOE/PC/51***

"Lacks technology and appropriate human resources" ***QOE/EM/17***

"They do not have the technology and the technical know-how" ***QOE/CSO/44***

"It has moderately been resourced but due to corruption and misplaced priorities, the local content is not able to be increased." ***QOE/EM/53***

"They lack boldness in negotiations, No national interest and only partisan interest." ***QOE/LU/54***

"GNPC is too politicized to deliver its mandate." ***QOE/LOC/57***

"Lack of existing industrial capacity and industrial base creation." ***QOE/LOC/47***

"Lack of cohesiveness among major stakeholders that carry local content mandate." ***QOE/LU/60***

"The legal framework and financially resourced to independently implement/play lead role in promoting LC across the value chain. Not much has been done in that regard" ***QOE/LOC/48***

Statement 24 assesses domestic firms' capabilities and international competitiveness in the industry. Table 7.13 shows that most respondents, 37 out of 81 constituting 45.7%, deemed the above statement 'low'. The above data support Statements 18 and 19 that local companies face challenges, thereby curtailing their capabilities to participate in the oil industry fully.

Table 7.13: How do you assess domestic firms' capabilities and international competitiveness in the oil industry?

Statement	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Very Low	8	9.9	9.9	9.9
Low	37	45.7	45.7	55.6
Moderate	28	34.6	34.6	90.2
High	7	8.6	8.6	98.8
Very High	1	1.2	1.2	100.0
Total	81	100.0	100.0	

Source: Author, Field Survey

Statement 25 elicited the reasons for the answers to Statement 24:

"Not fully able to capitalize on arbitrage opportunities that would exist outside our borders. This is because of a lack of infrastructure and a steep learning curve for reducing costs." ***QOE/PC/62***

"Many of these companies usually have to form JVs with foreign companies. These foreign companies end up doing real work and take the chunk of the money." ***QOE/PC/63***

"socio-cultural (Business owners are short term minded). Lack of understanding of the sector by business owners, Fronting (perceived)". ***QOE/LOC/66***
"Inadequate infrastructure" ***QOE/LU/67***

Difficult in obtaining requisite international certifications" ***QOE/LOC/07***

"Because of the poor macroeconomic environment in the country does not help them. Lack of funding to support their business/operations." ***QOE/LU/15***
Lacks financial support, technical expertise, inadequate infrastructure prevents domestic firms to compete vigorously with foreign firms." ***QOE/EM/70***

"Lack of financial support to the indigenous companies." ***QOE/PC/71***

"Lack of financial support to enable them to compete with other international firms." ***QOE/LU/04***

"The sector is very much limited in technological capability, know-how as well as funding" ***QOE/LOC/09***

7.4 Section 3: Policy Lessons across the World

This section presents the analysed survey results of Section 3 of the questionnaire. It is focused on assessing respondents' opinions on the factors that have made developed countries successful in implementing LC and on the other hand, factors impeding the policy implementation in developing countries. As indicated in Table 7.14, most respondents ticked existing industrial capacity constituting 23%, followed by the provision of infrastructure (21.8%), Finance (20.5%), Human Capacity and Education (18.3%), and technology (15.8%). The other factors cited by the respondents include a good macroeconomic environment and investment in R&D.

Table 7.14: Factors that have made developed Countries successful factors.

Which of the following factors has made developed countries successful in LPC implementation?	**Responses**		**Per cent of Cases**
	N	**Per cent**	
Existing Industrial Capacity	73	23%	90.1%
Technology	50	15.8%	61.7%
Human Capacity and Education	58	18.3%	71.6%
Provisions of Infrastructure	69	21.8%	85.2%
Finance	65	20.5%	80.2%
Other	2	0.6%	2.5%
Total	317	100.0%	391.3%

Source: Author, Field Survey

The second strand is the impeding factors in developing countries. Table 7.15 indicates that most respondents ticked inadequate financial support to local firms as the significant factor. In contrast to the developed countries, existing industrial capacity was the leading factor for the LC policy's success. The rest of the factors in developing countries are in the order of inadequate infrastructure (13.8%), inadequate human capacity (13.2%), corruption (12.8%), technological capacity (12.6), lack of good governance (12.6%), and over-ambitious local content policy (12.1%). Other respondents specifically stated corruption and favouritism by IOCs in awarding contracts to their friends. Again, it can be seen from Tables 7.14 and 7.15 that inadequate infrastructure and Human Capacity were ranked as the second and the third essential factors from both perspectives.

Table 7.15: Factors that have made developing countries less successful.

Which of the following factors has made developing countries less successful in LPC implementation?	**Responses**		**Per cent of Cases**
	N	**Per cent**	
Corruption	63	12.8%	77.8%
Over Ambitious Local Content Policy	60	12.1%	74.1%
Lack of Good Governance	62	12.6%	76.5%
Inadequate Infrastructure	68	13.8%	84.0%
Inadequate Human Capacity	65	13.2%	80.2%
Inadequate Financial Support to Local Firm	72	14.6%	88.9%
Technological Challenge	62	12.6%	76.5%
Other	41	8.3%	50.6%
Total	493	100.0%	608.6%

Source: Field Survey

7.5 Chapter Summary

The Chapter presented and analysed the results of the close-and-open ended questionnaire on Local Content Development in Ghana. The questionnaire focused on eliciting respondents' opinions on the adequacy of the LC policy, assessing the effectiveness of the two implementation institutions of the Petroleum Commission and the national oil company, GNPC. The other issues assessed were the ranking of the four Local Content Challenges, and the policy lessons from developed and developing countries were assessed. All the above areas complemented open-ended questions to allow the respondents to give reason(s) for their answers to the close-ended questions.

CHAPTER EIGHT: DISCUSSION OF FINDINGS

8.1 Introduction

This chapter discusses the findings of the analysed qualitative and quantitative data in Chapters 6 and 7, respectively, which are converged to draw valid conclusions. The discussion involves interpreting, explaining, and evaluating the analysed data to reveal the importance of the results. The discussion follows in the order of the research objectives indicated in chapter one. The next topic discusses the institutional and regulatory framework of the Ghanaian oil industry.

8.2 Institutional and Regulatory Framework

The section is divided into two components: institutional structure and regulatory framework. The former comprises the industry upstream regulator, Petroleum Commission (PC), and the national oil company (NOC), Ghana National Petroleum Corporation (GNPC), with the legislative mandate to deepen local content and local participation in the industry. The latter includes the local content policy (LCP) and regulations governing the oil industry. The interpretation of the results of the afore-mentioned themes is discussed next.

8.2.1 Local Content Policy and Regulation

In Chapter 7, the research findings reveal that research participants mostly agreed that the adoption and implementation of the LCP was a ‘step in the

right direction' that can stimulate resource-based development if adequately implemented. Research participants further said LCP could increase technology transfer and develop backward and forward linkages to the Ghanaian oil industry. From the regulator and private sector point of view, research participants opined that the introduction of the LC Policy in 2013 created significant jobs of which local Ghanaian companies have received contracts over $10 billion. The above confirms experiences in Norway, the UK, where the petroleum sector activities were leveraged to create domestic economic opportunities (Marcel et al., 2016; Esteves, 2013; Ovadia, 2014 Tordo et al., 2013; Ado, 2013; Neum, 2008).

Although participants were optimistic about the LC in principle, most participants were concerned about the ability of the LC policy and regulation in its current form to achieve its intended purpose as stated in the law and the policy. Among other factors attributed to the above observation include ineffective monitoring, inadequate capacity of the state in terms of human resources, access to finance, ineffective policy coordination, infrastructure, fronting, corruption, and political interference. Others include a poorly designed LC policy that is overly ambitious. Interestingly, these issues confirm similar studies in almost all resource-rich African countries (Obiri et al., 2020; IMANI, 2019; Obiri et al., 2019; Ovadia, 2014; Ovadia, 2016). The design problem with the LC policy stems from the early conception and legislation of the policy. A thorough gap analysis of the country's capability and capacity was not comprehensive to guide the policy formulation.

This resulted in setting an overly ambitious target, for example, achieving 90% LC within ten years in Ghana, which participants said was not feasible due to the increasingly globalised nature of the industry's supply chain and a host of domestic challenges enumerated above. In designing LC policies in sub-Saharan Africa, countries in the region tend to focus on 'low-hanging fruits' (immediate employment opportunities et cetera) as termed by a participant at the expense of long-term strategic objectives vis-à-vis the country's capability. Mere setting targets to be achieved within a few years will prove inefficient if such initiatives are not accompanied by extensive analyses of the LC potential and detailed strategies to maximise this potential (Aoun and Mathieu, 2015). Similarly, no strategy on technology transfer, human resource development, infrastructure development, et cetera supports the LC regulations and overarching national development plan.

Moreover, even if such a strategy exists, it is in the form of what a participant termed 'silo policy' that is not necessarily connected to a bigger picture. What should hold different sectorial policies together is the country's holistic industrial policy. This 'silo policy' is ad hoc and, on many occasions, a party manifesto without broad support across the political and social divide leading to policy change when the political scene changes. There is no consensus-building on a long-term national development plan that identifies opportunities and the role of the O&G industry. Consensus building is vital in the case of Ghana, where political power changes every

eight years. This will, in turn, lead to clarifying the broader objectives of the oil industry and how LC policy fits into national development plans. From this basis, a balanced LC policy can be designed commensurate with the state's capacity and capability to target specific sectors of the economy.

Designing LCP cognizant of Ghana's capability will require outlining a baseline of existing capabilities and periodically assessing the progress against the baseline. This assessment can be conducted independently and validated with the IOCs, which must highlight what opportunities might exist (what type of skills, goods and services and what infrastructure will companies need to operate with), set reasonable targets, and what gaps need to be addressed (IGF, 2018; Marcel et al., 2016). One of the unintended consequences of the overambitious LCP is 'fronting'. Due to indigenous firms' financial and technical weakness, these local firms tend to 'front' (as partners) for foreign companies to secure operating licenses and, in turn, sub-contract to the foreign company without participating in the joint venture. This tends to defeat the purpose of the policy.

Apart from the enumerated issues above that cause 'fronting', research participants opined that the regulator lacks effective monitoring and enforcement mechanism (see section 8.2.2 for more). Participants were concerned about ineffective monitoring, evaluation, and lack of a strong measurement system of local content with an independent evaluation mechanism (see section 8.2.2 for more). This supports similar studies in

Nigeria and Angola, which lack strong metrics to calculate the percentage of local content in each activity to determine the current level of local content and participation in the oil industry (Ovadia, 2014, 2016; Nwapa, 2018). As a result, regulatory authorities have resulted in simplistic or surface measures for monitoring and evaluation (ibid). It is important that the petroleum commission works with the relevant stakeholders to devise appropriate metrics for the industry.

In comparing Nigeria's LC to Ghana's, Ovadia (2016) argued that although Ghana's LC is like Nigeria's LC, the former is weaker in fewer provisions and enforcement in avoiding locals acting as fronts for IOCs. Ghana's law does little to stop local firms from sub-contracting services from IOCs and does not require locals to own any capital equipment in a joint venture. In a similar study on addressing fronting in Nigeria, Ezeni and Nwuke (2017) recommended adopting Article 2 of the United Arab Emirates (UAE) Federal Law No 17, 2004, making it illegal to conceal foreign involvement in any commercial enterprise. A similar beneficial law will require local firms to disclose their owners.

One of the guiding principles for an effective LC policy is the adaptiveness of the policy towards changes in the external environment or changes in domestic supply chains and skills base (Marcel et al., 2016). The flexibility in the LC policy is essential for countries with a low economic development level that gives room for modifying the conditions to suit the prevailing

circumstances of the country's progress. The lack of flexibility and in-built periodic assessment in Ghana's LC policy makes stakeholders doubt its long-term sustainability and viability. Oil companies' opinions are not regularly sought regarding the policy implementation and any challenges they face. Even amongst government agencies, there is no policy coordination to address issues affecting the oil industry, leading to overlapping policies and wastage of scarce resources.

Specifically, participants referenced the lack of coordination and collaboration between government agencies such as the Petroleum Commission, GNPC, Scholarship Secretariat, and Ghana Education Trust Fund (GETFund)) in tackling overlapping policies. The end effect of the above is that each agency spends resources on training students outside Ghana in various oil and gas programmes without background knowledge of the number of the labour force and specific skills required for the industry.

8.2.2 Industry Regulator

Institutional and legal arrangements are essential when designing and implementing local content (LC) policy (Tordo et al., 2013). To that end, this section assessed the regulator, Petroleum Commission (PC), whether it is resourced to monitor and implement the policy, and secondly, how effective the implementation has been. Research participants agreed that the regulator is adequately resourced to monitor and implement the policy.

Explaining the reasons for the above answer, participants said that between 2016-2019 the PC has passed over eight regulations to support E&P, and the capacity at the institutional level had been built by employing personnel trained abroad as part of the initial strategy to train locals in anticipation of the oil industry.

Furthermore, participants emphasised that in Ghana, the O&G institutions are much better equipped and can deal with issues than the mining institutions, with a case in point being the latter struggling to deal with illegal mining. The O&G industry has been successful compared to the mining industry as the country learnt lessons from mining regarding regulations and revenue management. The above finding is consistent with the Natural Resource Governance Institute's (NRGI) resource governance index, which measures performance across the mining and O&G sectors. In 2017, an assessment conducted by NRGI indicated that Ghana's oil sector exhibited better governance than the mining sector (NRGI, 2017). The report further stated that both sectors perform better in sub-Saharan Africa than their counterparts because of a suitable enabling environment. Despite the relative strong capacity of Ghana's O&G institutions, there remain lingering doubts about the PC's effectiveness.

When a question was posed about how effective the LC implementation has been, most respondents considered it average. As always in resource-rich countries, poor implementation stems from the failure to consider the

regulator's capacity to monitor and measure performance before enacting the LC. Consequently, this leads to poor enforcement or conditions that facilitate influence peddling or corruption of public officials (Marcel et al., 2016). Marcel et al.'s (2016) observation is consistent with research participants' concerns about the PC's capacity to act independently of rent-seekers, political influence, and effectively monitor and evaluate the policy's progress. One respondent succinctly asked:

"Within the oil and gas space, most of the policies are there…the question has been the implementation of it…to the extent that has helped in the improvement of the regulatory mandate of these institutions. That one, there is a big question mark?" ***FGP/MA/04***

The above question and other issues of transparency and accountability, influence peddling in awarding contracts and recruitment led a participant to allege that "*…the place [PC] has been filled with so many people which is diluting the quality of their work sometimes people don't even have desks to sit on…*" [sic] ***RP/LLO/02***. Participants alleged that "…*somebody gets the opportunity because he knows somebody who knows somebody…"* ***FGP/FGP/02*** *and "…largely, the policy has been turned into favouritism"* ***FGP/PA/08****.* These findings confirm similar studies conducted in Angola and Nigeria. According to Ovadia (2012, 2013 and 2014), LC regulations have become an avenue for local elites to capture rents in Africa's resource-rich countries. Instead of the law being used for its intended purpose, the

political elites' resort to using it to enrich themselves, family members, and party followers. Without strengthening the operational efficiency of regulatory institutions, as studies have shown, natural resources' impact on the host country will be negative (Owusu, 2014; Robinson, 2006; Jensen and Wantchekan, 2004; Collier and Hoffler, 2005; Hodler, 2006).

Apart from strengthening the PC to counter the above issues, the IGF (2018) advises that the LC policy must contain built-in independent monitoring and enforcement mechanism that ensures various stakeholders are accountable. Failure to comply should not simply be met with punishment but institute a regular consultation and critical assessment of the policies for potential revision and improvement and phase out specific support measures when the local industries become competitive. Juxtaposing the above against the PC's monitoring system, most respondents pointed to loopholes that make companies circumvent the regulations. A participant contextualised the issue this way:

"The fundamental question is how are we measuring local content? Beyond the definition of local content in the act, what is PC doing to get a baseline data…so they will tell you that on their database they have 400 or so companies registered. Only about 30 are doing real work. Some of them are fronting for foreign companies…." ***RP/LCC/06***

As noted in section 8.2.1, one way of addressing 'fronting' is for the PC to improve monitoring and compliance and pass beneficial ownership laws to institute punitive actions. Mere passing of these laws will not be enough without understanding the root causes of stringent and unfeasible LC targets and the lack of industry consultation. Experience from Trinidad and Tobago has shown that working closely with industry players can secure opportunities for local companies and encourage the industry players to catalyse growth in the types of goods and services developed in the country (Amoako-Tuffour et al., 2015) without necessarily being prescriptive. Another way to curtail the above issue, as argued by Marcel et al. (2016), is to create a standardised and straightforward measurement and reporting system that is easy to implement and less burdensome for investors. The PC, therefore, must deepen effective monitoring, evaluation, auditing and certifying of local content after a follow up to cross-check the veracity of the activities performed by companies.

8.2.3 National Oil Company

The post-independence era in Africa ushered in nationalisation and establishing national oil companies (NOCs) to gain greater control over the state's natural resources. However, these NOCs have not lived up to expectations like those in Norway and Brazil. Indeed, if NOCs are managed well, it has been argued that they can create value, and, on the other hand, if their performance is weak, NOC will become a burden to LC implementation at the expense of private investment and production delays

(Tordo et al., 2011). The latter statement seems to be the case for the performance of Ghana's state-owned oil company, Ghana National Petroleum Corporation (GNPC). To that end, respondents were asked whether GNPC is adequately resourced to increase local content and participation in the industry.

Most respondents indicated that GNPC is moderately resourced, but as queried by a participant, "…*what significant thing has GNPC used the money for?"* ***FGP/PA/08***. It is estimated that the NOC has received about 35% of over $5 billion in revenue from the oil resources since 2011. This pessimism about the effective running of the state-owned company was attributed to two things: the lack of transparency and accountability in the financial records of the NOC and the persistent interference in the running of the NOC. These two participants summarised the issue of the latter below:

"GNPC have all it takes to be involved more deeply than they currently are. Staff of GNPC attend all the training in the world and get seconded to IOCs. GNPC's major problem, however, is independence to operate – budget, clout to pursue their project with no or minimal government interference, etc." [sic] ***QOE/EM/39***

"It has moderately been resourced but due to corruption and misplaced priorities, the local content is not able to be increased." ***QOE/EM/53***

Political interference has led to a lack of focus on GNPC's core mandate as participants poignantly stated, "… *GNPC is too politicised to deliver its mandate"* ***QOE/EM/50***. Juxtaposing GNPC's situation with Statoil from Norway demonstrates the need for greater independence, accountability and resisting interference from political leaders in formulating policy. According to Sigam and Garcia (2012), the state-owned oil company of Brazil, Petrobras, until the 1990s, was granted monopoly and autonomy for E&P and investment in technology, and human capital. In the case of GNPC, it has no autonomy in its administrative and operational functions but rather engages in a lot of non-commercial activities at the behest of the government. A respondent summed this situation as follows:

"We know that GNPC has been cash cow of the State for a long time. Two examples to highlights this situation: in the last administration when Karpower deal was being arranged, GNPC step in to provide a letter of credit ($100M). This new administration comes in, and then the governing party's chairman is appointed as the board chairman of the corporation, and CEO too is a well-known party financier. Then there is an allegation that comes; the board chairman is importing 275 buses for his party…so there are real questions around GNPC operation as a national oil company…" [sic] ***RP/LCC/06.***

This status quo deprives GNPC of the needed funds for its activities, thereby endangering its long-term sustainability. Political incumbents use patronage to secure political loyalty by offering supply contracts to local entrepreneurs, which fails to encourage entrepreneurial development. This

situation is peculiar to Ghana, Angola, and Nigeria, where local content has reinforced the ruling elite's power and wealth by relying on their connections to take over state-run businesses and direct benefits to certain well-placed businessmen (Ovadia, 2014). For parastatal institutions to effectively carry out their function, it depends on their powers and accountability, government effectiveness, regulatory quality, the rule of law, and control of corruption (Owusu, 2014; Klueh et al., 2009).

Compounding the interference issue is the lack of transparency and accountability in the financial statements of GNPC. A participant from civil society stated that civil society organisations (CSOs) have been championing for financial statements of the NOC to be published annually to no success. This has prevented the public and interested parties from assessing the corporation's assets and profitability and the usage of the oil revenue accruing to the NOC. These murky activities are against best corporate practices.

Accordingly, participants suggested that parastatal institutions' heads should be appointed on merit via a public process, and then everybody can put in an application supervised by an independent public body. The underlining principle is to follow Norway's Statoil, which was based on the separation of business from politics, guided by transparent political decisions not on an ideological basis but for practical purposes (Neum, 2008: Asiago, 2005; Marcel et al., 2016). In constituting board members,

special attention can be given to the broader community representation, i.e., labour, communities in which these companies operate and other special interest groups. Additionally, credible, and independent oversight institutions such as the sector ministry, parliament and civil society can provide checks and balance where the absence of these makes corruption unrestrained (Asiago, 2005; Marcel et al., 2016).

Furthermore, participants from local companies emphasised the lack of support they received from the NOC and the regulator. A participant had the following to say:

"The legal framework and financially resourced to independently implement/play role in promoting LC across the value chain. Not much has been done in that regard" ***Q0E/LOC/48***

Contrasting the above concerns with Petrobras's experience indicates that Petrobras plays a leading role in assisting local suppliers to secure loans from Petrobras's partner banks such as Progredir Programme, the National Bank for Economic and Social Development (BNDES) (Mushemeza et al., 2017). Petrobras also use the Credit Right Investment Funds to enable suppliers with whom the company has contracts to secure funding at lower rates than those on the open market (ibid). GNPC, on the other hand, does nothing in recommending or supporting local suppliers and manufacturers in securing loans. Therefore, it is important that GNPC coordinate policies

with relevant state agencies to create special economic zones for manufacturing and industrial development.

8.3 Implementation Challenges of Local Content

Local content development in resource-rich countries must be based on existing manufacturing, fabrication, and services (Kazzazi and Nouri, 2015; Sigam and Garcia, 2012; Obiri et al., 2019). However, most resource-rich countries' industrial base is weak, narrow, have poor access to technology, financing, and information, consequently making the local industry uncompetitive in the participation and increasing benefits from the oil industry (ibid). The above is consistent with the quantitative result (see Chapter 7) about domestic firms' capability and international competitiveness, which participants considered 'low'. The low assessment was attributed, among other factors, to the lack of financial support, technical expertise, and inadequate infrastructure. The next topic discusses the challenges as ranked by the research participants.

8.3.1 Finance

Research participants ranked access to credit as the critical factor impeding Ghanaian firms from participating in the O&G industry. The quantitative and qualitative data established that the unavailability of funds for SMEs affects the local firms' capitalisation and the long-term viability of the LC policy's aim to develop internationally competitive firms. Evidence from the literature alluded to the domestic challenges in the financial sector, coupled

with high-interest hampering borrowing and domestic oil suppliers (Amoako-Tuffour, 2015; ACEP, 2017; Acheampong et al., 2015). A participant had this to say:

"The interest rate has remained high for almost a decade. Local banks may not have the capacity (individually) to invest in financing some of these energy-related huge investments. Without finance, local participation requirements may be difficult to achieve." ***RP/LLO/02***

This issue affects local companies' ability to pre-finance O&G projects, pay their share of equity participation in JV agreements with international companies and even train and equip their workers with the required certification. Similarly, in many African countries, local companies are not financially resourced to compete and provide quality goods and services to the standards of the oil industry (Onuoha et al., 2015; Tordo and Anouti, 2013; Ovadia, 2012; Vaaland et al., 2011; Omenikolo and Amadi, 2010; Heum et al., 2003). The local companies' inability to access credit is partly attributed to insufficient financing opportunities, poor business environment and lack of dedicated funds equivalent to those in Brazil, the UK and Norway. Addressing this issue in the long-term will demand improving the business environment and how the financial sector is responsive to the O&G industry.

Aside from Ghana's macroeconomic environment, indigenous firms' inability to access capital is attributed to their structure. These indigenous

firms lack good corporate governance principles and sound financial management leading to their inability to pass the due diligence tests carried out by foreign partners and local banks. Sometimes, the funding problem is not the banks' readiness to assist local firms but the companies' structure. A participant had this to say:

"…the challenge is that local companies are not properly run or setup…so they don't have the management structure. A classic example is 'one-man company' which is often not well-structured, no business plan etc…in that case is not so much an issue of financing but the lack of local structures in place to assess the financing..." ***FGP/LCO/09***

The preceding is consistent with Vaaland et al. (2012) findings in Nigeria, which attributed the funding issue in the country to the lack of public structure that supports both the lenders and the companies and unrealistic risk assessment by the banks leading to a low score of local companies. So, the idea of having a local content fund to support the domestic firms, as happened in other jurisdictions, will fail without addressing some of these issues. The identified structural problem also agrees with a previous study in Ghana, which argued that poor organisational structure is the bane of many indigenous companies (ACEP, 2017).

More importantly, how independently will the local content funds be disbursed to companies on merit without political interference, as has been

an issue over the years. Participants against the funds argued that "*there is a challenge where the money will be given to politically connected companies"* **FGP/MA/04**. The above statement agrees with ACEP (2017) study, which argued there is a potential for the fund's management to be replete with political interference, which leads typically to default payment.

8.3.2 Infrastructure

According to the research participants, the next significant challenge is inadequate infrastructure to support business development and productivity. Experience from the case countries shows that LC policy thrives mainly on the existing manufacturing base. The manufacturing base will require developed infrastructure that makes both forward and backward linkages possible and ensures profitability. For example, in Norway, the LC policy implementation's success was attributed to the country having an industrialised economy, robust educational system and established sectors such as shipbuilding and hydroelectricity before oil was found (Aoun and Mathieu, 2015). Contrary to Ghana, it is estimated that the country will need an annual investment of $1.5 billion to bridge its infrastructure deficit over the next ten years.

The availability of specific infrastructure will enable the country to increase the volume of work done in-country, thus expanding the manufacturing base to support the oil industry needs. As often argued, resource-rich

countries' ability to provide and maintain the requisite infrastructure is essential for the domestic supply industry to be competitive (Sigam and Garcia, 2012; Kazzazi and Nouri, 2012; Heum et al., 2011; Klueh et al., 2007; INTSOK, 2003). Strategic investments comprising public and private investment in communications, transportation and energy infrastructure are essential to support industry linkages, create new industries and expand local business opportunities for business development. The presence of the above factors expands the manufacturing base and even influences profitability assessments by investors.

In other words, without adequate infrastructure to support the industrial base, the stated aim of using the LC policy to support backward linkages will not be successful. This is because the inadequate local infrastructure will increase local goods' final product, making it uncompetitive compared to foreign imported goods. A respondent explaining the importance of the issue of infrastructure in resource-rich countries put it succinctly:

"I will say infrastructure…you cannot do anything about tech transfer or skills developing if there is no base to support or facilitate it. That is the most urgent, the earlier we got or started putting infrastructure in place the better". ***FGP/MA/04***

It is instructive to note that poor infrastructure affects all resource-rich countries in Africa (Ovadia 2016; Ovadia 2014; Tordo and Anouti, 2013; Ibilola, 2012; Omenikolo and Amadi, 2010; Heum et al., 2003; Balouga,

2002). This sorry state of infrastructure is attributed to investments, years of neglect resulting from civil wars (i.e., Angola), lack of maintenance and corruption and wastage of public resources. In Ghana, the ministry of roads and highway and its agencies have been in existence for more than 20 years and have the technical capacities to successfully develop roads and highways. However, the lack of funds has affected the development and maintenance of transport infrastructure in Ghana, resulting in deteriorating networks. Participants contextualised the above issue in the following way:

"The challenge in the road and highway sector is the financial constraints due to lack of funds from the central government. Roads tolls collected and managed by the Ghana Road Fund Secretariat is insufficient to cover the cost of road infrastructure." **[sic] RP/LCC/06**

"Successive governments have invested in energy access, road and other infrastructure. This needs improvement in terms of quality and access. The government should develop practical steps to allow the private sector to invest in some of these infrastructures. Example, strategies on how the private sector could recoup their investments". ***RP/LCC/06***

Some of the research participants conceded that the government is making progress in infrastructure development, bypassing several legislative frameworks such as the infrastructure act to close the country's infrastructure deficit. To maximise enough benefits from the resources will demand energy-related infrastructure to support both backward and

forward linkages. It is equally essential that the government develop the legislative framework to attract private finance to create backward and forward linkages in special economic zones for direct supply to the industries. Some participants stated that the government had done little to help the private investors in this area.

8.3.3 Human Resource Capacity

Research participants deemed the Ghanaian oil industry's lack of human resource capacity the third most important factor impeding LC policy implementation. A participant summed it as follows:

"I'm talking in the sense of companies and individuals…if local companies are able to invest in their staff…it means they will have experienced staff or if you like qualified staff which will help them win contracts. In winning contracts, they will be able to make profits out of it…and be able to build infrastructure or even acquire technology…technology is on the market" [sic] ***FGP/LE/07****.*

Since the oil discovery, the regulator, PC, has introduced several programmes to boost local skills to make locals employable. These programmes include Ghana Upstream Internship Placement (GUSIP), intended to give graduates from the country's universities 6 to 12 months of opportunities to acquire practical experience with oil companies. Another programme is the Accelerated Oil and Gas Capacity (AOGC), where vocational and technical education training is provided. At the initial stages

of the oil development, the IOCs, in collaboration with the regulator, introduced the Enterprise Development Centre (EDC) to develop indigenous Ghanaian companies' capacity to meet the industry's requirements. Accordingly, the IOCs invested $5 million over five years for the EDC's running but it has folded up due to lack of funding.

Two critical issues affect human resource development: sustainable funding and the lack of policy coordination between academia, state institutions and the oil companies. The former issue is the lack of dedicated funds for training and improving its existing training structures. The latter is attributed to the lack of proactiveness of the regulator, PC, to institute collaboration between the three key players: academia, regulator, and the oil companies. However, a representative of the PC had this to say:

"Many people point their fingers at the PC…PC is just one institution…Indeed we are the ones to enforce the law…. implementation is not PC but three-fold. You have industry, PC and the academia or civil society. Industry has its role and that role is to comply and to implement and to ensure that they do what they have to do. Academia is to support by providing information…research-based information to be able to help. LC is largely driven by R&D and technology…. PC cannot innovate those technology or fund or put money into those technology. It has to be driven by academia...so there are technical universities and universities in Ghana which must play their role. And PC does the enforcement…so it is a three-fold activity. And all of them must be seen to play their role." [sic] ***RP/LE/04***

From the above quotation, it is self-evident that the PC is missing one crucial responsibility, facilitation. The PC can facilitate by bringing the industry's relevant players to discuss the policy and its challenges. Facilitation will bring forth educational infrastructure issues, retooling local universities and their curriculum, overlapping policy across different government agencies, and the role of different industry players such as academia and the IOCs in furthering the LC policy. The PC must learn from its counterpart in the UK, Offshore Supplies Office (OSO), which facilitated and had the power to sponsor applications for discretionary funding under the Industry Act, among other things (Civitas, 2013).

The existence of a skilled and experienced workforce is essential for the growth of the domestic industry. On the other hand, the lack of it will hinder the incorporation of domestic workers into the petroleum industry and the development of an industrial base necessary to spread the benefits in the sector to the broader economy (Sigam and Garcia, 2012). Without an experienced and skilled workforce, the implementation of the LC policy is hampered as companies are forced to recruit outside the country. According to Cosar (2011), technology transfer diffuses in developing countries through formal R&D but also the employment of skilled labour in general. Put it differently, the availability of human capital facilitates technology adoption in developing countries.

8.3.4 Technology

The last ranked challenge among the four categories is technology. Technology transfer in host countries is mostly achieved by enacting local content (LC) that requires oil companies to comply. However, the mere enactment of LC will not lead to the transfer of technology without prerequisite factors. As noted above in the other themes, technology transfer in resource-rich countries largely depends on the host countries' ability to absorb new technology predicated on a country's skilled labour and human capital and infrastructure in general. In Norway, the government's focus on innovation led to the establishment of the RF-Rogaland Research Institute to develop expertise in O&G technologies, and the University of Stavanger received funding to develop research programmes in petroleum engineering (IFRI, 2015). Also, Norway introduced tax deductions to encourage IOCs to relocate their research and development activities to the country (IFRI, 2015).

The incentives are in addition to LC regulations requiring oil companies to spend a percentage of their R&D locally. On the contrary, neither the said incentives nor effective monitoring and enforcement of existing LC regulations on technology exist in Ghana. Many participants stressed that lax monitoring and enforcement of laws cuts across all aspects of the LC regulation, including technology transfer plan, human resource development, et cetera. A participant had this to say:

"There must be that environment that will support the tech transfer…It will not be done in a vacuum…as a nation we must provide the enabling environment…and this will call for infrastructure…industrial infrastructure to be able to facilitate…. accelerate transfer of technology. In the policy, various agencies have been identified who must play a key role in creating that enabling environment including giving some financial incentives." [sic] ***RP/LLO/01***

In response to the above, a participant representing the industry regulator, the petroleum commission, partially agreed to the laxity in the compliance with the explanation that at the beginning of the Ghanaian oil industry, they relaxed the laws and encouraged companies to comply. Despite this explanation, many participants doubted the success of this approach. One of the respondents said:

"…The E&P Law requires at least 5% per cent equity participation in oil blocks by indigenous companies as a condition for signing a PA [Petroleum Agreement] but this has not yielded the expected transfer of technology as many are not active participants in activities on the field." ***RP/TO/05***

These concerns raised by the stakeholders confirm the perception (discussed in previous sections) that the PC and other state institutions cannot monitor and evaluate the LC implementation progress. Responding to the above issue of laxity in compliance, a representative from the regulator had this to say;

"The commissions monitoring is not up to the standard…true and false. Over the years the capacity of the commission as the staff capacity has ranged between 60 to 70 people and for the local content department, we're just 4, how do we monitor the entire over 700 companies, but the staff strength has increased to 50…people can attest that this year particular there have been more monitoring, starting last year than before…and because of that people are being compliant. Over the years too because it was quite new, we gave a lot of room as to using our penalties or penalising non-compliant companies, we were using more of the carrots by advice and caution and all those…" [sic] ***FGP/MA/06***

All the above issues identified by research participants tend to affect technology transfer.

8.4 Policy Lessons across the World

The policy lessons across the world were drawn from two perspectives: developed countries and developing countries. The analysed data from Chapter 7 and the lessons drawn from the literature review in Chapter 3 are discussed to draw policy lessons for effective implementation of the local content.

8.4.1 Infrastructure

There are several policy lessons research participants deemed essential in making the policy successful in developed countries. Prominent among these factors are existing industrial capacity and infrastructure development. For an industrial base to be successful, it will require a developed infrastructure that supports the industry's growth. In other

words, the availability of local infrastructure supports industry linkages, creates new industries, and expands local businesses. In Norway, for instance, the acclaimed success of the oil industry is attributed to the well-developed infrastructure, active state involvement and regulation, which provided a solid base for the domestic industries to develop an internationally supply industry.

Before discovering oil, Norway's domestic competencies included the shipping industry and the manufacture of ship equipment and shipyards. Subsequently, these competencies were easily adjusted and extended into the burgeoning O&G industry. Again, it has been argued that before discovering oil in the UK and Norway, these countries were not at the technological frontier concerning O&G expertise (Kalyuzhnova et al., 2016). Specifically, Norway had no petroleum service and supply industry, no R&D sector and sectoral institutions to manage the resource. Teka (2012) argues that setting the issue of quality of governance aside, Norway had a bigger economy in terms of size, per capita income and strength and size of the industrial sector compared to Angola.

On the other hand, research participants considered inadequate infrastructure the second most impeding factor after inadequate financial support to local firms in developing countries. For instance, in Nigeria and Angola, the LC policy's adoption has been used to establish production linkages between the commodity sector and the limited industrial sector via

stringent laws mandating local goods and services. Despite the apparent importance of infrastructure for the production linkage, it has been ignored and always seen as unrelated to the government's overarching aim to increase local goods and services (Tordo and Anouti, 2013; Ovadia, 2012). In more recent times, Nigeria and Angola's governments have established 'Nigeria Content Development Fund' and 'infrastructure-for-oil trade', respectively, for bridging the infrastructure deficit.

In Angola, the government spends almost $4.3 billion per year on infrastructure, with most of the funds skewed towards transport (World Bank, 2011), predominantly funded by domestic fiscal resources, and China, a source of external finance known as 'infrastructure for oil trade' agreement. In Brazil's case, its recognition as a success story is based on a robust industrial base supporting the oil industry. Likewise, there is a solid infrastructure base coupled with a protectionist environment for indigenous companies to partake in the industry's value chain in Brazil.

8.4.2 Finance

In developing countries, research participants considered inadequate financial support to local firms as the leading factor impeding their growth in the O&G industry. On the contrary, local firms' access to credit in developed countries was regarded as the third important factor in the LC policy's success in developed countries. In developed countries, funds were specifically established to support the local companies in the sector. In

Britain, the IMEG report of 1973 on the British O&G industry recommended that the government establish a scheme to support local suppliers financially. Consequently, the Offshore Supplies Office (OSO)'s subsequent creation had the power to sponsor applications for discretionary funding under the Industry Act (Civitas, 2013). Other state agencies, such as the National Enterprise Board, supported local firms financially. Similar credit schemes existed in Norway and Australia.

In developing countries, the Brazilian government established BENDES to provide capital support to local companies in the O&G industry. Also, a tax waiver is provided for oil companies in compliance with local content laws and quotas for a preferential purchase of locally produced goods in government tenders. In Angola and Nigeria, companies are not financially resourced to compete and provide quality goods and services to meet the oil companies' standards (Tordo and Anouti, 2013; Ovadia, 2012). Consequently, the oil companies have themselves introduced different financial schemes such as Chevron's Angola Enterprise Program (AEP), Total' Zimbo fund, and a joint guarantee fund has been created by Total and Banco Totta de Angola to increase SMEs' access to capital (Tordo and Anouti, 2013). Chevron's Angola Enterprise Program (AEP) provides technical assistance and financial support to indigenous companies by funding the Luanda Business Incubator, specialising in human resource, management, and finance training.

In 2011, Angola's government passed a law requiring oil companies to have a US dollar account in local banks to pay their taxes and contractors overseas. This policy was intended to provide liquidity to local banks and protect against fluctuations in the exchange rate, which is critical in managing the resource syndrome (Ovadia, 2012). Similarly, the Nigerian government has introduced the Nigerian Content Development Fund, which among other things, supports the local companies financially.

8.4.3 Human resource capacity

In developed countries, research participants considered human capacity and education the fourth factor for its success. In developing countries, corruption was ranked third, followed by human resource capacity. Despite the above contrasting data from the two perspectives, it still depicts the importance of a locally skilled and experienced workforce in implementing the LC policy. In Trinidad and Tobago, the LC policy hinges on developing local capability by increasing domestic firms' participation through preferential treatments, upgrading existing universities and research institutions, creating specialised centres, and aligning academic curricula with the needs of the industry. Local capacity was actualised by establishing the Centre for Energy Enterprise Development (CEED) to develop local skills for participation in value-added energy industry projects, business skills, and SMEs' competencies.

The above trend of LC development is like Nigeria and Angola's LC policy. However, the countries have not been able to scale human development. In a study by Ovadia (2012) on the dual nature of LC in Angola, he found that the primary concerns of IOCs are the low level of education and human resources. Similarly, Ezeani and Nwuke (2017) argued that indigenous companies in Nigeria encountered the same obstacles in local skilled availability, poor infrastructure, inadequate financing, corruption, and mismanagement. The LC policy's success will depend on the implementation's effectiveness, commitment with which Angola pursues human capacity building and infrastructure development (Ovadia, 2014).

In Nigeria, the government has established the Nigeria Content Development Fund (NCDF), made up of Nigerian banks' consortium to address credit for indigenous companies. This fund collects 1 per cent of every contract awarded in the upstream sector to address capacity building, human capital development, and infrastructure development (Ovadia, 2014). In developed countries, there existed a robust human capacity and education. That notwithstanding, the developed countries instituted a "full, fair and reasonable" principle for employment, training and tendering opportunities in the UK, Norway, which helped ensure local workers could be trained, employed, and given tendering opportunities. In Norway, local companies are supported with information during the contract tendering process, and the country has a robust reporting mechanism and flexible implementation.

Additionally, Norway aligned its educational system with the industry's demands through public and private partnerships, removing over-burdensome regulations and encouraging engagement between industry and research (Korinek and Ramdoo, 2017). This approach is more sustainable in producing the requisite labour for the industry and the wider economy over a long-term period. In Norway, the government set up a Supplier Development Program (UNCTAD, 2013), focusing on enhancing production links between foreign companies and indigenous firms, which helped create industry clusters. In Canada, LC legislation is found in the provinces that specify domestic contractors' preferences, hiring and training with more significant considerations for the Aboriginal groups.

8.4.4 Technology

The last factor that differentiates developing and developed countries is technology transfer. The Canadian government uses scientific research and experimental development (SR&ED) as a tax incentive to encourage Canadian firms of all sizes to conduct scientific research and experimental development in the country (Korinek and Ramdoo, 2017). The net effect of this is homegrown technology and continuous improvement in the industry. In Norway, the Goods and Services Office was established, among other reasons, to encourage R&D in collaboration with foreign companies and monitor oil companies' compliance with technology transfer requirements. Additionally, foreign companies were given tax incentives (as discussed in

section 8.3.4) to set up operational subsidiaries for the advancement of R&D in Norway.

Oil companies in Norway were required to conduct at least 50% of their research locally with local Norwegian institutions and transfer technology to domestic partners as enshrined in petroleum licenses (Kalyuzhnova et al., 2016). Developed countries recognised the importance of building a strategic alliance and encouraging innovation and technology uptake with local companies. In the UK, the government actively supported local capacity development via the establishing the National Enterprise Board, Offshore Energy Technology Board, and the OSO to support research and development, science and engineering programmes related to the industry.

In Brazil's case, the emphasis was put on domestic stimulation of technology with their state-owned company, Petrobras, at the forefront through licensing agreements with international suppliers. Furthermore, through contractual agreement, foreign oil companies were required to invest half of one per cent of each field's gross revenue in R&D in the companies' research facilities and the other half in local universities in Brazil. In addition to the above, Petrobras has its research facilities that focus on developing new technologies for the O&G industry.

A diversified industrial base and domestic technical capability played a vital role in quickly adapting and developing new technologies through

partnerships and R&D programs. Finally, through a collaboration between Petrobras and local universities, they managed to produce fit-for-purpose solutions for its production challenges. In Angola and Nigeria, technology transfer is ensured through JV agreements with the various state-owned O&G companies or through service contracts whereby foreign service companies provide services on behalf of local companies. Similar JVs are encouraged in all the resource-rich countries to build the capacity and tap into foreign companies' technology.

8.5 Model for Local Content Development and its sub-models

This section discusses the model for Local Content Development (LCD) and its various sub-models comprising causal loop diagrams (CLDs) for Technology, Finance, Infrastructure and Human Resource Capacity (HRC). The discussion delves into the participants' opinions on the relationships in the CLDs contrasted with the findings in the literature. The next topic is the conceptual model for LCD, which provides an analytical framework for systematically analysing the above themes' interrelationship.

8.5.1 Causal Loop Diagram for Local Content Development

The model is used as an analytical framework to disentangle local content implementation challenges, providing deeper insights and a holistic understanding of LC policy in Ghana. Figure 8.1 illustrates a complete causal loop diagram (CLD) for LCD comprising validated sub-models for Infrastructure, Technology, HRC and Finance with accompanying

strategies. The diagram reveals various interactions within the ecosystem of the LC implementation based on the above four factors.

After the initial mental model construction (see Chapter 5), model validation was done using experts from the PC, Energy ministry, academics, and private companies in Ghana. Participants were asked to review the diagram to (1) add or drop variables (cause, effect); (2) identify any missing relationship; (3) confirm the existence of a relationship or otherwise (Alasad et al., 2013). Figure 8.1 was validated, resulting in seven reinforcing loops (R1-R7) and a balancing loop (B1). The reinforcing loops produce desirable growth in the system, which therefore requires strategies to counteract any potential setbacks to the growth. Similarly, the balancing loop in figure 8.1 requires strategies to stabilise the system. These underlining concepts are used in devising effective strategies to address the loops in figure 8.1 and its disaggregated sub-models in subsection 8.5.2.

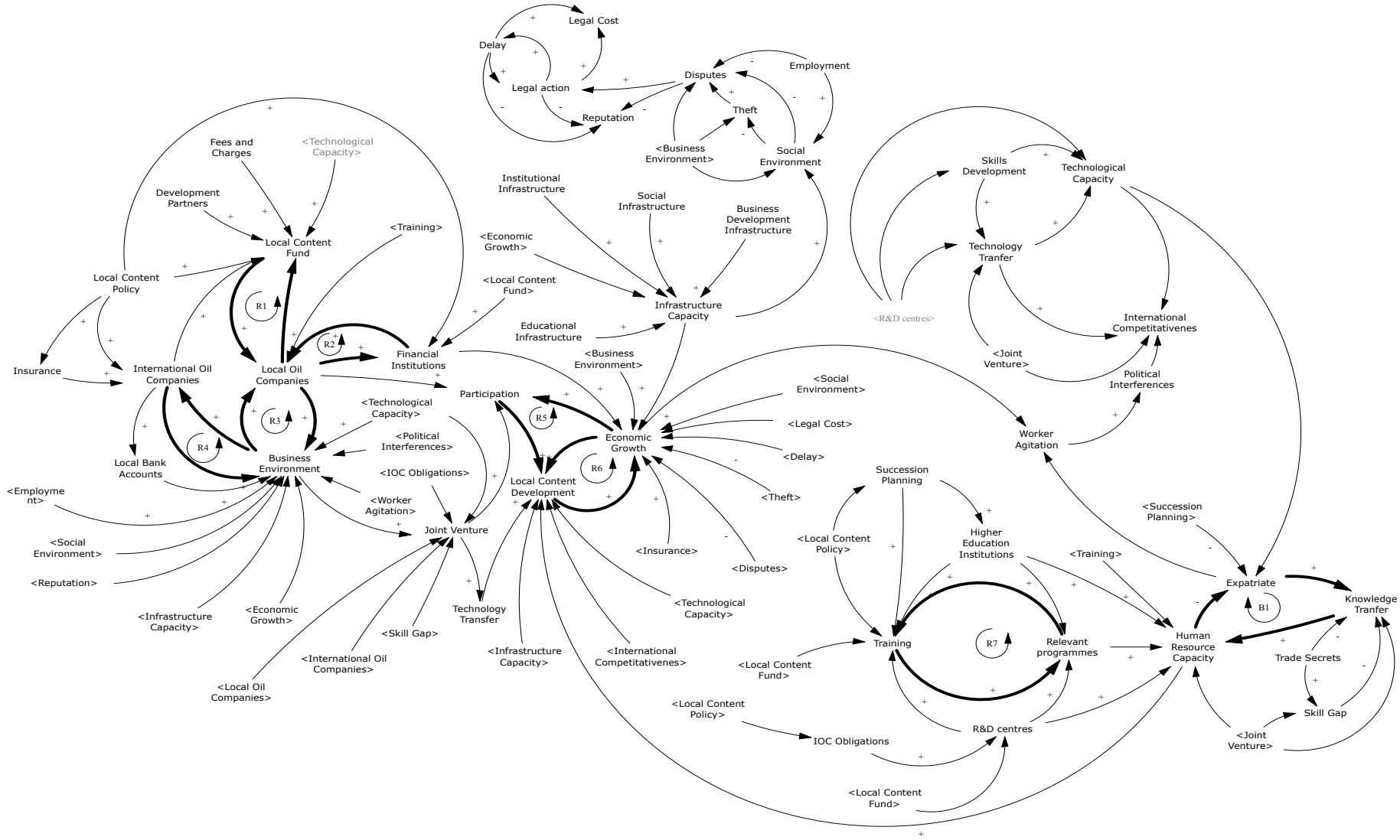


Figure 8.1: A Complete Causal Loop Diagram for Local Content Development.

In discussing figure 8.1, the research participants concurred that relationships exist between the variables, and these variables are essential building blocks for implementing of the LCP in Ghana. However, the potential impact of local content variables, as indicated in figure 8.1, will differ. Some of the participants' quotes are quoted below:

"*Without requisite local skills and expertise, the employment aspect of the policy will fail…and for that purpose, you need physical and institutions infrastructure to bring to fruition. So, that strong relationship exists between infrastructure and local skills and expertise development."* ***RP/LLO/02***

"…there is that relationship among all the factors…just that some factors have more impact than others. For instance, the rate of HRC and infrastructure impact is high on LCD…" ***RP/LLO/01***

Explaining the importance of these variables and their causal relationships (as indicated in figure 8.1), participants accentuated that finance availability will be crucial in developing an infrastructure base to support local suppliers and manufacturers. The availability of finance from petroleum resources can support local skills and capacity building, institutions' strengthening, domestic R&D, and support firms financially. Similarly, the availability of local infrastructure will create the enabling climate for the thriving of local manufacturing, technology transfer and local universities for training, creating a conducive environment for the growth of businesses.

Likewise, the availability of developed local skills and an experienced workforce aid in technology transfer and infrastructure development and contributes to the growth of the local economy. While acknowledging the model's relationship, participants stressed that all the variables' impact on LCD are not the same. Among these variables, the focus group participants considered Finance the decisive factor on LCD, followed by Infrastructure, HRC, and Technology, which corroborated the quantitative results. Participants, therefore, argued that it is essential that attention is paid to the above enablers to support the LC policy implementation at the early stages of the legislative framework's development.

This is consistent with previous studies suggesting that designing LC policy should always consider the country's current socioeconomic conditions (IGF, 2018; Marcel et al., 2016; Tordo et al., 2013; Ovadia, 2015; Acheampong et al., 15). Assessing the country's gaps in institutional capacity to monitor and implement laws, domestic capabilities in terms of skills and human resources, and infrastructure capability to support backward and forward linkages. As Ghana performs poorly in the above areas, it is then appropriate to focus the state's attention in the short term on creating a viable business environment. On the other hand, when the prerequisite, as mentioned earlier for success, is more promising, LC policy can be planned for the medium term (IGF, 2018). In Ghana, the focus is on what a respondent termed 'low-hanging fruits' instead of improving the business environment, which is more sustainable.

Effective strategies: The reinforcing loops in Figure 8.1 produce growth or desirable results, keeping the system running efficiently, thereby producing a virtuous circle. In such a scenario, the first action is to strategise to keep the system performing efficiently and anticipate any potential growth limit. Accordingly, the state's resources must focus on addressing the deficit in infrastructure development, developing local capability in terms of skills via retooling existing universities, and R&D centres and establishing specialise institutions for the industry, improving the macroeconomic environment and establishing specialised funds that support local firms.

On the other hand, the balancing loops in Figure 8.1 look at devising strategies that will stabilise the system by setting a clear objective and subsequent action to achieve the objective. Dealing with a balancing loop requires planning and anticipating potential side effects thereof. The strategies range from the strengthening of state institutions to act independently of rent-seeking and political interference, setting achievable targets, improving LC reporting and enforcement mechanisms, creating the enabling environment for the growth and profitability of local firms to a long-term strategic national development plan that encompasses the four thematic areas of the study.

These strategies are explained in detail in the sub-models (see section 8.5.2). The model demonstrates two things: the four variables are

prerequisites for resource-engineered development, and there exists a causal relationship in the thematic areas. Consequently, the challenges are addressed to allow the proposed solutions to have maximum impact across the broader economy.

8.5.2 Sub-models

The underlisted sub-models of Finance, Infrastructure, Human Resource Capacity and Technology are discussed in importance as ranked by the research participants.

8.5.2.1 Causal Loop Diagram for Finance

Validated CLD for Finance (Figure 8.2) below illustrates the causal relationships in the model.

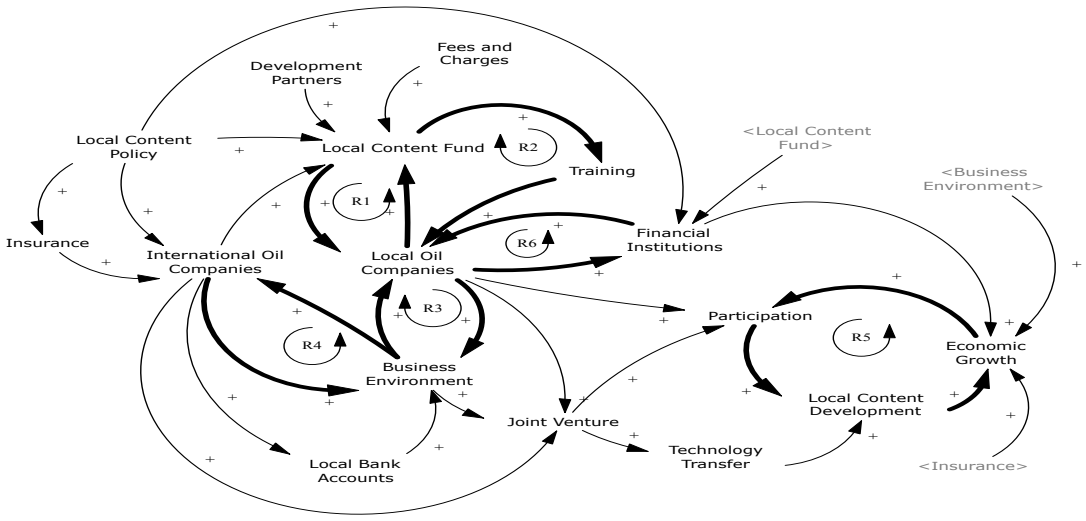


Figure 8.2: Validated CLD for Finance

The diagram (see figure 8.2) shows that the model contains reinforcing

loops from R1 to R6, critical in understanding the modelled system's behaviour. The diagram illustrates that successful financing of domestic firms will entail establishing the local content (LC) fund, creating the enabling business environment for the growth of financial institutions, which will support local firms to participate in JV. To that end, research participants argued that creating a fund to support businesses in the oil industry will demand a clear and qualifying criterion devoid of politics. This is because the usual trend of securing government contracts, scholarships or loans is through your affiliation to the ruling party, as claimed by participants. Against this backdrop, most participants favouring the fund argued for putting structures in place to curtail interference. A participant suggested the following:

"…clearly outline the process for submitting your business plan, you need to show your 3-year financials, KPIs, the management structure that meets the benchmark…" ***FGP/BA/05.***

As pointed out earlier, research participants emphasised the need to support local firms with what they termed 'business enablers' (energy and IT infrastructure Etc.) to reduce business costs. The above is in reference to 'business environment' variable in figure 8.2. Furthermore, there must be an accelerator program to provide business support services to ensure these companies use the money for the intended purpose and there is a return on the state's money and curtailed misappropriation. The above

arrangement is essential as most local firms in the Ghanaian oil industry are not well-structured - termed 'one-man company' – leading to a perception of likely administrative and operational weakness, thereby reducing local companies' chances of securing loans. The banks see these businesses as high risk with the highest probability of defaulting on payment loans.

On the other hand, few participants were against the setting up of an LC fund. One respondent said, "the *government has a number of credit facilities through Microfinance and Small Loans Centre, National Entrepreneurship and Innovation Programme, EximBank among others" SMEs. The challenge is that "these are not well coordinated and often grant small facilities (e.g., MASLOC), requires a number of steps and are politicised…"* **RP/LE/04**. The above is some of the concerns raised by the participants in addressing the CLD for finance and its loops

Effective strategies. As the CLD Finance produces reinforcing loops, strategies must be devised to keep the system at optimal performance while anticipating potential shortcomings. Accordingly, local firms' access to credit facilities can be addressed in the short term and long term. The short-term should necessitate establishing an LC fund predicated on two critical factors: an independent administrative body and business support services. The fund's administration should be composed of key players in the oil industry (oil companies, civil society organisations, regulators) under

parliamentary control over its activities.

This broad representation is to give funds credibility and independence from interference. This fund can be financed from oil revenue, international development partners and oil companies' contribution in exchange for a tax waiver, or the oil companies must be encouraged to contribute to the fund. Instead of the IOCs establishing a separate fund as practice in Angola, they can channel their resources into the LC fund with their representatives on the fund board to decide its usage.

The LC fund must have enforceable guidelines that spell out the qualifying criteria to curtail political interference. Secondly, the selected companies must be aided with business support services that build their capacity. In the long term, the government must improve the macro-economic environment and, more importantly, how the financial sector responds to the O&G industry. The long-term planning aligns with the reinforcing loop strategy of anticipating potential setbacks to the system. Therefore, the state's banks must be structured along Brazil's BENDES to support local firms financially. The state oil company, GNPC and the industry regulator, PC, can recommend local firms on merit to banks as practised by Petrobras in Brazil.

The PC and GNPC must team up to put measures in place that encourage local firms to pull their resources together to form a JV and stop this notion

of a 'one-man' company. This will improve local companies' viability and credit rating. The next strategy to address the CLD for finance is 'carrying over', where the IOCs can enter JV with local firms for a certain number of years without the latter committing an initial capital, allowing the local firms to build their finances and technical capacity gradually. This should depend on whether the local firms have the potential or established capacity to participate in the venture. This financing method should not be legislated as it becomes prescriptive, but the IOCs should be encouraged.

8.5.2.2 Causal Loop Diagram for Infrastructure

Validated CLD for Infrastructure (Figure 8.3) illustrates a causal relationship in which participants agreed that an "*interplay between these key factors*…" is essential for local infrastructure development. However, participants stressed that the rate of impact of each of the factors would vary considerably.

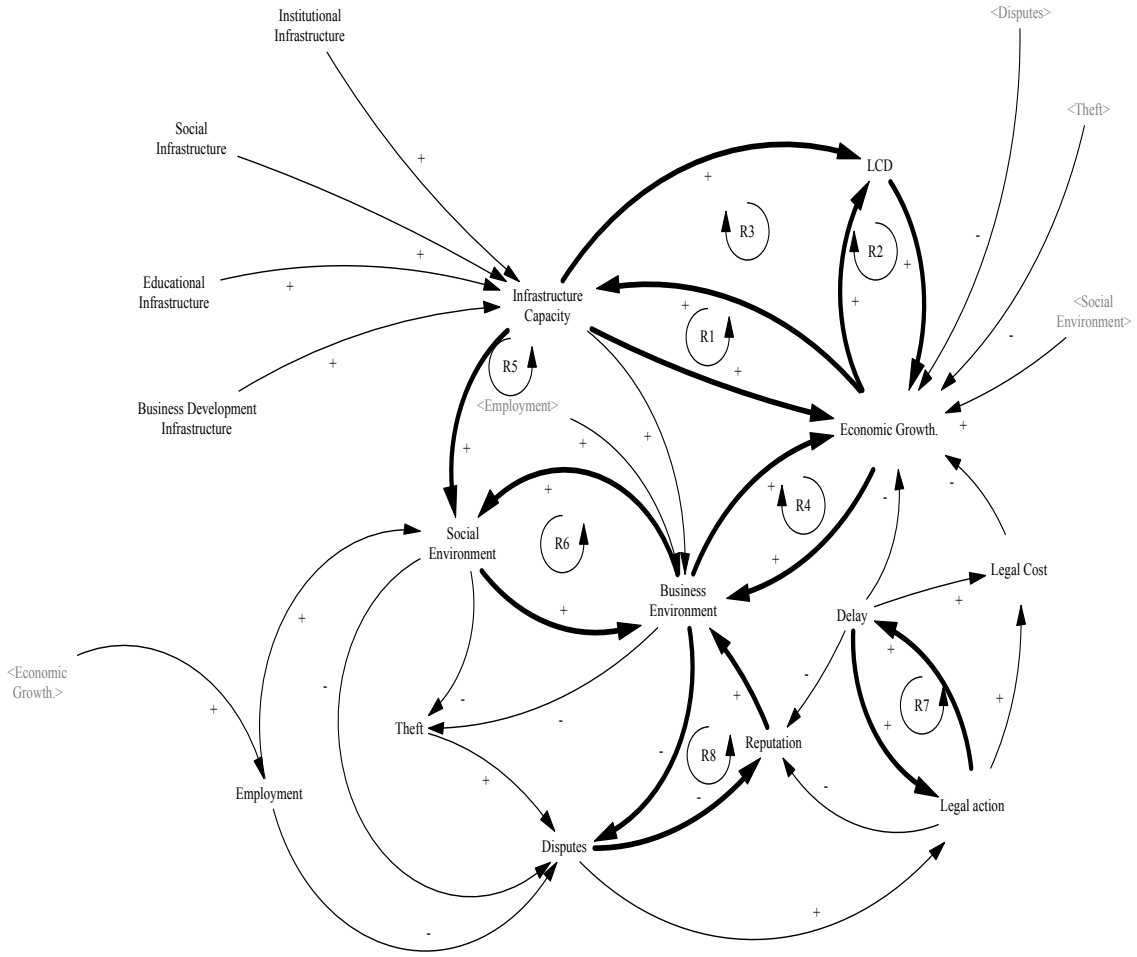


Figure 8.3. Validated CLD for Infrastructure

Participants further suggested adding technology infrastructure and financial incentives to the model captured under the business development infrastructure variable. The entire validated model contains reinforcing loops, R1 to R8, which demonstrate two things: investments in infrastructure capacity can create the environment for developing the host country's local capability in terms of skills, and technical expertise and support local manufacturing and industrial capabilities, ultimately propelling economic growth. On the contrary, lack thereof can lead to social

upheaval and disorder, especially in the host communities where these resources are found.

The latter scenario happens due to the oil industry's negative secondary impacts, which serve as a magnet for migration with resultant pressure on existing infrastructure and farmlands (Obiri et al., 2020). The above validates the argument that to narrow the technological gap between domestic companies and foreign firms and improve the former's local skills and capabilities, there must be an industrial infrastructure (INTSOK, 2007). Therefore, decisions on infrastructure investments should involve all stakeholders - central government, local authorities, and oil companies. It is in the interest of the oil companies to work together and assist the appropriate authorities in addressing the impact of oil activities, especially on the host communities. The host communities will then feel a sense of sharing in the resources' wealth, thereby creating a peaceful environment for operations.

More importantly, the central government and local authorities are responsible for addressing the infrastructure challenge. The host government will have to coordinate infrastructure investment based on a long-term national development vision for broader economic development (Rodrik, 2004; Marcel et al., 2016; Obiri et al., 2019). However, research participants accentuated that this has not been the case due to a lack of proper planning and wastage of scarce resources at the national level,

where there is perennial fostering of political parties' manifestoes as a development policy instead of a consensus-built long-term development plan. The effect is that programmes of erstwhile administration get abandoned by the next administration. Additionally, research participants raised corruption and interference in the award of contracts.

Effective strategies. Figure 8.3 produces eight reinforcing loops (R1-R8) that indicate the system is producing needed growth. As stated in the preceding themes, nothing grows forever, and as a consequent, it is essential to expect potential drawbacks. Accordingly, it is recommended that state institutions be strengthened to actively coordinate and harmonise policies from different government agencies to curtail the overlapping and disjointed policies. Without a common platform that coordinates policies in developing the infrastructure variables (see figure 8.3) that supports the industry's value chain, local industry growth will be minimal. Although the industry regulator is not directly responsible for building infrastructure, it must coordinate with relevant institutions in identifying infrastructure that can increase in-country manufacturing and supply to the oil industry.

The first step in sustainably addressing infrastructure is to craft a long-term national development plan that analyses critical infrastructure areas that can support the oil industry. Based on this, the government can take the lead in coordinating and financing infrastructure projects and creating the

legislative framework and regulatory instrument conducive to attracting private financing into priority areas.

The above is in line with research participants' arguments that "*one of the main challenges with infrastructural development in the extractive industry has to do with lack of proper planning at the institutional level, wastage of scarce resources on non-essential projects to fulfil political parties manifestoes which in turn deprive government's agencies of the requisite money for infrastructure projects and maintenance*". The other issue is overpricing of infrastructure projects at the institutional level. It was argued that overpricing of projects happens because "*most public institutions employ procurement processes and selection matrices which are not transparent*".

Participants further accentuated that the development of the infrastructure variables, as indicated in Figure 8.3, suffer from procurement abuses. By abusing a procurement process such as 'sole-sourcing' that is not always value for money-oriented, the state tends to lose vast sums of money. In certain instances, participants alleged that procurement is awarded to contractors who are not well-resourced: these often result in projects suffering delays and cost overruns. It is worthy to note that state institutions supposedly have performance monitoring and evaluation outfits to audit ongoing infrastructural projects. Conversely, such auditors are

easily influenced by contractors, and politicians and eventually compromise on expected standards.

Accordingly, these demands strengthening of institutional infrastructure to curtail political interference. Furthermore, there is an urgent need for a robust political will to stamp corruption and redefine the sole sourcing and procurement process. State institutions must be empowered to conduct a value for money analysis to curtail mostly inflated government projects. The oil companies should cooperate with the government (and local authorities and community leaders) to attend to the host communities' needs to reduce the oil industry's negative secondary impacts. However, it must be underscored that the oil companies' efforts complement the government's policy and not vice versa.

8.5.2.3 Causal Loop Diagram for Human Resource Capacity

Validated CLD for Human Resource Capacity (see Figure 8.4) indicated below shows causal relationships in the variables required for human resource development in the Ghanaian oil industry. Stakeholders stated that in building local human resources, emphasis should be on the relevant human resource, which will help depart from the current trend of training locals in programmes that are not relevant to the industry. From the diagram, the reinforcing loops (R1 and R2) reinforce the system's performance, enhancing the system's growth. On the other hand, the balancing loop (B1 and B2) brings about leverage to stabilise the system.

These loops demonstrate the following: strategic investments in training, R&D and domestic capacity will increase local capability and close the skill gap, and on the other hand, lack thereof will increase expatriates in the industry-leading to resentment and complaints about lack of local employment.

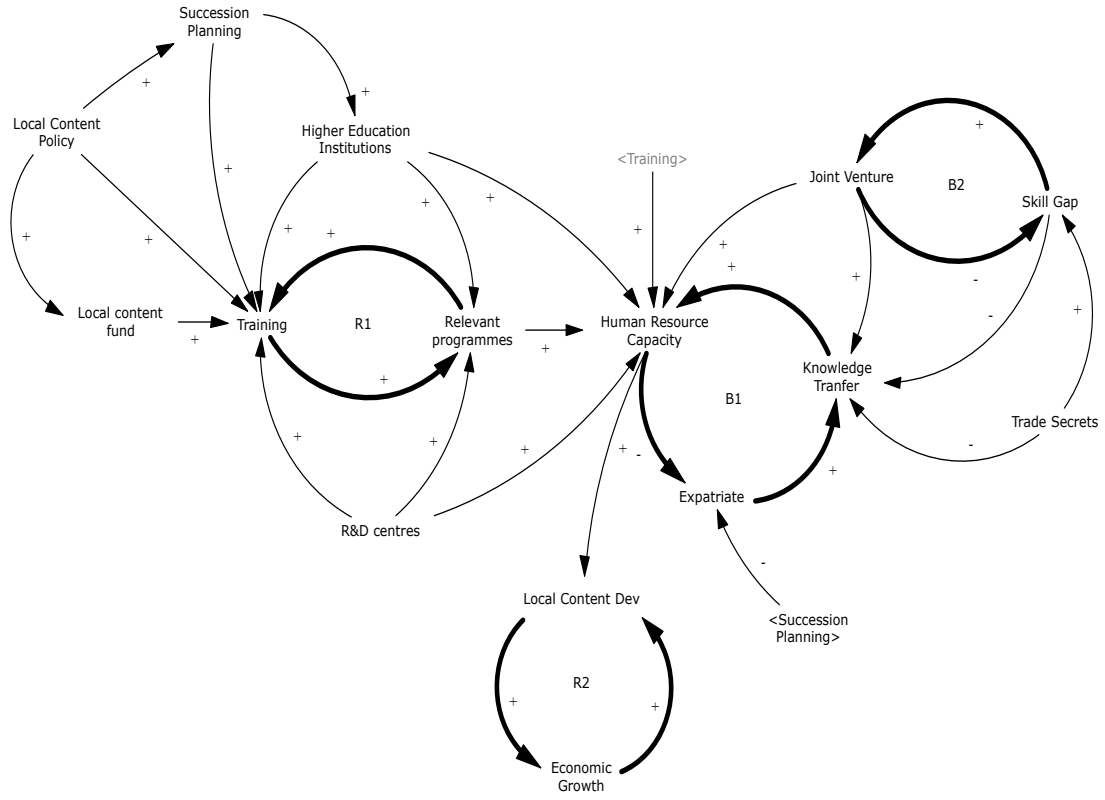


Figure 8.4. Validated CLD for Human Resource Capacity.

Research participants accentuated that the changing dynamics of the oil industry worldwide require a thoughtful investment in transferrable skills. A detailed analysis will help identify the skillset needed for each value chain stage and devise an appropriate strategy for the industry. This agrees with Marcel et al. (2016) argument that the sustainable way of building capacity

that will create value is to focus on skills transferable to other sectors of the economy.

In sub-Saharan countries, Peek and Gantes (2008) argued that skilled workers' shortages in the oil industry are attributed to inadequate educational facilities, inadequate vocational and technical training and increasing demand for higher-skilled workers. In Ghana, the educational facilities are good, but the issue has been vocational and technical training aligned with the industry's requirements. Much of the training is focused on management programmes to the detriment of technical skills favoured by the industry. The other issue with human development is the lack of dedicated funds like Nigeria's Content Development Fund for training and resourcing universities. Also, as noted in previous sections, developing human resources will require the regulator, the Petroleum Commission (PC), to play a central role in coordinating policy with other key players.

The above contrast with experience in Norway with its LC strategy focus on local capability development, education, and creation of new business. The Norway government focused its attention on supporting local universities, creating specialised centres, and designing academic curricula to meet the industry's requirements. Also, there is no overarching policy on human resource development to support the LC regulation in Ghana.

Effective Strategies. Participants' discussion of the CLD for HRC and its loops (see figure 8.4) laid bare two significant issues with human resource development in Ghana: policy coordination and harmonisation, and sustainable funding. Addressing the above will require the LC to be reviewed to be commensurate with the Ghanaian industry's capabilities and requirements. As it stands now, there is a misalignment between the Ghanaian LC stated objectives and the capacity of the local industry capacity and business environment to support the LC implementation. Accordingly, conducting a gap analysis can aid in developing a comprehensive strategy for the next 10 to 20 years, factoring in the country's developmental stage, comparative advantage, and the future trends of the global oil industry.

Furthermore, the industry regulator must be at the forefront of coordinating policy with the relevant government institutions and the private sector to aggregate and develop the required human resources. This is essential to curtail the overlapped policies of different government institutions on building capacity. Additionally, investment in building local capacity must be placed on skills that can be transferred to other sectors of the economy when the industry's life span comes to an end. Likewise, the discussion of CLD for HRC underscored the importance of effective monitoring of the LC laws. The regulator must improve its metric for monitoring and enforcing LC regulations on training, succession planning, and verification. More importantly, the oil companies should be engaged and consulted in

understanding the challenges they face in complying. The LC policy and laws must come with sunset clauses and regular review, i.e., five years to measure its effectiveness and recommend necessary changes. The LC must be a short-term strategy, and more importantly, it must be aligned with the overall government strategy on human resource development. The regulatory authority can institute an awarding scheme to incentivise local workers to report firms that infringe or dodge the LC policy laws.

The government will have to establish and operationalise LC funds like the Nigeria Content Development Fund (NCDF) for local capacity building (see section 8.5.2.1 for more). The fund can be channelled into what a respondent termed "…*three-way partnerships: technical Institute, universities and R&D centres..."* ***RP/LE/04.*** It will help ensure that the gap between universities' curriculum and the industry is bridged. The oil companies can create a pool of resources to support the strategies and create a forum for engaging local firms on tendering, capacity building, job vacancies and procurement opportunities and requirements. This latter option does not replace the overall responsibility of the government.

8.5.2.4 Causal Loop Diagram for Technology

The validated causal loop diagram (Figure 8.5) illustrates the various variables used in the model that interact to ensure technology transfer in the oil industry. Research participants suggested adding technology infrastructure to the model to create an environment for quicker

dissemination of information, research, and business development. The new model has a balancing loop, B1 and three reinforcing loops, R1-R3.

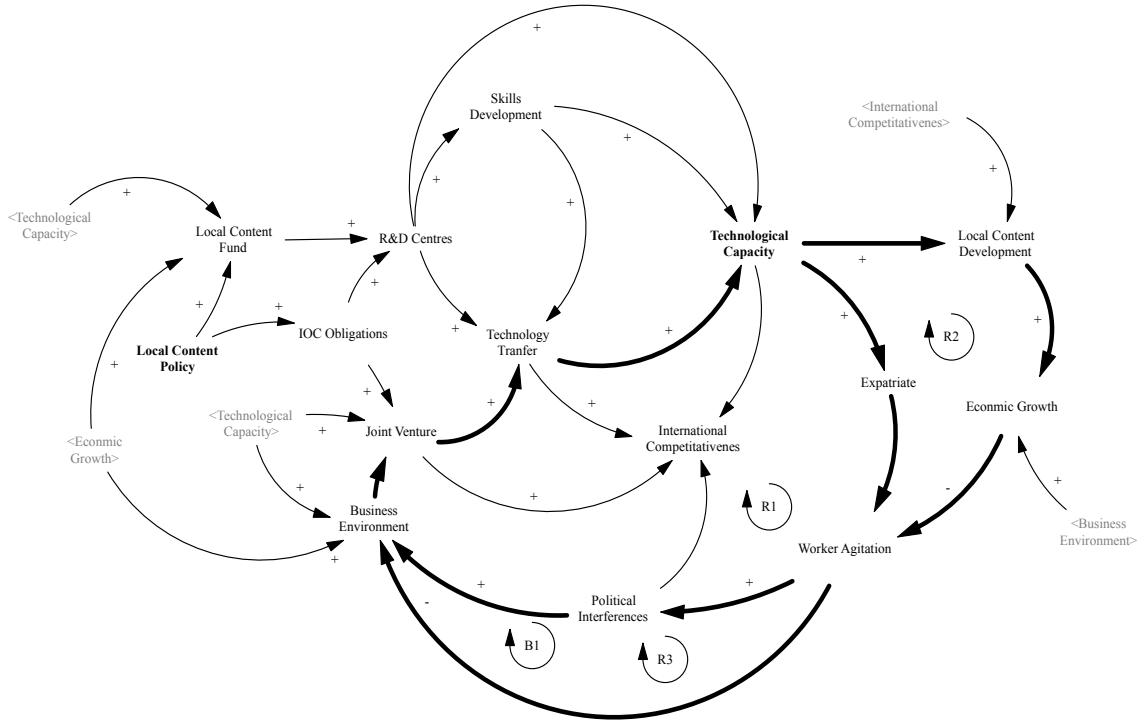


Figure 8.5. Validated CLD for Technology

The diagram's reinforcing and balancing loops produce desirable results resulting in growth and stabilising the system. Research participants underscored that technology transfer via joint venture is hampered by the local firms 'fronting' for foreign companies and inadequate infrastructure and funding. The above findings are consistent with Saggi (2003) and Owusu's (2014) studies, which argued that weak domestic absorption capacities impede technology transfer in the form of infrastructure, regulatory systems, and insufficient public funding. The above issue is exacerbated by the oil companies' claim that their local partners do not

have the requisite skills and labour to receive and absorb the technology. Indeed, Cosar (2011) argued that technology transfer does not diffuse only through formal R&D but also through skilled labour employment. Put differently, human capital availability facilitates technology adoption in resource-rich countries (Monday, 2015; Asghari and Rakkshanikia, 2013; Saggi and Kamal, 2002; Afriyie, 1988).

This stands to reason that technology transfer will depend on dedicated investment in human capacity coupled with robust infrastructure (as discussed in sections 8.5.2.2 and 8.5.2.3). In Ghana, the government has no broad strategy for technology development and no dedicated funding apart from the LC legislation, which enforcement was considered average by participants (discussed in sections 8.2.1 and 8.2.2). Contrasting the above with Brazil's experience, apart from the robust LC enforcement, the Brazilian government instituted a special fund to support R&D: Oil and Gas Sectoral Fund (CT-Petro), which comes from a portion of the royalties. Petroleum contracts in Brazil have an R&D clause which forces IOCs to allocate 1% of the gross revenue from the field that pays the Special Share Tax to R&D (Sigam and Garcia, 2012). However, an official of the regulator, PC, countered the above concerns on lack of funding and strategy as:

"LC is largely driven by R&D and technology…PC cannot innovate those technologies or fund or put money into those technologies". This is the

responsibility of technical universities and universities in Ghana which must play their role…" ***RP/LLO/02****.*

This has resulted in the regulator (and the government) not having an overall strategic plan, sustainable funding, or tax incentives to induce local R&D as practice in Canada. Consequently, local research facilities are left to their strategies for technology development. This lack of government strategy supports Asghari and Rakkshanikia's (2013) argument that technology transfer to developing countries is dependent on internal and external factors. The internal includes local infrastructure and national plans and actions for receiving the technology. The external deals with IOCs deciding to invest in developing countries due to the saturation of investment in developed countries. Therefore, it is not enough to require oil companies to comply with LC provisions on technology transfer without an accompanying national plan.

Effective strategies. Improving the performance of CLD and the loops must start with strengthening the regulatory institution's capacity. The regulatory institution's capability and compliance mechanism should be enhanced to ensure oil companies comply with LC laws on technology transfer. To ensure effective compliance, the regulator must engage the oil companies in understanding their difficulties complying with the technology plans. This, in turn, will produce two effects: one, give the regulator opportunity to assess the local content measuring metric

suitability, and secondly, understand the rampant allegation of locals 'fronting' for foreign companies. Without understanding the latter's causes, the LC laws' intended aim will fail if the local firms fail to participate in the joint ventures. Secondly, the regulator must follow Norway and Brazil's examples to establish a partnership between the industry and local universities and R&D centres to facilitate technology transfer.

In the long term, the regulator (and relevant government agencies) must develop a national strategy for technology development within the broader framework of the national development plan (as discussed in the earlier themes). The national strategy will focus on developing internal factors (infrastructure, local skills, et cetera) to support technology development and absorption and sustainable funding of R&D. Internal factors such as local infrastructure will improve specialised institutions' physical infrastructure, IT infrastructure, and restructuring of academic institutions and R&D institutions.

A special fund like Brazil's Oil and Gas Sectoral Fund must be instituted to support the R&D centres to develop indigenous technology while adopting appropriate technology to the state's needs. Tax incentives like Canada's income tax deduction can be adopted to support local companies to develop local technology. To achieve this, local companies' capacity must be upgraded with the requisite workforce to absorb or develop technology and the financial muscle to purchase technology on the open market.

These strategies will lead to the general improvement in technology development as the CLD for technology envisages.

8.6 Implementation Strategies

Figure 8.6 below illustrates a virtuous circle and feedback loop for implementing the identified strategies (section 8.5) for addressing the LC challenges. The first component of the framework comprises Finance, Infrastructure, HRC and Technology, which should constitute the developed strategy for addressing local content challenges. The second component of the framework consists of two emerging factors, of Political Leadership and Institutional Capacity and Stakeholder Engagement, which focus on the execution of the strategies.

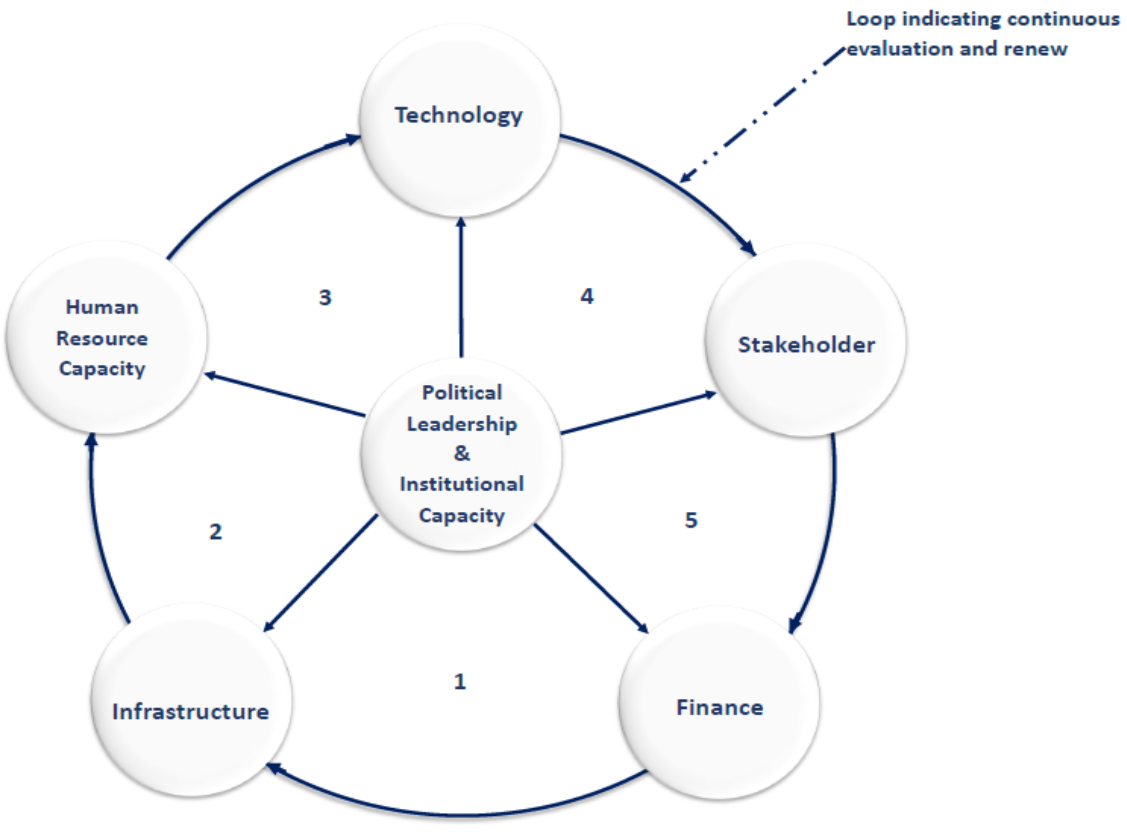


Figure 8.6: Implementation Strategies for Local Content Challenges.

The continuous revolving arrows in the diagram indicate the need for policymakers and stakeholders to review the implementation progress continuously. To set the identified strategies in motion and operate the strategies will require decisive political leadership and independent state institutions. Political leadership and institutional capacity serve as a nucleus for driving the other factors, as depicted in Figure 8.6. The stakeholder consultation provides a platform where broad consensus on policy from key players in the oil industry is discussed before implementation. The next topic discusses these factors starting with political leadership and institutional capacity.

8.6.1 Political Leadership and Institutional Capacity

The study argues that implementing the identified strategies in section 8.5.1 will be dependent on the role of political actors and the institutional impendence of state institutions. The underlisted questions are critical in separating political authority from public institutions.

- *What should be the level of public institutional independence?*
- *What sort of relationship should exist between political actors and public institutions?*

Answering the questions mentioned above will be crucial in delineating the boundary of political leaders' authority and curtailing persistent interference in Ghanaian public institutions' administrative and operational decisions. Political leaders are ultimately responsible for creating the legal

framework and policy direction that supports public institutions in instituting standards, industrial policies, and good governance. Indeed, Norway's local content implementation success is partly attributed to its ability to form a consensus on long-term development plans. On the contrary, in Ghana, there is no consensus building for long-term development with the two dominant parties, New Patriotic Party and National Democratic Congress, both relying solely on manifestoes that get abandoned on the assumption of a new government.

A participant observed that these manifestoes are used to create "*silo industries that are not necessarily connected to a bigger picture*". This, therefore, calls for a holistic national industrial policy for the broader economy that encompasses the oil industry. Notably, the industrial policy must have a broad consensus and support across the political divide that ensures the continuity of the policy. The industrial policy must emphasise the sustainability of the oil sector and how skills developed can be transferred to other sectors of the economy when the industry's life cycle ends. Secondly, to improve good governance in the oil sector, institutions enforcing LC laws, NOC participation in E&P, and the rule of law must be strengthened and resourced. Addressing the Ghanaian institutional capacity deficits to act independently of government interference and rent-seekers is the surest way to engineer resource-based development.

Key institutions such as the national oil company, GNPC, must be structured (de-politicise) to prevent politicians from using the institutions' funds for unrelated projects. Strengthening the state parastatal and oversight institutions that encourage openness, transparency, and accountability will curtail the corruption and rent-seeking behaviour of the political elites. The study argues that regulatory institutions and the NOC on their own will not be robust, independent of political interference if political leadership does not lead in creating the legal and regulatory framework that supports good governance.

8.6.2 Policy Coordination and Harmonisation

For the LC policy to support broad-based development, participants averred that there must be a concerted engagement to curtail the "*lack of cohesiveness among major stakeholders that carry local content mandate…* ***QOE/LU/60***. As succinctly put by another participant, "…*the implementation of the LC policy is three-fold: the regulator [and the government and its agencies], academia [universities and R&D centres], and the industry [oil companies and its contractors]* ***RP/LE/04***. Delineating the above stakeholders' roles and creating a shared platform for policy discussion and coordination is essential for implementing the LC policy. At the government level, it is essential that the national government and subnational authority formulate policies, create independent institutions, enforce laws, and provide a stable macroeconomic and political environment that rewards investment. As the lead implementor of the LC

policy, the industry regulator (Petroleum commission) enforces the laws and facilitate and coordinate policy discussion between academia and the oil companies.

Facilitation will bring forth educational infrastructure issues, retooling local universities and their curriculum, streamlining policy across different government agencies and sustainable ways of addressing industry players' concerns. The oil companies must assist the regulators in demystifying the procurement process and assist in training, providing notices and building the capacity of local firms. On the part of civil society, they can help shape policy and demand transparency in the affairs of the state institutions that are often shrouded in secrecy. More importantly, a cordial relationship must exist between the above players where each stakeholder gets the opportunity to contribute to policy formulation.

The regulatory institution should develop a platform to solicit ideas and inputs from the critical players before implementation. This forum should regularly review progress against set targets and suggest recommendations. Broad consultation on policy from the key players will receive comprehensive support and curtailed 'fronting', which research participants claimed is partly responsible for the lack of compliance with LC laws. In a nutshell, the study argues that for local content to work effectively, there must be exemplary political leadership, independent state institutions and stakeholder engagement that serve as a backbone for the

thriving of the under-listed strategies on Finance, Infrastructure, HRC and Technology.

8.6.3 Finance

Figure 8.6 depicts that the availability of finance will positively impact human resources, technology, and infrastructure developments. As already discussed above, the study found that this issue can be addressed from two perspectives: establishing a local content fund and improving the macro-economic environment in the long term. Ghana must follow Norway, Brazil, and the UK in providing financial support to local firms. However, the proposed fund's success will depend on institutional independence and business support services offered to local firms to help restructure the 'one-man companies' in Ghana. This is extremely important to stop the current trend in Ghana where access to government contracts and funds is influenced by politicians, thereby instituting patronage. This stands to reason that the mere establishment of a credit fund without the political leadership instituting the legal framework and guidelines that stress institutional independence and oversight responsibility, the intended outcome of the fund will fail.

8.6.5 Infrastructure

The first step toward improving Ghana's industrial base is developing a baseline infrastructure aligned with the long-term development strategy. As discussed in section 8.5.2.2, this should start with assessing Ghana's

capability and undertaking a diagnostic analysis of the priority areas where infrastructure improvement would have the desired multiplier effect on the economy. The earlier discussion of the causal loop diagram for infrastructure showed that the availability of developed infrastructure would provide a conducive environment for developing human resources and receiving and developing technology. Here again, the framework emphasises the implementation role of political leadership and state institutions in creating the enabling environment. Therefore, political leadership must strengthen state institutions to prevent rent-seeking, corruption and awarding contracts to party followers, as discussed in section 8.5.2.2.

8.6.5 Human Resource Capacity

As discussed in section 8.5.2.3, human resource development requires long-term planning to analyse the industry's current and future workforce needs. Among other things (see section 8.5.2.3), there should be a fund dedicated to training and capacity building, facilitating collaboration between the oil companies and academia to align the academic curriculum with the oil industry's requirements. Secondly, improper policy coordination among different government agencies leads to overlapping policies and the wastage of scarce resources. Here again, it is emphasised that the success of the strategies outlined in section 8.5.2.3 will depend on the level of freedom of the implementation institutions. To complement the above, the political leadership will have to institute a bipartisan or parliamentary

process of appointing these institutions' heads and boards. This, in turn, will ensure the institutions are managed by competent personnel not subject to influence peddling. Therefore, it is underscored that the long-term planning, policymaking, and policy coordination among different government agencies and implementation in Ghana will not be possible without decisive leadership and independent institutions.

8.6.6 Technology

Domestic development of technology and the transfer of technology from foreign companies to local firms will require several factors to be successful. As already enumerated in the technology section, several strategies include improving compliance and enforcement of the existing laws on technology transfer and requiring oil companies to commit a percentage of their R&D to the local university of their choice. The above can complement tax incentives and a dedicated fund to resource existing R&D centres in Ghana. Effectively implementing the said strategies will require infrastructure to support domestic R&D, skilled and experienced local human resources to receive technology transfer, appreciate its nuances, and access to finance to support local firms. The actual execution of the strategies will require leadership that understands the strategic relevance of infrastructure and skilled human resources in laying a solid base for local technology development and the transfer of technology via IOCs. Without decisive leadership and independent regulatory institution to deploy the suggested

strategies in section 8.5.2.4, the mere passing of local content laws will not lead to technology transfer.

8.7 Chapter Summary

This chapter provided a detailed discussion of the research findings of the analysed qualitative and quantitative data in chapters 6 and 7. It was then discussed in line with the research's objectives by starting with the Ghanaian oil industry's institutional and regulatory framework. The literature review supported both strands of the findings that institutional and regulatory performance must be improved, and more importantly, the laws on local content must be based on realistic targets cognizant of the country's developmental state. The chapter also discussed the findings of the implementation challenges of local content (LC) in Ghana and the policy lessons from two perspectives: developed countries and developing countries. The policy lessons across the world provided valuable lessons on the four main challenges of LC in Ghana. The analytical models for local content development and its sub-models were discussed with their attendant strategies. The chapter ended with a structure for implementing the strategies for the LC challenges.

CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS

9.1 Introduction

This final chapter will review the essential findings and the approach adopted in arriving at the research aim and objectives. Also, the study's contribution to knowledge on engineering resource-based development via local content implementation is reflected. After that, the study's boundaries which constitute limitations, are discussed, and recommendations are suggested for future research. Finally, the chapter ends with the study's conclusion and recommendation to policymakers and practitioners.

9.2 Re-examining the Research Aim and Objectives

The research study aimed to develop an implementation strategy for addressing Local Content (LC) challenges in resource-rich countries using Ghanaian oil industry as a case study. The underlisted objectives of the study are briefly revisited to accentuate how they were accomplished through the various stages of the study.

- *Objective 1: Evaluate the existing institutional and regulatory framework of Ghana's oil industry.*

Under objective 1, the study used quantitative and qualitative methods to answer it. First, the objective was composed of two distinct parts: institutional structure and the industry's regulatory framework. The institutional structure focused on two key state institutions: Petroleum

Commission (PC) and Ghana National Petroleum Corporation (GNPC). To that end, research participants observed that the PC and GNPC are resourced. However, the policy implementation is weak due to inadequate infrastructure, lack of financial support to local firms, ineffective monitoring system leading to 'fronting', and political interference in state institutions' administrative and operational functions, among other factors.

Additionally, research participants emphasised that GNPC has become a 'cash cow' of the state, depriving the corporation of the needed funds. This was due to the lack of institutional independence and persistent interference in their operational functions. The second component under this objective comprised the LC policy framework and its regulations. Despite research participants expressing overwhelming support for the LCP in principle, participants doubted the policy's ability and regulation in its current form to achieve its intended purpose. Among other factors, it was attributed to the over-ambitious LC policy not being cognizant of the country's developmental state, comparative advantage areas and the institutional capacity prerequisite for the policy implementation.

- *Objective 2: Critically review the challenges of local content implementation in Ghana.*

In furtherance of the second objective, mixed methods were employed to identify, describe, and rank the challenges of LC implementation in Ghana.

Ghana's LC Policy framework identified three implementation challenges: Finance, Technology and Human Resource Capacity (HRC), which are likely to impede the country's policy implementation. A pilot study was subsequently conducted to confirm or otherwise of the challenges. The purpose was to narrow the study to the fundamentals of the challenges: Infrastructure, Technology, Finance and HRC (see Appendix 1), which subsequently became the central themes of the study. Research participants considered Finance to be the vital impeding factor in the LC implementation in Ghana. Participants observed that the government's lack of a dedicated financial support scheme, high-interest rates, and what participants termed 'one-man company', among other factors, affect financing in the oil industry.

The second significant challenge is the infrastructure needed to create the enabling business environment to support industry linkages, creating and expanding industries to increase work volume done in the country. A respondent summarised the essence of infrastructure "…you cannot do anything about tech transfer or skills developing if there is not a base to support or facilitate it…" [sic] **FGP/MA/04**. Participants considered the lack of human resource capacity the third most important factor impeding policy implementation. Two critical issues affecting human resource development in Ghana: sustainable funding, and disjointed policy strategy between academia, state institutions and the oil companies. The last

challenge ranked was technology which deals with the ability to develop and absorb technology.

- *Objective 3: Analyse good practices in local content strategies around the world.*

Literature was used to review policy lessons on local content implementation from developed and developing countries (see Chapter 3). LC implementation from both perspectives follows the worldwide trend: employment, procurement, training and technology transfer requirements and financial support to local firms. Embedded in the LC policy is the principle of 'full and fair opportunity' and reasonable access to locals' tendering opportunities. Lessons from developed countries showed active state involvement and regulations and utilising existing industrial and manufacturing capacity, i.e., Norway. In addition to the LC requirement on technology transfer, Norway, the UK, Canada, and Brazil have dedicated funding and tax incentives for technology development and absorption. On the other hand, developing countries, especially Angola and Nigeria, rely more on regulations without a sufficient industrial base for manufacturing and challenges such as infrastructure and inadequate skills.

Subsequently, a questionnaire was used to assess research participants' opinions on some of the factors emerging from the LC policy lessons. For developed countries, industrial capacity was the most critical factor for the

success of LC, followed by infrastructure development, finance, human resource and technology. On the other hand, research participants considered finance, inadequate infrastructure, corruption, human resource capacity and technology to be the leading factors in policy implementation's unsuccessfulness in developing countries.

- *Objective 4: Analyse the interaction among the local content implementation challenges using casual loop diagrams.*

In fulfilling objective 4, a system thinking, and its causal loop diagram (CLD) tool were employed to analyse the interaction among the LC challenges in Ghana. The process commenced using the identified challenges to develop an initial model of Local Content Development (LCD) (see Chapter 5). The construction of the models' dynamic hypothesis was derived from the literature review and oil industry experts' mental modelling. The LCD model was broken down into four sub-models with its attendant analyses: (a) Finance, (b) Technology, (c) Infrastructure and (d) Human Resource Capacity sub-models. After the initial model construction, model validation was initiated using Energy ministry experts, the regulators, academics, and oil companies (see Chapter 6) in Ghana. The validated sub-models were combined to form a generic CLD for LCD with its attendant strategies (see Chapter 8).

Research participants observed that causal relationships exist in the models with different impact levels among the variables. The subsequent strategies devised for addressing the central themes of the study were predicated on the validated models. Broadly, participants recommended developing a long-term national plan that delineates the Ghanaian oil industry's role in national development vis-à-vis the industry's threats, risks, and opportunities. On finance, for example, participants argued that establishing a local content fund to support local firms should come with clear guidelines that curtail political interference, as has been the case in Ghana. The issue of political interference in state companies and institutions' administrative and operational functions emerged in the other themes of infrastructure, human resource development and technology.

Achieving the study's aim: The objectives summarised above are interlinked in arriving at the study's aim. Accordingly, the implementation strategy for addressing the challenges indicated in Chapter 8 (section 8.5) is meant to create the conditions for local businesses' growth in the Ghanaian oil industry. The implementation strategy is anchored on political leadership and institutional capacity, which the study argued is critical in providing leadership for policy formulation and implementation. The study underscored political leadership's importance in reaching consensus with opposition parties on a long-term national development plan that transcends the governing party. This is especially true in the case of Ghana, where power changes every 4-8 years. Additionally, political leadership is

responsible for devising the legal framework that enhances the critical state institutions' independence and capacity to limit political interference in their activities. The second phase of the frame is policy coordination and harmonisation among the industry players.

The industry players' concerns must be factored in policy formulation and implementation via creating a special forum for regular consultation. The study emphasised that the oil companies have a role in supporting the communities they operate, creating a conducive environment for their operations. The other phases comprised the strategies for Infrastructure, Technology, Finance and HRC developments, which its effectiveness and sustainability will depend on political leadership and institutional independence.

9.3 Contribution to Knowledge and Practice

The Ghanaian oil industry contributes significantly to the socio-economic development of the country and the host communities. However, the broader spill over effects to the domestic suppliers are hampered by several factors critical, among them are Infrastructure, Human Resource Capacity, Finance and Technology. The preceding challenges cannot merely be remedied via legislating the Local Content (LC) policy. Accordingly, the study broadly tried to change the narrative on LC implementation in resource-rich countries, which primarily focuses on employment targets, legislation, and regulations enforcement to address the challenges.

Addressing the challenges is the primary responsibility of the host government, and in that light, the study stresses that whatever IOCs do regarding LC legislation complements the government's overall programmes and policies but not the versa.

Specifically, this research study is the first to employ a system thinking tool of causal loop diagram (CLD) to analyse Local Content (LC) implementation challenges. The adoption of the method aided in holistically simplifying the potential factors that influence LC challenges and, in that process, enhanced insight and understanding of the root causes of the phenomenon under investigation. The underlining philosophy of the study was to consider the challenges as a 'system' with multiple interdependent components, multiple stakeholders and feedback processes all interacting in a non-linear relationship in the oil industry. The resultant effect is a new perspective on addressing LC challenges from all-inclusive and multiple perspectives. This, therefore, provides a systematic and comprehensive procedure for studying other areas of the oil industry, such as health and safety.

Third, the application of system thinking resulted in the developing a causal loop diagram (CLD) for Local Content Development. This comes with sub-models on Infrastructure, Technology, Finance and Human Resource Capacity. These models provided a detailed analysis of the interplay between essential variables for LCD in the industry. It further showed that

the concept of LCD should be seen from a holistic perspective to ensure the maximum impact of the policy. In other words, the models depicted the implementation of the LC policy encompasses a wide range of issues that policymakers must understand before implementation. Attendant to these models is the strategy for addressing the individual and the combined models.

Finally, this research study developed an implementation strategy anchored on political leadership and institutional independence. The role of infrastructure development, political leadership, and institutional independence in the implementation of local content has received little attention. Accordingly, the developed implementation framework stresses the importance of the above factors in actualising the LC challenges' identified strategies. This framework underscored the central role political leadership plays in setting the country's agenda and direction vis-à-vis economic development. Without decisive leadership supported by strong and independent state institutions, the policy interventions identified via the causal loop diagram will not work.

9.4 Limitations and Future Research

The concept of Local Content Policy is broad and not limited to the O&G sector. Caution must be taken in generalising the findings of this study to other sectors and geographic areas without considering the distinctive and peculiar nature of the sector in question. This is because the participants

selected for the study were based on their understanding of Local Content implementation and its challenges within the Ghanaian oil industry. More importantly, the challenges impeding Local Content implementation in Ghana are many and not just limited to the study's central themes of infrastructure, technology, finance, and human resource capacity. Two reasons characterised this decision:

- *the need to focus on the most pressing challenges that could help diversify the economy.*
- *the possibility of a relationship in point 1 could help provide a deeper analysis using CLD.*

Subsequent modelling of the LC challenge into causal loop diagrams was predicated on extracted variables from industry experts and literature that can change in other circumstances. In deciding which variables will constitute the system boundary for the model, the study considered the need for a small model size that will be manageable for analysis and policy formulation. As a result, the study ignored any variable that would not significantly influence the subject under study in Ghana. The above presupposes that the variables could have been more or less depending on the scope of a study, sectors, and study areas.

Further studies can be conducted into the developed causal loop diagram for Local Content Development and its sub-models of Finance, Infrastructure, Human Resource Capacity and Technology using

Quantitative System Dynamics (QSD). The QSD will be useful for quantitative computer simulation of the variables' behaviour over a certain period, its impact, and its required investment. The CLD models can be used to conduct a sensitivity analysis to compare the LC models' results under varying situations. For instance, simulation can be conducted over 30 years with random inputs to see the varying changes under a period of uncertainty, i.e., energy transition. The above can be extended to the mining sector. One issue that kept coming up during the study was political interference in parastatal companies' administrative and operational functions. This study recommends further research into the impact analysis of rent-seeking and political interference in Africa's parastatal companies' functions. Also, further research will be needed in developing a robust metric system for local content.

7.5 Research Conclusion and Recommendation

This study has attempted to broaden studies on the concept of Local Content implementation by focusing on the LCP challenges in Ghana. It thus supports the view that addressing infrastructure, human resource capacity, technology, and finance are critical for widening the local industry base in resource-rich countries (Ayelazuno and Graham, 2022; Abudu and Sai, 2020; IMANI, 2019; IGF, 2018, Marcel et al., 2016; Ovadia, 2016). To that end, system thinking was adopted to visualise the variables underpinning LC challenges and their relationships in the Ghanaian oil industry. This, in turn, provided a holistic approach to systematically

analysing the causal loop diagrams' variables and their effects on policy. The CLD demonstrated that strategic investment in infrastructure development could propel economic growth, and on the other hand, lack thereof could increase the negative secondary impact on host communities. It also demonstrated that causal relationships exist between the study's central themes, which helped analyse suitable policy options.

The study found that the Ghanaian LCP is overly ambitious and not cognisant of the prerequisite for effective implementation, which corroborates the study by ACEP (2017) and Acheampong et al. (2015). These prerequisites comprise strong and independent state institutions, adequate infrastructure, and credit facilities for local companies and suppliers. Furthermore, the study uncovered two critical issues affecting local capacity building: policy coordination and harmonisation among stakeholders and sustainable funding. These issues have been compounded by pervasive political interference in the administrative and operational functions of state oil and gas institutions.

Long-and short-term strategies are recommended in addressing the challenges of LC implementation in Ghana. The proposed strategies are based on the fact that the resource-rich countries' governments have the ultimate responsibility to tackle the issue, not foreign companies. The LC policy and regulations must be seen as a sub-strategy to complement the overall government strategy.

- **Institutional Independence and Political leadership**

  The study emphasised the need for strengthening the regulatory institutions and state-owned companies that ensure independence over their operations. One way of dealing with this is bypassing the appropriate legalisations that guarantee and depoliticise the institutions. That means the CEOs and the board of directors of parastatal institutions should have the autonomy needed to run these companies without undue interference from politicians. Also, the appointment of CEOs should be depoliticised and done on merit. To this end, state institutions that monitor and enforce LC regulations and participate in commercial E&P must be strengthened and resourced. Addressing the state and institutional capacity deficits in the extractive industry to act independently of government interference and rent-seekers is the surest way to sustainable development.

- **National Development Plan**

  The national development plan should contain the Finance, Infrastructure, HRC and Technology strategies outlined in Chapter 8, section 8.5. The study highlighted the need to develop a long-term development plan for Ghana that envisages the oil industry's role. Based on this, a plan can be developed to leverage the extractive industry to spur economic development. The plan should envision the opportunities, potential impediments, and feasible policies based on

the country's current developmental state. Also, emphasis must be on skills building that is transferrable to other sectors of the economy. Moreover, this can be achievable with a decisive leadership that embraces an inclusive policy-making process whereby all interested stakeholders, i.e., opposition parties' opinions, are factored into the plan. This is particularly important in the case of Ghana, where political power changes frequently.

- **Policy Coordination and Harmonisation**

Effective implementation of the LC policy in Ghana will depend on concerted policy engagement and cooperation between the regulator, the oil companies and academia. Delineating the above stakeholders' roles and creating a shared platform for policy discussion and coordination is essential for implementing the LC policy. The academia (and research centres) must lead in research and development, train and develop local capacity and capability, and develop a curriculum pertinent to the industry's requirements. The regulator (and the government), as the lead implementor of the LC policy, must not only enforce the policy but also facilitate and coordinate policy discussion regularly between all the key stakeholders. Similarly, the oil companies have a role to play in complying with local content regulations' requirements. This gives the oil companies the 'social license' to operate in the host communities, thereby ensuring that part of the host communities' resources goes to them for social and economic benefits.

The study emphasised that the oil industry's activities frequently lead to negative secondary impacts by enticing migration with pressure on existing infrastructure and agricultural lands. The study, therefore, argued that the oil companies could dedicate part of their resources to the issue of sustainable funding for local capacity building. However, it must be stated that these commitments are to support the state's primary responsibility, not vice versa.

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APPENDICES

Appendix 1: Pilot Study Data Collection and Analysis

1. 1 One-on-one interview

One-on-one interviews were conducted among Ghanaian oil industry's stakeholders (regulators, policymakers, civil society organisations) to ascertain the challenges (Finance, Technology, Human Resource Capacity) identified in the Ghanaian local content policy framework. Additionally, the essence of this pilot study using interviews was to narrow the research on the fundamentals of the challenges and find any key challenge not captured in the policy framework. The interviews allowed for in-depth interviews, thereby producing richer data and relevant information to the study (Trumbull, 2005). Before the interview, the participants were briefed in a letter about the study's aims and why they needed to be involved. As indicated in the table below, six participants were selected using purposive sampling.

Table: Summary of interviewees' Data

Interviews	**Interviewees code name**	**Age range**	**Position in organisation**
01	LR/LR/01	20-30	Lead Researcher
02	PA/LLO/02	30-40	Policy Analyst
03	TO/AD/03	30-40	Technical Officer
04	LCO/LE/04	20-30	Local Content Officer
05	LCO1/TO/05	30-40	Local Content Coordinator
06	LCD/LCC/06	40-50	Director

Jewell and Hardie (2009: 62) defined purposive sampling as selecting respondents suitable for answering your research based on the researcher's judgement. The study used stakeholder sampling, which Palys (2008, p.697) argued the method helps in "identifying major stakeholders who are in designing, giving, receiving or administering the programme or service being evaluated, and who might otherwise be affected by it". In other words, the study selected participants who possess the requisite traits, information and understanding of LCP implementation and its challenges.

The interviews lasted, on average, 45 minutes and principally focused on the following:

- Do you consider finance a challenge in LCP implementation in Ghana as identified in the government policy framework? Why?
- Do you consider technology a challenge in LCP implementation in Ghana? Why?
- Do you consider human resource capacity a challenge in LCP implementation in Ghana? Why?
- Any other challenge you would like to discuss not captured in the above? And why?

1.2 Analysis of the Pilot Study Data

The study used Creswell's (2009) six-step process for analysing the data, as elaborated in Chapter 3. This involves transcribing the data, reflecting on data, coding, identifying and describing the themes, representing the

data within the report and interpreting data. The analyses from the study are discussed next.

1.2.1 Finance

Participants were asked whether local companies' lack of access to capital by local companies is a significant challenge to the policy implementation. All the participants agreed that capital is the major problem facing local companies and suppliers' ability to participate in the value chain of the oil industry. The lack of capital impedes local companies' ability to participate in joint ventures (as required by local content law), requiring firms to pay their share of the operating cost. Local firms' inability to raise capital defeats the policy objectives to promote local participation and capacity building. Some of the participants' responses are quoted below.

"For the now, most of the local and foreign banks [in Ghana] lack the financial capacity to finance O&G projects." ***TO/AD/03***

"It is a huge problem the government and the jubilee partners are working on resolving it. For instance, the main operator of Ghana's oil field (Jubilee), Tullow, has decided to channel some amount of money monthly into certain local banks to help recapitalise them." ***LCO1/TO/05***

"Yes. Even the state-owned oil company, GNPC, lacks the capacity to finance projects on its own, which undermines the government policy to require Joint Venture (JV) with Ghanaian companies before International Oil Companies (IOCs) could commence operations". ***LCD/LCC/06***

These responses indicate the difficulties both the national oil company and local firms go through. For some participants, the issue of capital rests squarely on the capacity of the local financial institutions. Participants' responses are quoted below.

"…they are unable to tender for projects in the industry. More worrying is the limited capacity of both financial institutions and indigenous banks to pre-finance big projects in the industry…" [sic] ***LCO/LE/04***

"First of all, local companies lack the capacity to raise capital from financial institutions in Ghana – no credible collateral to support their applications." ***PA/LLO/02***

In a nutshell, the financing challenges facing indigenous firms in the oil industry comprise collateral issues, limited capacity of domestic financial institutions, and the lack of a dedicated funding scheme as practised in other resource-rich countries.

1.2.2 Technology

Similarly, participants were asked to confirm whether the lack of technology challenges LCP implementation in Ghana. In answering, a participant said, "*LCP generally facilitates technology and skills transfer via trading, research and development*", but there is no deliberate policy towards that effect in Ghana. Participants contended that LCP had not reached that level of success because technology transfer and capacity building are very low, and there has not been enough support to local companies to partake in the upstream sector. Participants had the following to say:

The oil industry especially the upstream sector involves the use of expensive technology for its E&P activities that are way beyond any Ghanaian company including GNPC". ***LR/LR/01***

"We, the regulator [Petroleum Commission], as part of our mission to bridge that gap strictly enforces the LC requirement that stipulates foreign companies should enter into joint venture with local companies. Through this, we hope that there will be knowledge and technology transfer. So far, it is going as planned." [sic] ***LCO/LE/04***

"The country has made huge progress in acquiring technology from the IOCs through JV. It is through this that had enabled GNPC to independently commence E&P operations in the Volta basin (onshore). However, technology still remains a major issue facing poorly resourced local companies." [sic] ***LCO1/TO/05***

For some participants, though the issue of technology is essential, it is in no way comparable to the challenge of finance. These participants argued that technology could be bought if local companies were financially resourced.

"The issue of technology boils down to the ability of local companies to raise resources to purchase technology or enter into joint ventures. "Local companies are poorly resourced and as a result of that lacks the financial muscle to enter JV for purposes of technology transfer. If these companies are resourced financially, the issue of technology could easily be solved." [sic] ***TO/AD/03***

"Yes, technology is an issue but not to the level of finance". Through the joint venture with the country's Jubilee partners (Tullow, Kosmos etc.), GNPC has

benefited greatly in the exploration and production of oil in the country oil fields. "Going forward, GNPC and other indigenous companies must be resourced financially to be able to acquire these technologies in the open market or outsourced some of the E&P operations to international service companies". ***PA/LLO/02***

Participants conceded that country had made progress in acquiring technology from the IOCs through JV. "*It is through this that had enabled GNPC to independently commence E&P operations in the Volta basin (onshore). However, technology remains a major issue facing poorly resourced local companies"* ***LCD/LCC/06.***

1.2.3 Human Resource Capacity

A participant summed the issue of human resource capacity in the Ghanaian oil industry as "*a greater share of technical services required by the industry is still imported. Moreover, a great number of very important roles are still filled by expatriates with indigenous workforce representing mainly front line and middle level staff. The very essence of the LC regulations is not being realized but the fact that it is failing is not being recognized and addressed*" [sic] ***LCO1/TO/05.*** This stands to reason that the challenge identified in the Ghanaian policy framework has not been addressed sufficiently. Apart from the local content laws mandating foreign firms to hire locals, there has not been a broad strategy policy to develop, equip and align local universities and research centres with the oil industry's needs and requirements.

However, most participants argued that various government agencies had taken steps to upgrade and train locals abroad in different oil and gas courses. The challenge here is that training is not coordinated to determine the human resource gap needed to be filled, and the programmes are often management courses. The participants had the following to say:

"Human resource capacity was a major issue at the beginning of exploration and production five years ago. Much progress has been made by sponsoring a lot of Ghanaians to pursue various programmes related to the oil industry both locally and abroad". ***PA/LLO/02***

"GNPC also has upgraded the capacity of its employees. Local institutions are also being upgraded to offer some of these courses locally. The oil companies also assist in providing scholarship to pursue various courses outside Ghana. "However, most of these programmes have been in management related with little emphasis on the engineering and technical courses". ***LCD/LCC/06***

"A lot has been done in this regard by training the locals in the oil industry. The industry demands people who are highly skilled, and with a lot of experience. Most of the newly trained students lack this experience and are often with backgrounds in oil and gas management than courses like subsea and process engineering Etc. ***LCO/LE/04***

The focus should shift to more technical courses than the management ones." ***TO/AD/03***

1.2.4 Other challenges

1.2.4.1 Infrastructure

The other major challenge participants raised is the country's infrastructure deficit which curtails the development of the enabling environment for local companies to thrive. A participant argued that "*industrial infrastructural base is required to achieve the target* [the LC intended purpose of stimulating resourced based development] *is absent*" ***LR/LR/01***. For local manufacturing firms and suppliers to supply input to the oil industry will require the presence of business infrastructure, IT infrastructure, et cetera to create conditions for a sustainable and profitable business. Without this, firms will resort to importation, thereby defeating the essence of the LC policy. Other participants' responses are quoted below.

"It is the most serious issue affecting the country in its quest to maximise benefits from the resources. "This is, however, outside the regulator's scope but in conjunction with central government, the regulator outlines key infrastructure areas that must be improved". ***LR/LR/01***

"Not just fixing erratic power supply, roads etc. but also providing security infrastructure to prevent infrastructure failure to important installations [oil rig Etc.]. Environmental safety and security infrastructure should form part of the broader infrastructure. This is essential to ensure smooth operation of E&P activities both onshore and offshore". ***LCD/LCC/06***

"It is the important challenge among all the challenges. It is the fulcrum around which all the others revolve". ***LCO/LE/04***

It is the bedrock of any country that has been able to make progress economically". Norway's success in the oil sector is largely attributed to its strong infrastructure base." ***TO/AD/03***

…the only challenge when solved could propel the other sectors of the economy to grow, and prevent dependence on the oil enclave" ***LCO1/TO/05***

1.2.4.2 Fronting

A participant claimed that local companies are 'fronting' for foreign companies without participating in joint venture agreements stipulated in the LCP laws. To meet LCP requirements, local firms connived with foreign firms to appear as partners in joint ventures but on the ground, they do not participate in the actual operations. It was argued that this defeats the purpose of the LCP of transferring technology and know-how to locals. The causes of the fronting were attributed to a lack of enforcement and monitoring on the part of the regulator.

1.2.4.3 Environmental safety and security

Another participant raised the safety and security of the oil and gas operations in the producing regions. A concern was expressed that a cue has not been taken from Ghana's neighbours, especially Nigeria, where the resources have led to insecurity and contamination of river bodies.

1.2.5 Findings

All the research participants considered Infrastructure, Finance, Technology, and Human Resource Capacity to be the most critical of all the challenges facing the LCP implementation. Apart from the above, other themes raised during the interviews are Environmental safety and security and Fronting. Consequently, the pilot study narrowed the central themes of the main study to the first four challenges as the participants considered them the most important for propelling diversification of the economy and stimulating national development.

Appendix 2: Summary of key LC provisions in the L.I 2204

L.1 2204 provision	Description
Regulation 4(6)	A non-indigenous Ghanaian company providing goods or services must enter into JV agreement with foreign companies must have an equity participation of at least ten per cent.
Regulation 11	Preference to Ghanaian companies in the procurement of goods and services.
Regulation 12	10% price advantage to be given to indigenous Ghanaian companies.
Regulation 13	Single source justification subject to PC approval for the procurement of goods and services above $100,000.
Regulation 14	Submission of quarterly forecasts to the Petroleum Commission.
Regulation 15	Submission of specified documents to the Petroleum Commission at various stages of the bidding process.

Regulation 16	Review of selected contracts to ensure effective monitoring.
Regulations 17 (1) b&c	Employment and training sub-plan to be submitted by companies to the Petroleum Commission that details out timeframe within which Ghanaians can be employed at each phase of the petroleum activity, and progress made for the accelerated training of Ghanaians.
Regulations 18	Companies to submit a succession plan for any employment position that is occupied by a non-Ghanaian.

Appendix 3: GNPC current investments

Unincorporated investments	Incorporated Investments		
	Subsidiaries	Strategic investments	Other investments
Petroleum Agreements (PAs)	GNPC Exploration and Production Company (Explorco)	GNPC-TECHNIP	Airtel Ghana Limited
Data Acquisition Agreements	GNPC Oil and Gas Learning Foundation	Saltpond Offshore Production Company Limited (SOPCL)	Valley Farms
	GNPC Trading Company (Tradco)- Work in progress to operationalised it	GNPC-AGM Operating company (OPCO)	Mole Motel

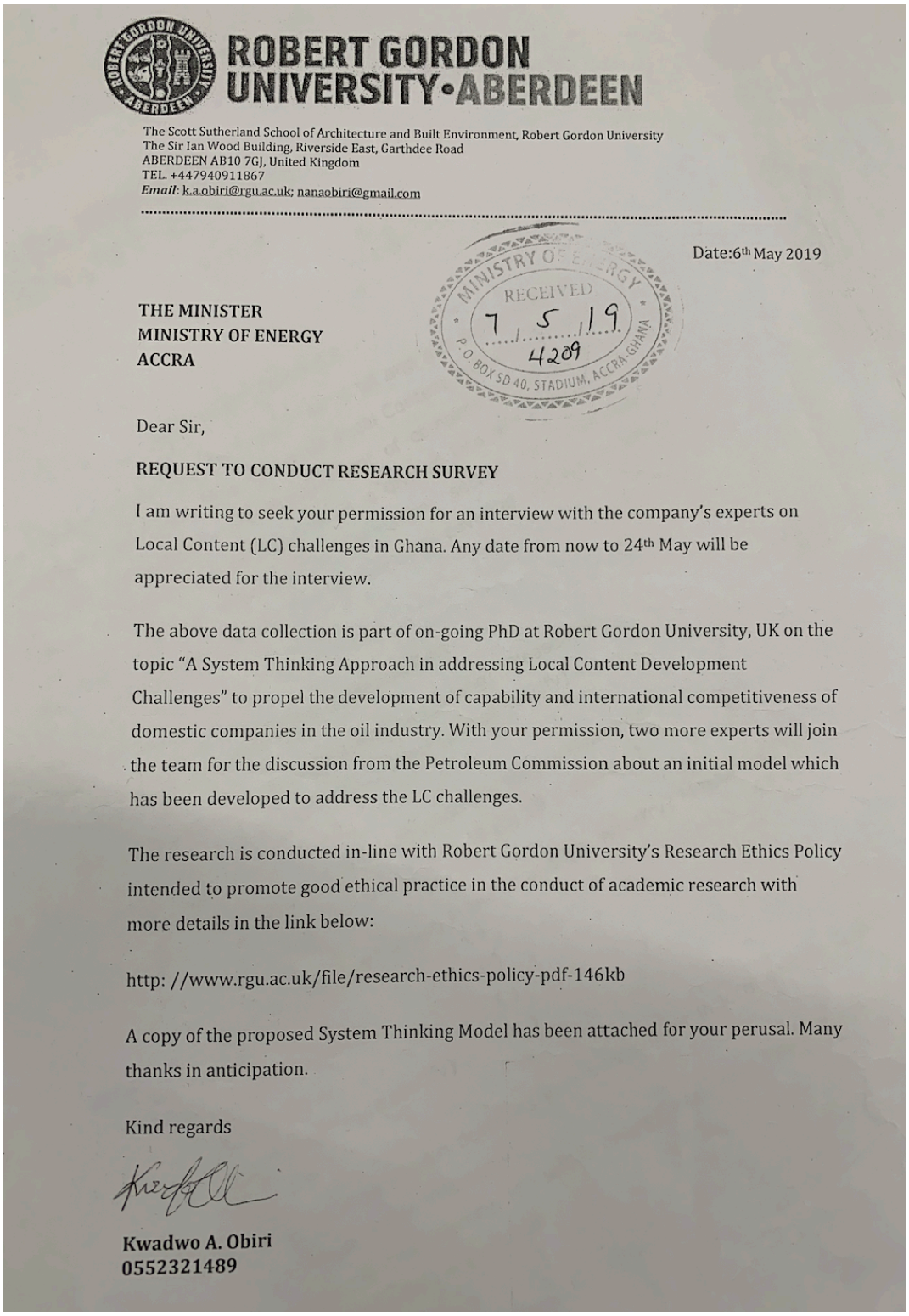
	Ghana National Gas Company (GNGC)		Prestea Sankofa Gold

Appendix 4: Variables references

Challenge	Reference
Infrastructure (institutional and physical infrastructure relationship) variables	Heum et al., 2011; Sigam and Garcia, 2012; Kazzazi and Nouri, 2012; Klueh et al., 2007; INTSOK, 2013; Acheampong et al., 2015; Tordo, 2011; Amoako-Tuffour et al., 2015; Robinson, 2006; Jensen and Wantchekan, 2004; Collier and Hoffler, 2005; Hodler, 2006; Owusu, 2014; UNECA, 2011.
Human Resource Capacity variables	Sigam and Garcia, 2012; Cosar, 2011; Monday, 2015; Yamoah, 2014; Groot and Molen (2000); Peek and Gantes, 2008; Darkwah, 2013; Omenikolo and Amadi (2010), Aneke (2002), Ariweriokuma (2008), Ibilola (2012), Owusu, 2014; Amoako-Tuffour et al., 2015; Onuoha et al. 2015; Ramdoo 2016; Tordo et al., 2011; Noe et al., 2003; Youndt et al., 2004; Marimuthu et al., 2009.
Finance variables	Heum et al. 2003; Omenikolo and Amadi (2010); Ovadia (2014); and Ramdoo 2016; Amoako-Tuffour et al., (2015); ACEP, 2017;

Technology variables	Saggi, 2002; Ghanadi, 2003; Asghari and Ali Rakhshanikia 2013; Heum et al., 2003; Nwosuet., 2006; Vaaland et al., 2012, Amoako-Tuffour et al., 2015, Balouga, 2012, Omenikolo and Amadi, 2010; Cusumano and Elenkov; 1994; Owusu, 2014; Mohamed et al., 2010; Cusumano and Elenkov, 1994; Tordo et al., 2011; Kumar et al., 1999, Escribano et al., 2009.

Appendix 5: Interview Letter



ROBERT GORDON UNIVERSITY·ABERDEEN

The Scott Sutherland School of Architecture and Built Environment, Robert Gordon University
The Sir Ian Wood Building, Riverside East, Garthdee Road
ABERDEEN AB10 7GJ, United Kingdom
TEL. +447940911867
Email: k.a.obiri@rgu.ac.uk; nanaobiri@gmail.com

Date:6th May 2019

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P.O BOX SD 40, STADIUM, ACCRA-GHANA

THE MINISTER
MINISTRY OF ENERGY
ACCRA

Dear Sir,

REQUEST TO CONDUCT RESEARCH SURVEY

I am writing to seek your permission for an interview with the company's experts on Local Content (LC) challenges in Ghana. Any date from now to 24th May will be appreciated for the interview.

The above data collection is part of on-going PhD at Robert Gordon University, UK on the topic "A System Thinking Approach in addressing Local Content Development Challenges" to propel the development of capability and international competitiveness of domestic companies in the oil industry. With your permission, two more experts will join the team for the discussion from the Petroleum Commission about an initial model which has been developed to address the LC challenges.

The research is conducted in-line with Robert Gordon University's Research Ethics Policy intended to promote good ethical practice in the conduct of academic research with more details in the link below:

http: //www.rgu.ac.uk/file/research-ethics-policy-pdf-146kb

A copy of the proposed System Thinking Model has been attached for your perusal. Many thanks in anticipation.

Kind regards

Kwadwo A. Obiri
0552321489

Appendix 6: Interview Schedule

- A brief introduction to the research topic and its aims by the researcher.
- Participants' specific information, such as the level of training and area of expertise will be asked.

Stage one; validation of the models

- Validation of the model and sub-models; confirmation of the causal links in the diagrams or otherwise?
- Can you suggest any missing variable, or the models are an apt representation of the challenges?

Stage two; policies are recommended based on stage 1.

- How can this issue of human resource capacity be addressed in your opinion?
- In your opinion, what ways can the above issue of finance be addressed?
- How can the above issue of infrastructure be addressed in your opinion?
- How can this issue of technology transfer be addressed in your opinion?
- Which of the above challenges is the most urgent, and why?
- Any challenges confronting the successful running of the Petroleum Commission (industry regulator)?

- Any challenges confronting the successful running of GNPC (National oil company)?
- Any other issue not discussed you would like to put across?

Appendix 7: RGU Research ethics and guidelines

Ethical conduct depends on:

1. Consideration of the impact of the research, including
- The potential implications of research for subjects and participants
- The potential implications of research for non-participants, and
- The uses to which research can be put

2. Guidance covering the treatment of participants, including
- informed consent
- confidentiality and anonymity (see section 3.3 below), and
- special consideration of vulnerable respondents

3. Academic considerations. Researchers are enjoined to
- Maintain research of high quality
- Display competence
- Act responsibly towards others in their field, and
- Advance their discipline

4. Guidance concerning research relationships. These include
- The responsibilities of the researcher to the body commissioning the research, - Responsibilities to the university,
- Commitments to fellow researchers, and
- Integrity in dealing with subjects, participants and stakeholders.

Appendix 8: Questionnaire

This questionnaire intends to elicit opinions of oil and gas policymakers and practitioners with respect to Ghanaian Local Content Policy (LCP) and the potential challenges to the development of competitive indigenous companies' growth in the oil industry. It is divided into three sections: section one covering respondent's information; section two covering Ghanaian local content policy and section three covering LCP across the world.

Section One – Respondent's information

1. Which of the following gender do you belong? (Please tick).
   (a) Male ( ) (b) Female ( ) (c) Other (please specify)…

2. Which of the following age ranges do you fall in? (Please tick).
   (a) 20- 29 ( ) (b) 30-39 ( ) (c) 40-49 (d) 50 – above ( )

3. What is your level of training in the oil and gas industry? Please tick.

(a)PhD ( )
(b) Msc/MBA/MEng ( )
(c) Bsc/BEng ( )
(d) Other (Please specify) … ( )

4. Which organisation describes your involvement in local content policy? (Please select all that apply).

(a) Government agency- Ministry of Energy, Petroleum Commission etc. ( )
(b) Civil society organisation ( )
(c) Local company ( )
(d) International Oil Company (IOCs) ( )

(e) Other……

5. How long have you worked in the above post? (Please tick).

(a) Below 4 years ( ) (b) 5-9 years ( ) (c) 10-14 years ( ) (d) 15- above years ( )

Section two – Ghanaian Local Content Policy

6. Which of the following would you use to describe the intended purpose of LCP in the upstream oil and gas sector? (Please select all that apply).

(a) Local participation ( )
(b) Increase local goods and services to the oil industry ( )
(c)Encourage technology transfer and capacity building ( )
(d) Job creation and increased employment ( )
(e) Other (Please specify) ….

7. How relevant LCP is in the oil and gas industry? (Please tick).

(a) Very relevant ( )
(b) Relevant ( )
(c) Not relevant ( )
(d) Other

8. What is/are the reason(s) for your answer?

9. How adequate is the Local content regulation in the oil industry?

(a) Highly adequate ( )
(b) Adequate ( )
(c) Not adequate ( )
(d) Other (Please specify)

10. What is(are) the reason(s) for your answer?

11. Would you say LCP in the oil and gas industry has been successful in Ghana since 2013?
(a) Yes ( ) (b) No ( )

12. What is(are) the reason(s) for your answer?

13. To what extent do you agree that Ghana is on course, to achieve the minimum target of 90 per cent LC level in the oil industry? (Please tick)
(a)Strongly disagree ( )
(b) Disagree ( )
(c) Neutral ( )
(d) Agree ( )
(e) Strongly agree ( )

14. What is(are) the reason(s) for your answer?

15. Indicate whether the implementation institution (Petroleum Commission) is adequately resourced to monitor and implement the LCP? (Please tick)
(a)Strongly agree ( )
(b) Agree ( )
(c) Neutral ( )
(d) Disagree ( )
(e) Strongly disagree ( )

16. In your opinion how effective has the LC policy implementation been.

(a) Very strong ( )
(b) Strong ( )
(c) Good ( )
(d) Average ( )
(e) None ( )

17. What is/are the reason(s) for your answer?

18. Please rank the following challenges to LCP implementation.

	Very low				Very High
Human resource capacity	1	2	3	4	5
Inadequate infrastructure	1	2	3	4	5
Technology	1	2	3	4	5
Finance	1	2	3	4	5

Other (Please specify) …

19. Any other critical factors not mentioned in the above answers? (Please state)

20. How relevant are the following critical success factors for local content development? (Please rank them).

	Very low				Very High
Independent State-owned oil company	1	2	3	4	5
Human capacity and education	1	2	3	4	5
Infrastructure	1	2	3	4	5
Technology	1	2	3	4	5
Good governance	1	2	3	4	5
Finance	1	2	3	4	5

Other (Please specify) ….

21. Any other critical factors not mentioned in the above answers? (Please state).

22. Please indicate whether GNPC is adequately resourced to increase local content and local participation in the oil industry. (Please tick)

(a)Very low ( )
(b) Low ( )
(c) Moderate ( )
(d) High ( )
(e) Very high ( )

23. What is(are) the reason(s) for your answer?

24. How do you assess the capabilities and international competitiveness of domestic firms in the oil industry?

(a)Very low ( )
(b) Low ( )
(c) Moderate ( )
(d) High ( )
(e) Very high ( )

25. What is(are) the reason(s) for your answer?

Section Three – Policy lessons across the world

26. Which of the following factors have made other countries successful in LCP implementation? (Please select all that apply).

(a) Existing industrial Capacity ( )
(b) Technology ( )
(c) Finance ( )
(d) Provision of Infrastructure ( )
(e)Human capacity and education ( )
(f) Other…

27. Which of the following factors have made developing countries less successful in LCP implementation? (Please select all that apply).
(a) Inadequate human capacity ( )
(b) Over-ambitious local content policy ( )
(c) Lack of good governance ( )
(d) Corruption ( )
(e) Inadequate infrastructure ( )
(f) Inadequate financial support to local firms ( )
(g) Technological challenge ( )
(h)Other…

*****End*****